

# 2019 GUIDE TO CROP PROTECTION

For the chemical management of weeds, plant diseases and insects

Introduction

Weed Control

Foliar Fungicides

Seed Treatments

Insect Control



This publication is only a guide intended for the use of Saskatchewan growers. Always refer to the product label for application details and precautions. If information in this publication conflicts with the label, use label directions.

Saskatchewan 

## Saskatchewan Ministry of Agriculture

### Regional Offices

Saskatchewan Agriculture's team of Regional Service Representatives and Crops, Agricultural Programs, Agri-Environmental, Range Management, and Livestock and Feed Specialists offer personalized advice and support to producers and agribusinesses. For the latest information on these topics, contact your nearest Regional Office at:

<b>Kindersley</b> <b>306-463-5513</b>	<b>Prince Albert</b> <b>306-953-2363</b>	<b>Weyburn</b> <b>306-848-2857</b>
<b>Moose Jaw</b> <b>1-866-457-2377</b>	<b>Swift Current</b> <b>306-778-8285</b>	<b>Yorkton</b> <b>306-786-1531</b>
<b>North Battleford</b> <b>306-446-7962</b>	<b>Tisdale</b> <b>306-878-8843</b>	
<b>Outlook</b> <b>306-867-5575</b>	<b>Watrous</b> <b>306-946-3220</b>	

### Agriculture Knowledge Centre **1-866-457-2377**

The Agriculture Knowledge Centre provides up-to-date agriculture information and assistance to farmers, ranchers and the agriculture industry on topics such as crop and livestock production; new research and technology; government programs and services; farm business management; forage production and public trust. The Agriculture Knowledge Centre's Resource Agents and Specialists are pathfinders committed to providing expert technical information and excellence in client service.

### Crop Protection Laboratory **306-787-8130**

The Crop Protection Laboratory offers a range of diagnostic services to assist in the identification of problems associated with all agricultural crops and forage. The major areas of expertise include weed, insect and plant disease identification and herbicide resistance screening.

A Crop Protection Laboratory submission form should be completed fully and included with each sample to provide important background information for a more accurate diagnosis. Crop Protection Laboratory submission forms and instructions on submitting samples can be found at [www.saskatchewan.ca/agriculture](http://www.saskatchewan.ca/agriculture) and search "Crop Protection" or email [croplab@gov.sk.ca](mailto:croplab@gov.sk.ca) for a full list of services and fees.

### Pest Management Regulatory Agency (PMRA)

[www.hc-sc.gc.ca/cps-spc/pest/index-eng.php](http://www.hc-sc.gc.ca/cps-spc/pest/index-eng.php)

Information service (Ottawa)	1-800-267-6315
Canada Medical Services Branch	306-780-5449

### Agriculture and Agri-Food Canada (AAFC)

Saskatoon Research Centre	306-385-9301
Scott Research Farm	306-247-2011

Melfort Research Farm	306-752-2776
Indian Head Research Farm	306-695-5225

### Pesticide Residue Analysis

(Herbicide, fungicide or insecticide)

ALS Labs **1-306-668-8370**  
[www.alsenviro.com](http://www.alsenviro.com)

### Additional Information

For more information on herbicides, pesticides, pesticide safety and weed, insect or plant disease control, consult the publications available from the Agriculture Knowledge Centre or visit the Saskatchewan Agriculture website at [www.saskatchewan.ca/agriculture](http://www.saskatchewan.ca/agriculture).

You can also find us on YouTube, Facebook and Twitter @SKAgriculture.

## Major Poison Control Centres

**Saskatchewan Health**  
**1-866-454-1212**

## Toxicology Centre

University of Saskatchewan  
**306-966-7441 or 306-966-7442**  
**[tox.centre@usask.ca](mailto:tox.centre@usask.ca); [www.usask.ca/toxicology](http://www.usask.ca/toxicology)**

## Spill Report

Saskatchewan Environment  
[www.SaskSpills.ca](http://www.SaskSpills.ca)  
**1-800-667-7525**

*This publication was prepared by the Saskatchewan Ministry of Agriculture in co-operation with Manitoba Agriculture, Food and Rural Initiatives, and with the assistance of the Saskatchewan Weed Committee.*

## Pesticide Application Licensing

**The Pest Control Products (Saskatchewan) Act** and Regulations related to that Act require that any person who applies a pesticide for commercial purposes must have a valid applicator's licence.

To be eligible for a licence, appropriate training is required from the Agriculture Division of Saskatchewan Polytechnic.

**Phone:** 1-800-467-4278

Further details regarding licensing requirements can be obtained from the Crops and Irrigation Branch of Saskatchewan Agriculture. Visit [www.saskatchewan.ca/agriculture](http://www.saskatchewan.ca/agriculture) and search for "pesticide licensing."

**Phone:** 306-787-4662

**Provincial Pesticide Investigator:** 306-787-8711

# Guide to Crop Protection 2019

For Reference Until December 31, 2019  
This publication is updated annually and replaces  
the 2018 and previous issues.

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Table 1: Metric Conversion Factors\* (Approximate)

Metric Unit	Metric to Imperial	Imperial Unit	Imperial to Metric	Metric Unit
Linear centimetre (cm)	x 0.39	Linear inch	x 2.54	Linear centimetre (cm)
Area square metre (m²) hectare (ha)	x 1.2 x 2.5	Area square yard acres	x 0.84 x 0.4	Area square metre (m²) hectare (ha)
Volume litre (L)	x 0.22	Volume gallon	x 4.55	Volume litre (L)
Pressure kilopascals (kPa)	x 0.14	Pressure psi	x 6.9	Pressure kilopascals (kPa)
Weight gram (g) kilogram (kg)	x 0.04 x 2.2	Weight ounce (oz) pound (lb)	x 28.35 x 0.454	Weight gram (g) kilogram (kg)
Agricultural litres per hectare (L/ha) litres per hectare (L/ha) litres per hectare (L/ha) millilitres per hectare (mL/ha) kilograms per hectare (kg/ha) grams per hectare (g/ha)	x 0.089 x 0.357 x 0.71 x 0.014 x 0.89 x 0.014	Agricultural gallons/acre quarts/acre pints/acre fluid ounces (fl. oz)/acre pounds (lb)/acre ounces (oz)/acre	x 11.23 x 2.81 x 1.41 x 70.22 x 1.12 x 70	Agricultural litres per hectare (L/ha) litres per hectare (L/ha) litres per hectare (L/ha) millilitres per hectare (mL/ha) kilograms per hectare (kg/ha) grams per hectare (g/ha)

\*EXAMPLE: To convert centimetres to inches, multiply by 0.39; conversely, to convert inches to centimetres, multiply by 2.54.  
CAUTION: Herbicide labels are in metric units only. Conversion between the Metric and Imperial system may result in confusion. It is recommended to use metric units only.

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# Introduction

## How to Use This Book

This publication is only a guide. Always refer to the product label for application details and precautions. If the information in this publication differs from the label information, follow label instructions.

The *Guide to Crop Protection* is divided into five chapters: (1) Introduction; (2) Weed Control; (3) Foliar Fungicides; (4) Seed Treatments; and (5) Insect Control.

To use the information in each of these sections, use the following process:

1. Turn to the charts at the beginning of each section. There is a set of charts for weeds, plant diseases and insect control. Select the chart for the crop you want or plan to grow. Use the chart to match your weed, disease or insect problems with the products available for that crop.
2. Once you have narrowed your product choices down to a few candidates, go to the recommendation section for that product. Products are listed alphabetically. Read the recommendations thoroughly for each product you are considering.
3. Read the product label attached to the container for detailed instructions on application.

This publication is intended to be used as a guide only. Information contained herein is that available at time of printing.

While every effort has been made to ensure accuracy, the provincial government does not accept responsibility for label changes. When more than one trade name is listed, not all weeds or tank mixes may appear on all labels. Consult product labels attached to pesticide containers for final detailed instructions.

Certain recommendations in this publication are given in quantity of commercial product per acre (mL, L, g or kg/acre). Product labels are given in quantity of product per hectare (mL, L, g or kg/ha). To avoid application errors be sure to read and understand label recommendations.

The *Guide to Crop Protection* includes the most recent recommendations for weed, plant disease and insect control in field and forage crops. These recommendations are based on the uses registered under the Pest Management Regulatory Agency's *Pest Control Products Act*. It is an offence under *The Pest Control Products Act* to apply any chemical in a manner not consistent with the product label. If you have any doubts regarding the instructions in this publication, or on the product label, contact the company representative, your local agricultural office or the Pest Management Regulatory Agency for further advice.

## Product Labels and PCP Numbers

On each Product Page you will see a Registration or PCP number, so named because it is mandated by the *Pest Control Products Act*. Under the Act, every pesticide requires a unique identifier – the product's Registration or PCP number. That number must also appear on the product's label.

**The pesticide label packaged with the product** is the authoritative source of information on use of the product and will contain more detailed information than is included in this Guide. Some products have a number of trade names for the same active ingredient. However, each product will have its own Registration (PCP) number and these appear next to the registrants' names. Users who are seeking more detailed information than is provided in this guide, prior to purchase, can use the Registration (PCP) number to access a sample product label online through the Pest Management Regulatory Agency's (PMRA) website or they can contact the PMRA Hotline by phone at 1-800-267-6315.

Visit <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php> to access the Electronic Label Search Tool. The PMRA Product Information database can be searched by a product's trade name, active ingredient, company name or Registration (PCP) number. Since several products can contain the same active ingredient and there are often several versions of the same or similar labels on this database, using the PCP number is the most direct route to finding the label that links to the product page in this Guide. **There may be some differences between a label found on the package and the sample labels found on the PMRA-Label Search web site so always refer to the packaged product label when applying the product.**

Once the product is located, you may click on its number to view an Adobe Acrobat (PDF) document containing the label and any supplemental registrations. Some of these documents run to many pages but you can use the 'Find' capabilities of the Acrobat Reader plug-in for your browser to jump to specific areas of interest. If you do not have Adobe Acrobat Reader installed on your computer, you can download a free version from [www.adobe.com](http://www.adobe.com).

## Safe Use of Herbicides, Fungicides and Insecticides

Herbicides, fungicides and insecticides are classified according to the use hazard and risk involved. The categories of hazard are:

- toxicity
- flammability
- explosive potential
- corrosivity
- other




The degree of risk is represented by symbols taken from common traffic sign shapes represented by the stop, caution and yield signs. The signal word for each of the signs is danger (high risk), warning (moderate risk) and caution (low risk). Where the risk is minimal, no designation is required. The label on the container will carry the appropriate signs for the protection of the user. Degree of risk symbols for herbicides, insecticides and fungicides used in field and forage crops are included in the product directory. The symbols are illustrated in Figure 1.

Figure 1. Degree of Risk and Hazard Symbols



LD<sub>50</sub> values are used to rate the toxicity of pesticides. The LD<sub>50</sub> refers to the dose of pesticide (in mg per kg of the test animal's body weight) that is lethal to 50 percent of the group of test animals. For example, if a pesticide has an LD<sub>50</sub> value of 10 mg/kg, and the test animals each weigh 1 kg, then 50 percent of the animals would die if they each ate 10 mg of the pesticide.

Table 2. Oral LD<sub>50</sub> Values as they relate to the Risk/Hazard Symbols

	
DANGER POISON LD <sub>50</sub> less than 500 mg/kg Indicates high toxicity	WARNING POISON LD <sub>50</sub> 500-1,000 mg/kg Indicates moderate toxicity
	
CAUTION POISON LD <sub>50</sub> 1,000-2,500 mg/kg Indicates low toxicity	SYMBOL ABSENT LD <sub>50</sub> greater than 2,500 mg/kg Indicates very low toxicity

Different types of protective equipment are required for pesticides that differ in toxicity. Special equipment requirements are described on the product label, but in general the following precautions must be taken when using pesticides of different hazard ratings.

- **Danger Poison** – requires goggles, respirator, gloves and skin protection, avoid fumes and spray mist.
- **Warning Poison** – requires goggles, gloves and skin protection, avoid fumes and spray mist.
- **Caution Poison** – requires gloves and skin protection, avoid fumes and spray mist.

The absence of a hazard symbol on a pesticide label indicates low toxicity to mammals. Nevertheless, protective clothing should be worn when using pesticides that do not have a hazard symbol.

## Protecting Yourself from Exposure to Herbicides, Fungicides and Insecticides

The use of protective equipment and sound safety procedures will help minimize your exposure to herbicides, fungicides and insecticides. Follow the 10 rules for safe application listed below, and wear the safety equipment recommended.

### 10 Rules for Safe Application

1. Never smoke or eat while applying pesticides.
2. Avoid inhaling sprays or dusts. Wear protective clothing and a respirator.
3. Sprayer lines carrying chemicals should not enter the operator's cab.
4. Have soap, water and a towel available. Should concentrated product spill on skin, hands, face or eyes, wash immediately.
5. Wash hands and face when leaving the treated area, before break periods, lunch or urination.
6. Bathe or shower and change into clean clothing after working with pesticides. Wash clothing each day before re-use.
7. Call a physician or get the patient to a hospital immediately if symptoms of illness occur during or shortly after pesticide application. Be sure to take along the product label or container.
8. Store pesticides out of reach of children and where there is no chance of contact with human food or livestock feeds. Do not store herbicides with insecticides and avoid cross-contamination. Storage areas should be locked.
9. Keep chemicals in their original containers, never in unmarked containers or bottles used for food or drink.
10. Follow proper container disposal methods. All containers should be triple rinsed or pressure rinsed, punctured to render the container non-reusable, and delivered to designated disposal sites.

## Protective Clothing

Wear protective equipment as described in the chart to reduce exposure.

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Coveralls	<p>There are two types of coveralls: disposable and reusable.</p> <p>Disposable coveralls are lightweight and comfortable on warm days. They can be worn for mixing and applying pesticides, then discarded at the day's end. If they become contaminated, they should be discarded at once.</p> <p>The second type of coverall is made of washable fabric and may be reused many times. These fabric coveralls are adequate for use with all but the most highly toxic and concentrated pesticides.</p>	<p>Button (or zip) right up to the neck. Loose coveralls around the neck will suck and blow pesticide in and out of the interior of the coveralls as you bend and move.</p> <p>Wear coveralls over a long-sleeved shirt and pants.</p>
Aprons	<p>When pouring or otherwise handling concentrated pesticides, it makes good sense to wear protection in the form of an apron. The apron protects the front of your body from spills or splashes of the concentrate.</p> <p>The apron should be made of rubber or synthetic liquid-proof material that will resist the solvents.</p>	Make sure the apron covers your body from your chest to your boots.
Gloves	Protect your hands by wearing chemical-resistant gloves. Neoprene gloves provide the best protection. Natural rubber gloves may be used when handling organo-phosphorus or carbamate pesticides. Be sure that they are designed for use with solvents and pesticides. Never use lined gloves, gloves with wristbands or leather gloves.	Put gloves on and roll up the first inch or two of the cuff. That way when you lift your hands, any liquid on the gloves won't drip down your arms.
Hats	Use a chemical-resistant hat, preferably made of washable plastic. The hat may be a hard hat or made of flexible plastic. In either case, it should have a plastic sweatband. Wash and dry entire hat after each use and before storing. Ordinary baseball caps with cloth sweatbands are dangerous as they absorb the pesticide and recontaminate the forehead each time you wear them. Even small amounts of moderately or slightly toxic pesticides may cause severe skin irritation or other illness if exposure continues for several days.	
Boots	<p>Wear chemical-resistant, unlined boots. These boots are available in a variety of styles and materials.</p> <p>Neoprene boots are the best. Knee-length boots offer greater protection because they extend above the lower end of the apron. Avoid leather or fabric boots and shoes because these will absorb pesticides and cannot be cleaned effectively.</p>	Wear your pant legs outside the top of your boots. This will prevent spills and splashes from running into the boot and onto your leg.

## Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure.

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Goggles	Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dusts or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides.	Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles that fit snugly over them. Never wear contact lenses when working around pesticides.

Respirators	Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. (For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user). Dust masks are ineffective in protecting against herbicide vapours. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against herbicide vapours or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying herbicides.	When carrying out operations, change filters each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of the spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns.
Face Shields	Goggles offer some protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic.	Since the shield attaches to the hard hat, you can raise or lower it as needed.

## Understanding Maximum Residue Limit Statements in the Guide

To ensure the safety of Canadian food, maximum residue limits (MRLs) set the maximum allowable amount of a pesticide residue on a crop or in a processed crop product (e.g. oil or flour). Residue levels are typically assessed for pesticides registered on crops grown for food. MRLs even exist on imported food for pesticides or pesticide uses not registered in Canada.

Health Canada's Pest Management Regulatory Agency (PMRA) is responsible for setting MRLs in Canada. Similarly, importing countries set their own MRLs (also referred to as 'import tolerances') that Canadian crop exports are subject to. Trade issues between importing and exporting countries can arise due to variability in MRLs or a lack of established MRLs.

Crop pesticide uses that may contribute to trade irritations have been flagged on product pages in the Guide to Crop Protection with the statement: **'Note: As of January 1, 2019 <http://keepingitclean.ca> indicates that grain from crops treated with this product may have market access concerns. Please see pg 10 for more information AND consult potential grain buyer(s) before using this product.'** Manitoba Agriculture and Saskatchewan Ministry of Agriculture have included such statements on products uses with known or potential MRL issues. However, this may not be a complete list of product uses with potential trade issues.

Producers can follow these practices to help prevent exceeding MRLs:

- Read and follow product labels, especially with respect to registered crops, maximum application rates, maximum number of applications per season, crop stage and pre-harvest intervals.
- Talk to your commodity buyer before applying a pesticide, especially for new pesticide chemistries, new products and products registered on new crops.

More information on MRLs and 'flagged' products is available at <http://keepingitclean.ca/>.

## Avoiding Spray Drift

To minimize the risk of drift, follow these guidelines:

1. Do not spray in winds above 16 km/hr (10 m/hr).
2. Do not spray under dead calm conditions in early morning, night, or late evening. These are often associated with temperature inversions, and the combination of these factors can result in long-distance spray drift (2 km or more). Fog or dust that seems to hang in the air is a good indicator of an inversion.
3. Avoid nozzle pressures above 45 psi (310 kPa) for conventional flat fan tips.
4. Use a minimum of 45 L/acre water for all pesticides unless otherwise specified for the product.
5. Take note of buffer zones identified in the "Restrictions" section of this guide. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt, garden, or water body.
6. Use amine formulations of 2,4-D or MCPA where possible. Use special care when applying volatile herbicides (most herbicides in Group 3 and Group 4, particularly ester formulations). Avoid spraying these products on or immediately before hot days.
7. Ensure that air flow from air assisted sprayers is properly set to minimize airblast rebound and drift for different crop canopies.
8. Operate nozzles at their minimum recommended height. For 80° tips, this is 18" (45 cm), and for 110° tips, this is 12" (35 cm). Orienting nozzles forward allows further height reductions.
9. Special nozzles are now available that create coarse, low-drift sprays. Pre-orifice, Turbo-TeeJet, or venturi-type nozzles are available from a number of manufacturers, and these reduce drift by 50 to 95 percent. (Refer to the section entitled **Herbicide Efficacy with Low-Drift Nozzles**).
10. Consider equipping your sprayer with protective shrouds. A number of different designs are available that can reduce drift between 35 and 75 percent.
11. Reduce travel speeds. Rapid air movement over nozzle tips increases the risk of fine droplets prone to drift and turbulence from the sprayer itself can increase the uncertainty of spray deposition.

For more information on reducing drift, see the website: [www.Sprayers101.com](http://www.Sprayers101.com).



## Herbicide Efficacy with Low-drift Nozzles

A number of low-drift nozzles are now available from different suppliers. Well established nozzles, such as the Turbo TeeJet, reduce drift by about 50 percent and provide equivalent efficacy to a standard flat fan nozzle. Newer nozzles ("venturi" types) are best known for their dramatic ability to reduce drift (50 to 95 percent). Research suggests that these nozzles perform well at conventional carrier volumes, travel speeds, and product rates. Some aspects require special attention:

**Pressure:** Some venturi-type nozzles require higher pressures to operate properly. Below 40 psi (275 kPa), patterns for these designs may deteriorate rapidly resulting in poor overlaps and erratic control. Design improvements have resulted in venturi nozzles that require less pressure to operate effectively. When using automatic rate controllers, make sure your pressures match the recommended pressure ranges for good nozzle performance.

**Water Volume:** Droplet size becomes more important at lower water volumes. Little is known about low-drift nozzle performance at or below 5 gal/acre (23 L/acre). Since low-drift nozzles generate fewer droplets than conventional nozzles, ensure that water volumes are high enough for coverage when using coarse sprays.

**Weed Type:** Difficult-to-wet weeds, such as wild oats, green foxtail, lamb's-quarters, and cleavers, typically require finer sprays for effective coverage. When using venturi nozzles on these weeds, make sure your pressure is high enough to achieve good coverage. Larger weeds and reduced product rates typically make chemical control more difficult, and these conditions may also reveal some performance differences between nozzles.

**Herbicide Type:** Herbicides that belong to herbicide Groups 2, 4, and 9 perform well with venturi nozzles, even at normal pressures (40 psi). Application of herbicides in Groups 1, 6, 8, 10 and 14 may require higher pressures with venturi nozzles to maintain good performance, especially under challenging conditions. Wild oat control may be reduced with the coarsest sprays, even when applied at high pressure.

Check with your chemical representative to see if the manufacturer supports the use of low-drift nozzles with their products.

More information is available in the factsheet "Pesticide Application and Choosing the Right Nozzles," available from your local extension office or at the Saskatchewan Ministry of Agriculture Website: [Saskatchewan.ca/agriculture](http://Saskatchewan.ca/agriculture).

## Handling a Drift Complaint

When spray drift occurs, it is important to take the right steps to resolve the complaint. If you suspect that your crop or property has been damaged because of spray drift, use the following guidelines for resolving the situation.

1. Contact the suspected applicator as soon as possible. View the damage with the suspected applicator and determine if that person did, in fact, cause the damage.
2. Are you sure that the symptoms or damage you see has been caused by spray drift? Contact your local agriculture office or agronomist to discuss the injury symptoms.
3. If the damage was caused by the applicator, determine the extent of the damage and the level of compensation (if any) with the applicator.

4. If the situation cannot be resolved quickly because of disagreements on the extent of damage, cause of the damage, or level of compensation, contact your local agricultural office to discuss options on how to proceed. Documentation will be required, particularly if insurance companies are involved.
5. The involvement of a private consultant is recommended if documentation is required. Required documentation often includes samples of the damaged plants, photographs, and yield comparisons to determine losses. Your agricultural office can provide you with a list of private consultants in your area.
6. The best approach is to start an open and honest line of communication with the suspected applicator. The majority of drift complaints are resolved quickly and efficiently by communicating with the applicator, without the involvement of outside parties.

## Mixing Pesticides

The ability to control a broad range of weeds or other pests in one pass is the advantage that a mix of two or more products allows. If tank mixing is not done in the correct order, the result could be a tank-load of material that may not control the target pests, cause injury to the crop, plug nozzles, or leave an undesirable residue in the tank that will require extensive cleaning. Mistakes like these are costly, could put the user at unnecessary risk of exposure to the products, or create an environmental disposal problem.

To avoid mixing that may result in incompatibilities, **always consult the label of the products that are being used** to learn the correct order. **Remember to add all like components at the same stage of mixing.** The list below is a general rule-of-thumb for mixing pesticides:

1. Fill the spray tank with 1/4 to 3/4 the amount of water required for the application and turn on the sprayer agitation. Check the products that are being used for the correct amount to add. Once agitation has begun, maintain until the tank is emptied.
2. Add any water conditioner (fertilizer or pH adjuster) additives to the tank.
3. Add any wettable powders, or water dispersible granules (DF, DG, or WDG). Add dry products slowly to prevent clogged return lines. Allow sprayer to agitate for a few minutes, allowing the product to become completely suspended in the tank, before adding the next component.
4. Shake any containers of liquid pesticide thoroughly before adding to ensure they are well mixed.
5. Add any oil dispersions (OD) or flowable liquid suspensions (F, SC) to the tank. Allow to mix.
6. Add emulsifiable concentrates (EC) or emulsions (ME, SE) to the tank and allow to mix.
7. Add any pesticides that are solutions (SN) (i.e. amines and salts)
8. Add any surfactants or other adjuvants.

Remember to always consult the label for compatible mixes and recommended mixing order.

Many pesticides will break down if left in the tank for an extended period. Try not to mix any more than you can spray at one time.

If you need to stop spraying for a short time, leave the sprayer agitation running to keep products from settling or separating in the tank.

## Container Disposal

Proper disposal of used containers and unused pesticides is important to protect the environment and prevent contamination of soil and water resources. Rinse all containers prior to disposal to reduce environmental contamination caused by open dumping of unwanted containers. Only mix as much pesticide solution as is needed to treat the desired area.

### Triple Rinsing

Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99.9 percent free of residues, in most cases. Here are the steps that should be followed:

1. Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
2. Add a measured amount of rinse water or other diluent until container is about one-fifth full.
3. Rinse the container thoroughly and pour the rinsate into the spray tank.
4. Repeat the procedure twice (it should take only about 5 minutes in total).
5. Puncture or break triple rinsed containers to render them non-reusable. Paper bags should be rinsed once prior to disposal.

### Pressure Rinsing

Pressure rinsers can be used to rinse any size of empty pesticide container that can be lifted into position over the spray tank. A 30 second rinse with a pressure rinser is convenient and just as effective as triple rinsing. Pressure rinsers are constructed to be thrust into the bottom of a metal can or plastic jug. Holes, situated laterally in the rinser tip, direct water from a pressurized source against the inner sides of the container and effectively wash the residual pesticide into the spray tank. Some farmers have found it convenient to attach a rinser to the pump on their large water storage tank to minimize container handling. Pressure rinsers have the added advantage of rendering containers useless by automatically puncturing them.

### Disposal of Containers

Properly rinsed containers should be delivered to a designated pesticide container disposal site. Contact your ag Provincial Agriculture Office, municipal office or weed supervisor for the locations of pesticide container disposal sites in your municipality for more information on pesticide container recycling see [www.cleanfarms.ca](http://www.cleanfarms.ca).

## Sprayer Cleaning

When pesticide application is completed each day it is important to empty and clean the sprayer thoroughly to prevent the breakdown of certain pesticides, prevent adhesion of the pesticide to the sprayer, and to maintain the sprayer parts in good condition. Certain pesticides break down very quickly when left in solution, and several pesticide solutions can be corrosive to sprayer parts. Sprayer cleaning is especially important when changing from

one crop to another or from one pesticide to another. Each year several reports are logged of herbicide damage cause by carryover of product residue in the tank. To avoid the risk of contamination, sprayers should be cleaned as soon as possible after application is completed.

Do not clean sprayers where rinsate can run off into ditches or other water bodies, near sensitive plants or shelterbelts, or where other people or animals are likely to walk, to avoid unnecessary exposure to people, animals and the environment.

There are three basic types of rinse solution for cleaning sprayer tanks. Their recipes and basic procedures are outlined below:

- **The Ammonia Rinse** – Fill spray tank and add 1 L of household ammonia (3%) for every 100 L of clean water needed for the rinse and begin agitation. Allow solution to flush through the booms until the boom is completely filled with ammonia solution and top up the tank with water. Circulate the ammonia solution through the tank and pump system for 15 minutes. Flush hoses and booms with ammonia rinse solution again (minimum 5 minutes) before emptying. Remove nozzles and screens and scrub with 0.1 L household ammonia per 10 L clean water and an old toothbrush. Perform clean water rinse to remove ammonia solution prior to next spray load. Some herbicides recommend leaving the ammonia rinse in the tank over night to improve cleaning potential.
- **The Fresh Water Rinse** – The spray tank cleaning should begin and end with a fresh water rinse to remove the majority of potential contaminants prior to the cleansing process or prior to the next round of spraying. Drain the tank of its previous contents and fill the tank with clean water. Open nozzle valves and pump clean water through the booms and hoses. Top up the tank with more clean water and circulate/agitate for at least 10 minutes and empty the tank of waste water. If this is the first rinse after spraying, a high pressure hose could be used to clean residue from all surfaces in the tank. Do not enter the tank during the cleaning process.
- **The Detergent Rinse** – After rinsing with clean water, fill spray tank and add a heavy-duty detergent at 0.25 L per 100 L of water (some suggest a non-ionic surfactant such as Agral 90 or Agsurf at 0.6 L per 100 L of water). Circulate the mixture for a minimum of 5 minutes and spray out through sprayer nozzles. Nozzles and screens are removed and cleaned individually with the same detergent solution in a small container. Soaking in this solution for several hours also helps to loosen any deposits.

The above solutions are just components of the overall sprayer cleaning process. Typical rinse instructions will repeat a combination of one or two or all of these basic rinses. Below we will give some generic rinse instructions utilizing the basic rinses as components of the larger cleaning procedure. Never enter the tank during the cleaning process as some cleansers may release dangerous gases.

- **Method A** – Drain contents of tank – 1 to 2X Water Rinse – 2X Ammonia Rinse – 2X Water Rinse (one just prior to the next spraying event)
- **Method B** – Drain contents of tank – 2X Water Rinse – 2X Detergent Rinse – 2X Water Rinse

- **Method C** – Drain contents of tank – Several repetitions of the Water Rinse with nozzles and screens removed and checked for debris. Products: Adrenalin, Altitude, Amitol 240, Ares.

The above directions are general processes based on the similarities of tank cleaning recommendations between products in each of the herbicide groupings. Always follow the specific instructions on the product label.

Several products in the guide do not have label instructions regarding tank cleaning. In the case of products that have no cleaning recommendations on the label, there are some basic principals that can be applied. Products that are water based formulations can usually be cleaned from spray tanks using **Method C** above. Products that are formulated as an EC, SC or F (flowable) or use a petroleum based adjuvant should at least use **Method B**. The detergent breaks down the oil that may be sticking to the side of the tank. Products in Group 2 (most will already have a recommendation), with the exception of the 'IMI' products (see Table 8 on page 45), will require the use of **Method A**. The ammonia in **Method A** either increases the solubility of the product allowing it to be easily removed from the tank surfaces or speeds the breakdown of these products in water. If the product that is to be cleaned out of the tank is a combination of these elements, use a combination of Methods to clean the tank. In these cases, use a good commercial tank-cleaning product from a recognized source, with both ammonia and detergent as components.

Group 2 compounds are highly active on sensitive plants so even a small amount remaining in the sprayer can present a risk of injury. They can also occasionally be trapped on the tank walls and plumbing by petroleum based formulations or adjuvants when tank mixed with other products, resulting in tank residues that may be tougher to remove. A way to reduce the chance of this occurring is to add detergent at 0.25 L per 100 L to the Ammonia

Rinse portion to assist with the breakdown of the petroleum coating so that the ammonia may rid the tank of Group 2 product.

It is very important to clean sprayers immediately after every use. With a more diverse rotation, the likelihood of damage from lack of care increases dramatically.

## How to Identify Crop and Weed Leaf Stages

Recognition of plant growth stages is essential for effective weed and disease control. Many herbicides and fungicides are safe on a crop only when applied at a specific growth stage. Similarly, weeds are controlled only when they are at certain growth stages.

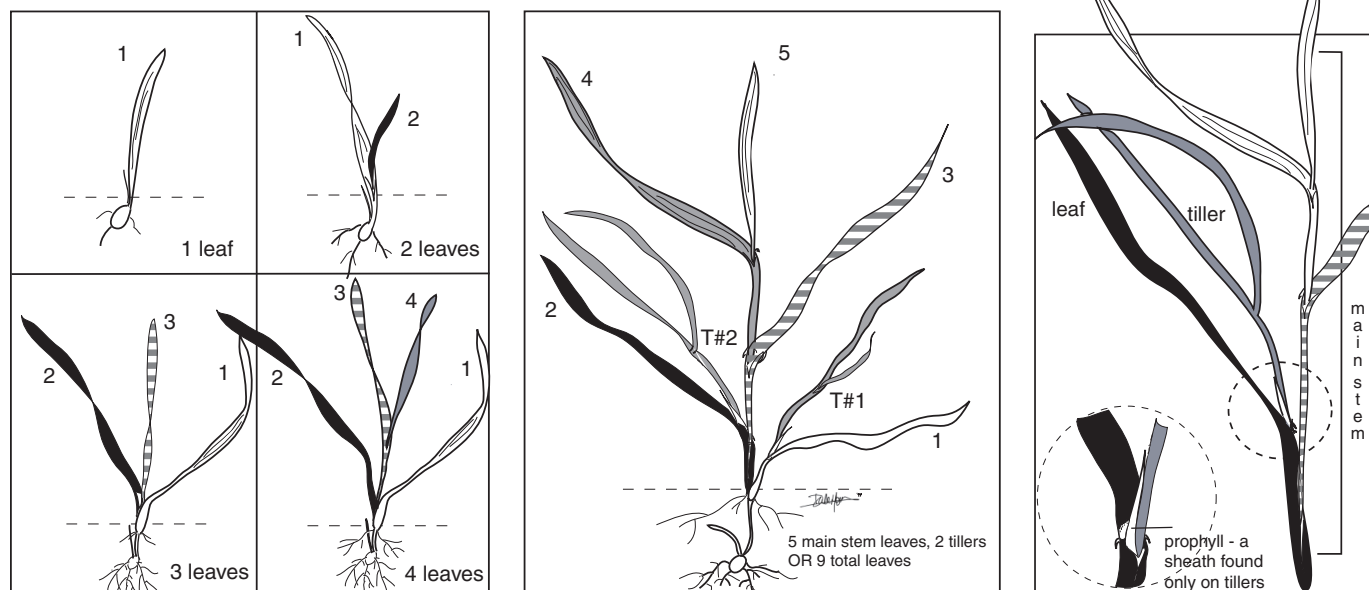
For most post-emergent products, growth stages are described by the number of leaves. The following is a description of how to count leaves for staging.

### Cereals and Annual Grass Weeds

Manufacturers generally use two different systems of staging for grasses. The minimum stages of application are similar, while the later stages may differ.

Some manufacturers use "Total Leaf Count" stages based on the number of leaves on the entire plant, including tillers or secondary shoots. Most recommendations are based on the number of main stem leaves and tillers. Tillers or stools are the secondary shoots or stems of a grass plant. Similar to the branches of a broadleaf plant, tillers will emerge from the axils between the leaf and main shoot. Tillers usually begin to appear at the 3 or 4 leaf stage. When staging a plant in this manner, be sure to identify the tillers first, then count only leaves that originate from the main shoot.

Figure 2. Leaf Stages of Cereals and Annual Grass Weeds

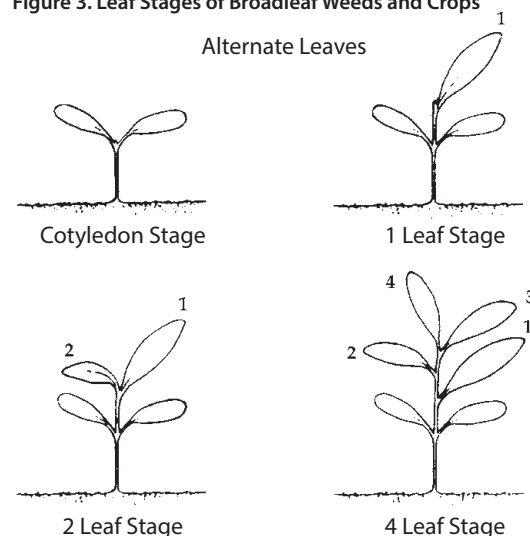


## Broadleaf Weeds

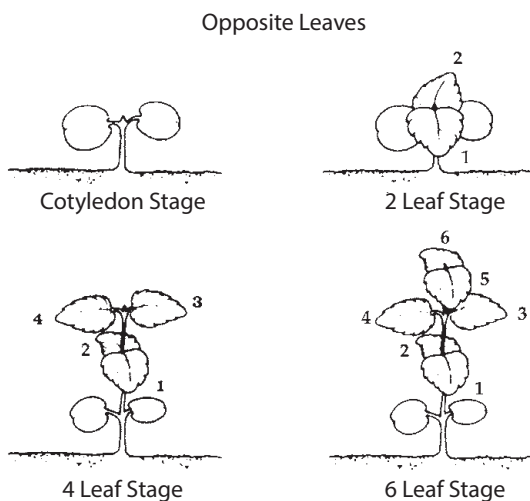
**Cotyledons** – These are the seed leaves that usually emerge above ground. On some plants, such as faba beans, lentils and peas, they stay below the soil surface. Cotyledons are not true leaves and are not counted when determining leaf number. They are a different shape than the true leaves and may dry up and disappear at an early stage.

**Alternate leaves** – Some plants have one leaf at each node on the stem. The next leaf emerges at the next higher node and extends away from the stem in the opposite direction. These plants (lamb's quarters and wild mustard are good examples) are said to have alternate leaves. To determine the leaf stage, simply count the number of leaves present (Figure 3).

Figure 3. Leaf Stages of Broadleaf Weeds and Crops



**Opposite leaves** – Plants with two leaves at each node, one on each side of the stem, are said to have opposite leaves. The next pair of leaves on the next node are rotated about 45° so that they are not directly over the previous pair. Plants with opposite leaves have even-leaf numbers only. When counting, the leaf number progresses from cotyledons to 2 leaf, 4 leaf, etc. These plants generally appear shorter than plants with alternate leaves at a similar leaf stage. **Be sure to count each pair as two leaves.** Hemp nettle is a weed that has opposite leaves (Figure 3).



**Whorled leaves** – More complex plants like cleavers may have whorled leaves. These plants have three or more leaves at each node on the stem. The leaf number in each whorl may vary, so be sure to count each individual leaf unless the Guide or label recommendation refers to the number of leaf whorls (Figure 3).

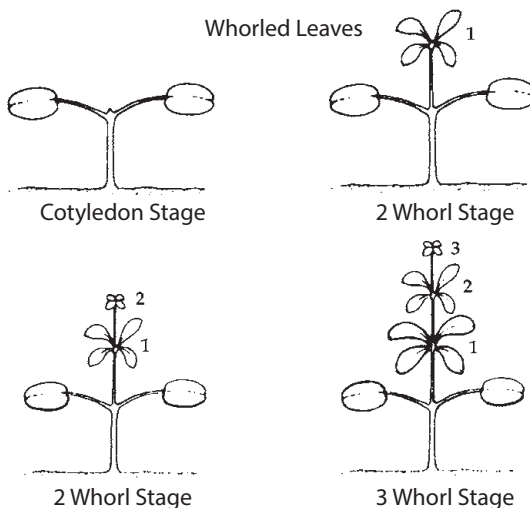
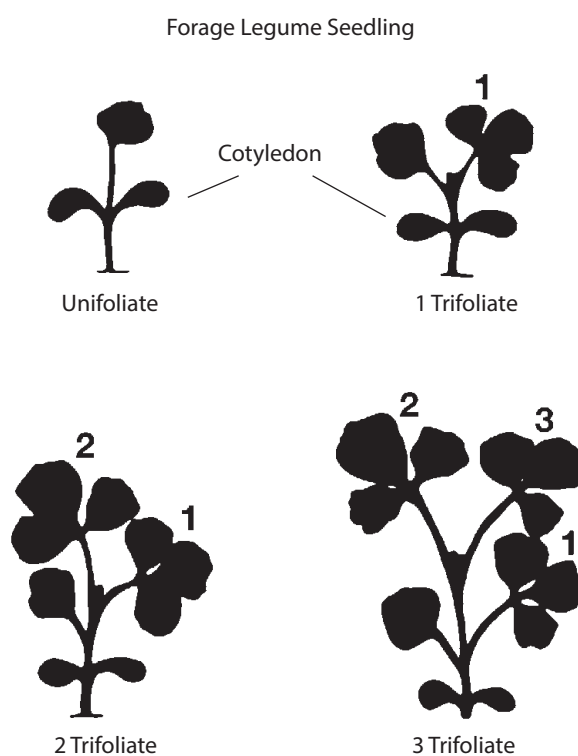
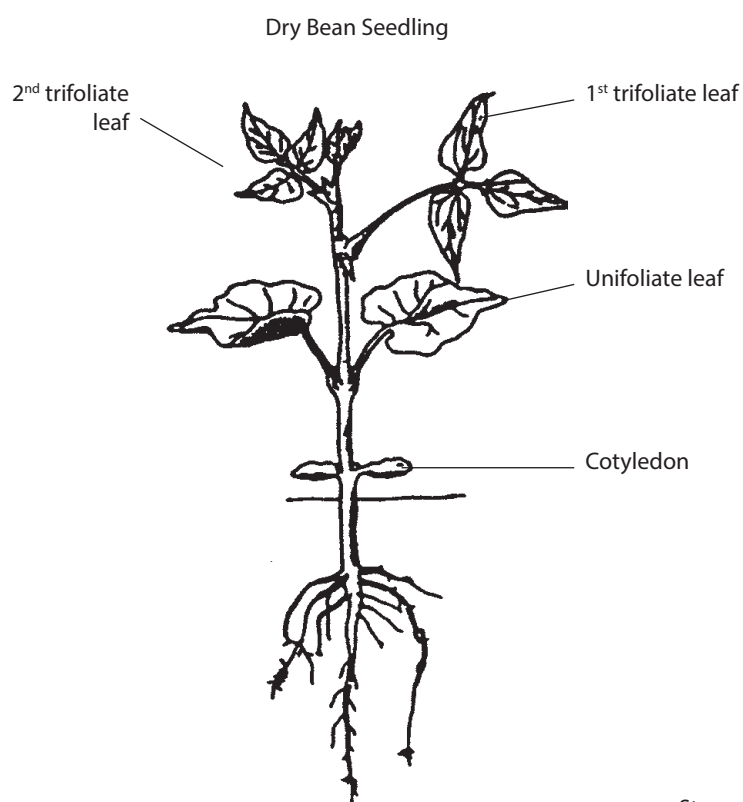
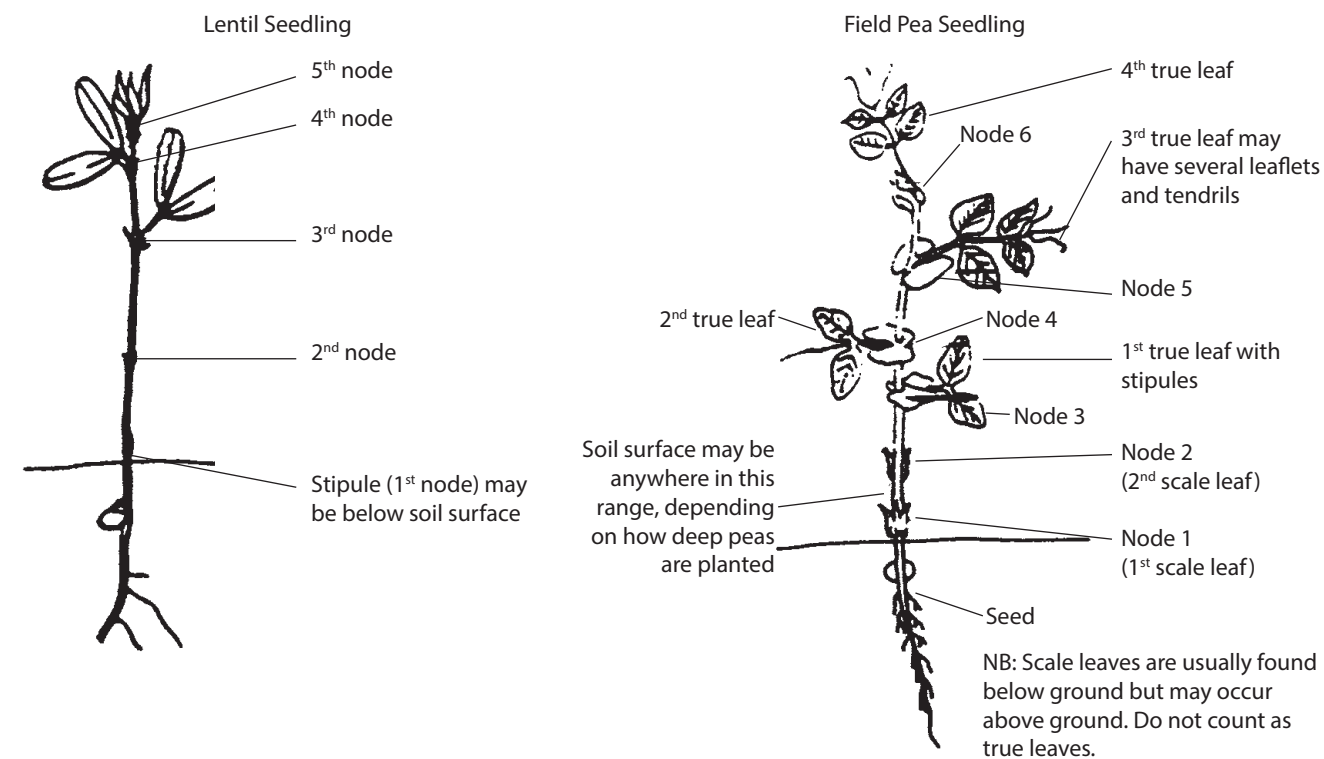




Figure 4. Leaf Stages of Certain Special Crops and Forages



Stages of alfalfa, red clover and alsike clover leaf development



# Trade Names, Active Ingredients and Formulations

Legend: (F) = formulated component; (B) = blended granules; (DC) = divided container

WP wettable powder	EC emulsifiable concentrate	SP water soluble powder	SL soluble concentrate	A amine
WG water dispersible granule	G granule	EW emulsion, oil in water	OD oil dispersion	E ester
TB Tablet	SC suspension concentrate	DS powder/dust for dry seed treatment	FS flowable concentrate for seed treatment	LS solution for seed treatment
SG water soluble granule	AS aqueous suspension			

## Herbicides


(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
2,4-D Amine - 200 g/L SL (F)	aminopyralid - 40 g/L SL (F)	mecoprop-P - 80 g/L SL (F)		Restore II	Corteva Agriscience
2,4-D Amine - 295 g/L SL (F)	dicamba - 110 g/L SL (F)			DyVel DSp	BASF Canada
2,4-D Amine - 600, 700 g/L SL				2,4-D Amine or Ester	Various
2,4-D Ester - 225 g/L EC (F)	bromoxynil - 225 g/L EC (F)			Thrasher II	ADAMA Canada
2,4-D Ester - 225 g/L EC (F)	bromoxynil - 225 g/L EC (F)			Leader	IPCO
2,4-D Ester - 225 g/L EC (F)	bromoxynil - 225 g/L EC (F)			Approve	Nufarm Agriculture
2,4-D Ester - 240 g/L EC (F)	bromoxynil - 90 g/L EC (F)	fluroxypyr - 80 g/L EC (F)		Enforcer D	Nufarm Agriculture
2,4-D Ester - 280 g/L EC (F)	bromoxynil - 280 g/L EC (F)			Thumper	Bayer CropScience
2,4-D Ester - 282 g/L EC (F)	dichlorprop - 300 g/L EC (F)			Dichlorprop-D	IPCO
2,4-D Ester - 282 g/L EC (F)	dichlorprop - 300 g/L EC (F)			Turboprop	UAP
2,4-D Ester - 360 g/L EC (F)	fluroxypyr - 90 g/L EC (F)			OcTrain XL	Corteva Agriscience
2,4-D Ester - 360 g/L EC (F2)	fluroxypyr - 90 g/L EC (F2)		pinoxaden - 25 g/L EC (F1)	TraxosTwo	Syngenta Canada
2,4-D Ester - 360 g/L SL (F)	picloram - 97.5 g/L SL (F)			Grazon XC	Corteva Agriscience
2,4-D Ester - 400 g/L EC (F)	dichlorprop-P - 210 g/L EC (F)			Dichlorprop-DX	IPCO
2,4-D Ester - 400 g/L EC (F)	dichlorprop-P - 210 g/L EC (F)			Estaprop XT	Nufarm Agriculture
2,4-D ester - 473 g/L (F)	pyraflufen - 6.1 g/L (F)			BlackHawk (new)	Nufarm Agriculture
2,4-D Ester - 564 g/L EC	thifensulfuron:tribenuron - 33.3%:16.7% SG	fluroxypyr - 333 g/L EC		Retain SG (new)	Loveland Products
	thifensulfuron:tribenuron - 33.3%:16.7% SG	fluroxypyr - 180 g/L EC		Retain SG (old)	Loveland Products
2,4-D Ester - 660 g/L EC	fluroxypyr - 180 g/L EC			Rush 24	ADAMA Canada
2,4-D Ester - 660 g/L EC	florasulam - 50 g/L SC			MPower Battlefront 2,4-D	Agracity
2,4-D Ester - 660 g/L EC	fluroxypyr - 180 g/L EC			MPower Foxy Pro	Agracity
2,4-D Ester - 660 g/L EC	tribenuron - 75% WG			MPower X-Ko	Agracity
2,4-D Ester - 660 g/L EC	fluroxypyr - 333 g/L EC			Attain XC	Corteva Agriscience
2,4-D Ester - 660 g/L EC	florasulam - 50 g/L SC			Frontline 2,4-D XC	Corteva Agriscience
2,4-D Ester - 660 g/L EC	aminopyralid - 52.5% WG (F)	metsulfuron - 9.45% WG (F)		Reclaim II	Corteva Agriscience
2,4-D Ester - 660 g/L EC	pyroxusulam - 15% WG (F)	hauiloxygen - 5% WG (F)		Rexade	Corteva Agriscience
2,4-D Ester - 660 g/L EC	carfentrazone - 240 g/L EC			BlackHawk (old)	Nufarm Agriculture
2,4-D Ester - 660 g/L EC	fluroxypyr - 180 g/L EC			Flurox-24	Nufarm Agriculture
2,4-D Ester - 660 g/L EC	tribenuron - 75% WG			Ko-Act	Nufarm Agriculture
2,4-D Ester - 660 g/L EC	tribenuron - 8.25% WG (F)	dicamba - 58.45% WG (F)		Salvo	UAP
2,4-D Ester - 660g/L EC				Triton K	FMC
2,4-DB Ester - 625 g/L EC				Cobutox 625	IPCO
2,4-DB Ester - 625 g/L EC				Caliber	Loveland Products
2,4-DB Ester - 625 g/L EC				Embutox 625	Nufarm Agriculture
aminocyclopyrachlor - 39.5% WG (F)	metsulfuron - 12.6% WG (F)			Navius	Bayer Environmental Sciences
acifluorfen - 240 g/L SL				Ultra Blazer	United Phosphorus Inc.
aminopyralid - 40 g/L SL (F)	2,4-D Amine - 200 g/L SL (F)			Restore II	Corteva Agriscience
aminopyralid - 52.5% WG (F)	metsulfuron - 9.45% WG (F)	2,4-D Ester - 660 g/L EC		Reclaim II	Corteva Agriscience



[illegible]





	(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
	flumioxazin - 33.5% WG (F)	pyroxasulfone - 44.5% WG (F)			<i>Fierce</i>	Valent Canada
	flumioxazin - 51% WG				<i>Chateau</i>	Valent Canada
	flumioxazin - 51% WG				<i>Valtera</i>	Valent Canada
	fluroxypyr - 100 g/L SC (F)	florasulam - 2.5 g/L SC (F)	MCPA ester - 600 g ae/L		<i>Outshine</i>	ADAMA Canada
	fluroxypyr - 100 g/L SC (F)	florasulam - 2.5 g/L SC (F)	MCPA ester - 600 g/L		<i>Stellar</i>	Corteva Agriscience
	fluroxypyr - 100 g/L SC (F)	florasulam - 2.5 g/L SC (F)	MCPA ester - 350 g/L (F)		<i>Stellar XL</i>	Corteva Agriscience
	fluroxypyr - 113 g/L EC (F)	dicamba - 87 g/L EC (F)			<i>Pulsar</i>	Syngenta Canada
	fluroxypyr - 150 g/L SC (F)	thifensulfuron - 30 g/L SC (F)			<i>Travallas</i>	FMC
	fluroxypyr - 180 g/L	MCPA ester - 600 g/L EC	metsulfuron - 3 g/L SC (F)		<i>Rush M</i>	ADAMA Canada
	fluroxypyr - 180 g/L	MCPA ester - 600 g/L EC			<i>MPower Foxy M</i>	AgriCity
	fluroxypyr - 180 g/L	imazamox - 120 g/L SL			<i>Altitude FX2</i>	BASF Canada
	fluroxypyr - 180 g/L	MCPA ester - 600 g/L EC			<i>Trophy</i>	Nufarm Agriculture
	fluroxypyr - 180 g/L EC	MCPA Ester - 225 g/L EC (F)	bromoxynil - 225g/L EC (F)		<i>ForceFighter</i>	ADAMA Canada
	fluroxypyr - 180 g/L EC	2,4-D Ester - 660 g/L EC			<i>Rush 24</i>	ADAMA Canada
	fluroxypyr - 180 g/L EC	2,4-D Ester - 660 g/L EC			<i>MPower Foxy Pro</i>	AgriCity
	fluroxypyr - 180 g/L EC		bromoxynil - 210 g/L EC (F)		<i>MPower Foxy</i>	AgriCity
	fluroxypyr - 180 g/L EC	pyrasulfotole - 37.5 g/L EC (F)			<i>Infinity FX</i>	Bayer CropScience
	fluroxypyr - 180 g/L EC	thifensulfuron:tribenuron - 33.3%:16.7% SG	2,4-D Ester - 564 g/L EC		<i>Ikwin</i>	Great Northern Growers
	fluroxypyr - 180 g/L EC	thifensulfuron:tribenuron - 33.3%:16.7% SG			<i>Retain SG (old)</i>	Loveland Products
	fluroxypyr - 180 g/L EC	2,4-D Ester - 660 g/L EC			<i>Flurox-24</i>	Nufarm Agriculture
	fluroxypyr - 217 g/L EC (F)	clodinafop - 112 g/L (F)			<i>Signal FSU</i>	Nufarm Agriculture
	fluroxypyr - 250 g/L EC (F)	MCPA ester - 600 g/L EC	thifensulfuron:tribenuron - 50%:25% SG		<i>Pixxaro</i>	Corteva Agriscience
	fluroxypyr - 250 g/L EC (F)	pinoxaden - 50 g/L EC (F)	hauloxifen - 16.2 g/L EC (F)		<i>Rezuvant</i>	Corteva Agriscience
	fluroxypyr - 333 g/L EC	clopyralid - 50 g/L EC	hauloxifen - 16.2 g/L EC (F)		<i>MPower Foxy CM</i>	AgriCity
	fluroxypyr - 333 g/L EC	2,4-D E - 660 g/L EC	MCPA Ester - 280 g/L EC		<i>Attain XC</i>	Corteva Agriscience
	fluroxypyr - 333 g/L EC	clopyralid - 50 g/L EC (F)	MCPA Ester - 280 g/L EC (F)		<i>Prestige XC</i>	Corteva Agriscience
	fluroxypyr - 333 g/L EC	pyroxusulam - 30 g/L OD			<i>Tandem</i>	Corteva Agriscience
	fluroxypyr - 333 g/L EC	thifensulfuron:tribenuron - 50%:50% SG			<i>Barricade II</i>	FMC
	fluroxypyr - 333 g/L EC	thifensulfuron:tribenuron - 50%:50% SG	thiencarbazone - 10 g/L SC	MCPA ester - 600 g/L EC	<i>Predicade</i>	FMC
	fluroxypyr - 333 g/L EC	thifensulfuron:tribenuron - 50%:50% SG	2,4-D Ester - 564 g/L EC		<i>Retain SG (new)</i>	Loveland Products
	fluroxypyr - 80 g/L EC (F)	33.3%:16.7% SG	bromoxynil - 90 g/L EC (F)		<i>Enforcer D</i>	Nufarm Agriculture
	fluroxypyr - 80 g/L EC (F)	MCPA - 200 g/L EC (F)	bromoxynil - 200g/L EC (F)		<i>Enforcer M</i>	Nufarm Agriculture
	fluroxypyr - 80 g/L EC (F)	bromoxynil - 200 g/L EC (F)	MCPA ester - 200 g/L EC (F)	thifensulfuron:tribenuron - 50%:25% SG	<i>Enforcer MSU</i>	Nufarm Agriculture
	fluroxypyr - 87.5 g/L EC (F)	pinoxaden - 50 g/L EC (F)			<i>Axial Xtreme</i>	Syngenta Canada
	fluroxypyr - 87.5 g/L EC (F)	pinoxaden - 50 g/L EC (F)	bromoxynil - 210 g/L EC (F)	pyrasulfotole-37.5 g/L EC (F)	<i>Axial Xtreme iPak</i>	Syngenta Canada
	fluroxypyr - 90 g/L EC (F)	2,4-D Ester - 360 g/L EC (F)			<i>OctTain XL</i>	Corteva Agriscience
	fluroxypyr - 90 g/L EC (F)	clopyralid - 90g/L SL (F)			<i>Momentum</i>	Loveland Products
	fluroxypyr - 90 g/L EC (F2)	2,4-D Ester - 360 g/L EC (F2)	pinoxaden - 25 g/L EC (F1)	clodinafop - 25 g/L EC (F1)	<i>TraxosTwo</i>	Syngenta Canada
	fomesafen - 240 g/L SL				<i>Reflex</i>	Syngenta Canada
	fomesafen - 67 g/L SL (F)	glyphosate - 271 g/L SL (F)			<i>FlexStar GT</i>	Syngenta Canada
	foramsulfuron - 22.5 g/L OD				<i>Option 2.25 OD</i>	Bayer CropScience
	glufosinate - 150 g/L SL				<i>MPower GoodHarvest</i>	AgriCity
	glufosinate - 150 g/L SL				<i>MPower Vigor</i>	AgriCity
	glufosinate - 150 g/L SL				<i>Liberty 150 SN</i>	BASF Canada
	glufosinate - 200 g/L SL				<i>Liberty 200 SN</i>	BASF Canada
	glyphosate - 194 g/L SL (F)	dicamba - 46 g/L (F)			<i>Glykamba</i>	Nufarm Agriculture
	glyphosate - 240 g/L SL (F)	dicamba - 120 g/L SL (F)			<i>Roundup Xtend</i>	Bayer CropScience
	glyphosate - 271 g/L SL (F)	fomesafen - 67 g/L SL (F)			<i>FlexStar GT</i>	Syngenta Canada





(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
MCPB - 375 g/L SL (F)	MCPA Na+ - 25 g/L SL (F)			<i>Clovitox Plus</i>	IPCO
MCPB - 375 g/L SL (F)	MCPA K+ - 25 g/L SL (F)			<i>Topside</i>	Loveland Products
MCPB - 375 g/L SL (F)	MCPA K+ - 25 g/L SL (F)			<i>Tropotox Plus</i>	Nufarm Agriculture
mecoprop-P - 130 g/L SL (F)	MCPA Amine - 160 g/L SL (F)	dichlorprop-P - 310 g/L SL (F)		<i>Optica Trio</i>	UAP
mecoprop-P - 150 g/L SL				<i>Mecoprop-P</i>	UAP
mecoprop-P - 62.5 g/L SL (F)	dicamba - 62.5 g/L SL (F)	MCPA amine - 275 g/L SL (F)		<i>Tracker Xp</i>	IPCO
mecoprop-P - 62.5 g/L SL (F)	dicamba - 62.5 g/L SL (F)	MCPA amine - 275 g/L SL (F)		<i>Sword</i>	Loveland Products
mecoprop-P - 62.5 g/L SL (F)	dicamba - 62.5 g/L SL (F)	MCPA amine - 275 g/L SL (F)		<i>Target</i>	Syngenta Canada
mecoprop-P - 80 g/L SL (F)	dicamba - 110 g/L SL (F)	2,4-D Amine - 295 g/L SL (F)		<i>DyVelDSp</i>	BASF Canada
metolachlor - 400 g/L SC (F)	atrazine - 320 g/L SC (F)			<i>Primextra II Magnum</i>	Syngenta Canada
metolachlor - 915 g/L EC				<i>Dual II Magnum</i>	Syngenta Canada
metribuzin - 480 g/L SC				<i>Metrix SC</i>	Sharda CropChem
metribuzin - 70% WG				<i>Buzzin</i>	Sharda CropChem
metribuzin - 75% WG				<i>Squadron</i>	ADAMA Canada
metribuzin - 75% WG				<i>Sencor</i>	Bayer CropScience
metribuzin - 75% WG				<i>TriCor</i>	United Phosphorus Inc.
met sulfuron - 12.6% WG (F)	aminocyclopyrachlor - 39.5% WG (F)			<i>Navius</i>	Bayer Environmental Sciences
met sulfuron - 3 g/L SC (F)	thifensulfuron - 30 g/L SC (F)	fluroxypyr - 150 g/L SC (F)		<i>Travallas</i>	FMC
met sulfuron - 60% SG				<i>Ally Toss-N-Go</i>	FMC
met sulfuron - 60% WG				<i>Escort</i>	Bayer Environmental Sciences
met sulfuron - 8.6% SG (B)	tribenuron - 42.9% SG (B)			<i>MPower X-Pro</i>	Agracity
met sulfuron - 8.6% SG (B)	tribenuron - 42.9% SG (B)			<i>Express Pro</i>	FMC
met sulfuron - 9.45% WG (F)	aminopyralid - 52.5% WG (F)	2,4-D Ester - 660 g/L EC		<i>Reclaim II</i>	Corteva Agriscience
nicosulfuron - 37.5% WG (F)	rimsulfuron - 37.5% WG (F)			<i>Ultim</i>	Corteva Agriscience
nicosulfuron - 75% WG				<i>Accent</i>	Syngenta Canada
paraquat - 200 g/L SL				<i>Gramoxone</i>	Syngenta Canada
picloram - 240 g/L SL				<i>Tordon 22K</i>	Corteva Agriscience
picloram - 97.5 g/L SL (F)	2,4-D Ester - 360 g/L SL (F)			<i>Grazon XC</i>	Syngenta Canada
pinoxaden - 25 g/L EC (F)	clodinafop - 25 g/L EC (F)			<i>Traxos</i>	Syngenta Canada
pinoxaden - 25 g/L EC (F1)	clodinafop - 25 g/L EC (F1)	2,4-D Ester - 360 g/L EC (F2)		<i>TraxosTwo</i>	Syngenta Canada
pinoxaden - 50 g/L EC	fluroxypyr - 250 g/L EC (F)	fluroxypyr - 90 g/L EC (F2)		<i>Rezuvant</i>	Corteva Agriscience
pinoxaden - 50 g/L EC	pyrasulfotole - 37.5 g/L EC (F)	haloxifen - 16.2 g/L EC (F)		<i>Axial iPak</i>	Syngenta Canada
pinoxaden - 50 g/L EC (F)	fluroxypyr - 87.5 g/L EC (F)	bromoxynil - 210 g/L EC (F)		<i>Axial Xtreme</i>	Syngenta Canada
pinoxaden - 50 g/L EC (F1)	fluroxypyr - 87.5 g/L EC (F1)	pyrasulfotole - 37.5 g/L EC (F2)		<i>Axial Xtreme iPak</i>	Syngenta Canada
pinoxaden - 50g/L EC				<i>Axial</i>	Syngenta Canada
pinoxaden - 92.7 g/L EC (F)	florasulam - 7.7 g/L EC (F)			<i>Broadband</i>	Syngenta Canada
propoxycarbazone - 70% WG				<i>Olympus</i>	Bayer CropScience
propyzamide - 400 g/L SC				<i>Kerb SC</i>	Corteva Agriscience
propyzamide - 50% WSP				<i>Kerb 50WSP</i>	Corteva Agriscience
pyraflufen - 13.5 g/L (F)	MCPA ester - 420 g/L (F)			<i>Goldwing</i>	Nufarm Agriculture
pyraflufen - 6.1 g/L (F)	2,4-D ester - 473 g/L (F)			<i>BlackHawk (new)</i>	Nufarm Agriculture
pyrasulfotole - 15.5 g/L EC (F)	fenoxaprop-p - 46 g/L EC (F)	bromoxynil - 87.5 g/L EC (F)		<i>Tundra</i>	Bayer CropScience
pyrasulfotole - 31.3 g/L EC (F)	thiencarbazon - 5 g/L SC (F)	bromoxynil - 175 g/L EC (F)		<i>Velocity m3</i>	Bayer CropScience
pyrasulfotole - 37.5 g/L EC (F)	bromoxynil - 210 g/L EC (F)			<i>Infinity</i>	Bayer CropScience
pyrasulfotole - 37.5 g/L EC (F)	bromoxynil - 210 g/L EC (F)	fluroxypyr - 180 g/L EC		<i>Infinity FX</i>	Bayer CropScience
pyrasulfotole - 37.5 g/L EC (F)	pinoxaden - 50 g/L EC	bromoxynil - 210 g/L EC (F)		<i>Axial iPak</i>	Syngenta Canada
pyrasulfotole - 37.5 g/L EC (F)	bromoxynil - 210 g/L EC (F)	pinoxaden - 50 g/L EC (F1)		<i>Axial Xtreme iPak</i>	Syngenta Canada
pyroxasulfone - 250 g/L SC (F)	sulfentrazone - 250 g/L SC (F)			<i>Authority Supreme</i>	FMC
pyroxasulfone - 44.5% WG (F)	flumioxazin - 33.5% WG (F)			<i>Fierce</i>	Valent Canada
pyroxasulfone - 447 g/L SE (F)	carfentrazone - 53 g/L SE (F)			<i>Focus</i>	FMC
pyroxasulfone - 85% WG	carfentrazone - 240 g/L EC			<i>Focus (co-pack)</i>	FMC
pyroxasulam - 15% WG (F)	haloxifen - 5% WG (F)	2,4-D Ester - 660 g/L EC		<i>Rexade</i>	Corteva Agriscience





(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
pyroxsulam - 21.5% WG pyroxsulam - 30 g/L OD pyroxsulam - 30 g/L SC quinclorac - 51.55% SG (B)	fluroxypyr - 333 g/L EC thifensulfuron:tribenuron - 10.3%:5.2% SG (B)			Simplicity GoDRI Tandem Simplicity OD Triton C	Corteva Agriscience Corteva Agriscience Corteva Agriscience FMC
quinclorac - 75% WDG quinclorac - 75% WDG quinclorac - 75% WDG quinclorac 180 g/L SN quizalofop-p - 96 g/L EC quizalofop-p - 96 g/L EC quizalofop-p - 96 g/L EC rimisulfuron - 20% WG rimisulfuron - 25% WG rimisulfuron - 37.5% WG (F) saflufenacil - 342 g/L SC saflufenacil - 70% SG sethoxydim - 450 g/L EC sethoxydim - 450 g/L EC sethoxydim - 450 g/L EC sethoxydim - 450 g/L EC simazine - 480 g/L SC simazine - 90% WG sulfentrazone - 250 g/L SC (F) sulfentrazone - 480 g/L SC sulfentrazone - 480 g/L SC thiencarbazon - 10 g/L SC thiencarbazon - 10 g/L SC thiencarbazon - 10 g/L SC	nicosulfuron - 37.5% WG (F)  imazamox - 35% WG (F) imazamox - 35% WG (F) imazamox - 25 g/L SL  pyroxsulfone - 250 g/L SC (F) carfentrazone - 240 g/L EC tribenuron - 50% SG  fluroxypyr - 333 g/L EC	imazethapyr - 35% WG (F) imazethapyr - 35% WG (F)		Clever Ingenious Masterline Quinclorac Facet L Assure II Yuma GL Contender Sortan IS Prism SG Ultim 75DF/Grande Heat LQ Heat WG Odyssey Ultra Odyssey Ultra NXT Poast Ultra Solo Ultra Simazine 480 Princep Nine T Authority Supreme Authority Authority Charge Luxxur Varro Predicade	Great Northern Growers UAP Univar Canada BASF Canada Corteva Agriscience Gowan Canada IPCO Corteva Agriscience Corteva Agriscience Corteva Agriscience BASF Canada BASF Canada BASF Canada BASF Canada BASF Canada Loveland Products Univar ProVMWeb FMC FMC FMC Bayer CropScience Bayer CropScience FMC
thiencarbazon - 5 g/L SC (F) thifensulfuron - 30 g/L SC (F) thifensulfuron - 50% SG thifensulfuron: tribenuron - 10.3%:5.2% SG (B) thifensulfuron: tribenuron - 33.3%:16.7% SG thifensulfuron: tribenuron - 33.3%:16.7% SG thifensulfuron: tribenuron - 33.3%:16.7% SG thifensulfuron: tribenuron - 33.3%:16.7% SG thifensulfuron: tribenuron - 33.3%:16.7% SG thifensulfuron: tribenuron - 33.3%:16.7% SG thifensulfuron: tribenuron - 50%:25% SG thifensulfuron: tribenuron - 50%:25% SG thifensulfuron: tribenuron - 50%:25% SG (F) thifensulfuron: tribenuron - 50%:25% SG (F)	pyrasulfotole - 31.3 g/L EC (F) fluroxypyr - 150 g/L SC (F) quinclorac - 51.55% SG (B) MCPA Ester - 500 or 600 g/L EC  MCPA ester - 500 or 600 g/L EC  fluroxypyr - 333 g/L EC fluroxypyr - 180 g/L EC bromoxynil - 200 g/L EC (F) clodinafop - 112 g/L (F)	thifensulfuron:tribenuron - 50%:50% SG bromoxynil - 175 g/L EC (F) metsulfuron - 3 g/L SC (F)  thifensulfuron:tribenuron - 50%:50% SG bromoxynil - 175 g/L EC (F) metsulfuron - 3 g/L SC (F)  2,4-D Ester - 564 g/L EC 2,4-D Ester - 564 g/L EC MCPA ester - 200 g/L EC (F) fluroxypyr - 217 g/L EC (F)	MCPA ester - 600 g/L EC	Velocity m3 Travallas Pinnacle SG Triton C  Refine M  Refine SG  BroadSide  Retain SG (new) Retain SG (old)  Enforcer MSU  Signal FSU MPower R Deploy	Bayer CropScience FMC FMC FMC  FMC  FMC  Loveland Products Loveland Products Loveland Products Nufarm Agriculture Nufarm Agriculture Agricity Anysta LifeScience

(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Predicade	FMC
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Barricade II	FMC
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Armezon Impact Shieldex 400SC	BASF Canada UAP ISK BioSciences/Engage
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Bison	Agro
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Achieve (Liquid Achieve)	ADAMA Canada
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Marengo	Corteva Agriscience
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Nufarm Tralkoxydim	Loveland Products
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Avadex MicroActiv	Nufarm Agriculture
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Fortress MicroActiv	Gowan Canada
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Avadex Liquid EC	Gowan Canada
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Inferno Duo	Gowan Canada
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	MPower X-Pro	Arysta LifeScience
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Express Pro	Agricity
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Luxxur	FMC
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Express FX	Bayer CropScience
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Express SG	FMC
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	MPower Extra	FMC
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	MPower X-Ko	Agricity
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Inferno	Agricity
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Ko-Act	Arysta LifeScience
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Spike	Nufarm Agriculture
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Triton K	Nufarm Agriculture
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Treflan MicroActiv	FMC
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Rival 10G	Gowan Canada
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Bonanza 10G	Nufarm Agriculture
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Treflan Liquid EC	UAP
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Bonanza 480 Liquid	Gowan Canada
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC	Rival EC	UAP
thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	thiencarbazon - 10 g/L SC	MCPA ester - 600 g/L EC		Nufarm Agriculture

Foliar Fungicides

(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
ametoctradin - 300 g/L SC (F)	dimethomorph - 225 g/L SC (F)	benzovindiflupyr - 100 g/L EC		Zampro	BASF Canada
azoxystrobin - 75 g/L SC (F)	propiconazole - 125g/L SC (F)	benzovindiflupyr - 100 g/L EC		Trivapro	Syngenta Canada
azoxystrobin - 75 g/L SC (F)	propiconazole - 125 g/L SC (F)	benzovindiflupyr - 100 g/L EC		Quilt	Syngenta Canada
azoxystrobin - 143 g/L SC (F)	propiconazole - 124 g/L SC (F)	benzovindiflupyr - 100 g/L EC		Topnotch	ADAMA Canada
azoxystrobin - 200 g/L SC (F)	difenciconazole - 125 g/L SC (F)	benzovindiflupyr - 100 g/L EC		Quadrif Top	Syngenta Canada
azoxystrobin - 250 g/L SC	benzovindiflupyr - 100 g/L EC	benzovindiflupyr - 100 g/L EC		Elatus	Syngenta Canada
azoxystrobin - 250 g/L SC	benzovindiflupyr - 100 g/L EC	benzovindiflupyr - 100 g/L EC		Azoshy 250SC	Sharda Crop Chem
azoxystrobin - 250 g/L SC	benzovindiflupyr - 100 g/L EC	benzovindiflupyr - 100 g/L EC		Quadrif	Syngenta Canada
Bacillus amyloliquefaciens - 5x10 <sup>10</sup> spores/mL AS				Double Nickel LC	UAP
Bacillus amyloliquefaciens - 1x10 <sup>10</sup> spores/mL AS				Double Nickel 55	UAP

(Component 1) Active Ingredient** - Formulation	(Component 2) Active Ingredient** - Formulation	(Component 3) Active Ingredient** - Formulation	(Component 4) Active Ingredient** - Formulation	Product	Company
Bacillus mycoides - 40% WG Bacillus subtilis - 1.34% WP Bacillus subtilis - 26.2% WP benzovindiflupyr - 78 g/L EC (F) benzovindiflupyr - 100 g/L EC benzovindiflupyr - 100 g/L EC boscalid - 250 g/L SC (F) boscalid - 70% WG boscalid - 70% WG boscalid - 70% WG chlorothalonil - 500 g/L SC chlorothalonil - 500 g/L SC chlorothalonil - 720 g/L SC chlorothalonil - 90% WG chlorothalonil - 12.5% WG (F) chlorothalonil - 500 g/L SC (DC) chlorothalonil - 500 g/L SC (DC) Coniothyrium minitans - 5.3% WG copper hydroxide - 50% WG copper octanoate - 1.8% SL copper sulphate / copper oxychloride - 53% WP copper sulphate / copper oxychloride - 50% WP cyazofamid - 400 g/L SC cymoxanil - 60% WG	difenoconazole - 117g/L EC (F) azoxystrobin - 75 g/L SC (F) azoxystrobin - 250 g/L SC prothioconazole - 150 g/L SC (F) pyraclostrobin - 250 g/L EC     mancozeb - 62.5% WG (F) metalaxyl-M - 480 g/L EC (DC) metalaxyl-M - 480 g/L EC (DC)	propiconazole - 125g/L SC (F)		LifeGard WG Serenade Soil Serenade OPTI Aprovia Top Trivapro Elatius Cotegra Lance AG Cantus WDG Lance WDG Bravo 500 Bravo ZN Echo 720 Echo 90DF Elixir Ridomil Gold / Bravo Ridomil Gold SL / Bravo Contans WG Parasol WG Cueva Copper 53W  Copper Spray  Ranman 400SC Curzate 60DF  Tanos 50F  Quadris Top Aprovia Top Forum Zampro Tanos 50 DF  Reason 500SC Allegro 500F Luna Tranquility Propulse Evito 480  Fullback 125 SC Nexicor Priaxor Dyax Sercadis Overall 240SC Prodex SC  Rovral Flo Kenja 400SC Elixir Gavel 75 DF Dithane Rainshield	UAP Bayer Bayer Syngenta Canada Syngenta Canada Syngenta Canada BASF Canada BASF Canada BASF Canada BASF Canada Syngenta Canada Syngenta Canada UAP UAP United Phosphorus Inc. Syngenta Canada Syngenta Canada Bayer Nufarm Agriculture Engage Agro Loveland Products Canada Loveland Products Canada UAP Corteva Agriscience Division of DowDuPont Corteva Agriscience Division of DowDuPont Syngenta Canada Syngenta Canada BASF Canada BASF Canada Corteva Agriscience Division of DowDuPont Bayer Syngenta Canada Bayer Bayer Arysta LifeScience Canada FMC Canada BASF Canada BASF Canada BASF Canada BASF Canada ADAMA Canada Sharda CropChem Canada FMC Canada Engage Agro United Phosphorus Gowan Canada Dow AgroSciences
cymoxanil - 25% WG (F)  difenconazole - 125 g/L SC (F) difenoconazole - 117g/L EC (F) dimethomorph - 500 g/L SC dimethomorph - 225 g/L SC (F) famoxadone - 25% WG (F)  fenamidone - 500 g/L SC flazinam - 40% SC fluopyram - 125 g/L SC (F) fluopyram - 200 g/L SC (F) fluxastrobin - 480 g/L SC  flutriafol - 125.08 g/L SC fluxapyroxad - 30 g/L EC (F) fluxapyroxad - 167 g/L SC (F) fluxapyroxad - 250 g/L SC (F) fluxapyroxad - 300 g/L SC iprodione - 240 g/L SC iprodione - 240 g/L SC  iprodione - 240 g/L SC isofetamid - 400 g/L SC mancozeb - 62.5% WG (F) mancozeb - 66.7% WG (F) mancozeb - 75% WG	famoxadone - 25% WG (F)  azoxystrobin - 200 g/L SC (F) benzovindiflupyr - 78 g/L EC (F)  ametoctradin - 300 g/L SC (F) cymoxanil - 25% WG (F)        pyrimethanil - 375 g/L SC (F) prothioconazole - 200 g/L SC (F)   pyraclostrobin - 200 g/L EC (F) pyraclostrobin - 333 g/L SC (F) pyraclostrobin - 250 g/L SC (F)     chlorothalonil - 12.5% WG (F) zoxamide - 8.43% WG (F)	propiconazole - 125 g/L EC (F)		Tanos 50F  Quadris Top Aprovia Top Forum Zampro Tanos 50 DF  Reason 500SC Allegro 500F Luna Tranquility Propulse Evito 480  Fullback 125 SC Nexicor Priaxor Dyax Sercadis Overall 240SC Prodex SC  Rovral Flo Kenja 400SC Elixir Gavel 75 DF Dithane Rainshield	Corteva Agriscience Division of DowDuPont Corteva Agriscience Division of DowDuPont Syngenta Canada Syngenta Canada BASF Canada BASF Canada Corteva Agriscience Division of DowDuPont Bayer Syngenta Canada Bayer Bayer Arysta LifeScience Canada FMC Canada BASF Canada BASF Canada BASF Canada BASF Canada ADAMA Canada Sharda CropChem Canada FMC Canada Engage Agro United Phosphorus Gowan Canada Dow AgroSciences

(Component 1) Active Ingredient** - Formulation	(Component 2) Active Ingredient** - Formulation	(Component 3) Active Ingredient** - Formulation	(Component 4) Active Ingredient** - Formulation	Product	Company
mancozeb - 75% WG				<i>Manzate Pro-Stick</i>	United Phosphorus
mancozeb - 75% WG				<i>Penncozeb 75DF</i>	United Phosphorus
mandipropamid - 250 g/L SC				<i>Revus</i>	Syngenta Canada
Mandipropamid - 250 g/L SC	oxathiopiprolin - 30 g/L SC			<i>Orondis Ultra</i>	Syngenta Canada
metalaxyl-M - 480 g/L EC				<i>Ridomil Gold 480 EC</i>	Syngenta Canada
metalaxyl-M - 480 g/L SL				<i>Ridomil Gold 480 SL</i>	Syngenta Canada
metalaxyl-M - 480 g/L EC (DC)	chlorothalonil - 500 g/L SC (DC)			<i>Ridomil Gold / Bravo</i>	Syngenta Canada
metalaxyl-M - 480 g/L SL (DC)	chlorothalonil - 500 g/L SC (DC)			<i>Ridomil Gold SL / Bravo</i>	Syngenta Canada
metconazole - 90 g/L EC				<i>Caramba</i>	BASF Canada
metconazole - 50% WG				<i>Quash</i>	Valent Canada
metconazole - 80 g/L EC (F)	pyraclostrobin - 130 g/L EC (F)			<i>Twinline</i>	BASF Canada
metiram - 55% WG (F)	pyraclostrobin - 5% WG (F)			<i>Cabrio Plus</i>	BASF Canada
metiram - 80% WG				<i>Polyram DF</i>	BASF Canada
mono/di-potassium salts of phosphorous acid - 53% SL				<i>Confine Extra</i>	Winfield Solutions
mono/di-potassium salts of phosphorous acid - 53% SL					
oxathiopiprolin - 30 g/L SC					
penthiopyrad - 200 g/L SC				<i>Rampart</i>	Loveland Products
					Canada
picoxystrobin - 250 g/L SC				<i>Orondis Ultra</i>	Syngenta Canada
				<i>Fontelis</i>	Corteva Agriscience
propiconazole - 125 g/L EC (F)				<i>Vertisan</i>	Division of DowDuPont
propiconazole - 250 g/L EC				<i>Acapela</i>	Corteva Agriscience
propiconazole - 250 g/L EC					Division of DowDuPont
propiconazole - 250 g/L EC				<i>Nexicor</i>	Corteva Agriscience
propiconazole - 250 g/L EC				<i>Tilt 250E</i>	Division of DowDuPont
propiconazole - 432 g/L EC				<i>Propel</i>	BASF Canada
propiconazole - 418 g/L EC				<i>Propi Super 25 EC</i>	Syngenta Canada
				<i>Bumper 432 EC</i>	Sharda CropChem
				<i>Co-Op Pivot</i>	ADAMA Canada
					Federated Co-operatives Limited
propiconazole - 418 g/L EC				<i>Nufarm Propiconazole</i>	Nufarm Agriculture
propiconazole - 418 g/L EC				<i>Fitness</i>	Loveland Products
					Canada
propiconazole - 418 g/L EC				<i>Pivot 418EC</i>	IPCO
propiconazole - 125 g/L SC (F)				<i>Quilt</i>	Syngenta Canada
propiconazole - 124 g/L SC (F)				<i>Topnotch</i>	ADAMA Canada
propiconazole - 125 g/L SC (F)				<i>Trivapro</i>	Syngenta Canada
prothioconazole - 480 g/L SC				<i>Proline 480SC</i>	Bayer
prothioconazole - 150 g/L SC (F)				<i>Cotegra</i>	BASF Canada
prothioconazole - 125 g/L EC (F)				<i>Prosaro 250EC</i>	Bayer
prothioconazole - 125 g/L EC (F)				<i>Prosaro XTR</i>	Bayer
prothioconazole - 125 g/L EC (F)				<i>Delaro 325 SC</i>	Bayer
prothioconazole - 175 g/L SC (F)				<i>Propulse</i>	Bayer
prothioconazole - 200 g/L SC (F)				<i>Cabrio Plus</i>	BASF Canada
pyraclostrobin - 5% WG (F)				<i>Twinline</i>	BASF Canada
pyraclostrobin - 130 g/L EC (F)				<i>Nexicor</i>	BASF Canada
pyraclostrobin - 200 g/L EC (F)				<i>Headline EC</i>	BASF Canada
pyraclostrobin - 250 g/L EC				<i>MPower Spade</i>	BASF Canada
pyraclostrobin - 250 g/L EC				<i>Lance AG</i>	BASF Canada
pyraclostrobin - 250 g/L EC				<i>Dyax</i>	BASF Canada
pyraclostrobin - 250 g/L EC				<i>Priaxor</i>	BASF Canada
pyraclostrobin - 250 g/L SC (F)				<i>Scala SC</i>	Bayer
pyraclostrobin - 250 g/L SC (F)				<i>Luna Tranquility</i>	Bayer
pyraclostrobin - 333 g/L SC (F)					
pyrimethanil - 400 g/L SC					
pyrimethanil - 375 g/L SC (F)					
propiconazole - 75 g/L SC (F)					
azoxystrobin - 143 g/L SC (F)					
azoxystrobin - 75 g/L SC (F)					
azoxystrobin - 75 g/L SC (F)					
boscalid - 250 g/L SC (F)					
tebuconazole - 125 g/L EC (F)					
tebuconazole - 125 g/L EC (F)					
trifloxystrobin - 150 g/L SC (F)					
fluopyram - 200 g/L SC (F)					
metiram - 55% WG (F)					
metconazole - 80 g/L EC (F)					
propiconazole - 125 g/L EC (F)					
boscalid - 70% WG					
fluxapyroxad - 250 g/L SC (F)					
fluxapyroxad - 167 g/L SC (F)					
fluopyram - 125 g/L SC (F)					
fluxapyroxad - 250 g/L SC (F)					
fluxapyroxad - 167 g/L SC (F)					
fluopyram - 125 g/L SC (F)					
fluxapyroxad - 250 g/L SC (F)					
fluxapyroxad - 167 g/L SC (F)					
fluopyram - 125 g/L SC (F)					
fluxapyroxad - 250 g/L SC (F)					
fluxapyroxad - 167 g/L SC (F)					
fluopyram - 125 g/L SC (F)					
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fluxapyroxad - 167 g/L SC (F)					
fluopyram - 125 g/L SC (F)					
fluxapyroxad - 250 g/L SC (F)					




(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
<i>Reynoutria sachalinensis</i> - 20% SC sodium/potassium/ammonium phosphites - 53.6% SL sulphur - 80% WG tebuconazole - 250 g/L EW tebuconazole - 432 g/L SC tebuconazole - 432 g/L SC tebuconazole - 125 g/L EC (F) tebuconazole - 125 g/L EC (F) trifloxystrobin - 150 g/L SC (F) zoxamide - 8.43% WG (F)				<i>Regalia Maxx</i> <i>Phostrol</i>	Marrone Bio Innovations Engage Agro
				<i>Cosavet DF Edge</i> <i>Folicur 250EW</i> <i>Hornet 432 F</i> <i>Palliser</i> <i>Prosaro 250EC</i> <i>Prosaro XTR</i> <i>Delaro 325 SC</i> <i>Gavel 75 DF</i>	Engage Agro Bayer Nufarm Agriculture Inc. Bayer Bayer Bayer Bayer Gowan Canada
	prothioconazole - 125 g/L EC (F) prothioconazole - 125 g/L EC (F) prothioconazole - 175 g/L SC (F) mancozeb - 66.7% WG (F)				

## Seed Treatments

(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
azoxystrobin - 143 g/L SC azoxystrobin - 1.33% FS azoxystrobin - 1.33% FS	fludioxonil - 143 g/L SC fludioxonil - 3.32% FS fludioxonil - 3.32% FS	difenoconazole - 112 g/L SC metalaxyl-m+s - 2.65% FS metalaxyl-m+s - 2.65% FS	thiabendazole - 26.5% FS thiabendazole: thiamethoxam - 26.5%: 47.6% FS	<i>Stadium</i> <i>Maxim Quattro</i> <i>Cruiser Maxx Corn</i>	Syngenta Canada Syngenta Canada Syngenta Canada
<i>Bacillus subtilis</i> - 26.2% WP captan - 30% FS carbathiin - 87.5 g/L FS	ipconazole - 9.38 g/L FS			<i>Serenade OPTI</i> <i>Agrox FL</i> <i>Rancona VRS</i>	Bayer Norac Concepts Anysta LifeScience Canada
carbathiin - 133.33 g/L FS	metalaxyl - 13.33 g/L FS	ipconazole - 5.0 g/L FS		<i>Rancona Trio</i>	Anysta LifeScience Canada
carbathiin - 15.59% FS	thiram - 13.25% FS			<i>Vitaflo 280</i>	Anysta LifeScience Canada
carbathiin - 15.59% FS carbathiin - 15.59% FS carbathiin - 47.6 g/L FS clothianidin - 600 g/L FS	thiram - 13.25% FS thiram - 13.25% FS thiram - 95.3 g/L FS	imidacloprid - 285.7 g/L FS		<i>Vitaflo SP Fungicide</i> <i>Vitaflo Fungicide</i> <i>Gaucha CSFL</i> <i>Nipsit INSIDE 600</i> <i>Insecticide</i> <i>Poncho 600FS</i> <i>Titan</i> <i>Nipsit SUITE Cereals OF</i> <i>Seed Protectant</i>	IPCO Bayer Valent Canada BASF Canada BASF Canada Valent Canada
clothianidin - 290 g/L FS clothianidin - 600 g/L FS cyantraniliprole - 200 g/L FS	metalaxyl - 9.24 g/L FS metalaxyl - 7.15 g/L FS penflufen - 100 g/L FS	metconazole - 4.92 g/L FS trifloxystrobin - 7.15 g/L FS prothioconazole - 18 g/L FS	penflufen - 10.7 g/L FS	<i>Prosper EverGol</i> <i>Titan Ernesto</i> <i>Verimark</i>	Bayer Bayer Corteva Agriscience Division of DowDuPont Syngenta Canada Corteva Agriscience
cyantraniliprole - 600 g/L FS cyantraniliprole - 625 g/L FS				<i>Fortenza</i> <i>Lumiderm</i>	Division of DowDuPont Syngenta Canada Corteva Agriscience
difenoconazole - 19.4 g/L FS difenoconazole - 112 g/L SC difenoconazole - 77.2 g/L FS difenoconazole - 36.8 g/L FS	fludioxonil - 19.4 g/L FS fludioxonil - 143 g/L SC mandipropamid - 154.3 g/L FS fludioxonil - 7.6 g/L FS	azoxystrobin - 143 g/L SC sedaxane - 77.2 g/L FS metalaxyl-m+s - 9.2 g/L FS	sedaxane - 15.4 g/L FS	<i>Maxim D</i> <i>Stadium</i> <i>Vibrance Ultra Potato</i> <i>Vibrance Quattro</i>	Division of DowDuPont Syngenta Canada Syngenta Canada Syngenta Canada Syngenta Canada



(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
difenoconazole - 123 g/L FS	fludioxonil - 62.5 g/L FS	thiamethoxam - 250 g/L FS		Cruiser Maxx Potato Extreme	Syngenta Canada
difenoconazole - 16 g/L FS	fludioxonil - 1.7 g/L FS	thiamethoxam - 269 g/L FS	metalaxyl- m+s:sedaxane-5:3.4 g/L FS	Helix Vibrance	Syngenta Canada
difenoconazole - 36.9 g/L FS	fludioxonil - 7.7 g/L FS	thiamethoxam - 61.5 g/L FS	metalaxyl-m+s: sedaxane-9.2: 15.4 g/L FS	Cruiser Vibrance Quattro	Syngenta Canada
difenoconazole 16 g/L FS	metalaxyl-m+s - 5 g/L FS	thiamethoxam - 269 g/L FS	fludioxonil: sedaxane- 1.7 g/L : 3.4 g/L FS	Visivio	Syngenta Canada
dimethyl benzyl ammonium chloride - 10% Liquid				General Storage	Ag-Services
ethaboxam - 383 g/L FS	fludioxonil - 25 g/L FS	metalaxyl-m+s - 37.5 g/L	sedaxane - 50 g/L FS	Disinfectant	Valent Canada
fenamidone - 500g/L SC				INTEGO Solo Fungicide	Syngenta Canada
fludioxonil - 0.5% DS				Vibrance Maxx with	Syngenta Canada
fludioxonil - 19.4 g/L FS	difenoconazole - 19.4 g/L FS			INTEGO Seed Treatment	Bayer
fludioxonil - 143 g/L SC	difenoconazole - 112 g/L SC	azoxystrobin - 143 g/L SC		Reason 500 SC	Syngenta Canada
fludioxonil - 62.5 g/L FS	difenoconazole - 123 g/L FS	thiamethoxam - 250 g/L FS		Maxim D	Syngenta Canada
				Stadium	Syngenta Canada
fludioxonil - 0.5% DS	mancozeb - 5.7% DS			Cruiser Maxx Potato	Syngenta Canada
fludioxonil - 0.73% FS	metalaxyl-m+s - 1.10% FS			Extreme	Syngenta Canada
fludioxonil - 25 g/L FS	metalaxyl-m+s - 37.5 g/L FS			Maxim MZ PSP	Syngenta Canada
fludioxonil - 0.73% FS	metalaxyl-m+s - 1.10% FS	sedaxane - 50 g/L FS		Apron Maxx RTA	Syngenta Canada
fludioxonil - 0.73% FS	metalaxyl-m+s - 1.10% FS	sedaxane - 500 g/L FS		Vibrance Maxx RFC	Syngenta Canada
fludioxonil - 7.6 g/L FS	metalaxyl-m+s - 9.2 g/L FS	sedaxane - 15.4 g/L FS	difenoconazole - 36.8 g/L FS	Vibrance Maxx RTA	Syngenta Canada
fludioxonil - 25 g/L FS	metalaxyl-m+s - 37.5 g/L FS	sedaxane - 50 g/L FS	ethaboxam - 383 g/L FS	Vibrance Quattro	Syngenta Canada
				Vibrance Maxx RFC with	Syngenta Canada
				INTEGO Seed Treatment	Syngenta Canada
fludioxonil - 25 g/L FS	metalaxyl-m+s - 20 g/L FS	thiabendazole - 150 g/L FS		Apron Advance	Syngenta Canada
fludioxonil - 3.32% FS	metalaxyl-m+s - 2.65% FS	thiabendazole - 26.5% FS	azoxystrobin - 1.33% FS	Maxim Quattro	Syngenta Canada
fludioxonil - 1.12% FS	metalaxyl-m+s - 1.7% FS	thiamethoxam - 22.6% FS	azoxystrobin;	Cruiser Maxx Beans	Syngenta Canada
fludioxonil - 3.32% FS	metalaxyl-m+s - 2.65% FS	thiamethoxam - 47.6% FS	thiabendazole- 1.33%: 26.5% FS	Cruiser Maxx Corn	Syngenta Canada
			sedaxane - 500 g/L FS		Syngenta Canada
fludioxonil - 0.73% FS	metalaxyl-m+s - 1.1% FS	thiamethoxam - 47.6%	sedaxane - 500 g/L FS	Cruiser Maxx Vibrance	Syngenta Canada
				Pulses	Syngenta Canada
fludioxonil - 1.12% FS	metalaxyl-m+s - 1.7% FS	thiamethoxam - 22.6% FS	sedaxane - 500 g/L FS	Cruiser Maxx Vibrance	Syngenta Canada
				Beans	Syngenta Canada
fludioxonil - 1.7 g/L FS	metalaxyl-m+s - 5 g/L FS	thiamethoxam - 269 g/L FS	sedaxane: difenoconazole- 3.4:16 g/L FS	Helix Vibrance	Syngenta Canada
fludioxonil - 7.7 g/L FS	metalaxyl-m+s - 9.2 g/L FS	thiamethoxam - 61.5 g/L FS	sedaxane: difenoconazole- 15.4:36.9 g/L FS	Cruiser Vibrance Quattro	Syngenta Canada
fludioxonil - 1.7 g/L FS	metalaxyl-m+s - 5 g/L FS	thiamethoxam - 269 g/L FS	difenoconazole: sedaxane - 16 g/L: 3.4g/L FS	Visivio	Syngenta Canada
					Syngenta Canada
fluxapyroxad - 17 g/L FS	metalaxyl - 10 g/L FS	pyraclostrobin - 17 g/L FS	metalaxyl - 10 g/L FS	Insure Pulse	BASF Canada
fluxapyroxad - 8.35g/L FS	pyraclostrobin - 16.7 g/L FS	triticonazole - 16.7 g/L FS		Insure Cereal FX4	BASF Canada
hydrogen peroxide - 27% LS				StorOx	Biosafe Systems
imidacloprid - 240 g/L FS				Admire SPT	Bayer
imidacloprid - 240 g/L FS				Alias 240SC	ADAMA Canada
imidacloprid - 600 g/L FS				Sombriero 600FS	ADAMA Canada
imidacloprid - 600 g/L FS				Stress Shield 600	Bayer
imidacloprid - 285.7 g/L FS	carbathiin - 47.6 g/L FS	thiram - 95.3 g/L FS	prothioconazole-15.4 g/L FS	Gaucha CSFL	Bayer
imidacloprid - 600 g/L FS	metalaxyl - 6.2 g/L FS	tebuconazole - 3.0 g/L FS	Raxil PRO Shield		Bayer CropScience
imidacloprid - 600 g/L FS	metalaxyl - 317 g/L FS	penflufen - 154 g/L FS	trifloxystrobin - 154 g/L FS	Trilex EverGol Shield	Bayer

 (Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
ipiconazole - 9.38 g/L FS	carbathiin - 87.5 g/L FS			Rancona VRS	Arysta LifeScience Canada
ipiconazole - 5.0 g/L FS	carbathiin - 133.33 g/L FS	metalaxyl - 13.33 g/L FS		Rancona Trio	Arysta LifeScience Canada
ipiconazole - 4.61 g/L FS	metalaxyl - 6.15 g/L FS			Cover 2	Loveland Products Canada Inc.
ipiconazole - 4.61 g/L FS	metalaxyl - 6.15 g/L FS			Rancona Pinnacle	Arysta LifeScience Canada
mancozeb - 16% DS				Solan MZ	Norac Concepts
mancozeb - 16% DS				Tubersel	Norac Concepts
mancozeb - 16% DS				Potato ST16	Wilbur-Ellis Co.
mancozeb - 5.7% DS				Maxim MZ PSP	Syngenta Canada
mandipropamid - 250 g/L FS	fludioxonil - 0.5% DS			Revus	Syngenta Canada
mandipropamid - 154.3 g/L FS	difenoconazole - 77.2 g/L FS	sedaxane - 77.2 g/L FS		Vibrance Ultra Potato	Syngenta Canada
metalaxyl - 317 g/L FS				Allegiance FL	Bayer
metalaxyl - 317 g/L FS				Belmont 2.7FS	Arysta LifeScience Canada
metalaxyl - 317 g/L FS	ipiconazole - 4.61 g/L FS			Trilex Component B	Bayer
metalaxyl - 6.15 g/L FS	ipiconazole - 4.61 g/L FS			Cover 2	Loveland Products Canada Inc.
metalaxyl - 6.15 g/L FS	ipiconazole - 4.61 g/L FS			Rancona Pinnacle	Arysta LifeScience Canada
metalaxyl - 13.33 g/L FS	ipiconazole - 5.0 g/L FS	carbathiin - 133.33 g/L FS		Rancona Trio	Arysta LifeScience Canada
metalaxyl - 46.5 g/L FS	metconazole 23.2 g/L FS			Metlock CT	Valent Canada
metalaxyl - 9.24 g/L FS	metconazole - 4.92 g/L FS	clothianidin - 30.7 g/L FS		Nipsit SUITE Cereals OF	Valent Canada
				Seed Protectant	
metalaxyl - 61.4 g/L FS	prothioconazole - 76.8 g/L FS	penflufen - 38.4 g/L FS		EverGol Energy	Bayer
metalaxyl - 10 g/L FS	pyraclostrobin - 17 g/L FS	triticonazole - 17 g/L FS		Insure Cereal	BASF Canada
metalaxyl - 10 g/L FS	pyraclostrobin - 16.7 g/L FS	triticonazole - 16.7 g/L FS	fluzapyroxad - 8.35 g/L FS	Insure Cereal FX4	BASF Canada
metalaxyl - 10 g/L FS	pyraclostrobin - 17 g/L FS	pyraclostrobin - 17 g/L FS		Insure Pulse	BASF Canada
metalaxyl - 7.15 g/L FS	trifloxystrobin - 7.15 g/L FS	clothianidin - 290 g/L FS	penflufen - 10.7 g/L FS	Prosper EverGol	Bayer
metalaxyl - 317 g/L FS	trifloxystrobin - 154 g/L FS	penflufen - 154 g/L FS		Trilex EverGol	Bayer
metalaxyl - 317 g/L FS	trifloxystrobin - 154 g/L FS	penflufen - 154 g/L FS	imidacloprid - 600 g/L FS	Trilex EverGol Shield	Bayer
metalaxyl - 6.6 g/L FS	tebuconazole - 5 g/L FS			Raxil MD	Bayer
metalaxyl - 6.2 g/L FS	tebuconazole - 3.0 g/L FS	imidacloprid - 600 g/L FS	prothioconazole - 15.4 g/L FS	Raxil PRO Shield	Bayer CropScience
metalaxyl - 6.2 g/L FS	tebuconazole - 3.0 g/L FS	prothioconazole - 15.4 g/L FS		Raxil PRO	Bayer
metalaxyl-m+s - 1.10% FS	fludioxonil - 0.73% FS			Apron Maxx RTA	Syngenta Canada
metalaxyl-m+s - 37.5 g/L FS	fludioxonil - 25 g/L FS	sedaxane - 50 g/L FS		Vibrance Maxx RFC	Syngenta Canada
metalaxyl-m+s - 1.10% FS	fludioxonil - 0.73% FS	sedaxane - 500 g/L FS		Vibrance Maxx RTA	Syngenta Canada
metalaxyl-m+s - 9.2 g/L FS	fludioxonil - 7.6 g/L FS	sedaxane - 15.4 g/L FS	difenoconazole - 36.8 g/L FS	Vibrance Quattro	Syngenta Canada
metalaxyl-m+s - 37.5 g/L FS	fludioxonil - 25 g/L FS	sedaxane - 50 g/L FS	ethaboxam - 383 g/L FS	Vibrance Maxx RFC with	Syngenta Canada
				INTEGO Seed Treatment	Canada
metalaxyl-m+s - 20 g/L FS	fludioxonil - 25 g/L FS	thiabendazole - 150 g/L FS		Apron Advance	Syngenta Canada
metalaxyl-m+s - 2.65% FS	fludioxonil - 3.32% FS	thiabendazole - 26.5% FS	azoxystrobin - 1.33% FS	Maxim Quattro	Syngenta Canada
metalaxyl-m+s - 1.7% FS	fludioxonil - 1.12% FS	thiamethoxam - 22.6% FS	azoxystrobin: thiabendazole	Cruiser Maxx Beans	Syngenta Canada
metalaxyl-m+s - 2.65% FS	fludioxonil - 3.32% FS	thiamethoxam - 47.6% FS	- 1.33%; 26.5% FS	Cruiser Maxx Corn	Syngenta Canada
		thiamethoxam - 269 g/L FS	sedaxane: difenoconazole-	Helix Vibrance	Syngenta Canada
metalaxyl-m+s - 5 g/L FS	fludioxonil - 1.7 g/L FS		34:16 g/L FS		
metalaxyl-m+s - 9.2 g/L FS	fludioxonil - 7.7 g/L FS	thiamethoxam - 61.5 g/L FS	sedaxane: difenoconazole-	Cruiser Vibrance Quattro	Syngenta Canada
			15.4:36.9 g/L FS		

(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
metalaxyl-m+s - 5 g/L FS	fludioxonil - 1.7 g/L FS	thiamethoxam - 269 g/L FS	difenoconazole: sedaxane - 16 g/L; 3.4 g/L FS	Visivio	Syngenta Canada
metalaxyl-m+s - 1.1% FS	fludioxonil - 0.73% FS	thiamethoxam - 47.5% FS	sedaxane - 500 g/L FS	Cruiser Maxx	Syngenta Canada
metalaxyl-m+s - 1.7% FS	fludioxonil - 1.12% FS	thiamethoxam - 22.6% FS	sedaxane - 500 g/L FS	Vibrance Pulses Cruiser Maxx	Syngenta Canada
metconazole - 23.2 g/L FS	metalaxyl - 46.5 g/L FS	clothianidin - 30.7 g/L FS		Vibrance Beans	Valent Canada
metconazole - 4.92 g/L FS	metalaxyl - 9.24 g/L FS			Metlock CT	
mono/di-potassium salts of phosphorous acid - 53% SC				Nipsitl SUITE Cereals OF	Valent Canada
phosphorous acid - 53% SC				Seed Protectant	
Oxathiapiprolin - 200g/L FS				Confine Extra	Winfield Solutions
penflufen - 10.7 g/L FS					
penflufen - 15.4 g/L FS				Rampart	Loveland Products
penflufen - 15.4 g/L FS					
penflufen - 100 g/L FS				Lumisena	Canada
penflufen - 100 g/L FS					
penflufen - 38.4 g/L FS				Prosper EverGol	Division of DowDuPont
penflufen - 15.4 g/L FS				Trilex EverGol	
prothioconazole - 76.8 g/L FS				Trilex EverGol Shield	Bayer
prothioconazole - 15.4 g/L FS				Emesto Silver	
prothioconazole - 15.4 g/L FS				Titan Emesto	Bayer
prothioconazole - 18 g/L FS				EverGol Energy	
prothioconazole - 18 g/L FS				Trilex Component A	Bayer
prothioconazole - 18 g/L FS				EverGol Energy	
pyraclostrobin - 17 g/L FS				Raxil PRO	Bayer
pyraclostrobin - 17 g/L FS				Emesto Silver	
pyraclostrobin - 16.7 g/L FS				Raxil PRO Shield	Bayer
saponins of <i>Chenopodium quinoa</i> - 63.02% WS				Emesto Silver	
sedaxane - 500 g/L FS				Titan Emesto	Bayer
sedaxane - 15.4 g/L FS				Insure Cereal	
sedaxane - 3.4 g/L FS				Insure Pulse	BASF Canada
sedaxane - 15.4 g/L FS				Insure Cereal FX4	
sedaxane - 15.4 g/L FS				Heads Up Plant Protectant	Heads Up Plant
sedaxane - 15.4 g/L FS				Protectants	
sedaxane - 500 g/L FS				Vibrance 500FS	Syngenta Canada
sedaxane - 3.4 g/L FS				Vibrance Quattro	
sedaxane - 50 g/L FS				Helix Vibrance	Syngenta Canada
sedaxane - 500 g/L FS					
sedaxane - 50 g/L FS				Cruiser Vibrance Quattro	Syngenta Canada
sedaxane - 50 g/L FS				Visivio	
sedaxane - 50 g/L FS				Vibrance Maxx RFC	Syngenta Canada
sedaxane - 50 g/L FS				Vibrance Maxx RTA	
sedaxane - 50 g/L FS				Vibrance Maxx RFC with	Syngenta Canada
sedaxane - 50 g/L FS				INTEGO Seed Treatment	
sedaxane - 77.2 g/L FS				Cruiser Maxx	Syngenta Canada
sedaxane - 500 g/L FS				Vibrance Pulses	
sedaxane - 500 g/L FS				Cruiser Maxx	Syngenta Canada
sedaxane - 500 g/L FS				Vibrance Beans	
sedaxane - 500 g/L FS				Rascendo	Syngenta Canada
sedaxane - 500 g/L FS				Visivio	
sedaxane - 500 g/L FS					Syngenta Canada
sedaxane - 500 g/L FS					



(Component 1) Active Ingredient* - Formulation	(Component 2) Active Ingredient* - Formulation	(Component 3) Active Ingredient* - Formulation	(Component 4) Active Ingredient* - Formulation	Product	Company
tebuconazole - 5 g/L FS	metalaxyl - 6.6 g/L FS	imidacloprid - 600 g/L FS	prothioconazole - 15.4 g/L FS	<i>Raxil MD</i>	Bayer
tebuconazole - 3.0 g/L FS	metalaxyl - 6.2 g/L FS			<i>Raxil PRO Shield</i>	Bayer
tebuconazole - 3.0 g/L FS	metalaxyl - 6.2 g/L FS	prothioconazole - 15.4 g/L FS		<i>Raxil PRO</i>	Bayer
thiabendazole - 500 g/L SC				<i>Mertect SC</i>	Syngenta Canada
thiabendazole - 150 g/L FS	metalaxyl-m+s - 20 g/L FS	fludioxonil - 25 g/L FS	azoxystrobin - 1.33% FS	<i>Apron Advance</i>	Syngenta Canada
thiabendazole - 26.5% FS	metalaxyl-m+s - 2.65% FS	fludioxonil - 3.32% FS	azoxystrobin:	<i>Maxim Quattro</i>	Syngenta Canada
thiabendazole - 26.5% FS	metalaxyl-m+s - 2.65% FS	fludioxonil - 3.32% FS	thiamethoxam - 1.33%; 47.6% FS	<i>Cruiser Maxx Corn</i>	Syngenta Canada
thiamethoxam - 240 g/L FS				<i>Actara 240SC</i>	Syngenta Canada
thiamethoxam - 47.6% FS	fludioxonil - 62.5 g/L FS	difenoconazole - 123 g/L FS		<i>Cruiser 5FS</i>	Syngenta Canada
thiamethoxam - 250 g/L FS				<i>Cruiser Maxx</i>	Syngenta Canada
thiamethoxam - 22.6% FS	fludioxonil - 1.12% FS	metalaxyl-m+s - 1.7% FS	azoxystrobin: thiabendazole	<i>Potato Extreme</i>	Syngenta Canada
thiamethoxam - 47.6% FS	fludioxonil - 3.32% FS	metalaxyl-m+s - 2.65% FS	- 1.33;26.5% FS	<i>Cruiser Maxx Beans</i>	Syngenta Canada
thiamethoxam - 22.6% FS	fludioxonil - 1.12% FS	metalaxyl-m+s - 1.7% FS	sedaxane - 500 g/L FS	<i>Cruiser Maxx Corn</i>	Syngenta Canada
thiamethoxam - 47.6% FS	fludioxonil - 0.73% FS	metalaxyl-m+s - 1.1% FS	sedaxane - 500 g/L FS	<i>Cruiser Maxx</i>	Syngenta Canada
thiamethoxam - 61.5 g/L FS	fludioxonil - 7.7 g/L FS	metalaxyl-m+s - 9.2 g/L FS	sedaxane: difenoconazole - 15.4;36.9 g/L FS	<i>Vibrance Beans</i>	Syngenta Canada
thiamethoxam - 269 g/L FS	fludioxonil - 1.7 g/L FS	metalaxyl-m+s - 5 g/L FS	sedaxane: difenoconazole - 3.4;16 g/L FS	<i>Cruiser Maxx</i>	Syngenta Canada
thiamethoxam - 269 g/L FS	fludioxonil - 1.7 g/L FS	sedaxane - 3.4 g/L FS	difenoconazole: metalaxyl m+s - 16 g/L; 5g/L FS	<i>Vibrance Pulses</i>	Syngenta Canada
				<i>Cruiser Vibrance Quattro</i>	Syngenta Canada
thiophanate-methyl - 10% DS				<i>Helix Vibrance</i>	Syngenta Canada
thiram - 13.25% FS	carbathiin - 15.59% FS			<i>Visivio</i>	Syngenta Canada
thiram - 13.25% FS	carbathiin - 15.59% FS			<i>Senator PSPT</i>	Nippon Soda Company
thiram - 95.3 g/L FS	carbathiin - 15.59% FS			<i>Vitafla 280</i>	Arysta LifeScience
trifloxystrobin - 7.15 g/L FS	carbathiin - 47.6 g/L FS			<i>Vitafla SP Fungicide</i>	Canada
trifloxystrobin - 154 g/L FS	metalaxyl - 7.15 g/L FS	imidacloprid - 285.7 g/L FS		<i>Vitafla Fungicide</i>	IPCO
trifloxystrobin - 154 g/L FS	metalaxyl - 317 g/L FS	clothianidin - 290 g/L FS		<i>Gaucha CSFL</i>	IPCO
trifloxystrobin - 154 g/L FS	penflufen - 154 g/L FS	penflufen - 154 g/L FS	penflufen - 10.7 g/L FS	<i>Prosper EverGol</i>	Bayer
trifloxystrobin - 17 g/L FS	pyraclostrobin - 17 g/L FS	metalaxyl - 10 g/L FS		<i>Trilex EverGol</i>	Bayer
triticonazole - 16.7 g/L FS	fluxapyroxad - 8.35g/L FS	metalaxyl - 10 g/L FS	pyraclostrobin - 16.7 g/L FS	<i>Trilex Component A</i>	Bayer
				<i>Insure Cereal</i>	BASF Canada
				<i>Insure Cereal FX4</i>	BASF Canada

## Insecticides

Product	Active Ingredient	Formulation	Company
<i>Actara 240 SC/Actara 25 WG</i>	thiamethoxam	240 g/L SC, 25% WG	Syngenta Canada
<i>Admire 240 / SPT</i>	imidacloprid	240 g/L SC	Bayer CropScience
<i>Alias 240 SC</i>	imidacloprid	240 g/L SC	Loveland Products Canada
<i>Ambush</i>	permethrin	500 g/L EC	Amvac Chemical Corp.
<i>Assail</i>	acetamiprid	70% WP	Engage Agro / Nippon Soda Co. Ltd.
<i>Beleaf</i>	flonicamid	50% WP	FMC Corporation
<i>Capture</i>	bifenthrin	240 g/L	FMC Corporation
<i>Citadel 480EC</i>	chlorpyrifos	480 g/L EC	IPCO
<i>Closer</i>	sulfoxaflor	240 g/L	Dow AgroSciences
<i>Clutch</i>	clothianidin	50% WG	Valent Canada Inc.
<i>Concept</i>	imidacloprid: deltamethrin	75 g/L SC : 10 g/L SC	Bayer CropScience
<i>Coragen</i>	chlorantraniliprole	200 g/L SC	FMC Corporation
<i>Cygon 480EC/Cygon 480-Ag</i>	dimethoate	480 g/L EC	IPCO, FMC Corporation
<i>Decis</i>	deltamethrin	50 g/L EC	Bayer CropScience
<i>Delegate</i>	spinetoram	25% SG	Dow AgroSciences
<i>Dibrom</i>	naled	864 g/L EC	Loveland Products Canada
<i>Dipel 2X DF</i>	<i>Bacillus thuringiensis</i>	32 billion CLU/kg WG	Valent BioSciences
<i>Eco Bran</i>	carbaryl	2% spreadable bran bait	Peacock Industries
<i>Entrust</i>	spinosad	80% WP	Dow AgroSciences
<i>Fulfill</i>	pymetrozine	50% WG	Syngenta Canada
<i>Imidan</i>	phosmet	70% WP	Gowan Canada
<i>Insecto</i>	diatomaceous earth	90%	Natural Insecto Products Inc.
<i>Lagon 480E</i>	dimethoate	480 g/L EC	Loveland Products Canada
<i>Lannate</i>	methomyl	90% SP	E. I. duPont Canada
<i>Lorsban 4E</i>	chlorpyrifos	480 g/L EC	Dow AgroSciences
<i>Mako</i>	cypermethrin	407 g/L EC	Engage Agro Corp.
<i>Malathion 85E / 500</i>	malathion	85%, 500 g/L EC	Loveland Products Canada, IPCO
<i>Matador</i>	lambda-cyhalothrin	120 g/L EC	Syngenta Canada
<i>Minecto Duo</i>	thiamethoxam: cyantraniliprole	20% : 20% WG	Syngenta Canada
<i>Movento 240 SC</i>	spirotetramat	240 g/L SC	Bayer CropScience
<i>MPOWER Krypton</i>	chlorpyrifos	480 g/L	NewAgco Inc.
<i>Nolo Bait</i>	spores of <i>Nosema (Paranosema) locustae</i> Canning	Minimum of 2.2x10 <sup>6</sup> on coated wheat bran	M&R Durango, Inc.
<i>Nufos 4E</i>	chlorpyrifos	480 g/L EC	FMC Corporation
<i>Oberon</i>	spiromesifen	240 g/L SC	Bayer CropScience
<i>Orthene</i>	acephate	75% SP	Loveland Products Canada
<i>Perm-UP</i>	permethrin	384 g/L EC	United Phosphorous Inc
<i>Phostoxin</i>	aluminum phosphide	55% tablets	Degesch America Inc
<i>Poleci</i>	Delthamethrin	25 g/L EC	Bayer CropScience
<i>Pounce</i>	permethrin	384 g/L EC	FMC Corporation
<i>Protect-It</i>	diatomaceous earth	90%	Hedley Technologies Ltd
<i>Pyrifos 15G</i>	chlorpyrifos	15% G	Gowan Canada
<i>Pyrinex 480EC</i>	chlorpyrifos	480 g/L EC	ADAMA Canada
<i>Rimon 10 EC</i>	novaluron	10% EC	Platform Specialty Products
<i>Sevin XLR</i>	carbaryl	466 g/L	Univar Canada Ltd.
<i>Sharda chlorpyrifos 480 EC</i>	chlorpyrifos	480 g/L EC	Sharda CropChem Canada
<i>Ship 250 EC</i>	cypermethrin	250 g/L	Sharda CropChem Canada
<i>Silencer 120 EC</i>	lambda-cyhalothrin	120 g/L EC	ADAMA Canada
<i>Sluggo Professional</i>	ferric phosphate	0.76 % granules	Engage Agro Corp.
<i>Success 480 SC</i>	spinosad	480 g/L SC	Dow AgroSciences
<i>Superior 70 oil</i>	mineral oil	99%	Loveland Products Canada, N.M. Bartlett Inc.
<i>Tempo</i>	cyfluthrin	20% WP	Bayer CropScience
<i>Thimet 20G</i>	phorate	20% G	Amvac Chemical
<i>UP-Cyde</i>	cypermethrin	250 g/L EC	United Phosphorous Inc
<i>Voliam Xpress</i>	lambda-cyhalothrin:	50 g/L: 100 g/L	Syngenta Canada
<i>Warhawk</i>	chlorantraniliprole chlorpyrifos	480 g/L EC	Loveland Products Canada



## Key to Product Pages

### Pesticide Product Name

This field lists the pesticide product name. Where there is only one product the commercial “trade” name is given. Where more than one company sells pesticides with the same combination of active ingredients the “generic” (active ingredient) name is given.

If the active ingredients are all in a common formulation (liquid, granule, etc.) the generic name will appear as ‘Ingredient A/ Ingredient B’ and if the active ingredients are in separate containers to be mixed in the sprayer the names are given as ‘Ingredient A + Ingredient B’.

### Pesticide Resistance Group #

*This area will the pesticide active ingredient(s) to the mode of action that ingredient uses and refer to a page number where more information can be found.*

### Company:

This section identifies the company (or companies) that manufacture or market this crop protection product (or generic equivalents) in Canada as well as the PCP# for that (those) product(s). See page 7 for more information on PCP numbers. PCP#s are given as ‘(PCP#XXXXX)’ where XXXXX is a four or five digit number unique to that product. In some cases, where there are multiple components with separate PCP numbers, the PCP number will be provided below under ‘Formulation:’

### Formulation:

This section gives information on the active ingredient and its concentration in the product as well as information on formulation type and packaging types and configurations. Formulation strength (or concentrations) are given in % by weight for dry formulations and g/L for liquid formulations. PCP numbers may also be give for some products (see above).

### Crops and Staging:\*

This section indicates on which crops the product may be used and what stage of crop development it should be applied at. Rates may also be included in this section if they vary between crop types or crop stage.

*\*\*This section will also indicate which crops are registered under the User Requested Minor Use Label Expansion (URMULE) program. Some companies, as a condition of placing these minor crops on their labels request, that users of their product on these crops do so at their own risk because the registration was approved with information the company did not produce.*

*These crops will be flagged separately from the main crops.*

### Pest (Diseases, Insects, Weeds) and Staging:

This section indicates the pests (Diseases, Insects, or Weeds) that are indicated on the product label as controlled or suppressed, as well as any specifics on the timing of application relative to the pest stage if required. Rates may also be included in this section if they differ for different pests or stage of pest.

### Rates:

The rates provided in this section are given in the amount of product required per acre and the number of acres treated per package unit where possible. This section will also indicate any adjuvants that are to be used in conjunction with the product and the rate of that adjuvant.

This section will not be present if rates have been integrated into either of the previous **Crops** or **Pest** sections.

## Application Information:

- **Water Volume:** This section indicates the minimum carrier water volume to be used to apply the product. Using less than the recommended minimum carrier application volume can negatively affect pesticide performance, particularly with contact pesticides and when using low drift nozzles.
- **Nozzles and Pressure:** This section indicates if there are any particular nozzles that should or should not be used to apply the product. Pressures indicated reflect those for conventional nozzles. Low drift nozzles may require higher pressures for proper performance. A general statement of "Use nozzles and pressures designed to deliver proper coverage with **ASABE** \_\_\_\_ droplets" indicating the ideal droplet sizes to allow for the combination of lowest drift potential and best performance from the pesticide. ASABE refers to the American Society of Agricultural Engineers who have set standards a series of droplet measurements (in microns or micrometres) that classify droplet sizes from 'fine' to 'very coarse'.

## How it Works:

This section typically refers to the page where a general description of the various modes of action of either herbicide, fungicides or insecticides.

## Effects of Growing Conditions:

This section summarizes any adverse conditions that will affect the biological function of the crop or the target pest and therefore possibly impact the product's performance. In most cases both crop and target pest must be growing or functioning normally for pesticides to provide expected performance and/or crop tolerance. Adverse weather conditions such as extreme heat, cold, drought or flooding can slow or stop the biological processes in the crop or pest. These biological processes in the crop allow the pesticide to be degraded quickly. If biological processes that are attacked by the pesticide, and under normal conditions would kill the pest, are not functioning normally the pest may be able to rid itself of the pesticide before dying and recover from the application.

## Tank Mixes:

This section indicates which other pesticides the pesticide label indicates are registered for use as tank mix combinations with this pesticide.

Common mixes may include:

### Herbicides:

- (Subtitles may indicate specific crops or condition restrictions:)

### Insecticides:

### Fungicides:

### Fertilizers:

There may be additional pesticides that are registered but not listed on this product's label. Other pesticides may have this product listed as a mix option on their labels. The note below (**in bold**) directs users to a chart inside the back cover that show all available mixes for this pesticide. The product listed on the left column of the chart is the product that supports the mix. Mixes supported by both products are marked with an 'X'. Mixes supported by only one of the products is indicated by an arrow pointing to the left column.

*Included in the tank mix section in non-bolded italics may be any precautions against the mixing of pesticides which will have adverse reactions such as crop injury, reduced pest control or unusual increased danger in the use of the product.*

**Note: The above mixes are those listed on the pesticide label only. To check for other possible mixes see the blue fold out chart inside the back cover.**

## Restrictions:

Since most pesticides have a capacity to injure neighboring plants, wildlife or people, they will come with restrictions on their use in order to prevent this unintentional damage. Misuse of pesticides may result in as little as temporary or superficial damage to plants or a slight irritation to the eyes or nose, or could also result in poor performance of the pesticide, severe injury and/or yield loss to very sensitive plants and/or unacceptable residues in agricultural commodities, and/or serious illness or death of non-target organism or people. It is important to comply with product restrictions in order to minimize the impact of the pesticide used on non-target organisms and people. A selection of common restrictions and precautions found on product labels are provided in this section, **but it is important to read the label carefully in order to understand how to use the product properly.**

- **Rainfall:** This section indicates the required delay between application and rainfall to avoid reductions in the performance of the product or the unintentional movement of the product.
- **Re-entry:** This section indicates when it is safe for a person to re-enter treated field following an application of a particular pesticide without the same personal protection used to apply the product.
- **Resistance Management:** This section highlights products where an increased risk of the target pests developing resistance to the group of products (typically fungicides) has been identified. If no specific risk has been identified the reader is referred to a general resistance section. All pesticides have some risk of the target pest developing resistance. Rotating pesticide groups using as many different resistance groups as possible in the rotation is one way to avoid or delay resistance development.
- **Grazing:** This section indicates whether and how soon treated crops may be grazed by livestock or otherwise fed to livestock. This restriction is in place to avoid residues of the pesticide from being detected in milk or meat from animals consuming forage, greenfeed or straw from treated crops or forage.
- **Pre-harvest interval:** Is the time that must be left between application of a pesticide and the harvest of a crop in order to prevent greater than allowable residues of the pesticide in the harvested material. Harvest is the cutting of the crop (i.e. combining or hay cut) or removal of the harvestable material from the plant (i.e. picking fruit or stripper header). Maximum Residue Limits (MRLs) are set for commodities based on registered rates and staging of pesticides used in the production of those commodities. Disregarding these intervals can result in residues over the MRLs, which can lead to market disruptions.
- **Re-cropping:** This section indicates how soon specific crops may be seeded into treated fields. Failure to adhere to these delays could result in injury to the following crop.
- **Aerial Application:** This section indicates whether the product may be applied by aircraft and any special conditions that may be necessary.
- **Labelling:** In addition to other precautions and warnings, seed treatment products will also have statements about how seed treated with the product should be labeled.
- **Storage:** This section indicates how the product must be stored. As a general rule, unused pesticides should always be stored in their original containers in a secure, dry area, away from other pesticides, food or feed.
- **Buffer Zones:** This section will indicate any setback distances that are required from sensitive aquatic or upland habitats. Newer labels may indicate that these distances are from the downwind edge of the boom but older labels may not. Examples of aquatic habitats are lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands. Examples of terrestrial habitats are grasslands, forested areas, shelter belts, woodlots, hedgerows, riparian areas and shrublands.

In addition to the set back or 'buffer' distances indicated on product labels, provincial environment departments may also have additional restrictions or requirements for permits to apply pesticides to or near water. Check with the provincial environment department/ministry for more information.

## Tank Cleaning:

This section describes the measures that are required to properly clean out spray tanks. A general overview of sprayer cleaning is given on page 12, but products where there is a high risk of crop damage as a result of very low level contamination of the spray solution, will have specific measures indicated.

## Hazard Rating:

This section indicates the relative toxicity of the pesticide, formulations or components. For an explanation of the symbols used here see pages 7-8. An additional symbol that is used that is not a standard symbol is the (!) exclamation mark which indicates an otherwise undefined risk factor (i.e. irritation).

Example:



Caution – Eye Irritant

Some older products have not had hazard ratings developed, while other products have very low toxicity and do not have hazard warnings. Even in the absence of a hazard rating users should wear a minimum of nitrile gloves and an apron as well as long sleeved apparel during mixing and avoid unnecessary exposure.

# Weed Control

The use of herbicides to control weeds is often important in determining the success or failure of a crop. However, many other practices can be implemented before and after a herbicide application to help reduce weed competition. The use of these practices is termed Integrated Weed Management.

## Integrated Weed Management

A farming system that uses an array of inter-dependent cultural, biological, mechanical and herbicidal weed control practices is implementing Integrated Weed Management (IWM). It is essential that IWM involve a variety of tools including the rotation and/or mixes of available herbicide groups, ensuring that weeds are exposed to a diverse range of control mechanisms. The goal of IWM is to improve the health and vigour of crops so that they may out-compete weeds emerging in the stand. This helps to reduce selection for resistance to any single control agent and to delay or prevent the development of herbicide resistant weeds.

Practicing IWM does not mean abandoning chemical weed control, just relying on it less exclusively. For example:

- You may decide to choose a taller wheat variety or a tall, viny pea variety for a certain field. These crop selections will compete strongly with weeds, possibly allowing you to skip a spray operation in more competitive crops.
- You could insert a short-term forage crop into your crop rotation. Studies show that short-term (3 year) alfalfa stands can reduce wild oat and green foxtail populations by up to 80 percent the year after breaking.
- Early sown barley may give you enough of a “jump” on the weeds that you can avoid herbicide applications.
- Use of vigorous, high-quality seed, sown shallow, can give you better crop competition than poor-quality or deeply sown crop seed.
- Banding nitrogen near the seed can give your crop an advantage over weeds.

For more information, refer to “Integrated Weed Management: Making it Work on Your Farm” factsheet, available from both Manitoba Agriculture and Saskatchewan Ministry of Agriculture.

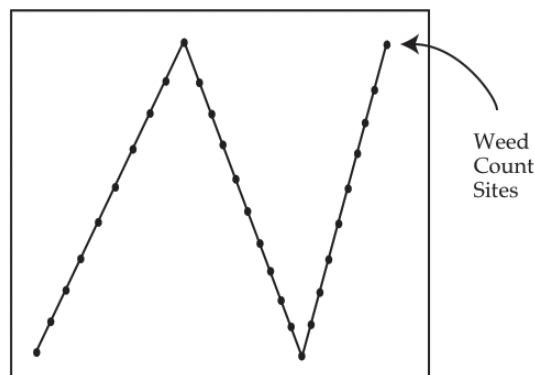
## Making Spray Decisions

### Field Scouting

Field scouting is an important tool for making informed spray decisions. Accurately assessing the type and number of weeds in the field will help you determine if a spray operation is necessary. The scouting pattern diagram on this page provides a guideline for scouting a field. The entire field should be walked to get a feel for the distribution and species of the weeds present. A minimum of 20 weed counts should be taken across the field. A smaller number may be used, but be aware that accuracy decreases as the number of counts gets smaller. Count the number of weeds in a 1 m<sup>2</sup> or a

0.25 m<sup>2</sup> area and divide the total number of weeds by the number of counts taken to obtain an average for the field. If using 0.25 m<sup>2</sup> samples, make sure to multiply by four so your average is for a 1 m<sup>2</sup> area.

Some weeds are not distributed uniformly and may be found in patches (for example, Canada thistle) or in low spots. As well, the type and number of weeds found along the field edges may be very different from those found inside the field. These areas should be considered separate from the rest of the field. If possible, patches, low spots, and field borders should be treated separately, as field-wide spraying may not be required. Look out for new invading weeds and patches of herbicide-resistant weeds. Herbicide-resistant weeds and new invaders should be removed (manually if necessary), regardless of their number, to prevent them from spreading and becoming a serious control problem. Mapping your field’s weed problems will allow you to monitor the spread of weed patches over time and help you assess the effectiveness of your control program.



## Yield Losses Caused by Weeds

Knowing the amount of crop yield loss caused by a given weed density will help you decide if a spray operation is required. The tables on the following pages give an indication of the yield loss caused by some of the important grassy weeds.

### THESE TABLES SHOULD BE USED ONLY AS A GUIDE.

The figures are based on Western Canadian research trials and will not be accurate all of the time. The yield loss values apply only to healthy, well fertilized crops with good stand establishment. Crops that are diseased or emerged unevenly will not compete well with weeds and will suffer larger yield losses than indicated in these tables. The yield loss figures are based on competition from a single weed species only. Other weeds, such as wild mustard or Canada thistle, must be controlled if the figures are to be accurate. As well, the tables are based on competition from normal height crops. Semi-dwarf or hybrid varieties may not compete as well with weeds and the figures may not be accurate in these cases.

Table 1. Yield Losses (Percent) in Wheat Caused by Wild Oats.

	Wild Oat Density – Number Per Square Metre																
	1	2	4	6	8	10	12	14	16	18	20	25	30	35	40	45	50
Wild Oats are 1 Leaf Stage Ahead of the Crop	1	2	4	6	8	10	12	14	15	17	19	22	26	29	32	34	37
Wild Oats are the Same Leaf Stage as the Crop	1	1	2	4	5	6	7	8	9	10	11	14	16	18	20	22	24
Wild Oats are 1 Leaf Stage Behind the Crop	0	1	1	2	3	3	4	5	5	6	7	8	10	11	13	14	15

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 1. Spray Decision Guideline for Wild Oats in Wheat.

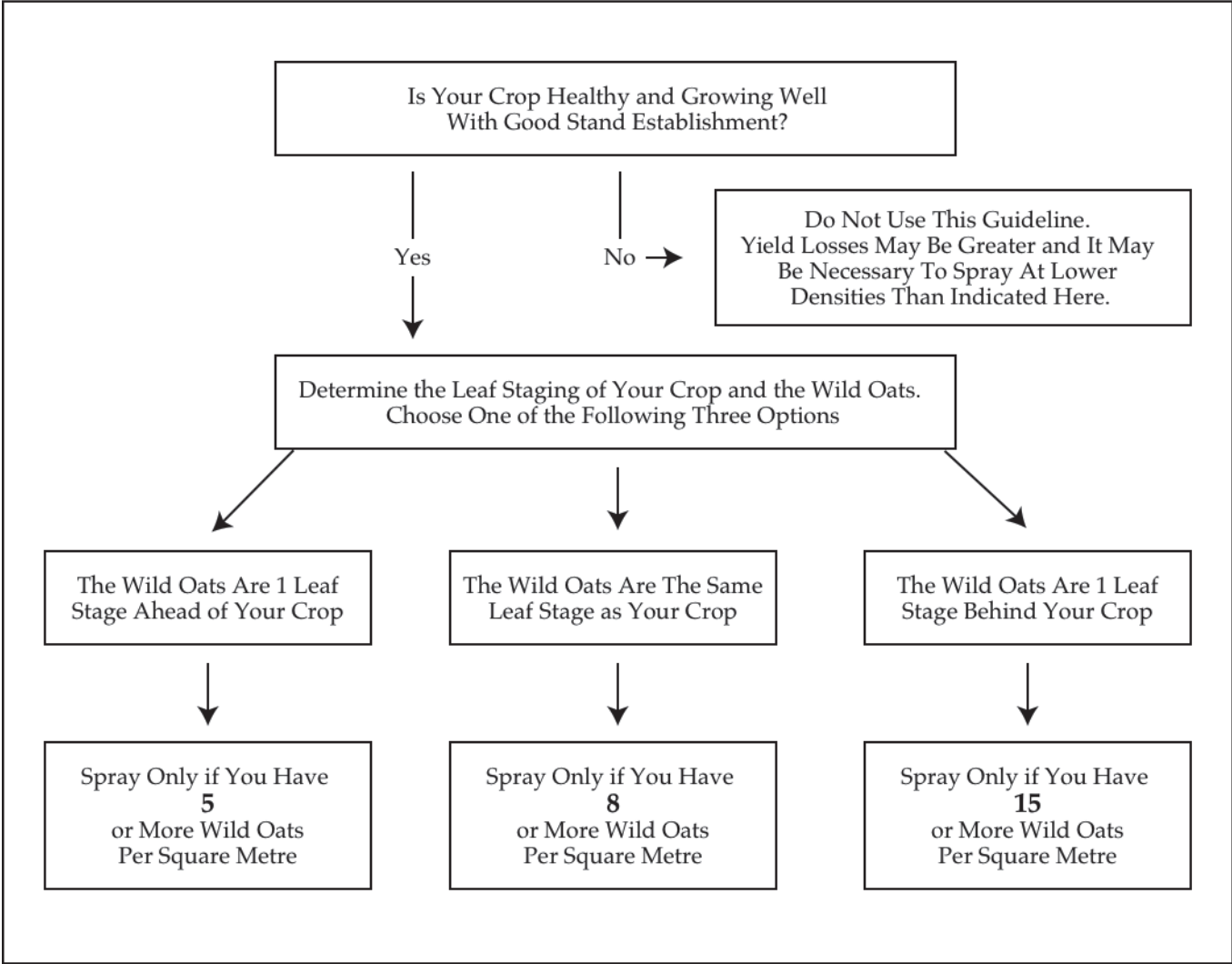
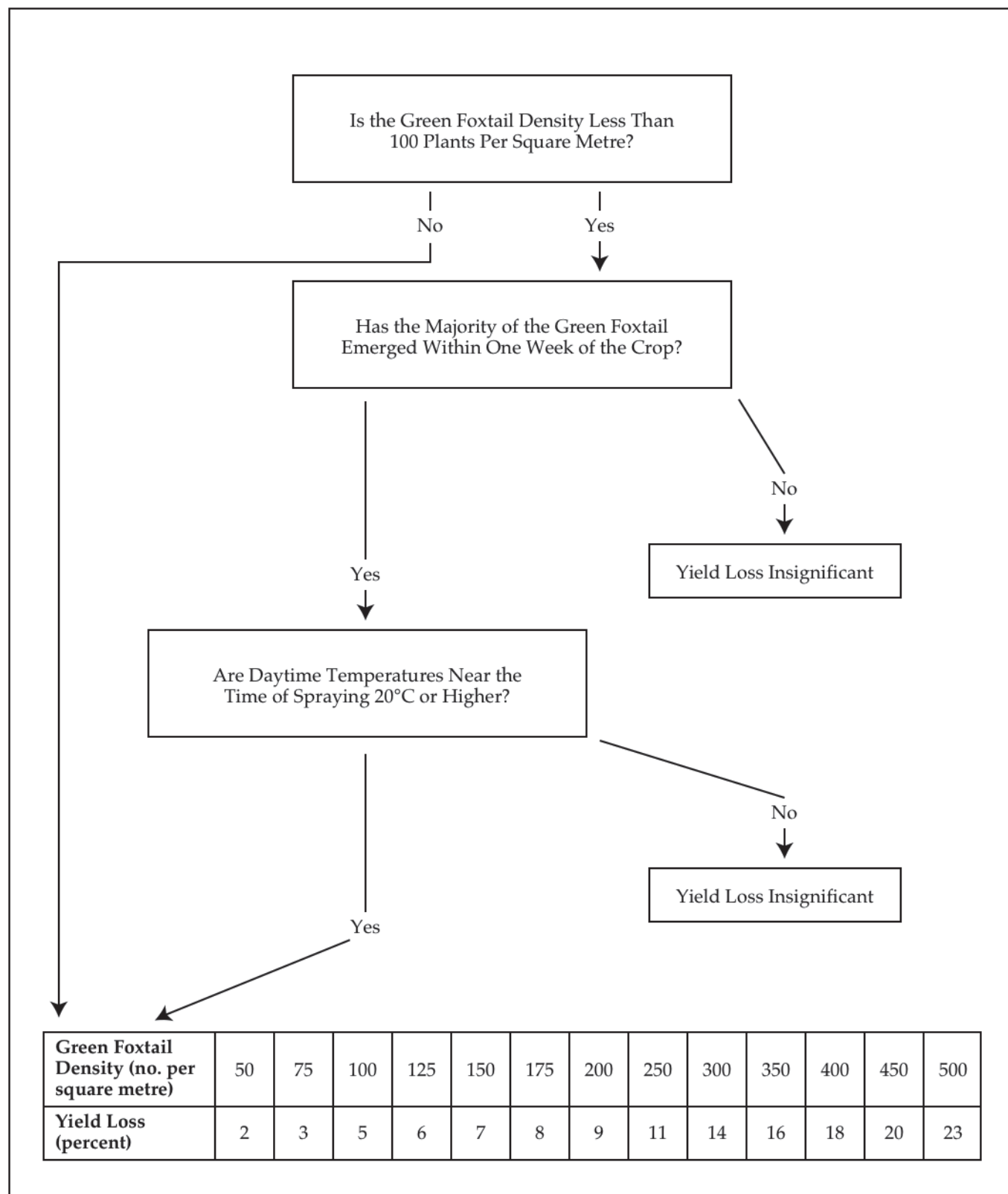




Table 2. Yield Losses (Percent) in Wheat Caused by Green Foxtail (Wild Millet).

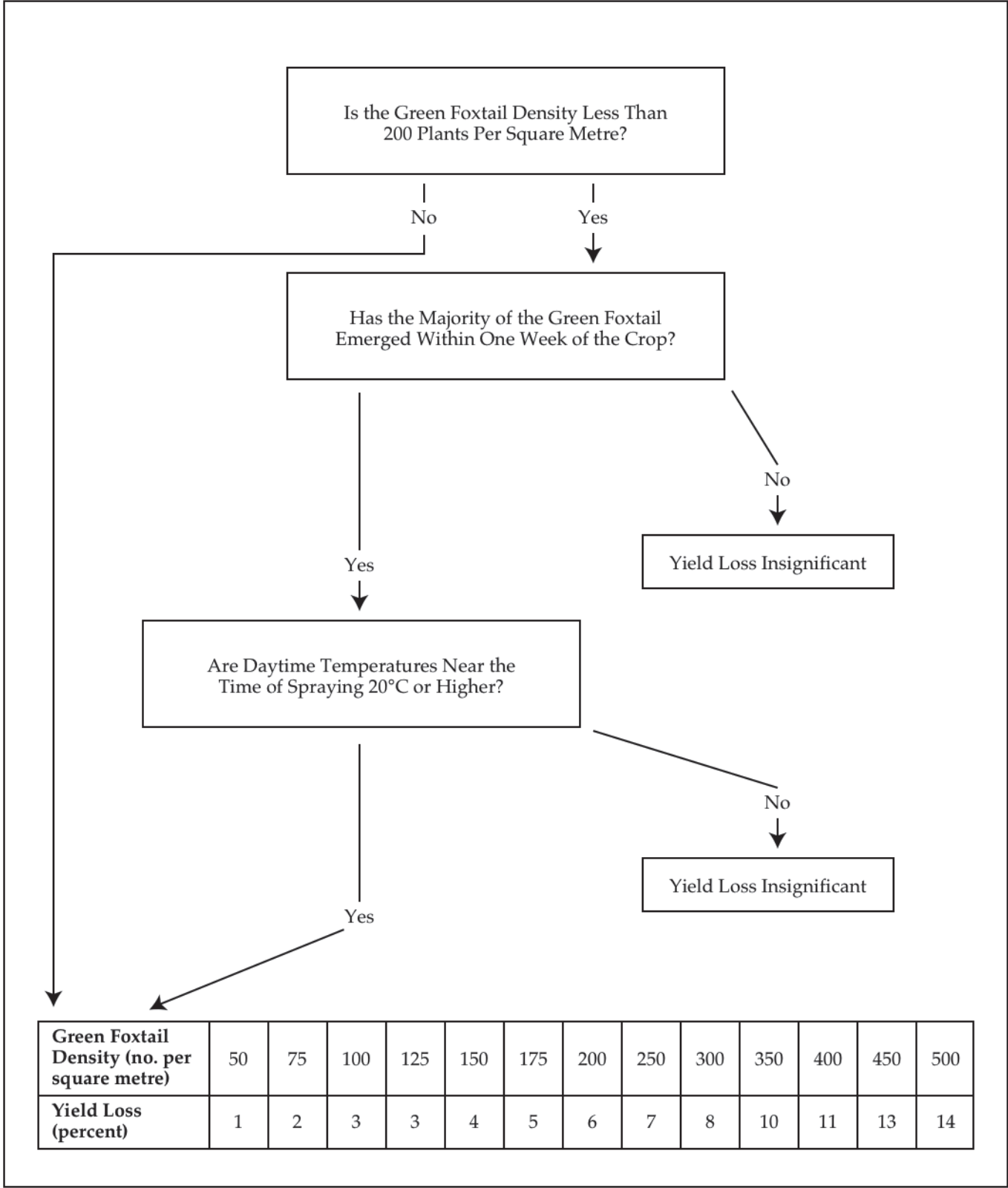


Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 3. Yield Losses (Percent) in Barley Caused by Wild Oats.

Crop Density (plants/m <sup>2</sup> )	Relative Emergence	Wild Oat Density (plants/m <sup>2</sup> )											
		1	5	10	15	20	25	30	40	50	70	100	150
300	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.3	1.4	2.8	4.1	5.4	6.7	8.0	10.3	12.6	16.8	22.4	30.2
	Wild Oats are the Same Leaf Stage as the Crop	0.3	1.3	2.5	3.7	4.8	6.0	7.1	9.2	11.3	15.1	20.3	27.6
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	0.9	1.7	2.6	3.4	4.2	5.0	6.6	8.1	11.0	15.0	20.9
225	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.4	1.9	3.6	5.4	7.0	8.6	10.2	13.1	15.9	20.9	27.4	36.2
	Wild Oats are the Same Leaf Stage as the Crop	0.3	1.6	3.1	4.6	6.1	7.5	8.8	11.4	13.9	18.4	24.4	32.6
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	1.0	2.0	3.0	4.0	4.9	5.8	7.6	9.3	12.6	17.1	23.6
175	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.5	2.3	4.6	6.7	8.7	10.7	12.5	16.1	19.3	25.1	32.3	41.8
	Wild Oats are the Same Leaf Stage as the Crop	0.4	1.9	3.8	5.6	7.3	8.9	10.5	13.6	16.4	21.6	28.2	37.1
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	1.1	2.3	3.4	4.4	5.5	6.5	8.5	10.4	14.0	18.9	25.9

Table 4. Yield Losses (Percent) in Barley Caused by Green Foxtail (Wild Millet).



Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 5. Yield Losses (Percent) in Canola Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre													
	1	2	4	6	8	10	12	14	16	18	20	25	30	
Wild Oats	3	5	6	8	9	10	11	12	13	14	15	16	18	
Volunteer Wheat	1	3	6	8	10	11	12	14	15	16	17	19	21	
Volunteer Barley	3	5	8	10	12	14	15	17	18	19	20	23	25	

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta); and O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 2. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Canola.

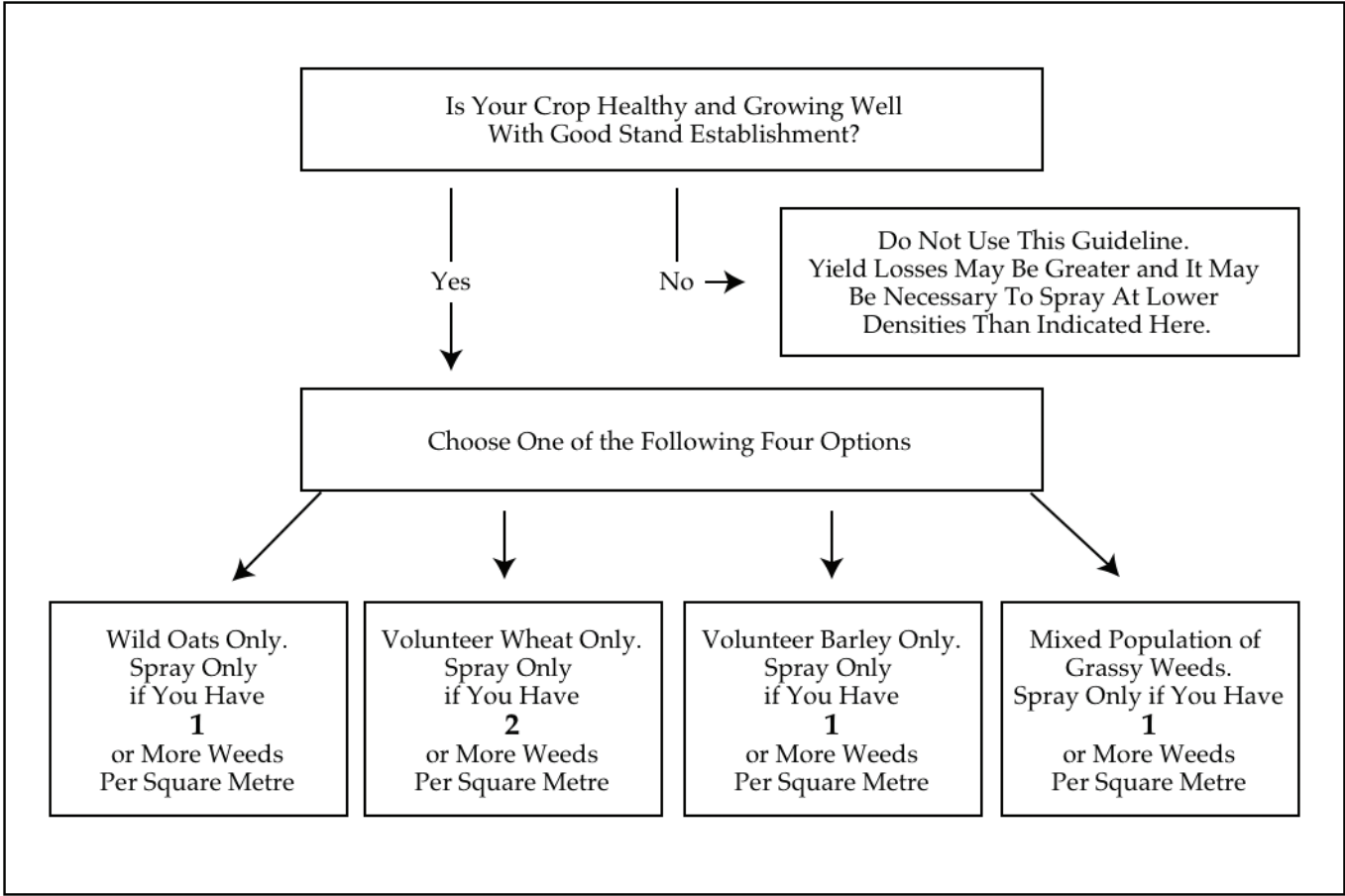
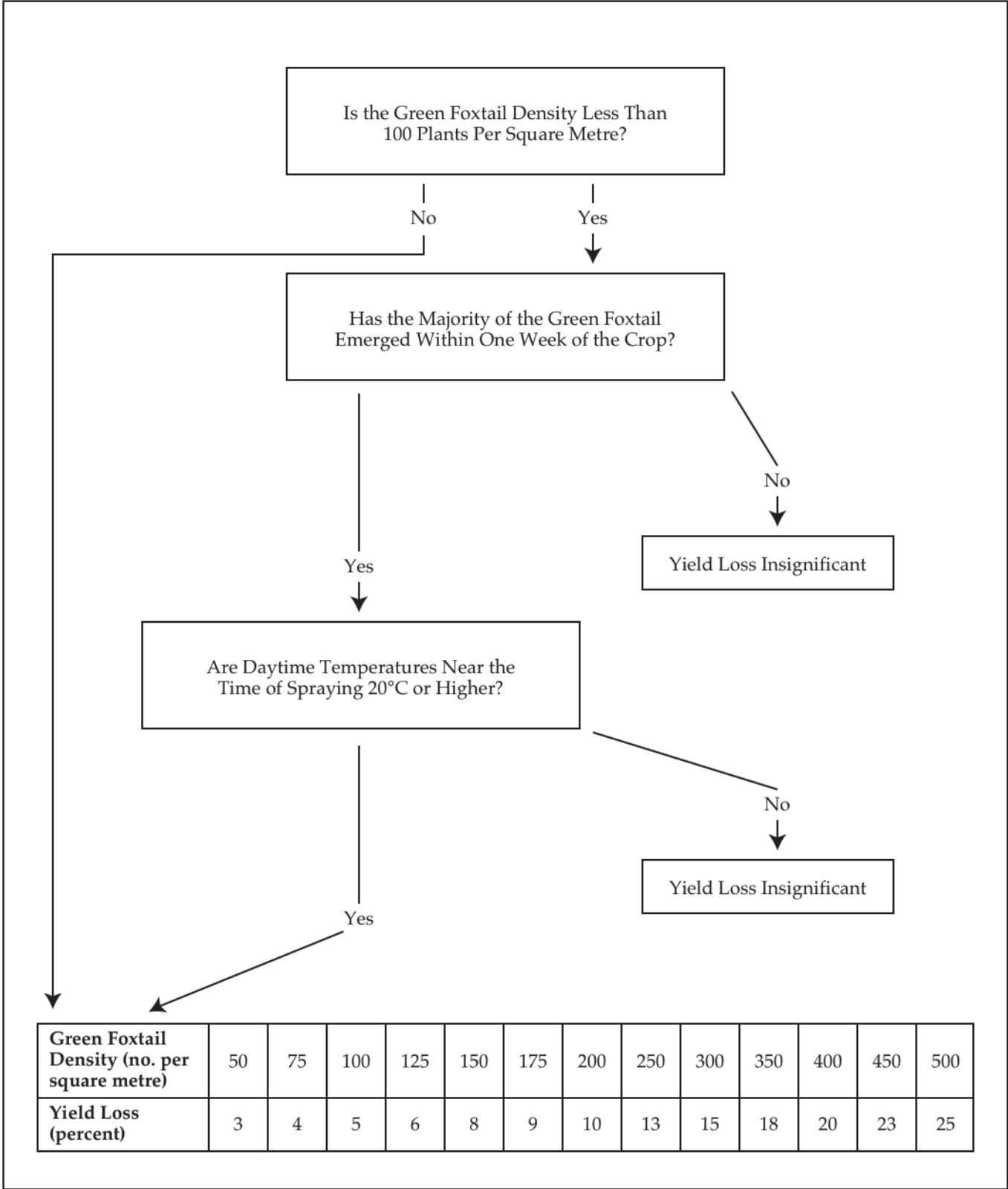


Table 6. Yield Losses (Percent) in Canola Caused by Green Foxtail (Wild Millet)



Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

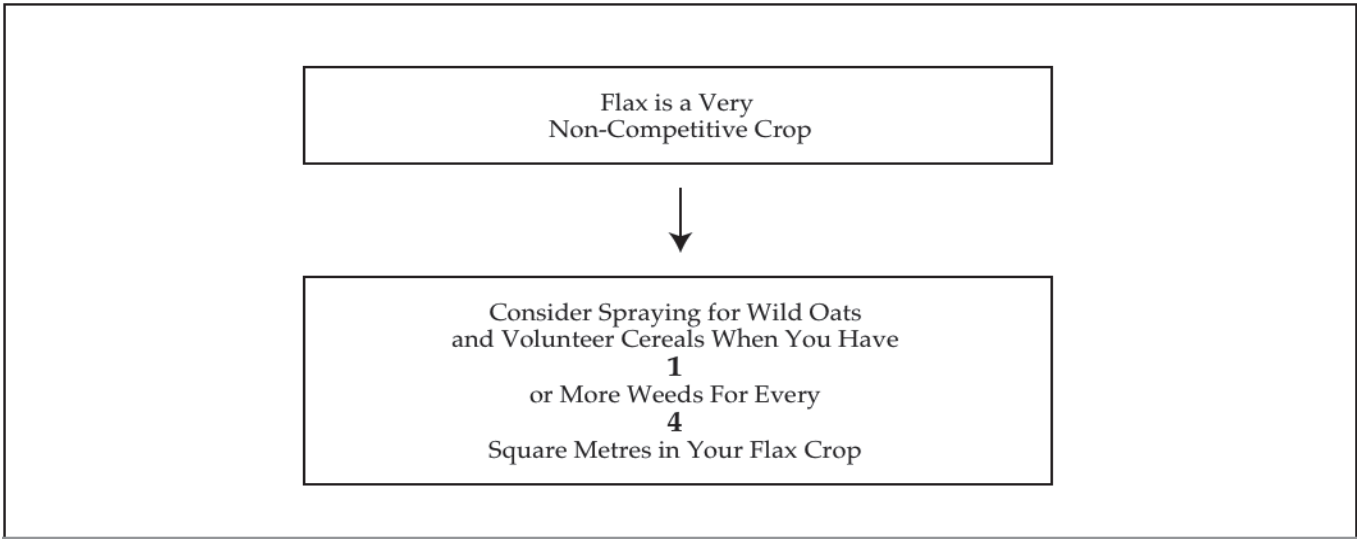


Table 7. Yield Losses (Percent) in Flax Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre									
	1	2	3	4	5	6	7	8	9	10
Wild Oat	6	8	10	12	13	15	16	17	18	19
Volunteer Wheat	6	11	15	18	22	24	27	29	31	33
Volunteer Barley	6	12	16	21	24	28	31	34	36	39

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta); and Friesen et al., University of Manitoba (Winnipeg, Manitoba)

Figure 3. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Flax.



Deciding to Spray – Economic Thresholds and Herbicide Resistance

An economic threshold is the level of infestation at which lost yield exceeds the cost of the chemical and its application. Determining the economic threshold will help you decide if a spray operation is necessary.

The following example outlines how to determine an economic threshold:

You have a wild oat problem in your wheat. After a thorough field scouting, you have determined that your field has an average density of 35 wild oats per square metre. You know that the crop and weeds are at the same leaf stage. Using Table 1, choose the “Same Leaf Stage” row and read across to 35 wild oats per square metre. You will find that your yield loss will be about 18 percent.

You think it could be a 60 bushel per acre wheat crop, and expect to get \$6 per bushel for it. Therefore:

- 60 bushels x 0.18 (percent of expected yield loss) = 10.8 bushels per acre of lost yield
- 10.8 bushels x \$6 per bushel = \$64.80 per acre of lost income

Now find out the price of your herbicide. Most wild oat herbicides for wheat cost between \$10 to \$25 per acre. In this case, lost income exceeds the cost of the herbicide and application, so spraying would be justified.

Alternatively, you may want to use the figures provided with some of the yield loss tables. These figures provide flowcharts to assist you in making spray decisions. In some cases the flowcharts may indicate to spray when you do not have an economic threshold weed density, but most times they will prevent you from spraying unnecessarily.

Another factor to consider when deciding whether to spray is your herbicide rotation. A one in three rotation of herbicide groups is currently recommended to delay the development of herbicide resistance for weeds such as wild oats and green foxtail. Skipping a spray operation will give you an extra year of flexibility in your herbicide rotation. This means that you have one extra herbicide group to choose from the year after you skipped the spray operation. When making spray decisions, the ability to rotate herbicides should be considered in addition to the economics of spraying.

Making the Spray Decision

Remember that economic thresholds should be used only as guides when making a spray decision. Lost income caused by dockage or downgrading must also be considered. FIELDS THAT ARE NOT SPRAYED THIS YEAR HAVE A HIGHER POTENTIAL FOR PROBLEMS THE FOLLOWING YEAR BECAUSE OF WEED SEED RETURN. A farmer’s experience and common sense play an important role when deciding to spray. Used properly, however, the economic threshold can be an important tool in making spray decisions.

## Weed Resistance to Herbicides

In recent years, the number of herbicide-resistant weeds and the areas they infest have increased.

Most herbicide-resistant weed infestations have developed following repeated use of the same herbicide (or herbicide group) for a number of years on the same field. Growers who have developed weed resistance on their farms will typically see a weed, which is normally controlled by a herbicide, escape uncontrolled after a number of years of use of the same product or product group. Individual plants may be resistant to 1.5 up to 10 or more times the normal field rate.

## Herbicide Groups

To help you plan your herbicide program, the following table lists "herbicide groups." To slow down the process of developing weed resistance, tank mix products from different groups to control the same key weeds and/or use products from different groups from year to year on your fields.

**Table 8. Herbicide Site of Action and Chemical Family for Resistant Weed Management**

Site of Action (Group)	Common Name	Herbicide Tradename	Premix or Co-pack <sup>†</sup> Tradenames*
<b>ACC-ase Inhibitor (1)</b> Aryloxyphenoxy propionic acid "Fop"	clodinafop	<i>Horizon NG=Foothills NG=Nextstep NG, Cadillac One=Ladder All In, Aurora=Cadillac=Foax=Ladder=Signal=Slam'-R</i>	<i>Signal FSU*<sup>†</sup>, Traxos, TraxosTwo*<sup>†</sup></i>
	fenoxaprop	<i>Puma Advance =Wildcat Enhanced, Bengal WB= Cordon=MPower HellCat=Vigil WB</i>	<i>Tundra</i>
	quizalofop	<i>Assure II=Yuma GL</i>	-
Cyclohexanedione "Dim"	clethodim	<i>Select=Centurion=Antler=Arrow= Clethodim 250=MPower Independence= Shadow RTM=Patron = Statue, Arrow-All-In</i>	-
	sethoxydim	<i>Poast Ultra</i>	<i>Odyssey Ultra/Odyssey Ultra NXT*<sup>†</sup>, Solo Ultra*<sup>†</sup></i>
	tralkoxydim	<i>Achieve=Bison=Marengo=Nufarm Tralkoxydim</i>	-
Phenylpyrazolin "Den"	pinoxaden	<i>Axial</i>	<i>Axial iPak*<sup>†</sup>, Axial Xtreme*, BroadBand*, Rezuvant<sup>†</sup>*, Traxos, TraxosTwo*<sup>†</sup></i>
<b>ALS Enzyme Inhibitor (2)</b> Imidazolinone "Imi"	imazamethabenz	<i>Assert=Avert</i>	-
	imazamox	<i>Solo/Solo ADV, Mizuna, Davai 80SL</i>	<i>Altitude FX2*, Ares, Odyssey=Duet=MPower Ninja, Odyssey NXT, Odyssey Ultra/Odyssey Ultra NXT*<sup>†</sup>, Salute*<sup>†</sup>, Solo Ultra*<sup>†</sup>, Tensile*<sup>†</sup>, Viper ADV</i>
	imazapyr	-	<i>Ares, Salute*<sup>†</sup></i>
	imazethapyr	<i>Pursuit=Gladiator=MPower Kamikaze= MultiStar=Phantom</i>	<i>Odyssey=Duet, Odyssey NXT, Odyssey Ultra/Odyssey Ultra NXT*<sup>†</sup></i>
Sulfonylurea "SU"	ethametsulfuron	<i>Muster</i>	-
	foramsulfuron	<i>Option 2.25 OD</i>	-
	halosulfuron	<i>Permit WG</i>	-
	metsulfuron	<i>Ally, Escort</i>	<i>Express Pro, MPower X-Pro<sup>†</sup>, Navius*, Reclaim*<sup>†</sup>, Reclaim II*<sup>†</sup>, Travallas*</i>
	nicosulfuron	<i>Accent /Accent Grande</i>	<i>Ultim</i>
	rimisulfuron	<i>Prism, Sortan IS</i>	<i>Ultim</i>
	thifensulfuron	<i>Pinnacle</i>	<i>Barricade II*<sup>†</sup>, Broadside*<sup>†</sup>=Refine M*<sup>†</sup>, Enforcer MSU*<sup>†</sup>, Predicade*<sup>†</sup>, Refine SG=Nimble=Deploy=MPower R, Retain SG*<sup>†</sup>, Signal FSU*<sup>†</sup>, Travallas*, Triton C*, Triton K*<sup>†</sup></i>

Table 8. Herbicide Site of Action and Chemical Family for Resistant Weed Management, *continued*

Site of Action (Group)	Common Name	Herbicide Tradename	Premix or Co-pack <sup>†</sup> Tradenames*
Sulfonylurea "SU" <i>continued</i>	tribenuron	<i>Express SG=Spike=MPower Extra</i> <i>=Inferno WDG</i>	<i>Barricade II*<sup>†</sup>, Broadside*<sup>†</sup>=Refine M*<sup>†</sup>, Express FX*<sup>†</sup>, Express Pro, Enforcer MSU*<sup>†</sup>, Inferno Duo, Ko-Act*<sup>†</sup>=MPower X-Ko, Luxxur<sup>†</sup>, MPower X-Pro<sup>†</sup>, Predicade*<sup>†</sup>, Refine SG=Nimble=Deploy=MPower R =Boost=Draft, Retain SG*<sup>†</sup>, Signal FSU*<sup>†</sup>, Travallas, Triton C*<sup>†</sup>, Triton K*<sup>†</sup></i>
Triazolopyrimidine "TZP"	florasulam	<i>PrePass Flex=Priority=MPower</i> <i>Battlefront=Blitz=FirstPass</i>	<i>Broadband*, Cirpreme XC*<sup>†</sup>, MPower</i> <i>Battlefront M<sup>†</sup>*=Frontline XL*= Topline*<sup>†</sup>, MPower Battlefront+2,4-D<sup>†</sup>*=Frontline</i> <i>2,4-D*<sup>†</sup>, HotShot*<sup>†</sup>, Korrex II*<sup>†</sup>, Paradigm<sup>†</sup>, MPower Kickoff*<sup>†</sup>=PrePass XC*<sup>†</sup>, MPower Battlefront CM<sup>†</sup>*=Spectrum*<sup>†</sup>, Stellar*<sup>†</sup>=Outshine*<sup>†</sup>, Stellar XL*</i>
	pyroxulam	<i>Simplicity</i>	<i>Rexade*<sup>†</sup>, Tandem*<sup>†</sup></i>
Sulfonylamino- carbonyltriazolinone "SACT"	flucarbazone	<i>Everest/Sierra 2.0, Everest/Sierra 3.0</i>	<i>Inferno Duo</i>
	propoxycarbazone- sodium	<i>Olympus</i>	-
	thiencarbazone	<i>Varro</i>	<i>Luxxur<sup>†</sup>, Predicade*, Velocity m3*</i>
<b>Mitotic Inhibitor (3)</b> Dinitroaniline (DNA)	ethalfluralin	<i>Edge</i>	-
	trifluralin	<i>Treflan=Bonanza=Rival</i>	<i>Fortress MicroActiv*</i>
Benzamide	propyzamide	<i>Kerb (SC, 50WP)</i>	-
<b>Growth Regulators (4)</b>  Phenoxy	2,4-D amine	<i>2,4-D, others</i>	<i>Dyvel DSp, Restore II</i>
	2,4-D ester	<i>2,4-D Ester, Salvo</i>	<i>Approve*=Leader*=Thrasher*=Thumper*, Blackhawk*<sup>†</sup>( old form), Turboprop, Estaprop XT=Dichlorprop DX, Enforcer D*, Frontline 2,4-D*<sup>†</sup>, Flurox- 24<sup>†</sup>=Rush 24<sup>†</sup>= MPower Foxy Pro<sup>†</sup>,=Attain XC<sup>†</sup>, Ko-Act*<sup>†</sup>, Octtain XL, Reclaim*<sup>†</sup>, Reclaim II*<sup>†</sup>, Rexade*<sup>†</sup>, Retain SG*, TraxosTwo*<sup>†</sup>, Triton K*<sup>†</sup></i>
	2,4-D choline	-	<i>Grazon XC</i>
	2,4-DB	<i>Embutox, Cobutox, Caliber</i>	-
	Dichlorprop (2,4-DP)	-	<i>Turboprop, Estaprop XT=Dichlorprop DX, Optica Trio</i>
	MCPA amine	<i>MCPA Amine</i>	<i>Dyvel, Optica Trio, Sword, Target, Tracker XP</i>
	MCPA ester	<i>MCPA LV ester</i>	<i>Buctril M*=Badge II*=Logic M*=Mextrol 450* =MPower Buck M, Curtail M, Enforcer M*= ForceFighter*<sup>†</sup>, Enforcer MSU*<sup>†</sup>, Frontline XL*, Goldwing*, Pixarro<sup>†</sup>, Predicade*<sup>†</sup>, MPower Foxy CM<sup>†</sup>=Prestige XC<sup>†</sup>, Prestige XL, Spectrum<sup>†</sup>*= MPower Battlefront CM<sup>†</sup>*, Stellar*<sup>†</sup>= Outshine*<sup>†</sup>, Stellar XL*, MPower Battlefront M<sup>†</sup>*=Topline*<sup>†</sup>, Trophy<sup>†</sup>=MPower Foxy M<sup>†</sup>=Rush M<sup>†</sup></i>
	MCPA K+	<i>Various</i>	<i>Clovitox Plus, DyVel, Topside, Tropotox Plus</i>
	MCPA Na (sodium)	-	-
	MCPB	-	<i>Clovitox Plus, Topside, Tropotox Plus</i>
	Mecoprop-p (MCPB)	<i>Mecoprop-P</i>	<i>Dyvel DSp, Optica Trio, Sword, Target, Tracker XP</i>

Table 8. Herbicide Site of Action and Chemical Family for Resistant Weed Management, *continued*

Site of Action (Group)	Common Name	Herbicide Tradename	Premix or Co-pack <sup>†</sup> Tradenames*
Benzoic acids	dicamba	<i>Engenia</i>	-
	• bapma salt		
	• Dimethylamine salt	<i>Oracle, Dicamba L</i>	<i>DyVel, DyVel DSp, Express FX*, Korrex II*†, Sword, Tracker XP, Triton K*</i>
	• Digycolamine salt	<i>Banvel II, Banvel VM, FeXapan=XtendiMax</i>	<i>Pulsar, Target, Roundup Xtend</i>
	• Sodium (Na) salt	-	<i>Distinct=Overdrive</i>
	• Isopropylamine	-	<i>Glykamba*</i>
Pyridine	aminopyralid	-	<i>Restore II, Reclaim*†, Reclaim II*†</i>
	aminocyclopyrachlor	-	<i>Navius*</i>
	clopyralid	<i>Lontrel=Pyralid=MPower Clobber</i>	<i>Cirpreme*†, Curtail M=MPower Clobber M, MPower Clobber G†*=Eclipse†*, Momentum, MPower Foxy CM†=Prestige XC†, Prestige XL, Salute†*, MPower Battlefront CM= Spectrum†*, Tensile†*</i>
	fluroxypyr	<i>Ikwin, MPower Foxy</i>	<i>Altitude FX2*†, Attain XC†=Flurox-24†= MPower Foxy Pro†= Rush 24†, Axial Xtreme*, Barricade II*†, Cirpreme XC*†, EnforcerD*, Enforcer M*=ForceFighter†*, Enforcer MSU†*, Infinity FX*†, Momentum, OcTTain XL, Pixarro†, Predicade*†, MPower Foxy CM†= Prestige XC†, Prestige XL, Pulsar, Retain SG*†, Rezuvant†*, Signal FSU*†, Stellar*†=Outshine*†, Stellar XL*, Tandem*†, Travallas*, TraxosTwo*†, Trophy†= MPower Foxy M†=Rush M†</i>
	halauxifen	-	<i>Paradigm†*, Pixarro*†, Rexade*†, Rezuvant†*</i>
	picloram	<i>Tordon 22K</i>	<i>Grazon XC</i>
Quinoline	quinclorac (dicots)	<i>Clever=Ingenious=MasterLine Quinclorac, Facet L</i>	<i>Triton C*</i>
<b>Photosystem II Inhibitor (5)</b> Triazine	atrazine	<i>Aatrex</i>	<i>Primextra II Magnum*</i>
	simazine	<i>Princep Nine-T=Simazine 480</i>	-
Triazinone	hexazinone	<i>Velpar DF CU</i>	-
	metribuzin	<i>Sencor=TriCor=Squadron=Buzzin, Metrix SC</i>	-
<b>Photosystem II Inhibitor (6)</b>	bentazon	<i>Basagran=Benta Super=MPower Boa, Basagran Forté</i>	<i>Viper ADV*</i>
	bromoxynil	<i>Pardner=Brotext=Bromotril II=Koril 235; Brotext 480=Loveland Bromax= MPower Bromoxynil</i>	<i>Approve*=Leader*=Thrasher*=Thumper*, Axial iPak*, Buctril M*= Badge*=Logic M*= Mextrol 450*, Conquer*†, Enforcer D*, Enforcer M*= ForceFighter*†, Enforcer MSU*†, HotShot*†, Infinity*, Infinity FX*†, Tundra*, Velocity m3*</i>
<b>Photosystem II Inhibitor (7)</b>	linuron	<i>Lorox=Linuron 400</i>	-
<b>Lipid Synthesis Inhibition (8)</b> Thiocarbamate	EPTC	<i>Eptam</i>	-
	triallate	<i>Avadex Brands</i>	<i>Fortress MicroActive*</i>

Table 8. Herbicide Site of Action and Chemical Family for Resistant Weed Management, *continued*

Site of Action (Group)	Common Name	Herbicide Tradename	Premix or Co-pack <sup>†</sup> Tradenames*
<b>EPSP Synthase Inhibitor (9)</b>	glyphosate-IPA, K, DMA	<i>several - see page 233</i>	<i>CleanStart<sup>†*</sup>, Eclipse III<sup>†*</sup>=MPower Clobber G<sup>†*</sup>, Flexstar GT<sup>*</sup>, Glykamba<sup>*</sup>, MPower Kickoff<sup>†*</sup>=PrePass XC<sup>†*</sup>, Roundup Xtend</i>
<b>Glutamine Synthetase Inhibitor (10)</b>	glufosinate	<i>Good Harvest, Liberty 150=MPower Vigor, Liberty 200</i>	-
<b>Bleaching: DOXP Synthase Inhib. (13)</b>	clomazone	<i>Command</i>	-
<b>PPO (Protox) Inhibitor (14)</b> Diphenyletherimine	acifluorfen	<i>Ultra Blazer</i>	-
	fomesafen	<i>Reflex</i>	<i>Flexstar GT<sup>*</sup></i>
N-phenylphthalimide	flumioxazin	<i>Chateau=Valtera</i>	-
Phenylpyrazole	pyraflufen	-	<i>BlackHawk (with pyraflufen)<sup>*</sup>, Goldwing<sup>*</sup></i>
Pyrimidinedione	saflufenacil	<i>Heat LQ</i>	<i>Heat Complete<sup>†*</sup></i>
Triazolinone	carfentrazone	<i>Aim</i>	<i>Authority Charge<sup>†</sup>, Blackhawk (with carfentrazone)<sup>†*</sup>, CleanStart<sup>†*</sup>, Conquer<sup>†*</sup>, Focus<sup>*</sup> († old form)</i>
	sulfentrazone	<i>Authority</i>	<i>Authority Charge<sup>†</sup>, Authority Supreme<sup>†*</sup></i>
<b>Very Long Chain Fatty Acid Inhibitor (15)</b> Acetamide	dimethenamid-P	<i>Frontier Max=Outlook</i>	-
Chloroacetamide	S-metolachlor+ safener	<i>Dual II Magnum</i>	<i>Primextra II Magnum<sup>*</sup></i>
	pyroxasulfone	-	<i>Authority Supreme<sup>†*</sup>, Fierce<sup>*</sup>, Focus<sup>*</sup> († old form), Heat Complete<sup>†*</sup></i>
<b>Auxin Inhibitor (19)</b>	diflufenzopyr	-	<i>Distinct<sup>*</sup>=Overdrive<sup>*</sup></i>
<b>Photosystem I Inhibitor (22)</b>	diquat	<i>Reglone=Armory=Bolster=Craven=Desica=Diquat 240=Drifast=Guardman Diquat=MasterLine Diquat=Stage, Reglone Ion, Reward</i>	-
	paraquat	<i>Gramoxone</i>	-
<b>Unknown (26)</b>	quinclorac (grass)	<i>Clever=Ingenious=MasterLine Quinclorac; Facet L</i>	-
<b>Bleaching: HPPD Inhibition (27)</b>  Pyrazolone	pyrasulfotole	-	<i>Axial iPak<sup>†*</sup>, Infinity<sup>*</sup>, Infinity FX<sup>†*</sup>, Tundra<sup>*</sup>, Velocity m3<sup>*</sup></i>
	tolpyralate	<i>Shieldex</i>	-
	topramezone	<i>Impact=Armezon</i>	-

Adapted from WSSA Herbicide Classification System For Resistant Weed Management. Weed Technol. 17:606-608 and the NDSU Weed Control Guide.

Contact herbicides = Groups 5, 6, 7, 10, 14, and 22.

\* Products contain more than one active ingredient and appear in more than one group. In some instances, both active ingredients act to kill the same weed using different modes of action. Using these products or tank mixes of products from different groups that control the same high risk weed (see the Herbicide Resistant Weeds in Western Canada chart on page 51) will slow down the process of developing weed resistance.

New herbicides do not necessarily have a unique mode of action and may fall within the groups listed in the charts.

Herbicides that have the same mode of action may not control the same weed spectrum or have the same crop safety. For example, *Assert* and *Ally* have the same mode of action; however, *Assert* controls wild oats while *Ally* does not.

<sup>†</sup> Products are packaged with multiple components in one package. Each component may also have multiple active ingredients.



## How Do Herbicides Work?

There are several ways to define how herbicide work:

- **Timing (may apply to crop and/or weed and may be one timing for the crop and another for the weed):**
  - **PPI (Pre-Plant Incorporated):** the product is applied to the soil and worked in with a tillage implement prior to seeding. The product remains effective in the soil for one to several weeks, preventing weeds from emerging within the crop.
  - **PRE (Pre-Emergent Surface):** the product is applied to the soil surface and relies on rainfall to move it into the emergence zone of target weeds in the soil. The product remains effective in the soil for one to several weeks, preventing weeds from emerging within the crop. Products may allow application in the fall or in the spring prior to seeding or following seeding up until the emergence of the crop and target weeds.
  - **POST (post-emergent foliar):** the product is applied at the seedling stage of the weed and/or the crop. Early applications are usually the most beneficial to crop yield because of the removal of competition by the target weed at the crop's most vulnerable stage.
  - **Pre-harvest:** applied prior to the harvest of the crop to address weeds growing in mature.
- **Target:**
  - **Cell membrane disruptor:** causes the plant cells to produce compounds that attack the integrity of the cell membrane. Result is the spilling of cell contents into the environment and rapid drying of affected tissues.
  - **Inhibitor of essential growth component (amino acids, lipids):** blocks the production of essential building blocks for plant growth and maintenance. Target weeds stop growing and display a loss of green colour, typically in new growth first and then in older tissues as plants need to repair their tissues after environmental damage.
  - **Pigment inhibitor:** new tissues produced after exposure to the herbicide develop without colour (white). Some tissues may display red or purple tinges as a result of the presence of stress compounds called anthocyanins.
  - **Plant hormone mimic/Hormone transport inhibitor:** the herbicide produces the same response in plants as the natural hormone but susceptible plants are unable to break down these compounds as they would natural hormones. Results in unregulated growth of the plant cells causing distorted growth and a proliferation of non-functional tissue in the stem/root, blocking water flow to plant shoots. Transport inhibitors concentrate both natural and synthetic hormones in the tissues where they were produced, causing distorted growth.
  - **Seedling Root inhibitor:** stops roots growth of susceptible weeds. Susceptible weeds fail to emerge from treated soil.
  - **Seedling Shoot inhibitor:** stops shoot growth in susceptible weeds. Susceptible weeds fail to emerge from treated soil.
  - **Unknown:** the target of the herbicide is not known.
- **Movement:**
  - **Little to no plant movement:** typically soil active products. Does not move from the point where it enters the plant, or only by diffusion.
  - **Apoplastic Movement:** xylem-mobile; moves passively within free space and cell walls, upward through the transpiration stream (with water). Foliar applied products are relatively immobile. Soil active products are taken up by the root and transported to the upper portions of the plant.
  - **Symplastic Movement:** phloem-mobile – enters the cell where it is actively moved within the plant to areas of rapid growth along with other nutrients and sugars.
- **Spectrum:**
  - **Non-selective:** controls or injures most plants, except for those crops that have been bred to tolerate the herbicide.
  - **Selective:** controls weeds within a crop. Specific herbicides may be specific to control of the following weed types
    - Broadleaf
    - Grass
- **Biochemistry:**
  - The "Group" numbering system, developed by Weed Science Society of America (WSSA), and was adopted by the Pest Management Regulatory Agency of Health Canada for use on Canadian labels.
  - This system uses the herbicide's chemistry to summarize their general Mode of Action on weeds. There are also sub-divisions within these Groups (see Table 8 on page 45) that may have differing resistance patterns.
  - All herbicides within a Group share a common mode of action and resistance mechanism.
  - Herbicides within a Group may have different basic chemical structures. The difference in these basic structures are captured by the sub-group.
  - In general, weeds resistant to one herbicide within a Group (or sub-group where they are available) will be resistant to all herbicides within the Group/sub-group. There are exceptions to this rule. Cross resistant between sub-groups within a Group is common.
  - Resistance management strategies are required wherever resistance is known or there is a risk of resistance development.
  - Heavy reliance on herbicides without the integration of other non-herbicide management practices raises the risk of resistance evolution greatly.

After applying a herbicide, fields can be scouted to determine the effectiveness of the treatment. The symptoms of different herbicide groups, and the approximate time it takes to develop these symptoms, are listed in the following table. Weed patches that are not affected should be noted and checked, as they may be herbicide resistant. Note that symptoms may take longer to develop when conditions are not conducive to rapid plant growth.

The following table gives a brief description of symptoms that may be exhibited if plants are injured by a herbicide. The symptoms of each group are addressed for both foliar and soil exposures.

**Table 9. The Mode of Action, Site of Uptake and Symptoms of Different Herbicide Groups**

Herbicide Group	Mode of Action	Site of Uptake	Weed symptoms/timing	
			Grass weeds	Broadleaf weeds
1	Systemic	Foliar	Reduced growth, yellowing of growing point in 1 to 3 weeks. Newest leaf of affected plant pulls out easily in 3 to 5 days.	Tolerant
2	Systemic	Foliar/Soil	Newest leaves yellowed in 3 to 10 days, dead in 1 to 3 weeks.	Newest growth discolored (red/yellow/purple) and/or miniaturized; the whole plant is involved in 1 to 3 weeks.
3	Systemic	Soil	Reduced emergence, poor root development of emerged plants. Roots often swollen/stunted and root tips darkened.	Reduced emergence, poor root development of emerged plants.
4	Systemic	Foliar	Tolerant to moderate rates. High rates cause symptoms similar to drought. Improper timing may cause kernel abortion in cereal crops.	Abnormal growth (twisted stems, cupped leaves) in 2 to 10 days.
5	Systemic	Soil	Wilted and yellowed oldest leaves beginning at leaf margins, death in 7 to 10 days.	
	Contact	Foliar	Yellowed oldest leaves, death within days.	Yellowed/bleached oldest leaves where spray contacts, death within days.
6	Contact	Foliar	Some leaf tip burn or white tissues possible.	Yellowed leaves in 2 to 4 days, death in 1 to 2 weeks.
7	Systemic	Soil	Yellowed and stunted plants, death in 10 to 14 days.	
	Contact	Foliar	Interveinal yellowing of oldest leaves, death within days.	
8	Contact	Foliar	Yellowed leaves in 3 to 7 days, stunted plants.	Tolerant
	Systemic	Soil	Reduced emergence, emerged leaves dark green/blue.	
9	Systemic	Foliar	Wilted, yellowed leaves in 7 to 10 days. Newest growth is impacted first followed by the rest of the plant.	
10	Contact	Foliar	Wilted, bleached leaves in 3 to 5 days, death in 1 to 2 weeks.	
11	Systemic	Foliar	Plants wilted in 2 to 3 days, bleached and purpling leaves in 1 to 2 weeks.	Plants wilted in 2 to 3 days, bleached leaves in 1 to 2 weeks. Perennial plants die slowly.
13	Systemic	Soil	Bleached leaves, susceptible seedlings die shortly after emergence.	
14	Contact	Foliar	Some leaf burn at contact points or leaf edges.	Leaves yellowed and desiccated in 1 to 3 days. (Post-emergence applications)
	Systemic	Soil	Bleaching and yellowing, death prior to or shortly following emergence	
15	Systemic	Soil	Reduced emergence, emerged plants stunted.	
19	Systemic	Foliar	Twisting of older leaves, new leaves fail to expand, plant death in 2 to 4 weeks.	
22	Contact	Foliar	Leaves wilted within hours, desiccated in 1 to 3 days.	Leaves wilted in 1 to 3 days, desiccated and dead in 3 to 7 days.
26 (grass weeds only)	Systemic	Foliar	Immediate cessation of growth, rapid desiccation of new leaves and purpling and yellowing of older tissues.	See Group 4.
27	Systemic	Foliar	Some bleaching and whitening of leaves.	Leaves bleached and whitened in 2 to 10 days and death in 7 to 10 days.

## How to Identify Weed Resistance

It is important to avoid confusing herbicide failure caused by resistance with herbicide failure caused by various other factors (such as weather or application errors). When a herbicide fails to control weeds because of weather or application factors, that herbicide may work in the field the next season. But when herbicides fail because of the development of resistance, they will fail in subsequent years, regardless of weather or application procedures.

Herbicide resistance should be suspected under the following conditions:

- A weed species that the herbicide controlled in previous seasons now escapes the treatment, while other weeds that appear on the label continue to be controlled in the field.
- The escapes cannot be attributed to adverse weather or emergence after application (if a post-emergence product is in question).
- Irregular-shaped patches of a weed develop where the herbicide gives little or no control.
- Records of the past history of the field show repeated use of the same herbicide, or combinations of herbicides, that kill the weed in question in the same way.

**Table 10. Herbicide-Resistant Weeds in Western Canada**

Weed	Herbicide Group	Locations Confirmed
Barnyard grass	Group 2	MB
Canada Fleabane	Group 9	Occurs in several US states
	Multiple Resistant: Groups 2 & 9	Occurs in Ontario
Cleavers	Group 2	AB, MB, SK
	Group 4	AB
	Multiple combinations of: Groups 2 & 4	AB
Chickweed	Group 2	AB, MB, SK
Cow Cockle	Group 2	AB
Downy Brome	Group 2	Occurs in Montana
Foxtail, green	Group 1	AB, MB, SK
	Group 2	MB, SK
	Group 3	AB, MB, SK
	Multiple combinations of: Groups 1 & 3	MB, SK
Foxtail, yellow	Group 1 + 2	MB
Hemp-nettle	Group 2	AB, MB
	Group 4	AB
	Multiple combinations of: Groups 2 & 4	AB
Kochia	Group 2	AB, MB, SK (overwhelming majority)
	Group 4 (dicamba and fluroxypyr)	SK
	Group 5	Occurs in North Dakota and Montana
	Group 9 (glyphosate)	AB, MB, SK
	Multiple Resistant: Groups 2 & 9	AB, MB, SK
	Multiple Resistant: Groups 2 & 4	SK
	Multiple Resistant: Groups 2, 4 (dicamba) & 9	AB
	Multiple Resistant: Groups 2, 4 & 9	AB
Lamb's-quarters	Group 2	SK
	Group 5	Occurs in Ontario
Marshelder (false ragweed)	Group 2	Occurs in North Dakota
Mustard, Ball	Group 2	AB
Mustard, Wild	Group 2	AB, MB, SK
	Group 4	MB
	Group 5	MB

Table 10. Herbicide-Resistant Weeds in Western Canada, *continued*

Weed	Herbicide Group	Locations Confirmed
Narrow-leaved hawk's-beard	Group 2	AB
Persian Darnel	Group 1	AB, SK
Ragweed, giant	Group 2 & 9	Occurs in Ontario, Minnesota
Redroot pigweed	Group 2	MB, SK
	Group 5	Occurs in Ontario
Russian thistle	Group 2	AB, SK
	Group 9	Occurs in Montana
Shepherd's-purse	Group 2	AB, MB, SK
Smartweed, pale	Group 2	MB
Spiny Annual Sow-thistle	Group 2	AB, MB
Stinkweed	Group 2	AB, MB, SK
Waterhemp	Group 2 & 9	Occurs in North Dakota, Ontario
	Group 2, 5, 9 & 14	Ontario
Wild buckwheat	Group 2	AB
Wild oat	Group 1	AB, MB, SK
	Group 2	AB, MB, SK
	Group 8	AB, MB, SK
	Multiple combinations of: Groups 1 & 2, Groups 1 & 8, Groups 2 & 8, Groups 1, 2 & 8, Groups 1, 2, 8 & 25, Groups 1, 2, 8, 14, 15 (MB)	AB, MB, SK

See Table 8 on page 45 for a complete list of products in each Herbicide Resistance Group.

## If Weed Resistance Develops on Your Farm

It is important to identify weed resistance before it spreads across your farm. Plan on conducting a "patch watch" scouting program this summer to identify suspicious patches before they become difficult to manage. Resistant weed patches have been identified on fields where producers were unaware of their existence.

Your patch watch program should begin shortly after spraying and continue through July after the crop has headed out and most weeds are visible from a distance. If you find suspicious looking patches, contact your local agricultural office or crop protection company representative to assist you in confirming weed resistance. If resistance is suspected:

1. Map the location of the patches and mark them with stakes so you will remember their location.
2. Mow, cultivate or spot spray the patches. Resistant patches should not be allowed to produce seed.
3. Patchy areas should NOT be harvested with the rest of the field. Harvest these areas separately, and make sure to clean all harvesting equipment before leaving the area to prevent the spread of seeds across the field or a neighbouring field.
4. Check patches each year to monitor their spread. Keeping your resistant weeds isolated to a manageable patch is easier than dealing with an entire field of resistant weeds.

## Adjuvants and Your Herbicide

Adjuvants are important ingredients in chemical weed control. Many herbicides must be applied with an adjuvant. If it is forgotten, the level of weed control can vary widely, and re-spraying may be necessary.

Many products have adjuvants built into the formulation. Others require adjuvant addition (e.g. *Refine SG*). Some adjuvants were developed specifically for one herbicide, and these are either pre-packaged with the herbicide, or are identified by name on the label (e.g. *Turbocharge* for *Achieve*, *Amigo* for *Select/Centurion*). Consult a company representative to determine the support for pesticide adjuvant combinations not listed on the product label.

With some products, adjuvants need to be added only under certain conditions. For example, glyphosate products have built-in adjuvants, but require additional adjuvant when low rates (pre-seeding or chem-fallow), high water volumes, or certain tank mixes are used.

Adjuvants should be added only when required. If one is not required, addition can reduce weed control or injure crops. Product labels will describe when an adjuvant is required, and what type should be used.

There are two main classes of adjuvants: “activators or spray modifiers” (including surfactants and crop oils), and “utility modifiers” (including pH adjusters, water conditioners, low-drift adjuvants, and anti-foaming agents). The most important class of adjuvants is the activators. Surfactants, the main group within the activators, are “surface active agents.” These chemicals produce effects at points where two substances touch, such as between two liquids (herbicide and water) or between a solid and a liquid (herbicide and leaf surface). Some surfactants act as dispersing agents, helping to keep a pesticide suspended in water. Others work on the plant, improving the wetting, sticking and penetrating characteristics of the herbicide droplets. Oil-based adjuvants contain petroleum or vegetable oil and an emulsifier that suspends

the oil in tiny droplets within the spray solution. Oil-based adjuvants typically assist in herbicide penetration into the leaf.

There are two basic types of surfactants (ionic and non-ionic), of which the non-ionic are most common. The following table lists the surfactants registered for use with herbicides in Western Canada.

### Adjuvants and Registered Pesticides:

Note – some products are specific about the concentration of active ingredient in the surfactant for product performance. Check with the product page in this guide or the product label.

Trade Name	Composition	Registered Pesticides (Adjuvant label only)
<i>Addit Adjuvant</i> (PCP#29263)	37% surfactant blend	<i>Bison</i>
<i>Adigor Adjuvant</i> (PCP#28151)	48.8% methylated rape seed oil 28.2% ethoxylated alcohols	<i>Broadband</i>
<i>Agral 90</i> (PCP#24725),	90% nonylphenoxy polyethoxy ethanol	<i>Accent, Altitude FX, Battalion</i> , diquat, <i>Escort</i> , flucarbazone, glyphosate, <i>Muster</i> , <i>Pinnacle</i> , <i>Prism</i> , imazethpyr, metsulfuron, thifensulfuron/tribenuron, <i>Reflex</i> , <i>Reward</i> , <i>Triton K</i> , <i>Ultim</i> (Not all adjuvants may be used with all herbicides listed)
<i>Agral 90</i> (PCP#11809), <i>IPCO Agsurf Original</i> (PCP#15881)	92% nonylphenoxy polyethoxy ethanol	
<i>Agsurf II</i> (PCP#30071)	92% Alcohol ethoxylate	
<i>Amigo Adjuvant</i> (PCP#22644), <i>X-Act</i> (PCP#28225), <i>Patron Adjuvant</i> (PCP#32496), <i>MPower Tonto</i> (PCP#32615), <i>Surf-Act</i> (PCP#32313)	30% phosphate ester surfactant	clethodim <sup>†*</sup>
<i>Assist Oil Concentrate</i> (PCP#16937), <i>CropOil 83/17 Adjuvant</i> (PCP#30978), <i>XA Oil Concentrate</i> (PCP#11769), <i>Score Adjuvant Liquid</i> (PCP#12200)	83% paraffin based mineral oil 17% surfactant blend	<i>AAtrex, Basagran</i> (all crops), <i>Ultra Blazer</i> , clodinafop <sup>†*</sup> , clodinafop + bromoxynil/ MCPA ester <sup>†*</sup> , <i>Impact</i> , quizalofop ( <i>Contender</i> , <i>Yuma GL</i> ), <i>Simplicity</i> (Not all adjuvants may be used with all herbicides listed)
<i>Citowett Plus Adjuvant</i> (PCP#12766), <i>Super Spreader</i> (PCP#17402)	50% octylphenoxypolyethoxy ethanol	<i>Accent, AAtrex, Basagran</i> (peas), <i>Escort</i> , flucarbazone, metsulfuron, <i>Muster</i> , <i>Pinnacle</i> , <i>Prism</i> , thifensulfuron/tribenuron, <i>Triton K</i> , <i>Ultim</i>
<i>Companion Adjuvant</i> (PCP#15882)	70% octylphenoxypolyethoxy-(9)- ethanol	Glyphosate, metsulfuron, <i>Muster</i>
<i>Enhance</i> (PCP#29270), <i>Nufarm Enhance</i> (PCP#29952), <i>ADAMA Adjuvant 80</i> (PCP#30419)	80% triglyceride ethoxylate 10 POE	<i>Accent</i> , diquat, <i>Escort</i> , <i>Folicur 432</i> , glyphosate, <i>Gramoxone</i> , <i>Lontrel</i> , <i>Muster</i> , <i>Pinnacle</i> , <i>Prism</i> , imazethapyr, metsulfuron, thifensulfuron/tribenuron, <i>Signal</i> , <i>Signal FSU</i> , <i>Reflex</i> , <i>Reglone</i> , <i>Reward</i> , <i>Ultim</i> , <i>Valtera</i>
<i>Hasten Spray Adjuvant</i> (PCP#27420)	73.3% methyl and ethyl oleate (esterified vegetable oil)	<i>Impact</i>
<i>HiActivate Non-Ionic Liquid Spreader Activator</i> (PCP#31817)	900 g/L alkylaryl polyoxyethylene glycols, free fatty acids & isopropyl alcohol	<i>Accent</i> , <i>Assure</i> , <i>Ally</i> , <i>Pursuit</i> , <i>Ultim</i>
<i>Intake Adjuvant</i> (PCP#31243)	586 g/L paraffinic oil 242 g/L alkoxylated alcohol non-ionic surfactants	<i>Tralkoxydim</i> ( <i>Liquid Achieve</i> , <i>Marengo</i> ), <i>Simplicity</i> , <i>Tandem</i> , <i>Refine SG</i> , <i>Ally</i> , <i>Reclaim II</i> , <i>Escort</i>
<i>LI 700</i> (PCP#23026)	80% surfactant blend	Diquat, flucarbazone, glyphosate, <i>Fulfill</i> insecticide, quizalofop ( <i>Assure II</i> )



Trade Name	Composition	Registered Pesticides (Adjuvant label only)
<i>Liberate Adjuvant</i> (PCP#29491)	100% lecithin, methyl esters of fatty acids and alcohol ethoxylate	Flucarbazone, <i>Pursuit</i> , <i>Reflex</i> , <i>Odyssey</i> , quizalofop ( <i>Assure II</i> ), thifensulfuron/tribenuron, tribenuron, metsulfuron ( <i>Accurate</i> )
<i>Merge Adjuvant</i> (PCP#24702)	50% surfactant blend 50% solvent (petroleum hydrocarbons)	<i>Ares*</i> , <i>Heat WG</i> , <i>Heat LQ*</i> , quinclorac, <i>Odyssey</i> , <i>Odyssey Ultra*</i> , <i>Poast Ultra</i> , quizalofop, <i>Solo</i> , <i>Tensile</i> , <i>Triton C</i>
<i>MSO Concentrate with Leci-Tech</i> (PCP#28385), <i>IPCO Contender MSO Adjuvant with Leci-Tech</i> (PCP#32198)	70% methylated seed oil of soybean	imazethapyr, <i>Odyssey</i> , <i>Poast Ultra</i> , quizalofop ( <i>Contender</i> )
<i>Sure-Mix Surfactant</i> (PCP#25467)	60% paraffinic petroleum oil 40% surfactant blend	quizalofop
<i>Turbocharge Adjuvant</i> (PCP#23135) <i>Adjuvant for Nufarm Tralkoxydim</i> (PCP#30828) <i>Carrier</i> (PCP#30639)	50% mineral oil 39.5% surfactant blend	<i>Paradigm</i> , tralkoxydim <sup>†*</sup> , clethodim ( <i>Statue only</i> ) <sup>*</sup>

\* The adjuvant is packaged with the product.

† Note: All products may not be registered with all adjuvants. See product page in the following sections to determine which adjuvants are registered for each herbicide.

## Crop and Herbicide Recommendation Tables

The following charts give general weed control comparisons based on rates, timing and other application instructions and precautions as outlined in this Guide.

A dot (•) will indicate if the weed is listed on a product label. Where rate ranges are listed for controlling a given weed, ratings are based on results achieved with the higher rate unless noted otherwise. 'S' indicates weed suppression.

## Weed Control Tables

Table 1. Weed Control in Barley

HERBICIDE	Page	Barnyard Grass	Foxtail, Green and Yellow	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers	
2,4-D	83							*		*	* <sup>5</sup>	*		*	*		*	*	*	*	*	TG	*	TG		*	S	
Avadex	106				*																							
Axial	109	*	*		*																							
Axial iPak	111	*	*		*	*		*	*		* <sup>4</sup>	*	*	*	*	S	*	*	*	*	*	S	*	S		*		
Axial Xtreme	112	*	*		*	S		*						*														
Barricade II	114					*	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Broadband	124	*	*		*	*		*	*				S				*	S		*		S	*			*		
Bromoxynil	126				*					*				*	*		* <sup>7</sup>	* <sup>7</sup>	*		*		* <sup>7</sup>					
Bromoxynil/2,4-D	130				*	*				*				*	*		*	*	*	*	*		*			*	*	
Bromoxynil/MCPA	132				*	*		*	*	*		*		*	*		*	*	*	*	*	TG	*	TG		*	*	
Bromoxynil+MCPA+Fluroxypyr	136				* <sup>7</sup>	*	* <sup>7</sup>	* <sup>7</sup>	* <sup>7</sup>	* <sup>7</sup>		* <sup>7</sup>	* <sup>7</sup>	*	*		*	S	* <sup>7</sup>	* <sup>7</sup>	* <sup>7</sup>		* <sup>7</sup>	TG	* <sup>7</sup>	* <sup>7</sup>		
Cirpreme/MCPA	140				*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	
Clopyralid	151				*																	TG		*				
Clopyralid/MCPA	154				*						* <sup>3</sup>	*		S	*		*	* <sup>7</sup>		* <sup>7</sup>	* <sup>7</sup>	TG	*	*		* <sup>7</sup>	*	
Clopyralid/MCPA+fluroxypyr	156				*		S	*	*		* <sup>3</sup>	*	S	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Dicamba + MCPA/2,4-D	163				*			*	*	*	*	*	* <sup>1</sup>	*	*	*	*	*	*	*	*	TG	*	TG		*	*	
Dicamba/Mecoprop/MCPA	168				*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	TG		*	*	
Dichlorprop/2,4-D	170				*	* <sup>3</sup>				*	S	*	*	*	*	*	*	*	*	*	*	*	*	TG		*	*	
DyVel	179				*				S	*		*	*	*	*		*	*	*	*	*	*	*			*	*	
DyVel DSp	181				*				S	*		*	*	*	*	S	*	*	*	*	*	*	*	TG		*	*	
Enforcer D	186				* <sup>7</sup>	*		*	*		TG	*	*	*	*	* <sup>7</sup>	*	* <sup>7</sup>	* <sup>7</sup>	*	*	*	*	S		*	*	
Enforcer MSU	188				*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	TG	*	*	*	
Fenoxaprop	195	*	*		*																							
Florasulam	203				*	*	*	*					S		*		*	S		*	*	S	*			*	*	
Florasulam + Clopyralid/MCPA	207				*	*	*	*				* <sup>3</sup>	*	*	*		*	*		*	*	*	*	*	*	*	*	
Florasulam + MCPA	210				*	*	*	*	*		* <sup>5</sup>	*	*	*	*		*	*		*	*	TG	*	TG		*	*	
Florasulam/fluroxypyr + MCPA	212				*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	
Fluroxypyr	217				S	*	*	*	*	*			S	*	*	*	*	*	*	*	*	*	*		*	*	*	
Fluroxypyr + 2,4-D, OcTTain XL	220/ 305				*		S	*	*	*	* <sup>3</sup>	*	S	*	*	*	*	*	*	*	*	S	*	S	*	*	*	
Fluroxypyr + MCPA	222				S	*	*	*	*	*		*	* <sup>3</sup>	*	*	*	*	*	*	*	S	*	*		*	*	*	
Fortress MicroActiv	226		*		*	S								S	S			S	S									
Imazamethabenz	257				*	S											*						*					
Infinity	269				*	*	*	*			* <sup>4</sup>	*	*	*	*	S	*	*	*	*	*	S	*	S		*	*	
Linuron + MCPA amine	279		S		*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*					
MCPA	284							*		* <sup>8</sup>	*	*	S	*	*	*	*	*	*	*	*	*	*					
MCPA K	284							*		*	*	*	S		*		*			*			*					
Mecoprop-p	290							*	*						*		*							TG				
Metribuzin	291					*	*						* <sup>7</sup>	*	*		*	*	*	*	*		*			*	*	
Metsulfuron	295					*	*	*	*			*	*	*	*	*	*	*	*	*	*	* <sup>3</sup>	*			*	*	
Momentum	297				*		*	*	*					*	*		*	*	*	*	*			*	*	*	*	
Optica Trio	311				*	*	*	*	*					*	*		*	*			*		*	TG		*	*	
Paradigm	318				*	*	*	*	*		*	*	S	S	*	*	*	*	*	*	*	S	*	S	*	*	*	
Pixxaro	325				*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*		*	S	*	*	*	
Pulsar	335				*		*	*	*					*	S			S	*						*	*	*	
Quinclorac	337	*	*			*		*	*						*		*	*				S				*	*	
Retain	350				*	*	*	*	*			*	*	*	*		*	*	*	*	*	*	*			* <sup>2</sup>	*	
Rezuvant	354	*	*		*	*	*	*	*			*	*	*	*	*	*	*	*	*	*				*	*	*	
Thifensulfuron/tribenuron	373				*	*	*	S	*			*	*		*	S	*	*	*	*	*	S	*	S		* <sup>2</sup>	*	
Thifensulfuron/tribenuron + MCPA	377				*	*	*	S	*		* <sup>6</sup>	*	*	*	*	S	*	*	*	*	*	S	*	S		*	*	
Tralkoxydim	382	*	*		*																							
Travallas	385				*	*	*	*	*		* <sup>4</sup>	*	*	*	*	*	*	*	*	*	*	*	*	TG	*	* <sup>2</sup>	*	
Tribenuron + 2,4-D	393				*			*	*		* <sup>5</sup>	*	*	*	*	*	*	*	*	*	*	*	*	TG		*	*	
Trifluralin (green foxtail control)	396		*		*	*	*	*	*						*			*										
Trifluralin (grassy and broadleaf)	396	*	*		*	*	*	*	*						*			*										
Triton C	401				*	*	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	S	S		* <sup>2</sup>	*
Triton K	403				*	*	*	*	*		* <sup>6</sup>	*	*	*	*	*	*	*	*	*	*	*	*	TG		*	*	
Tundra	405	*	*		*	*	*	*	*		* <sup>4</sup>	*	*	*	*	S	*	*	*	*	*	*	S	*	S		*	*

\* Control. S – Suppression. TG – Top growth control.

<sup>1</sup> MCPA K mixes only. <sup>2</sup> Will not control CLEARFIELD canola varieties. <sup>3</sup> Spring seedlings only. <sup>4</sup> Up to 25 cm diameter. <sup>5</sup> Seedlings and overwintered rosettes.<sup>6</sup> Less than 15 cm diameter. <sup>7</sup> Controlled at higher rates. <sup>8</sup> Fall application.

Table 2. Weed Control in Oats

HERBICIDE	Page	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-DB	86				• <sup>5</sup>					TG				•		•	•		•	S <sup>5</sup>	TG <sup>5</sup>	•	TG <sup>5</sup>			
Bromoxynil	126				•				•				•	•		• <sup>5</sup>	• <sup>5</sup>	• <sup>3</sup>		•		• <sup>5</sup>				
Bromoxynil/MCPA	132				•	•			•		•	•	•	•		•	•	•	•	•	TG	•	TG		•	•
Clopyralid	151				• <sup>5</sup>																TG		•			
Clopyralid/MCPA	154				•				•	• <sup>3</sup>	•		S	•		•	• <sup>5</sup>		•	• <sup>5</sup>	TG	•	•		• <sup>5</sup>	•
Dicamba + MCPA	163				•			•	•		•	S	•	•		•	•	•	•	•	TG	•	TG		•	
Dicamba/Mecoprop/MCPA	168				•	•		•			•	•	•	•		•	•	•	•	•	•	•	TG		•	•
DyVel	179				•			S	•			•	•	•		•	•	•	•	•	TG	•	TG	•	•	•
Florasulam + Clopyralid/MCPA	207				•		•	•		• <sup>4</sup>	• <sup>3</sup>	•	•	•		•	•		•	•	•	•	•		•	•
Florasulam + MCPA	210				•		•	•		• <sup>5</sup>	•	•		•		•	•		•	•	TG	•	TG		•	•
Linuron + MCPA amine	279	S			•		•		•		•	•		•		•	•		•	•		•				
MCPA	284								•		•	S	•	•		•	•		•	•		•				
MCPB/MCPA	288										S		•	•		•	•		•		TG	•	•		•	
Mecoprop-p	290						•	•						•		•							TG			
Optica Trio	311				•		•	•					•	•		•	•					•	TG		•	
Prestige XC/Prestige XL (see Clopyralid/MCPA+Fluroxypyr)	156				•		S	•		• <sup>3</sup>	•	S	•	•	•	•	•		•	•	•	•	•	•	•	•
Stellar/Stellar XL (see Florasulam/fluroxypyr + MCPA)	212				•		•	•	•		•	•	•	•		•	•		•	•		•		•	•	
Thifensulfuron/tribenuron	373				•		•	S			•	•		•	S	•	•	•	•	•	S	•	S		• <sup>2</sup>	•
Thifensulfuron/tribenuron + MCPA	377				•		•	S		•	•	•		•	S	•	•	•	•	•	S	•	S		•	•

• Control. S – Suppression. TG – Top growth control.

<sup>2</sup> Will not control CLEARFIELD canola varieties. <sup>3</sup> Spring seedlings only. <sup>4</sup> Seedlings and overwintered rosettes. <sup>5</sup> Controlled at higher rates.

Table 3. Weed Control in Rye or Triticale

HERBICIDE		Page	CROP F - Fall Rye, R - Spring Rye, T - Triticale	Barnyard Grass	Foxtail, Green and Yellow	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D <sup>3</sup>	83	F/R										•	• <sup>2</sup>	•		•	•		•	•	•	•	•	TG	•	TG		•	S
Bromoxynil <sup>1</sup>	126	F						•				•				•	•		• <sup>3</sup>	• <sup>3</sup>	•		•		• <sup>3</sup>				
Bromoxynil/MCPA <sup>1</sup>	132	F						•	•			•		•		•	•		•	•	•	•	•	TG	•	TG		•	•
Dicamba + 2,4-D <sup>2</sup>	163	R						•			•	•		•		•	•		•	•	•	•	•	TG	•	TG		•	
Infinity	269	T						•		•	•		• <sup>1</sup>	•	•	•	•	S	•	•	•	•	•	S	•	S		•	
MCPA <sup>3</sup>	284	F/R										•		•	S	•	•		•	•		•	•		•				
Tralkoxydim	382	F/R/T	•	•			•										•		•	•									

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Up to 25 cm diameter. <sup>2</sup> Seedling stage only. <sup>3</sup> Controlled at higher rates.

Table 4. Weed Control in Wheat (Spring, Durum and Winter)

HERBICIDE	Page	CROP: W - Winter, S - Spring, D - Durum	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Annual bromes	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers	
2,4-D	83	W/S/D									*		*	* <sup>1</sup>	*		*	*		*	*	*	*	*	TG	*	TG		*	S	
Altitude FX <sup>6</sup>	95	S <sup>6</sup>	*	*	*	S <sup>D</sup>		*	*			*					*	*	S	*	*	S	*	*		*		*	*		
Avadex	106	S/D						*										*	S	*	*	S	*	*	*			*	*		
Axial	109	W/S	*	*	*			*																							
Axial iPak	111	S	*	*	*			*	*		*	*		S	*	*	*	*	S	*	*	*	*	*	S	*	S		*		
Axial Xtreme	112	S	*	*	*			*	S		*						*			S	*	*		*					*		
Barricade II	114	W/S/D						*	*	*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Bentazon + 2,4-D	117	S											*					*	*	S	*	*	*	*	*	*		*	*	*	
Broadband	124	S	*	*	*			*	*		*	*				S				*	S	*	*		S	*			*	*	
Bromoxynil	126	W/S/D						*					*				*	*		* <sup>5</sup>	* <sup>5</sup>	*	*	*		* <sup>1</sup>					
Bromoxynil/2,4-D	130	S/D						*	*				*		*		*	*	*	*	*	*	*	*	*	*			*	*	
Bromoxynil/MCPA	132	W/S/D						*	*		*	*			*	*	*	*	*	*	*	*	*	*	TG	*	TG		*	*	
Bromoxynil+MCPA+Fluroxypyr	136	W/S/D						* <sup>5</sup>	* <sup>5</sup>	* <sup>5</sup>	* <sup>5</sup>	* <sup>5</sup>	* <sup>5</sup>		* <sup>5</sup>	*	*	*	*	S	* <sup>5</sup>	* <sup>5</sup>	* <sup>5</sup>	* <sup>5</sup>		* <sup>5</sup>	TG	* <sup>5</sup>	* <sup>5</sup>	* <sup>5</sup>	
Cirpreme/MCPA	140	W/S/D						*	*	*	*	*	*	*	*	*	S	*	*	*	*	*	*	*	*	*	*	*	*	*	
Clodinafop	148	S/D	*	*	*			*										*	*		*	*	*	*	*	*	*	*	*	*	
Clopyralid	151	S						*																	TG		*				
Clopyralid/MCPA	154	S/D						*					*	* <sup>1</sup>	*		S	*	*	*	* <sup>5</sup>	*	*	* <sup>5</sup>	*	*	*	*	* <sup>5</sup>	*	
Clopyralid/MCPA+Fluroxypyr	156	W/S/D						*		S	*		* <sup>1</sup>	*	S	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Dicamba + MCPA/2,4-D	163	W/S/D						*	*		*	*	*	* <sup>3</sup>	*	*	*	*	*	*	*	*	*	*	TG	*	TG		*	S	
Dicamba/Mecoprop/MCPA	168	W/S/D						*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	TG	*	TG		*	*	
Dichlorprop/2,4-D	170	W/S/D						*	* <sup>5</sup>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	TG	*	*	
DyVel	179	W/S/D						*			S	*	*	*	*	*	*	*	*	*	*	*	*	*	TG	*	TG		*	*	
DyVel DSp	181	W/S/D						*			S	*	*	*	*	*	*	*	S	*	*	*	*	*	*	*	TG		*	*	
Enforcer D	186	S/D						* <sup>5</sup>	*		*	*		* <sup>5</sup>	*	*	*	*	* <sup>5</sup>	*	* <sup>5</sup>	* <sup>5</sup>	*	*	*	*	S	* <sup>5</sup>	*	*	
Enforcer MSU	188	W/S/D						*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	TG	*	*	*	
Fenoxaprop	195	S/D	*	*	*			*									*	*		*	*	*	*	*	*						
Fierce	198	W/S		*		* <sup>1</sup>		*	*		*		*				*	*		*	*	*	*	*	*				S		
Florasulam	203	S/D						*	*	*	*				S		*	*		*	S	*	*	S	*	*		*	*	*	
Florasulam + 2,4-D	205	S/D						*	*	*	*	*	* <sup>2</sup>	*	S	*	*	*	*	*	*	*	*	*	S	*	S		*	*	
Florasulam + Curtail M	207	S/D						*	*	*	*	*	* <sup>2</sup>	* <sup>1</sup>	*	*	*	*	*	*	*	*	*	*	TG	*	*		*	*	
Florasulam + MCPA	210	S/D						*	*	*	*	*	* <sup>2</sup>	*	*	*	*	*	*	*	*	*	*	*	TG	*	TG		*	*	
Florasulam/fluroxypyr + MCPA	212	S						*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*		
Flucarbazone	214	W/S/D	S	*	S			*	S <sup>5,12</sup>								*	*	*	*	*	*	*	*	*	*			*	* <sup>4</sup>	
Fluroxypyr	217	W/S/D						S	*		*				S	*	*	*	*	*	*	*	*	S	*		*	*	*		
Fluroxypyr + 2,4-D, OctTail XL	220	W/S/D						*		S	*	*	* <sup>1</sup>	*	S	*	*	*	*	*	*	*	*	*	S	*	S	*	*	*	
Fluroxypyr + MCPA	222	S/D						S	*		*	*	*	*	*	*	*	*	*	*	*	*	*	S	*	*	*	*	*	*	
Focus <sup>10</sup>	224	W/S	*	*	*	* <sup>10</sup>		S	S		*						S	S		S	*			*	*	*	*	*	*	*	
Fortress MicroActiv	226	S/D		*				*									S	S			S	S									
Imazamethabenz	257	S/D						*	*											*	*	*	*	*	*	*	*		* <sup>4</sup>	*	
Infinity	269	W/S/D						*	*	*	*		S	*	*	*	*	*	S	*	*	*	*	*	S	*	S		*	*	
Linuron + MCPA amine	279	S/D						*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*					
MCPA	284	W/S/D						*	*			*	*	*	S	*	*	*	*	*	*	*	*	*	*	*	*		*	*	
Mecoprop-p	290	S/D						*	*		*	*					*	*	*	*	*	*	*	*	*		TG		*	*	
Metribuzin	291	S/D						*	*		*	*			*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	
Metsulfuron	295	S/D						*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	* <sup>8</sup>	*	*	* <sup>8</sup>	*	*	
Momentum	297	S/D						*	*		*	*					*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Olympus	309	W/S/D				* <sup>10</sup>		S									*	*													
Optica Trio	311	W/S/D						*	*	*	*						*	*	*	*	*	*	*	*	*	*	TG		*	*	
Paradigm	318	W/S/D						*	*	*	*	*	* <sup>7</sup>	*	S	S	S	*	*	*	*	*	*	*	S	*	S <sup>7</sup>	*	*	*	
Pixxaro	325	W/S/D						*	*	*	*	*	S <sup>7</sup>	*	*	*	*	*	*	*	*	*	*	*	*	*	S <sup>7</sup>	*	*	*	
Predicade	330	S/D	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Pulsar	335	S						*	*		*	*	*	*	*	*	*	S	*	*	S	*	*	*	*	*	*	*	*	*	

Table 4. Weed Control in Wheat (Spring and Winter) *continued*

HERBICIDE	Page	CROP: W - Winter, S - Spring, D - Durum	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Annual bromes	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
Quinclorac	337	S/D	•	•								•			•	•		•		•	•	•	•	•	S			•		
Retain	350	S						•			•							•		•	•	•	•			•			•	•
Rexade	352	W/S/D	•	S		• <sup>D11</sup>		•	•	S	•	•	•	•	•	•	S	•	•	•	•	•	•	•		•	S	•	•	
Rezuvant	354	S	•	•	•			•	•		•	•			•	•	•	•	•	•	•	•	•					•		
Signal SFU	361	S/D	•	•	•			•	•		•	•			•	•	•	•	S	•	•	•	•		S	•	S	•	•	•
Simplicity OD/Simplicity GoDRI	365	W/S	•	S	•	•		•	S		•	•		S		•		•	•		•	S	•	•		•	S		• <sup>4</sup>	
Tandem	371	W/S	•	S	•	•		•	S		•	•		S	•	•	•		•		•	S	•	•		•	S	•	• <sup>4</sup>	
Thifensulfuron/tribenuron	373	W/S							•		•	S			•	•		•	S	•	•	•	•	•	S	•	S		• <sup>4</sup>	•
Thifensulfuron/tribenuron + MCPA	377	W/S						•	•	•		S	• <sup>8</sup>	•	•	•	•	•	S	•	•	•	•	•	S	•	S	•	•	•
Tralkoxydim	382	W/S	•	•	•			•										•			•	•	•	•	•					
Travallas	385	W/S/D							•	•	•	•	•	• <sup>4</sup>	•	•	•	•			•	•	•	•	•	•	•	S	•	• <sup>4</sup>
Traxos	387	S/D	•	•	•			•																						
TraxosTwo	389	S/D	•	•	•			•	•		S	•	•	• <sup>1</sup>	•	S	•	•	•	•	•	•	•	•	S	•	S	•	•	•
Tribenuron + 2,4-D	393	S											•	•	•			•		•	•	•	•				TG		•	•
Trifluralin (foxtail control) <sup>10</sup>	396	S/D		•	•													•		• <sup>1</sup>	•	•	•	•	•					
Triton C	401	S/D							•		•	•			•	•	•	•	• <sup>1</sup>	•	•	•	•	•	S	•	S	S	• <sup>4</sup>	•
Triton K	403	W/S/D							•				•	• <sup>8</sup>			•	•	•	•	•	•	•	•		•	TG		•	•
Tundra	405	S	•	•	•			•	•		•	•		S	•	•	•	•	S	•	•	•	•	•	S	•	S		•	
Valtera <sup>10</sup>	411	S		S							•						•	•			•									S
Varro	414	W/S/D	•	•	S	S <sup>D</sup>		•	•		•	•			•			S	S	•	•	S	•			•				S
Velocity m3	417	W/S/D	•	•	S	S <sup>D</sup>		•	•		•	•		S	•	•	•	•	S	•	•	•	•	•	S	•	S			•

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Spring seedlings only. <sup>2</sup> Spring seedlings and overwintered rosettes. <sup>3</sup> MCPA K mixes only. <sup>4</sup> Will not control CLEARFIELD canola varieties.

<sup>5</sup> Controlled at the higher rates. <sup>6</sup> For use on CLEARFIELD wheat varieties only. <sup>7</sup> Up to 30 cm tall or across. <sup>8</sup> Less than 15 cm diameter. <sup>10</sup> Weeds controlled when emerging from seed only (not controlled if emerged at application). <sup>11</sup> Control of Japanese brome, suppression only of downy brome. <sup>12</sup> Not registered for all products. See product page. <sup>10</sup> J = Japanese brome, D = Downy brome



Table 5. Weed Control in Corn

HERBICIDE	Page	Barneyard Grass	Volunteer Cereals	Foxtail, Green	Foxtail, Yellow	Wild Oats	Quackgrass	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed Annual Species	Sow-thistle (Perennial)	Stinkweed	Sunflower, Volunteer	Thistle, Canada	Volunteer Canola
2,4-D	83								*			*	*	*	*	*	*	*	*	*	*	TG	*	*	S	*
2,4-DB	86							*					TG			*	*	*		*	S	TG	*	*	TG	*
Aatrex	89					*		*								*	*	*			*					
Accent	91	*		*	S	*	*										*	*								
Bentazon	117									*	*	*				*	*	S	S	*	*		*		S	*
Bromoxynil	126							*				*			*	*	*	*	*		*		*			*
Bromoxynil/MCPA	132							*	*			*		*	*	*	*	*	*	*	*	S	*	*	S	*
Dicamba	163							*			*					*	*	*			*	S			S	*
Dicamba + 2,4-D amine	163							*			*	*	S	*	*	*	*	*	*	*	*	S	*	*	S	*
Distinct	176							*				*			*	*	*	*			*	S			TG	*
Dual II Magnum <sup>8</sup>	178	• <sup>9</sup>		• <sup>9</sup>	• <sup>9</sup>						• <sup>9</sup>				• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>	S <sup>9</sup>				• <sup>9</sup>			
DyVel DSp	181							*			*	*		*	*	*	*	*	*	*	*		*		TG	*
Fierce	199			*				*	*	*					*	*	*				*					S
Focus <sup>8</sup>	224	• <sup>9</sup>		• <sup>9</sup>	• <sup>9</sup>	S <sup>9</sup>		S			• <sup>9</sup>				• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>					• <sup>9</sup>			
Frontier Max	228			*																						
Glyphosate <sup>1, 4</sup>	233	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	• <sup>7</sup>
Liberty 200 SN <sup>3</sup>	277	*		*	*	*	S	*	*		*					*	*	*	*	*	*	*	*		S	
Linuron	279	S		S	S			*	*				• <sup>11</sup>		• <sup>11</sup>	*	*	*	*	*	*	• <sup>9</sup>	*			
MCPA	284											*		*		*	*			*	*		*			
MCPB/MCPA	288															*	*	*		*	*	S	*		S	*
Option 2.25 OD <sup>6</sup>	312	*		*	*				*							*	*	*		*	*					
Permit WG	320								*		*					*	*	*		*	*					• <sup>12</sup>
Primextra II Magnum <sup>8</sup>	331	• <sup>9</sup>		• <sup>9</sup>	• <sup>9</sup>			• <sup>9</sup>								• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>			• <sup>9</sup>					
Shieldex	359	S		*	S							*				*	*	*		*	*					
Simazine	363	*			*	*		*								*	*				*					
Sortan IS	369	*		*	S		*	*								S	*	*								*
Topramezone <sup>10</sup>	378	S		S	S					S						S	*	S			S					
Topramezone + Atrazine	378	S		S	S					S						*	*	*			*					
Ultim <sup>2,6</sup>	408	*	*	*	S	*	*										*	*	*							• <sup>12</sup>

\* Control. S – Suppression. TG – Top growth control.

<sup>1</sup> For use on glyphosate tolerant varieties only. <sup>2</sup> See product page for registered corn varieties. <sup>3</sup> For use on Liberty 200 SN tolerant corn varieties only. <sup>4</sup> Not all glyphosate products are registered for use on glyphosate tolerant corn. <sup>6</sup> For use in Manitoba only. <sup>7</sup> Will not control glyphosate tolerant varieties. <sup>8</sup> Apply pre-seed or pre-emergent.

<sup>9</sup> Only controlled when weeds are emerging from seed (not controlled if emerged at application). <sup>10</sup> Must be applied with a tank mix partner. <sup>11</sup> Linuron 400 only.

<sup>12</sup> Except CLEARFIELD tolerant varieties.

Table 6. Weed Control in Soybean

	Page	Herbicide Resistance Group	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Volunteer Barley	Volunteer Wheat	Wild Oat	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Nightshade, Hairy	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Volunteer Canola	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
HERBICIDE																											
Authority/Authority Charge <sup>7</sup>	103	14						*		S				*	*			*									
Authority Supreme	103	14&15	*	*	*			S	*		*			*	*			*			*						
Bentazon	117	6							*	*	*				*	*	*	S	S	*	*	*	*	*			
Clethodim	144	1	*	*	*	*	*	*							*	*		S	*			*					
Dicamba <sup>10, 11</sup>	163	4							*		*				*	*		*			*			TG		TG	
Dual II Magnum	178	15	* <sup>6</sup>	* <sup>6</sup>	* <sup>6</sup>													S <sup>6</sup>									
Edge Granular	184	3	*	*	*	S	S	S	*	*	S		S	*	*		S	*	S		S						
Fierce	198	14&15		*					*	*				*	*	*	*	*	*		*		S		*		
Flexstar GT <sup>1, 2</sup>	201	9/14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Focus	224	14/15	* <sup>6</sup>	* <sup>6</sup>	* <sup>6</sup>			S <sup>6</sup>	S <sup>6</sup>		* <sup>6</sup>			S <sup>6</sup>	S <sup>6</sup>	S <sup>6</sup>		* <sup>6</sup>			* <sup>6</sup>	* <sup>6</sup>					
Glyphosate <sup>2, 3</sup>	233	9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	* <sup>9</sup>	*	*	*	*
Heat Complete (residual component)	253	14/15		S	S			S	*		*			*	*	*	*	*			*	*					
Imazamox (Solo ADV and Davai 80 SL only)	260	2	*	*	*	*	*	*	S		S			S	*	*	*	*		*	*	*	* <sup>4</sup>				
Imazamox/Imazethapyr	262	2	*	*		*	* <sup>4</sup>	*	*	*	*		*		S	*	*	*	*	*	*	*	* <sup>4</sup>				
Imazethapyr	265	2															*		*	*	*	*	* <sup>4</sup>				
Liberty 200SN <sup>8</sup>	277	10	*	*	*		*	*	*		*				*	*	*	*	*	*	*	*		S		*	S
Linuron	279	7	S	S	S				*	*				S			*	*		*	*	*			S <sup>13</sup>	S <sup>13</sup>	
Metribuzin + Treflan EC (PPI)	291	5	*	*	*		*	*	*			*			*	*	*	*	*	*	*	*	*				
Odyssey Ultra	308	1&2	*	*	*	*	*	*	S	*	*		S		S	*	*	*	*	*	*	*	* <sup>4</sup>				S
Pinnacle	323	2													*	*	*	*		*							
Poast Ultra	327	1	*	*	*	*	*	*																		*	
Quizalofop	340	1	*	*	*	*	*	*																		*	
Reflex + Basagran <sup>1</sup>	345	6&14										*			*	*		S		*	*	*	*				
Roundup Xtend <sup>10</sup>	355	4&9	*	*	*	*	*	*	*	*	*	*	*	* <sup>12</sup>	*	*	*	*	*	*	*	*	* <sup>9</sup>	*	*	*	*
Trifluralin (broadleaf & grassy weeds)	396	3	* <sup>6</sup>	* <sup>6</sup>	* <sup>6</sup>			* <sup>6</sup>	* <sup>6</sup>	* <sup>6</sup>					* <sup>6</sup>			* <sup>6</sup>	* <sup>6</sup>								
Ultra Blazer	410	14										*			*	*	*	*		*				S			
Valtera <sup>5</sup>	411	14		S											*	*	*	*					S				
Viper ADV	421	2&6		*	*	*	*	*		*					*	*	*	S	*	*	*	*	*				

\* Control. S – Suppression. TG – Top growth control.

<sup>1</sup> For use in the Red River Valley of Manitoba only. <sup>2</sup> For use on glyphosate tolerant varieties only. <sup>3</sup> Not all glyphosate products are registered for use on glyphosate tolerant soybeans.

<sup>4</sup> Will not control CLEARFIELD varieties. <sup>5</sup> Apply in fall or spring prior to seeding of or up to 3 days after seeding. <sup>6</sup> Control of the following weeds emerging from seed (not controlled if emerged at application). See preseed table for emerged weeds controlled by the *Aim* component. <sup>7</sup> For in season activity only. For initial burn down of other weeds see Table 14b. <sup>8</sup> For use in *Liberty* tolerant soybeans only. <sup>9</sup> Will not control glyphosate tolerant varieties. <sup>10</sup> For use on RR Xtend soybean varieties only. <sup>11</sup> Not all dicamba products are registered for use on RR Xtend soybeans. <sup>12</sup> Including glyphosate resistant biotypes. <sup>13</sup> Seedlings only.

Table 7. Weed Control in Pea

HERBICIDE	Page	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer canola
Authority/Authority Charge <sup>3</sup>	101						• <sup>4</sup>			S <sup>4</sup>						• <sup>4</sup>	• <sup>4</sup>		• <sup>4</sup>							
Authority Supreme	103	•	•				S	•			•					•	•	S	•					•		
Avadex	106						• <sup>4</sup>																			
Bentazon	117									•	•	•					•	•	S	S	•	•		•	•	•
Clethodim	144	•	•	•	•	•	•																			
Edge Granular	184	• <sup>4</sup>	• <sup>4</sup>		S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	• <sup>4</sup>		• <sup>4</sup>	S <sup>4</sup>				S <sup>4</sup>	• <sup>4</sup>	• <sup>4</sup>		• <sup>4</sup>	S <sup>4</sup>		S <sup>4</sup>				
Heat Complete (residual component)	253		S				S	S			S					S	S	S	S					S		S
Imazamox (Dava! 80 SL only)	260	•	•		•	• <sup>2</sup>	•	S			S						•	•	•		•	•		•		•
Imazamox/Imazethapyr	262	•	• <sup>1</sup>		•	• <sup>2</sup>	•	S		•	•			•	S		S	•	•	•	•	•		•		• <sup>2</sup>
Imazethapyr	265		• <sup>1</sup>				S	S		•	•				•			•	•		•	•		•		• <sup>2</sup>
MCPA Sodium Salt/Amine	284													•			•	•			•			•		
MCPB/MCPA	288														S		•	•	•		•		TG	•	•	•
Metribuzin	291									•					•		•	•				•			•	•
Odyssey Ultra	308	•	•	S	•	•	•	S		•	•			•	S		S	•	•	•	•	•		•		• <sup>2</sup>
Poast Ultra	327	•	•	•	•	•	•																			
Quizalofop	340	•	•	•	•	•	•																			
Trifluralin (broadleaf & grassy weeds)	396	• <sup>4</sup>	• <sup>4</sup>				• <sup>4</sup>	• <sup>4</sup>		• <sup>4</sup>							• <sup>4</sup>		• <sup>4</sup>	S						
Valtera	411		S <sup>1,4</sup>							• <sup>4</sup>			• <sup>4</sup>			• <sup>4</sup>	• <sup>4</sup>		• <sup>4</sup>							•
Viper ADV	421	•	•		•	• <sup>2</sup>	•	S			S					S	•	•	•	•	•	•		•		

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Green foxtail only. <sup>2</sup> Will not control CLEARFIELD varieties. <sup>3</sup> For in season activity only. For initial burn down of other weeds see Table 14b. <sup>4</sup> For control of the marked weeds when emerging from seed (not controlled if emerged at application).

Table 8. Weed Control in Other Pulses

HERBICIDE	CROP						ANNUAL WEEDS																		PERENNIALS						
	Page	Bean, Dry	Fababean	Lentil	Chickpea	Sweet White Lupin	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Volunteer Barley	Volunteer Wheat	Wild Oat	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Nightshade, Hairy	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass	
Ares	99			X <sup>7</sup>			*	*	*	*	<sup>9</sup>	*	*	*	*		*		*	*		*	*	*	*	*					
Authority/Authority Charge <sup>12</sup>	101		X		X								<sup>11</sup>		S			<sup>11</sup>	<sup>11</sup>			<sup>11</sup>		*	*						
Authority Supreme	103				X		*	*	*			S	*	*				*	*	S		*			*	*					
Bentazon	117	X <sup>5</sup>	X											*	*	*			*	*	*	S	S	*	*	*	*	TG			
Clethodim	144	X	X	X	X		*	*	*	*	*	*																			
Dual II Magnum	178	X <sup>1</sup>				X	<sup>11</sup>	<sup>11</sup>	<sup>11</sup>													S									
Edge Granular	184	X <sup>2</sup>	X	X <sup>6</sup>	X		*	*	*	S	S	S	*	*	S		S	*	*			S	*	S		S					
Eptam Liquid EC	189	X					*	*	*	*	*	*		*					*			*	S			S				S	
Frontier Max	228	X <sup>2</sup>						*																							
Heat Complete (residual component)	253			X				S	S			S	S		S			S	S	S		S				S					
Imazamox	260			X <sup>7</sup>			*	*	*	*	<sup>9</sup>	*	S		S				*	*		*		*	*	*					
Imazamox/Imazethapyr	262		X	X <sup>7</sup>			*	*		*	<sup>9</sup>	*	<sup>8</sup>	*	*		<sup>8</sup>		S	*		*	<sup>8</sup>	*	*	*					
Imazethapyr	265	X <sup>3</sup>																			*										
Linuron	279					X	S	S	S				*	*				*	*			*		*	*	*					
Metribuzin (post-emergence)	291			X	X									S			S		S	S					S	S					
Metribuzin + Treflan (PPI)	291		X				*	*	*			*	*	*			*		*	*		*	*	*	*	*					
Odyssey Ultra	308		X	X <sup>7</sup>			*	*	*	*	*	*	S	*	*		S		S	*		*	*	*	*	*				S	
Permit WG	320	X <sup>5</sup>													*				*	*		*		*	*	*					
Poast Ultra	327	X	X	X	X	X	*	*	*	*	*	*				*			*	*		*		*	*					*	
Quizalofop	340	X <sup>5</sup>	X	X	X		*	*	*	*	*	*																		*	
Reflex + Basagran	345	X <sup>4</sup>														*			S	*		S		*	*	*	TG				
Solo Ultra	368			X <sup>7</sup>			*	*	*	*	*	*	S		S				*			*	*	*	*	*				S	
Trifluralin (broadleaf & grassy weeds)	396	X	X	X			*	*	*			S	S	*					*			*									
Valtera	411				X			S <sup>11</sup>						<sup>11</sup>				<sup>11</sup>	<sup>11</sup>		<sup>11</sup>	<sup>11</sup>						<sup>11</sup>			
Viper ADV	421	X					*	*	*	*	<sup>9</sup>	*	S		S			S	*	*		*	*	*	*	*					

\* Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Navy, kidney and pinto beans only. <sup>2</sup> Navy and kidney beans only. <sup>3</sup> Pinto, pink and red beans only. <sup>4</sup> For use on navy beans in the Red River Valley of Manitoba. Does not include weeds controlled by Basagran Forté. <sup>5</sup> Not all dry bean types have been tested for tolerance to this herbicide. <sup>6</sup> Fall applications only. <sup>7</sup> For use ONLY on CLEARFIELD lentil varieties. <sup>8</sup> Suppression in CLEARFIELD lentils. <sup>9</sup> Not including CLEARFIELD varieties. <sup>10</sup> Apply prior to seeding of or up to 3 days after seeding. <sup>11</sup> For control of the marked weeds when emerging from seed (not controlled if emerged at application). <sup>12</sup> For in season activity only. For initial burn down of other weeds see Table 14b.

Table 9. Weed Control in Flax

HERBICIDE	Page	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Cereals	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada
Authority/Authority Charge <sup>3</sup>	101							*			S					*	*			*						
Avadex	106						*																			
Bentazon	117								*	*	*						*		S	S	*	*			*	*
Bromoxynil <sup>1</sup>	126							*				*				*	*		*	*	*		*	*	*	*
Bromoxynil/MCPA <sup>1</sup>	132							*	*			*		*		*	*		S	*	*	*	TG	*	TG	
Clethodim <sup>1</sup>	144	*	*	*	*	*	*																			
Clopyralid <sup>1</sup>	151							*																*	*	
Clopyralid/MCPA <sup>1</sup>	154							*			*	*	*	*		S	*	*	*	*	*	*	TG	*	*	*
Eptam Liquid EC <sup>3</sup>	189	*	*	*	S	*	*		*				*				*	*		*						
Fortress MicroActiv	226		*	*			*	*								*	*		*	*						
MCPA	284										*		*	*	*	*	*		*	*	*	*		*	*	*
Poast Ultra <sup>1</sup>	327	*	*	*	*	*	*										*	*								
Quizalofop <sup>1</sup>	340	*	*	*	*	*	*																			
Trifluralin (broadleaf and grassy weeds) <sup>4</sup>	396	*	*	*			*	*	*	*							*		*							

\* Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Registered for use on both Flax and Solin (low linolenic acid flax). <sup>2</sup> Spring seedlings only. <sup>3</sup> Not recommended for use on flax in Saskatchewan. <sup>4</sup> Fall application only.

<sup>5</sup> For in season activity only. For initial burn down of other weeds see Table 14b.

Table 10. Weed Control in Canola

HERBICIDE	Page	Barley Grass	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada
Ares <sup>2</sup>	99	*	*	*		*	*	*	*		*	*				*		*	*	*	*	*	*	*	*	*	*
Avadex	106							*																			
Clethodim	144	*	*	*	*	*	*	*																			
Clopyralid	151								*																*	*	
Command 360ME	160											*															
Edge Granular	184	*	*	*		S	S	S	*	*	S					S	*	*	*		*	S		S			
Fortress MicroActiv	226		*	*				*	S								S	S			S	S					
Glufofenate 150 <sup>1</sup>	230	*	*		*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Glyphosate <sup>4,5</sup>	233	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Glyphosate+Clopyralid <sup>4</sup>	242	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Imazamox <sup>2</sup>	260	*	*	*		*	*	*	S			S			*	*	*	*	S	*	*	*	*	*	*	*	*
Imazamox/imazethapyr <sup>2</sup>	262	*	*			*	*	*	*	*	*	*			*	*		S		*	*	*	*	*	*	*	*
Muster Toss-N-Go	301														*	*				*	S			*		*	
Odyssey Ultra <sup>2</sup>	308	*	*	*	S	*	*	*	*	*	*	*			*	*		S	*	*	*	*	*	*	*	*	*
Poast Ultra	327	*	*	*	*	*	*	*																			
Quinclorac	337	*	*									*													S		
Quizalofop	340	*	*	*	*	*	*	*																			
Salute <sup>2</sup>	358	*	*	*		*	*	*	*	*	*	*			*	*		S	*	*	*	*	*	*	TG	*	TG
Solo Ultra <sup>2</sup>	368	*	*	*	S	*	*	*	S		S							*	S	*	*	*	*	*	*	*	
Tensile <sup>2</sup>	372	*	*	*		*	*	*	*			S						*	S	*	*	*	*	*	TG	*	TG
Trifluralin (broadleaf & grassy weeds)	396	*	*	*				S	S	*	*						*	*	*		*	*	*	*	TG	*	TG

\* Control. S – Suppression. TG – Top growth control.

<sup>1</sup> For use only on Liberty Link canola varieties. <sup>2</sup> For use only on CLEARFIELD canola varieties. <sup>3</sup> 1.35 L/acre rate of Liberty. Control may be reduced at lower rates.

<sup>4</sup> For use only on glyphosate tolerant canola varieties. <sup>5</sup> Not all glyphosate products are registered for use on glyphosate tolerant canola. <sup>6</sup> Will not control CLEARFIELD wheat volunteers. <sup>7</sup> Season long control. <sup>8</sup> For control of weeds when emerging from seed (not controlled if emerged at application).

Table 11. Weed Control in Potatoes\*

HERBICIDE	Page	Barnyard Grass	Foxtail, Green and Yellow	Volunteer Canola	Volunteer Corn	Volunteer Barley	Volunteer Wheat	Wild Oats	Quackgrass	Chickweed	Dandelion	Hemp-nettle	Lamb's-quarters	Mustard, Wild	Nightshade	Pigweed, Redroot	Pigweed, Prostrate	Purslane	Smartweed (Annual)	Shepherd's-purse	Stinkweed
<i>Chateau</i> (see <i>Valtera</i> )	410												•		•	•	•				
Clethodim	144	•	•		•	•	•	•	•												
<i>Dual II Magnum</i>	178	•	•												• <sup>1</sup>	S					
<i>Eptam Liquid EC</i>	189	•	•			•	•	•	S	•			•		• <sup>2</sup>	•	•	•			
<i>Frontier Max/Outlook</i>	228/ 314	•	•												•	•					
Linuron (pre-emergent use only)	279	S	S							•			•			•	• <sup>4</sup>	•	•	•	•
Metribuzin <sup>3</sup>	291			•						•		•	•	•		•			•	•	•
<i>Poast Ultra</i>	327	•	•		•	•	•	•	•												
<i>Prism</i>	333	•	•						•				S			•					

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> American and Eastern black nightshades. <sup>2</sup> Hairy nightshade. <sup>3</sup> Consult manufacturer or seed provider for varietal tolerance to Metribuzin. <sup>4</sup> Linuron 400 only.

\*Note: Before using any pesticides on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

Table 12. Weed Control in Sunflowers

HERBICIDE	Page	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Canola
Assure II (see Quizalofop)	340	•	•	• <sup>2</sup>	•	•	•																			
Authority /Authority Charge <sup>4</sup>	101							•			S					•	•			•						
Clethodim	144	•	•	• <sup>2</sup>	•	•	•																			
Edge Granular	184	•	•		S	S	S	•		•	S				S	•	•			•	S	S				
Eptam Liquid EC	189	•	•		•	•	•			•							•			•						
Express SG (see Tribenuron) <sup>5</sup>	390							S									•								•	
Imazamethabenz	257																		•					•	• <sup>1</sup>	
Imazamox <sup>3</sup>	260	•	•		•	• <sup>1</sup>	•	S			S						•		•	•		•		•	• <sup>1</sup>	
Muster Toss-N-Go	301													•	•				•			•		•		
Poast Ultra	327	•	•	S	•	•	•																			
Solo Ultra <sup>3</sup>	368	•	•	S	•	•	•	S			S						•		•	•		•		•	• <sup>1</sup>	
Trifluralin	396	•	•				S	S		•							•			•						

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Will not control CLEARFIELD volunteers. <sup>2</sup> Season-long control. <sup>3</sup> Apply only on CLEARFIELD sunflower varieties. <sup>4</sup> For in season soil activity only. For initial burn down of other weeds see Table 14b. <sup>5</sup> ExpressSun (tribenuron tolerant) sunflower varieties only.



Table 13. Weed Control in Special Crops

HERBICIDE	Page	CROP							ANNUAL WEEDS																		PERENNIALS								
		Canaryseed	Safflower	Caraway	Coriander	Buckwheat	Mustard	Oilseed mustard (Brassica Juncea)	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Volunteer Barley	Volunteer Wheat	Wild Oat	Buckwheat, Wild	Catchfly, night-flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Volunteer Flax	Volunteer Mustard, Canola	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
Ares	99						✓ <sup>6</sup>	•	•	•	•	• <sup>8</sup>	•					•				•	•	•	•	•	•	•			• <sup>8</sup>				
Authority/ Authority Charge	103						✓	✓														•													
Avadex	106	✓ <sup>1</sup>					✓							•																					
Bromoxynil	126	✓													•				•			•	•	•	•			•	•						
Bromoxynil/MCPA	132	✓													•	•			•	•		•	•	•	•	•	•	•	•	•	•	•	•		
Clethodim	144	✓	✓	✓	✓		✓	✓	•	•	•	•	•	•																				•	
Curtail M	154	✓													•				•	•		S	•	•	•		•	•	•		•	•	• <sup>4</sup>	•	
Dicamba + MCPA	163	✓													•			•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	
Dicamba/Mecoprop/ MCPA	168	✓													•	•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Edge Granular	184		✓	✓	✓		✓ <sup>2</sup>		•	•	•	S	S	S	•		•	S			S	•	•		•	S		S							
Enforcer M (see bromoxynil+ MCPA+fluroxypyr)	136	✓													• <sup>10</sup>	• <sup>10</sup>	• <sup>10</sup>		• <sup>10</sup>	• <sup>10</sup>	• <sup>10</sup>	•	•	•	S	• <sup>10</sup>	• <sup>10</sup>		• <sup>10</sup>	• <sup>10</sup>					
Fluroxypyr + MCPA	222	✓													S			•	•	•	•	•	•	•		•	S	•	•	•	•				
Fortress MicroActiv	226						✓			•	•			•	•							•	•		•	•									
Imazamox	260						✓ <sup>6</sup>		•	•	•	•	• <sup>8</sup>	•	S			S					•	•	•		•	•	•		• <sup>8</sup>				
Imazamox/Imazethapyr	262						✓ <sup>6</sup>		•	•	•	•	• <sup>8</sup>	•	•		•	•		•	•		•	•	•	•	•	•	•		• <sup>8</sup>				
Linuron	279			✓	✓																			•											
Muster Toss-n-Go	301						✓ <sup>3,9</sup>	✓												•	•			•				•	S						
Poast Ultra	327		✓	✓	✓	✓	✓		•	•	•	•	•	•																				•	
Prestige XC (see Clopyralid/MCPA+ Fluroxypyr)	156	✓													•		S	•		•	S	•	•	•	•		•	•	•	•	•	•	• <sup>4</sup>	•	
Quinclorac	337						✓		•	•								•																S	
Quizalofop	340						✓ <sup>9</sup>		•	•	•		•	•																•					
Solo Ultra	368						✓ <sup>6</sup>		•	•	•	•	•	•	S			S				•	•	•		•	•	•		• <sup>8</sup>				S	
Trifluralin	396		✓				✓		•	•	•			•	•		•					•	•	•											

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Granular formulation only. <sup>2</sup> Yellow mustard only. <sup>3</sup> Brown and oriental mustards only. <sup>4</sup> Spring seedlings only. <sup>5</sup> Oriental mustard only. <sup>6</sup> For use in CLEARFILED varieties only. <sup>8</sup> CLEARFIELD varieties not controlled <sup>9</sup> Including Ethiopian mustard (Brassica carinata) <sup>10</sup> Controlled at the higher rates.

Table 14a. Herbicides to Control Emerged Weeds Before Seeding or After Seeding but Prior to Crop Emergence

HERBICIDE	Page	Pre-seeding	Pre-emergent	Barley	Canaryseed	Canola	Chickpea	Corn, Field	Corn, Sweet	Dry Bean	Field Pea	Flax	Forage Grasses	Lentil	Oat	Potatoes	Rye	Soybean	Wheat
Amitrol	97	✓		✓		✓		✓		✓	✓							✓	✓
CleanStart	142	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
Glykamba	243	✓		✓				✓							✓		✓		✓
Glyphosate	233	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>The following products may or must (+) be mixed with glyphosate – for the marked crops</i>																			
+ 2,4-D (up to 294 gae/acre)	83	✓	✓	✓													✓	✓ <sup>3</sup>	✓
Aim EC	93	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
Authority Charge	103	✓	✓				✓				✓	✓						✓	✓
BlackHawk (with carfentrazone)	121	✓	✓	✓													✓	✓	✓
BlackHawk (with pyraflufen)	122	✓	✓	✓	✓			✓							✓ <sup>4</sup>		✓	✓	✓
+ Bromoxynil	126	✓	✓	✓		✓									✓				✓
+ Bromoxynil/florasulam	-	✓		✓											✓				✓
+ Bromoxynil/MCPA	132	✓		✓	✓			✓	✓			✓	✓		✓		✓		✓
Conquer	161	✓				✓													
+ Express FX	193	✓		✓			✓												✓
+ Florasulam	203	✓		✓											✓				✓
GoldWing	245	✓	✓	✓	✓			✓	✓		✓				✓		✓		✓
+ Heat LQ	249	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓			✓	✓
+ Heat Complete (burnoff component)	253	✓	✓					✓			✓			✓				✓	
+ Inferno Duo	267	✓	✓																✓
Ko-Act	-	✓		✓													✓		✓
+ Korrex	274	✓	✓	✓											✓				✓
+ MCPA (up to 200 gae/acre)	284	✓		✓			✓ <sup>1,2</sup>	✓ <sup>2</sup>	✓ <sup>2</sup>		✓ <sup>1,2</sup>	✓ <sup>2</sup>		✓ <sup>1,2</sup>	✓		✓		✓
+ Olympus	309	✓	✓																✓
Paradigm	317	✓		✓															✓
Quinclorac (Facet L only)	340	✓	✓																
+ tribenuron	390	✓		✓	✓ <sup>3</sup>					✓ <sup>3</sup>	✓ <sup>3</sup>		✓ <sup>3</sup>		✓ <sup>3</sup>			✓ <sup>3</sup>	✓
+ Tribenuron/Metsulfuron	394	✓		✓															✓

<sup>1</sup> Maximum of 140 gae/acre in chickpea, field pea and lentil (see glyphosate page). <sup>2</sup> Amine formulations only. <sup>3</sup> Only for select products. See product page for details.

<sup>4</sup> Applied a minimum of 7 days before planting.

Table 14b. Control of Emerged Weeds Before Seeding or After Seeding but Prior to Crop Emergence

HERBICIDE	Page	Brome (Downy, Japanese)	Foxtail Barley	Foxtail, Green	Quackgrass	Volunteer Cereals	Wild Oats	Buckwheat, Wild	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Narrow-leaved Hawk's-beard	Night-flowering catchfly	Russian Thistle	Shepherd's-purse	Smartweed (incl lady's-thumb)	Stinkweed	Volunteer Canola (including glyphosate tolerant varieties)	Volunteer Flax
<i>Amitrol</i>	97								*													
<i>CleanStart</i>	142	*		*		*	*	*	* <sup>2</sup>	*	*	*	*	*	*		*	*	*	*	*	*
<i>Glykamba</i>	243	*		*		*	*	*		*		*	*	*			*		*	*		
Glyphosate (180 gae/acre) <sup>1</sup>	233	*	S	*	*	*	*	*	S	*	*	*	*	*	*	S	*	*	*	*	*	*
Glyphosate (360 gae/acre) <sup>1</sup>	233	*	*	*	*	*	*	*	S	*	*	*	*	*	*	*	*	*	*	*	*	*
The following products may or must (+) be mixed with glyphosate – weeds marked are those that the product has activity on in addition to glyphosate																						
+ 2,4-D	83									*		*	*	*	*		*	*		*	*	*
<i>Aim EC</i>	93							*				*	*							*	*	*
<i>Authority Charge</i> <sup>3</sup>	103							*				*	*							*	*	*
<i>BlackHawk</i> (with carfentrazone)	121							S	* <sup>2</sup>	*		*	*	*	*	*	*	*		*	*	*
<i>BlackHawk</i> (with pyraflufen)	122								*	*		*	*	S	*			*		*	*	*
+ Bromoxynil	126							*				*	*	*	*		*		*	*	*	*
+ Bromoxynil/MCPA	132							*		*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Conquer</i>	161											*	*						*		*	*
+ <i>Express FX</i>	193								*			*			*		*	*		*	*	*
+ Florasulam	203							*	*	*	*			*	*			*	*	*	*	*
<i>GoldWing</i>	245							S <sup>4</sup>		S <sup>4</sup>		*	*	*	*	*				*	*	*
+ <i>Heat LQ</i>	249							*	*	*		*	*	*	*		*		*	*	*	*
+ <i>Heat Complete</i> (burnoff component)	253							*	*	*		*	*	*	*		*		*	*	*	*
+ <i>Inferno Duo</i>	267		*				*		*						*			*			*	*
<i>Inferno Duo</i>	267						S		S						*			*			* <sup>4</sup>	*
<i>Ko-Act</i>	-								*	*	*	*		*	*			*			*	*
+ <i>Korrex</i>	274							*			*	*	*	*	*			*		*	*	*
+ MCPA (up to 200 gae/acre)	284									*	*	*	*	*	*		*	*	*	*	*	*
+ <i>Olympus</i>	309	*	*									*	*	*	*		*		*	*	*	*
<i>Paradigm</i>	317								*	*	*	S	*	*	*	*		*	*	*	*	*
Quinclorac ( <i>Facet L</i> only)	337			*																		*
+ Tribenuron	390								*						*		*		*	*	*	*
+ Tribenuron/Metsulfuron	394								*						*	S				*	*	*

• Control. S – Suppression.

<sup>1</sup> Rates of application varies among brands. Consult the product page for application rates. <sup>2</sup> Spring seedlings only. <sup>3</sup> Initial burndown only. <sup>4</sup> Except Clearfield varieties. For extended in season control see *Authority Charge* in crop tables 7, 8, 9 and 12. <sup>4</sup> Control at high rate.

Table 15. Herbicides for Use as Harvest Aid or Desiccant Before Crop Harvest

HERBICIDE	Page	Alfalfa <sup>7</sup>	Barley	Canola	Chickpea	Dry bean	Faba bean	Forage	Field Pea	Flax	Lentil	Oat	Potato	Soybean	Sunflower	Wheat
<i>Aim EC</i> <sup>3,4</sup>	93		✓		✓	✓	✓		✓			✓	✓	✓		✓
<i>CleanStart</i>	142		✓		✓	✓			✓			✓	✓	✓		✓
<i>Diquat</i> <sup>3,5</sup>	173			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Glyphosate <sup>1,2</sup>	233		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
<i>Heat LQ/Heat WG</i> <sup>3,4</sup>	249		✓ <sup>8</sup>	✓	✓	✓			✓		✓ <sup>7</sup>			✓	✓	✓ <sup>8</sup>
<i>MPower Good Harvest</i>	299	✓									✓ <sup>6</sup>		✓ <sup>6</sup>			
<i>Valtera</i> <sup>3</sup>	411				✓	✓			✓		✓					✓

<sup>1</sup> Rates of application vary among brands. Consult glyphosate page for specific application rates. <sup>2</sup> For pre-harvest perennial weed control and may provide harvest management benefit. <sup>3</sup> For rapid plant tissue dry down to facilitate harvest. <sup>4</sup> May be tank mixed with glyphosate when used prior to harvest. <sup>5</sup> Refer to product page for surfactant requirements. <sup>6</sup> Not for crops grown for seed. <sup>7</sup> Red lentil only. <sup>8</sup> Heat LQ only.

Table 16. Weed Control in Fallow

HERBICIDE	Page	Brome, Downy	Foxtail Barley	Foxtail, Green	Quackgrass	Wild Oats	Volunteer Cereals	Buckwheat, Wild	Dandelion	Flixweed/Tansy Mustard	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Narrow-leaved Hawk's-beard	Night-flowering catchfly	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed (incl. Lady's-thumb)	Sow-thistle (perennial)	Stinkweed	Thistle, Canada	Volunteer Canola (including glyphosate tolerant varieties)	Volunteer Flax
<i>Amitrol</i>	97								•			•	•				•	•		•		•			
Dicamba + 2,4-D <sup>3</sup>	163							•		•		•	•	•			•	•		•			S		
Dicamba/Mecoprop/MCPA	168							•		•		•	•	•			•	•		•			S	•	
<i>DyVel DSp</i>	181							•		•		•	•	•			•	•		•			S		
<i>CleanStart</i>	142	•		•		•	•	•	• <sup>4</sup>	•	•	•	•	•	•			•	•	•		•		•	•
Glykamba	243	•		•		•	•	•		•		•	•	•				•		•		•			
Glyphosate (180 gae/acre) <sup>2</sup>	233	•	S	•	S	•	•	•	S	•	•	•	•	•	•	S	•	•	•	•	S		S	• <sup>1</sup>	•
Glyphosate (360 gae/acre) <sup>2</sup>	233	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	• <sup>1</sup>	•
The following products may or must (+) be mixed with glyphosate – weeds marked are those that the product has activity on in addition to glyphosate																									
+ 2,4-D	83									•		•	•	•	•	•		•	•			•		•	
<i>Aim EC</i>	93							•				•	•	•	•							•		•	
+ <i>BlackHawk</i> (with pyraflufen)	122						S	• <sup>4</sup>	•		•	•	•	•	•	•	•	•	•					•	
+ Bromoxynil	126							•			•	•	•	•				•	•			•		•	
+ Bromoxynil/MCPA	132							•	•	•	•	•	•	•		•	•	•	•	•		•		•	
+ <i>Distinct</i> (low rate)	176						•	TG				•	•		•		•								
<i>Distinct</i> (high rate)	176						•	TG				•	•		•					•	S	•	TG	•	
+ Florasulam	203						•	•	•	•		•	•		•				•	•		•		•	
+ <i>Heat LQ</i>	249						•	•	•	•		•	•	•	•		•					•		•	
+ <i>Ko-Act</i>	-							•	•	•	•	•		•	•				•					•	
+ <i>Korrex</i>	274																								
+ tribenuron	390							•										•	•			•		•	
+ tribenuron/metsulfuron	394							•				•			•	S				•			S <sup>3</sup>	•	

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Not including glyphosate tolerant canola. <sup>2</sup> Rates of application varies among brands. Consult the product page for application rates. <sup>3</sup> Fall rosettes and spring seedling.

<sup>4</sup> Spring seedlings

Table 17. Post-harvest Weed Control in Stubble

HERBICIDE	Page	Flixweed	Narrow-leaved Hawk's-beard	Shepherd's-purse	Stinkweed	Thistle, Canada	Quackgrass	Dandelion
2,4-D	83	•		•	•	S		S
<i>Amitrol</i>	97					S		
Dicamba + Glyphosate	163	•		•	•	S	S	
<i>BlackHawk</i> (with pyraflufen)	122	•	•	•	•			
Dicamba/Mecoprop/MCPA	168	•		•	•	S		
<i>Distinct</i> (low rate)*	176		•			TG		TG
<i>Distinct</i> (high rate)	176		•			TG		•
<i>DyVel DSp</i>	181	•		•	•	S		
<i>Express Pro</i> *	393		•					•
Florasulam + glyphosate	208	•	•	•	•			•
Glykamba	243	•		•	•	S	S	
Glyphosate	233	•	•		•	•	•	•
MCPA	284	•		•	•	S		S
<i>Paradigm</i> + glyphosate	317	•	•	•	•	•	•	•

• Control. S – Suppression. Levels of suppression vary depending on the product and growing conditions in the fall. Regrowth requiring in-crop treatments can be expected. TG – Top growth control.

\* To be used only in a mix with glyphosate.

Table 18. Weed Control in Grass Pastures and Hayfields

HERBICIDE	Page	Absinth	Bindweed, Field	Burdock	Thistle, Canada	Dandelion	Dock, Curled	Daisy, English	Flixweed	Foxtail Barley	Gumweed	Narrow-leaved Hawk's-beard	Knapweed	Leafy Spurge	Nodding Thistle	Poplar	Pussy Toes	Red Bartsia	Sage, Pasture	Snowberry	Sow-thistle, Perennial	Stinkweed	Tansy, Common	Wild Rose	Willow	Wormwood, Biennial
2,4-D (500 g/L)	83	S	S	•	S	S	•		•		S	•		S	S	S	S	•	S	S	S	•				•
2,4-DB	86		S		S	S	• <sup>3</sup>					• <sup>3</sup>									S	•				
Dicamba	163		S		S	S	S	S					S	S					S	•	S		S			
Dicamba + 2,4-D	163	S	S	•	S	S	S	S	•		S			S	S	S		•	S	•	S	•	S	•	S	
Escort	191				S	•										• <sup>3</sup>					S		•	•	• <sup>3</sup>	
Grazon	247			•	•	•	•							• <sup>2</sup>										•		
Kerb	272									•																
MCPA (500 g/L)	284		S		S	S	S		•		S			• <sup>3</sup>							S	•	S			•
MCPB/MCPA	288		S		S																S	•				
Navius	303				•	•			•				•	•		•				•	•	•	•	•	•	•
Overdrive	316					S								S												•
Reclaim II	343	•	S	•	•	•			•	•	•	•	•		•			•	•	•	•	•	•	•		•
Restore II	347	•		•	•	•	•		•		•		•								•		•			
Tordon 22K	380		• <sup>2</sup>		•								•	• <sup>2</sup>					•							

• Controlled. S – Top growth suppression only.

<sup>1</sup>Rates may vary between different brands. Check product page for specific rate for product and use.

<sup>2</sup> May require multiple applications for complete control. <sup>3</sup> Controlled by the highest rate within this range.

Table 19. Weed Control in Shelterbelts

HERBICIDE	Page	USE			SHELTERBELT SPECIES												WEEDS																					
		Before Planting	After Planting (New & Established)	Established	American Elm	Birch	Caragana	Crabapple	Green Ash	Juniper	Lilac	Manitoba Maple	Poplar	Scots Pine	Siberian Elm	Willow	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	
Amitrol	97			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Casoron	139		•		•		•	•	•	•	•	•			•	•		•		•	•	•					•	•	•	•	•	•	•	•	•	•	•	•
Glyphosate	233	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Gramoxone	247		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Linuron	279			•	•		•		•			•	•	•	•	•	S	•		•	•	•					• <sup>2</sup>	•		•				•	•	•	•	
Simazine	363		•	•	•		•		•			•		•	•	•	•	• <sup>1</sup>	•	•	•						•							•	•	•	•	
Trifluralin	396	•		•	•		•		•				•	•	•	•	•	•	•	•	•	•	•	•	•	•		•		•								

• Control. S – Suppression. TG – Top growth control.

<sup>1</sup> Yellow foxtail only. <sup>2</sup> Linuron 400 only.

Table 20a. Weed Control in Forage Crops - Crops

HERBICIDE	Page	GRASSES																				LEGUMES							COVER CROPS							
		Altai Wild Rye Grass	Brome grass	Creeping Red Fescue	Crested Wheatgrass	Intermediate Wheatgrass	Kentucky Bluegrass	Meadow Fescue	Meadow Foxtail	Millet	Northern Wheatgrass	Orchardgrass	Pubescent Wheatgrass	Reed Canarygrass	Russian Wild Ryegrass	Ryegrass, Annual	Ryegrass, Perennial	Slender Wheatgrass	Streambank Wheatgrass	Tall Fescue	Tall Wheat grass	Timothy	Western Wheatgrass	Alfalfa	Alsike Clover	Cicer Milkvetch	Red Clover	Sainfoin	Sweet Clover	Trefoil, Bird's-foot	White Dutch Clover	Barley	Flax <sup>16</sup>	Oats	Canola	Wheat
2,4-D <sup>8</sup>	83	X	X	X	X	X	X	X	X	S	X	X	X	X	X		X	X	X	X	X	X	X									X				X
2,4-DB <sup>8</sup>	86		S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>		S <sup>4</sup>			S <sup>4</sup>							S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>		S	S				S	S	X		X		X		
Avadex Liquid EC <sup>18</sup>	106																						S <sup>1</sup>	S <sup>1</sup>		S <sup>1</sup>		S <sup>1</sup>	S <sup>1</sup>	X	X		X	X		
Basagran <sup>8</sup>	117		S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>			S <sup>2</sup>	S		S <sup>2</sup>							S <sup>2</sup>				S <sup>2</sup>		X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>			X	X		X		
Bromoxynil <sup>8</sup>	126		S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>		S <sup>2</sup>		S	S <sup>2</sup>		S <sup>2</sup>	S <sup>2</sup>			S <sup>2</sup>			S <sup>2</sup>	S <sup>2</sup>		X <sup>2</sup>							X	X	X		X		
Bromoxynil / MCPA ester <sup>8</sup>	130		S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>		S <sup>2</sup>	S <sup>2</sup>		S <sup>2</sup>		S <sup>2</sup>	S <sup>2</sup>			S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>	X									X	X	X		X		
Clethodim <sup>8</sup>	144																						S									X		X		
Clopyralid	151	X	X	X	X	X	X	X	X		X		X	X			X	X	X	X <sup>9</sup>	X										X	X	X	X	X	
Curtail M	154																				E										X	X	X		X	
Dicamba + 2,4-D	163		S	X <sup>2</sup>	S	S		S	S		S	S					S	S	S	S	S										X				X	
Dicamba / Mecoprop / MCPA <sup>8</sup>	168		X <sup>9</sup>	X <sup>9</sup>	X <sup>9</sup>	X <sup>9</sup>	X <sup>9</sup>	X <sup>9</sup>	X <sup>9</sup>		X <sup>9</sup>	E <sup>9</sup>					E <sup>9</sup>	E <sup>9</sup>	E <sup>9</sup>	E <sup>9</sup>	E <sup>9</sup>	E <sup>9</sup>								X		X		X		
Edge <sup>18</sup>	184																						S <sup>2</sup>											X		
Eptam Liquid EC <sup>18</sup>	189																						S		S <sup>2</sup>		S <sup>2</sup>	S								
Fenoxaprop <sup>8</sup>	195															S <sup>2</sup>																				
Florasulam + Curtail M	207		X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>											X <sup>2</sup>			X <sup>2</sup>	X <sup>2</sup>										X		X		X	
Florasulam + MCPA <sup>8</sup>	210																				X															
Fluroxypyr / 2,4-D	220		X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>													X <sup>2</sup>		X <sup>2</sup>															
Gramoxone	247																						E <sup>9</sup>					E								
Heat LQ <sup>18</sup>	249		S <sup>2</sup>																													X <sup>2</sup>		X <sup>2</sup>		X <sup>2</sup>
Imazamethabenz <sup>8</sup>	257														X <sup>2</sup>																					
Imazethapyr <sup>8</sup>	265																						X <sup>15</sup>											X <sup>11</sup>		
Infinity	269		E													X					X <sup>2</sup>										X				X	
Kerb	272																							E					E							
MCPA <sup>8</sup>	284		X <sup>8,9</sup>	X <sup>8,9</sup>	X <sup>8,9</sup>	X <sup>8,9</sup>	X <sup>8,9</sup>	X <sup>8,9</sup>			X <sup>8,9</sup>	X <sup>8,9</sup>	X <sup>8,9</sup>	X <sup>8,9</sup>	X <sup>8,9</sup>		X <sup>8,9</sup>			X <sup>8,9</sup>	X <sup>8,9</sup>		S <sup>5,6</sup>	S <sup>5</sup>		S <sup>5</sup>				X	X	X		X		
MCPB + MCPA <sup>8</sup>	288	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>		S <sup>4</sup>			S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>				S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>4</sup>	S <sup>2,8</sup>	S		S				X		X		X		
Metsulfuron <sup>8</sup>	295			X	X	X					X											E <sup>8,17</sup>									X				X	
Odyssey	262																						X <sup>2</sup>					X <sup>2</sup>								
Poast Ultra	327			X <sup>2</sup>																			X	X	X		X	X				X		X		
Prestige XC	156		X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>													X <sup>2</sup>		X <sup>2</sup>										X				X	
Princep Nine-T	363																						E					E								
Quizalofop <sup>8</sup>	340																						X <sup>2</sup>	X <sup>2</sup>	S <sup>2</sup>	X <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>	S <sup>2</sup>		X		X		
Thifensulfuron / Tribenuron <sup>8</sup>	373		X	X	X	X	E				X	X	X					X	X	X	X	X									X		X		X	
Tralkoxydim <sup>8</sup>	382		X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>	X <sup>2</sup>					S <sup>2</sup>							S <sup>2</sup>				S <sup>2</sup>	S <sup>1</sup>	S <sup>1</sup>		S <sup>1</sup>	S <sup>1</sup>	S <sup>1</sup>	S <sup>1</sup>	X				X		
Trifluralin <sup>8,18</sup>	396																						S <sup>13</sup>	S <sup>14</sup>	S <sup>14</sup>	S <sup>14</sup>	S <sup>12</sup>	S <sup>12</sup>	S <sup>14</sup>			X <sup>7</sup>		X		
Velpar DF CU	419																						E													

S – seedling only. E – Established only. X – seedling or established. <sup>1</sup>Underseeded only. <sup>2</sup>For seed production only. <sup>4</sup>Do not graze or harvest for livestock in the year of treatment. <sup>5</sup>Use MCPA sodium salt on seedling forages only when underseeded to flax, oats, wheat or barley. Do not use on Flemish varieties of alfalfa. <sup>6</sup>For use as a spot treatment only control red bartsia. <sup>7</sup>Apply to fall prior to seeding. <sup>8</sup>All products may not be registered for crops and weeds indicated. Check product labels. <sup>9</sup>For forage production only. <sup>10</sup>Check recommendations for varietal restrictions. <sup>11</sup>CLEARFIELD varieties only. <sup>12</sup>Liquid formulations in spring only. <sup>13</sup>Bonanza 10G, Treflan EC (spring only). <sup>14</sup>Treflan EC in spring only. <sup>15</sup>Apply to seedlings stands that will be in production for three years after application and establishment stands that will be in production for 2 years after application. <sup>16</sup>May not include Solin (low linolenic acid flax). Check product label for restrictions. <sup>17</sup>Fall application only. <sup>18</sup>For application prior to emergence of the crop.



Table 20b. Weed Control in Forage Crops - Weeds

HERBICIDE	GRASSES						BROADLEAVED WEEDS																												VOLUNTEER CROPS														
	Page	Barleygrass	Foxtail Barley	Foxtail, Green	Foxtail, Yellow	Quackgrass	Wild Oats / Tame Oat	Blue Bur	Buckwheat, Wild	Burdock	Catchfly, Nightflower	Chickweed	Cleavers	Cockle, Cow	Cocklebur	Dandelion	Dock, Curled	Flaxweed	Goat's beard	Goosefoot, Oat-leaved	Hawk's beard, Narrow-leaved	Hemp-nettle	Knotweed, Prostrate	Kochia†	Lamb's quarters	Lettuce, Prickly	Mustard, Wild	Pigweed, Prostrate	Pigweed, Redroot	Pigweed, Russian	Plantain, Common	Radish, Wild	Ragweed, False / Giant	Russian Thistle	Scentless Chamomile	Shepard's Purse	Smartweed, Lady's thumb	Sow Thistle (Annual)	Sow Thistle (Perennial)	Stinkweed	Sunflower, Prairie / Annual	Thistle, Canada	Cereal Grains (wheat, barley)	Flax	Canola	Alsike Clover			
2,4-D	83						*	*							*	TG	*	⁵	*	*	⁵			*	*	*	*	*	*	*	*	*	*	*		⁵	*	*	TG	⁵	TG	TG			*				
2,4-DB	86							*								TG	S			*	*			*	*	*	*	*	*	*	*	*	*	*		*	S		TG	*		TG			*				
Avadex Liquid EC	106						⁴																		*	*	*	*	*	*	*	*	*																
Basagran	117										*	*			*										*	*	*	S				*		S	*	*			*		TG			*					
Bromoxynil	126						*	*							*	*								*	*	*	*	*	*	*	*	*			*	*			*										
Bromoxynil / MCPA ester⁸	132						*	*	*					*	*			*					*	*	*	*	*	S⁴						*	⁵	*	*		TG	*		TG			*				
Clethodim	144	*		*	*	S	*																																				*						
Clopyralid	151							*							*											*	*	*	*							*				TG		*			*				
Curtail M	154							*	*						*		⁷		⁵					S	*	*	*	*	*	*	T	*	*		⁵	*	*	*	TG	⁵	*	TG			*				
Dicamba + 2,4-D	163						*	*	*				*	*	*	*		*	*	⁵				*	*	*	*	*	*	*	*	*	*	*	*		*	*	TG	*	*	TG			*				
Dicamba / Mecoprop / MCPA	168							*	*	*			*	*	*	*		*				*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	TG	*	*	TG			*			
Edge	184	*	*	*	*	S²	*	*	*	S	*										S	*	*	*	*	*	*	*	*	*	*		S			S						S							
Eptam Liquid EC	189	*	*	*	S	*				*												S		*	*	*	*	*	*	*	*	*	*	*									*						
Fenoxaprop	195	*	*	*	*	⁴																			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
Florasulam + Curtail M	207							*		*	*				*		⁵				*			*	*	*	*	*	*	*	*	*	*			*	*	*	S	*	*	*	*	*	*	*			
Florasulam + MCPA	210							*	*	*	*	*	*	*	S	*	*			*		*	*	*	*	*	*	*	*	*	TG				*	*	S	TG	*	*	S			*					
Fluroxypyr / 2,4-D	220						*	*	*	S	*	*	⁵,⁶	⁵	*	⁵	⁵	⁵	⁵			*	*	*	*	*	⁶	*	*	*	⁶	*	*	⁶	⁶	⁶	⁶	⁶	S	TG	*	*	TG		*	*			
Gramoxone	247	*	*	*	*	⁴	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Imazamethabenz	257					*	S																			*													*										
Imazethapyr	265		S																						*	*	*	*	*	*	*	*	*			S	*		*						¹				
Infinity	269						*		*	*		S	*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	S	*	S		*					
Kerb	272	*	*	*	*	*				*			*									S³	*	*	*	*	*	*	*	*	*	*	*	*		TG	⁵		TG	TG		TG		*					
MCPA	284	*		*	*	⁴	*	*	*						*	*	*	*	*	*		S	*	*	*	*	*	*	*	*	*	*	*	*		TG	⁵		S	TG	⁵	*		*					
MCPB + MCPA	288														*						S			*	*	*	*	*	*	*	S	*												*		*			
Metsulfuron	295						*	S		*	*	*	*	*	*		*	*	*	*	*		S	S	*	*	*	*	*	*	*	*	*		S	*	*	*	S	S	*	S		S			¹		
Odyssey	262	*	*	*	*	*	*	S		*	*	*	*	*	*		*	*	*	*		S	S	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*		¹		¹			
Poast Ultra	327	*	S	*	*	S	*																																					*					
Prestige XC	156						*		S	*		⁵	⁵					⁵		S	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	S	*	*	S		*	*				
Princep Nine-T	363	*		*	*	⁴	*	*																*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
Quizalofop	340	*	S	*	*	S	*																	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
Thifensulfuron / Tribenuron	373						*	*	*	S	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	S	*	*	S			¹				
Tralkoxydim	382	*	*	*	*	*																												*															
Trifluralin	396	*	*	*	*	⁴	*	*	*	*	*	*	*	*	*							*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Velpar DF CU	419														TG			*															*				TG												

\* Control. S = Suppression. TG = Top growth control.

<sup>1</sup> Will not control CLEARFIELD varieties. <sup>2</sup> For control of wild oats only. <sup>3</sup> Controlled by MCPA K only. <sup>4</sup> Controls redroot pigweed only when a cereal cover crop is used. <sup>5</sup> Spring seedlings only. <sup>6</sup> Controlled only when growing rapidly. <sup>7</sup> Spring germinating rosettes.

<sup>8</sup> Note: Surveys have found that 90% of fields have group 2 resistant kochia. Group 2 herbicides alone will not likely provide effective control.

## Special Weed Problems

This section identifies specific weeds and some herbicides recommended for control. Refer to the particular crop section or the product label for information on specific products that may be used on the crops and for application instructions.

### Absinthe

**2,4-D LV Ester (500 g/L)** - In grass pastures with no legumes, spray 1.82 L per acre in late June, prior to flowering. Re-treat regrowth in late summer when plants have 6 to 10 inches (15 to 25 cm) of new growth. More than 1 season of treatment may be required.

**Dicamba** - In grass pasture and rangeland only, apply 0.5 L per acre in 20 to 30 gallons (90 to 135 L) per acre for top growth control when leaves are fully expanded.

**Restore II** - In grass pastures and rangeland, apply *Restore II* at 0.97 L per acre (one 10 L jug treats 10 acres) when actively growing.

### Alders

**2,4-D LV Ester (500 g/L)** - In grass pastures and non-crop land, apply 1.78 L per acre to the foliage of actively growing brush.

**Dicamba + 2,4-D amine or LV ester (500 g/L)** - In grass pastures, rangeland and non-crop land, apply dicamba at 2.1 L per 1,000 L of water with 2,4-D LV ester or amine at 4.0 L per 1,000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

### Aspen Poplar (Trembling Aspen)

**Dicamba + 2,4-D amine or LV ester (500 g/L)** - In grass pastures, rangeland and non-crop land, apply dicamba at 1.32 L per acre with 2,4-D LV ester or amine at 1.78 L per acre in 20 gallons per acre (90 L per acre) water to the foliage of actively growing brush in spring or early summer.

### Baby's Breath (Perennial)

**Dicamba** - In grass pastures with no legumes, apply 3.72 L per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water when actively growing.

### Biennial Wormwood

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L per acre to the foliage of actively growing plants.

**Overdrive** - In grass pastures and non-crop land, apply at 115 g per acre for control.

**Restore II** - In grass pastures, apply 0.97 L per acre (one 10 L jug treats 10 acres).

### Black Medic

**Dichlorprop/2,4-D; Mecoprop-p; dicamba/mecoprop/MCPA; 2,4-D amine or LV ester** - Apply in registered crops at registered rates to black medic in the 1 to 4 leaf stage for suppression only.

### Chokecherry

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L per acre to the foliage of actively growing brush.

### Common Tansy

**Glyphosate** - Apply at 1.9 to 2.8 L per acre in 10 gallons of water per acre (40 L per acre) to actively growing plants that are 8 to 10 inches (20 to 25 cm) tall (summerfallow, stubble and noncropland).

**Escort** - In pastures, rangeland and rough turf, apply 8 grams per acre in 10 to 20 gallons per acre (45 to 90 L per acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control.

**Restore II** - In grass pastures and rangeland, apply *Restore II* at 0.97 L per acre (one 10 L jug treats 10 acres) for suppression.

### Curled Dock

**Dicamba** - As a patch treatment or in pasture and rangeland, apply 0.92 L per acre *Banvel II* in 10 to 20 gallons per acre (45 to 90 L per acre) water to actively growing weeds for top growth control.

**Glyphosate** - As a spot treatment, apply 2.83 to 4.86 L per acre (360 g/L formulations or equivalent of other formulations) in 10 gallons per acre (45 L per acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

**MCPA amine, 2,4-D amine** - Apply 0.445 to 0.69 L per acre of formulations containing 500 g/L MCPA or 2,4-D amine to give top growth control.

**Dichlorprop/2,4-D** - 0.71 L per acre for suppression before plants are 2 inches (5 cm) tall.

### Diffuse and Spotted Knapweed

**Dicamba** - In grass pastures, rangeland and non-crop land, apply at 1.86 L per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water to actively growing weeds.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control.

**Restore II** - In grass pastures and rangeland, apply *Restore II* at 0.57 L per acre when actively growing.

**Tordon 22K** - In rangeland and grass pasture, apply 0.91 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

### Downy Brome and Japanese Brome

**Altitude FX /FX2** - Apply at label rates to suppress Japanese brome to the 4 leaf stage in CLEARFIELD wheat.

**Ares** - Apply at label rates to suppress Japanese brome to the 4 leaf stage in CLEARFIELD canola and lentils.

**Authority Supreme** - Apply in spring as a pre-plant or pre-emergent treatment to soybean, pea or chickpea for pre-emergent control of downy brome and Japanese brome.

**Florasulam + glyphosate** - Apply in spring or fall, prior to seeding cereal crops or in fallow at registered rates to control downy brome up to the 4 leaf stage.

**Flucarbazone** - Apply in spring at registered rates to control Japanese brome up to the 4 leaf stage.

**Focus** - Apply in fall or spring as a pre-plant or pre-emergent treatment to wheat, spring or winter, corn or soybeans for pre-emergent control of downy brome and Japanese brome.

**Glyphosate** - Prior to crop emergence, apply 0.51 to 0.77 L per acre (360 g/L formulations or equivalent of other formulations) in 5 to 10 gallons per acre (23 to 45 L per acre) water before downy brome is 6 inches (15 cm) in height.

**Glykamba** - Prior to crop emergence, apply 1.0 L per acre in 5 to 10 gallons per acre (23 to 45 L per acre) water between emergence and heading of downy brome.

**Odyssey Ultra** - control spring seedlings of Japanese brome in registered crops with *Poast Ultra* tank mix.

**Quizalofop** - in registered crops apply 200 mL per acre to downy and Japanese brome in the 2 to 5 leaf stage.

**Simplicity** - Suppression of downy brome and control of Japanese brome up to the 6 leaf stage when applied at registered rates in the fall in winter wheat. Apply in spring at registered rates to control Japanese brome up to the 6 leaf stage in winter or spring wheat (including durum).

**Solo** - Apply at label rates to suppress Japanese brome to the 4 leaf stage in registered crops.

**Tandem** - Applied at the maximum labelled rate in spring wheat (including durum) will control Japanese brome up to the 6 leaf stage.

**Trifluralin** - Apply at recommended rates for weed control in broadleaf crops prior to emergence.

**Velocity m3** - Apply at registered rates in registered crops to suppress Japanese brome.

**Viper ADV** - In field peas, at registered rates to suppress Japanese brome.

## Field Bindweed

**Dicamba** - As a patch treatment or in rangeland, apply 1.0 L per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water. Apply when field bindweed is in the flowering stage and allow 3 weeks after treatment before resuming normal summerfallow tillage.

**Basagran** - In labelled crops, apply 0.71 L per acre followed by 0.71 L per acre 7 to 10 days later. Apply in 20 to 35 gallons per acre (90 to 160 L per acre) water before field bindweed has developed a dark green colour and before it has begun trailing. Use a recommended surfactant (see recommendations under the appropriate crop).

**2,4-DB** - As a spot treatment in labelled crops apply 2.83 to 4.86 L per acre in 10 gallons per acre (45 L per acre) water at the bud stage. Do not disturb plants for at least 10 days following treatment. Heavy rainfall within 2 hours of application may wash chemical off the foliage and a repeat treatment may be required.

Rainfall occurring within 6 hours after application may reduce control.

**2,4-D amine** - In grass pastures containing no legumes or as a spot treatment, apply 1.82 L per acre of formulations containing 500 g/L 2,4-D amine at early flowering stage.

**Glyphosate** - As a spot treatment, apply 2.8 to 4.9 L per acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons per acre (45 to 135 L per acre) at the full bloom stage or beyond. Allow 7 or more days after application before tillage.

**Restore II** - For season long control in grass pastures and rangeland only, apply *Restore II* at 0.97 L per acre.

**Tordon 22K** - In rangeland and grass pasture, apply 3.6 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) for spot treatment, using hand wand application equipment only, to a maximum of one acre of every two acre area of land. of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Field Horsetail

**Amitrol 240** - Apply 5.0 to 6.7 L per acre in 10 to 30 gallons per acre (45 to 135 L per acre) water in non-cropped areas and pastures when the weed is young and actively growing.

**MCPA amine, potassium and sodium salt mixtures** - Apply 0.57 L per acre of formulations containing 500 g/L MCPA after the weeds have fully emerged for top growth control. May be used in wheat, oats, barley, flax and rye.

## Foxtail Barley

**Focus** - Apply in fall or spring as a pre-plant or pre-emergent treatment to wheat, spring or winter, corn or soybeans for pre-emergent suppression of downy brome and Japanese brome. For best results use in a program with glyphosate.

**Glyphosate** - Prior to crop emergence, apply 1 to 2 L per acre (360 g/L formulations or equivalent of other formulations) in 5 to 10 gallons per acre (23 to 45 L per acre) water to foxtail barley at the seedling to heading stage. Late fall applications may provide better control of established plants than spring applications.

**Glyphosate** - In glyphosate tolerant canola, apply 2 applications, each at 0.5 L per acre (360 g/L formulations or equivalent of other formulations), for season long control.

**Glykamba** - Prior to crop emergence, apply 1.26 L per acre in 5 to 10 gallons per acre (23 to 45 L per acre) water to foxtail barley before initiation of the seed head for suppression only.

**Gramoxone** - Apply 2.23 L per acre in 98 gallons per acre (445 L per acre) water or 75 mL in 2.2 gallons (10 L) water per 1076 square feet (100 sq. m) for top growth control only.

**Inferno Duo** - Prior to crop emergence apply 12.75 grams per acre of *Inferno Duo* with 180 to 360 gae per acre of glyphosate.

**Kerb** - Apply registered rates in 20 gallons per acre (90 L per acre) water between October 1 and freeze-up. Use the lower rate on grey-wooded soils or where perennial bluegrass or fescues are the predominant pasture species. Do not use *Kerb* for foxtail barley removal in seed grass stands or desired foliage stands of timothy or fescue grass species. At recommended rates, pasture stands

of perennial bluegrass and fescue may be reduced by 10 to 15 percent. Where perennial bluegrass and fescues are the dominant pasture species, use the lower rate of *Kerb*. Spray overlaps may seriously harm desirable pasture grass species. Where the grass stand comprises mostly foxtail barley and reseeding to a desirable grass species is required, delay seeding into the *Kerb*-treated soil until the end of June. Do not harvest or graze within 60 days of application with *Kerb*. Avoid using *Kerb* on soils having more than 6 percent organic matter.

**Quizalofop** - In registered crops apply 200 mL per acre to foxtail barley in the maximum 3-4 leaf + 3 tiller stage.

## Goat's-Beard

**2,4-D amine** - Apply 0.91 L per acre of formulations containing 500 g/L in early fall or early spring.

**Dicamba** - In grass pasture and rangeland only, apply 1.86 L per acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

**Dichloroprop + 2,4-D** - Apply 1.62 L per acre in early spring or fall.

## Gumweed

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 0.89 L per acre to the foliage of actively growing plants.

## Hemp Dogbane

**2,4-D amine or LV ester** - Apply 1.38 to 1.82 L per acre of formulations containing 500 g/L 2,4-D in fall before frost and while plant leaves are green.

**Glyphosate** - Apply 2.83 to 4.86 L per acre (360 formulations – see glyphosate page for other rates) when hemp dogbane is in the early bud stage. Apply in 10 gallons per acre (45 L per acre) water. Do not disturb treated plants for at least 7 days after application.

## Hoary Cress

**Amitrol 240** - For non-selective patch treatment in pastures and non-crop land, apply 8.9 to 13.8 L per acre.

**Glyphosate** - As a spot treatment in labelled crops, apply 2.83 to 4.86 L per acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons per acre (45 to 135 L per acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

## Leafy Spurge

**Amitrol 240** - Apply 15.2 to 18.5 L per acre in 10 to 30 gallons per acre (45 to 135 L per acre) water in non-cropped areas and pastures when the weed is between the late stages of flowering and early seed development.

**Dicamba** - Apply 0.84 L per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water for top growth control when the weed is actively growing. Patch treatment or pasture.

**2,4-D amine** - Apply 1.82 L per acre of formulations containing 500 g/L 2,4-D at early flowering stage. Repeat at least once to new growth later in the season. Control of established plants and new seedlings will require continued applications for a period of at least 4 to 5 years.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control.

**Tordon 22K** - In rangeland and grass pasture, apply 3.6 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

**Overdrive** - In grass pastures and non-crop land, apply at 115 g per acre for top-growth control.

## Locoweeds, Lupines, and Milk-vetches

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 to 2.75 L per acre at the full bloom stage.

## Milkweed

**Amitrol 240** - Apply 7.6 to 11.3 L per acre in 10 to 30 gallons per acre (45 to 135 L per acre) water in non-cropped areas and pastures in the early summer when all the shoots have emerged.

**Glyphosate** - When making Preharvest applications, use 1.0 L per acre (360 g/L formulations or equivalent of other formulations). For patch treatments, apply 4.86 L per acre (360 g/L formulations or equivalent of other formulations) in 10 gallons per acre (45 L per acre) water. Apply when most plants have reached the bud to bloom stage. Reduced results may occur on plants treated after full bloom as not all milkweed plants reach the required stage of growth at the same time. Repeat treatments may be required. Do not disturb plants for 10 days following treatment. Do not apply to plants covered with dust.

## Narrow-leaved Hawk's-beard

**2,4-DB** - Apply to forage legume crops at recommended rates at the 2 to 4 leaf stage of narrow-leaf hawk's-beard, after legume growth in the fall has stopped.

**2,4-D LV ester (600 g/L)** - In fall stubble, apply 0.57 to 0.90 L per acre to fall rosettes. Apply to fall seedlings or spring seedling to the 2 leaf stage at 0.22 to 0.38 L per acre or 0.4 to 0.6 L per acre in spring prior to bolting to control.

**Barricade, thifensulfuron/tribenuron, Triton C, Triton K** - Up to 4 inches tall in registered crops.

**Blackhawk** - Apply post-harvest or in-fallow to actively growing narrow-leaved hawk's-beard. Apply *BlackHawk* at 300 mL per acre in a mix with glyphosate at 180 to 360 gae/acre. For control in spring, apply prior to the 2 leaf stage.

**Distinct** - Apply in fallow or post-harvest at 58 grams per acre (with 180 to 360 g ae per acre glyphosate) or 115 g per acre.

**Express SG** - For season long control in range and pasture at the early bud-pre-bloom stage.

**Florasulam + glyphosate** - up to 8 cm tall prior to seeding registered crops.

**Florasulam + 2,4-D** - Up to 2 leaf stage in registered crops.

**Inferno Duo** - Prior to crop emergence apply 12.75 grams per acre of *Inferno Duo*.

**Glyphosate** - Prior to crop emergence, apply 0.51 to 0.77 L per acre (360 g/L formulations or equivalent of other formulations) in 5 to 10 gallons per acre (23 to 45 L per acre) water. Use the high rate if narrow-leaf hawk's-beard is between 3 and 6 inches (8 to 15 cm) in height.

**Glyphosate** - In glyphosate tolerant crops, apply 0.5 L per acre (360 g/L formulations or equivalent of other formulations) at the 1 to 6 leaf stage. Not all products are registered. Check glyphosate pages.

**Heat LQ** - Apply in a mix with glyphosate for rapid burndown prior to seeding.

**Paradigm** - As a pre-seed burn down with glyphosate at 7.5 to 10 grams per acre or in crop at 10 grams per acre as an in-crop application up to bolting and 30 cm in height.

**Travallas** - In registered crops apply to narrow-leaf hawk's-beard up to 10 cm tall or across.

**Tribenuron** - Apply 4 g per acre of 75% WG formulations or 6 g per acre of 50% SG formulations in a mix with glyphosate prior to seeding.

**Tribenuron/metsulfuron** - Up to 3 inches tall with residual activity, prior to the seeding of registered crops.

**Velpar** - Apply in late fall or early spring for control in established alfalfa in forage and seed production.

## Pasture Sage

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.2 L per acre to the foliage of actively growing plants.

**Dicamba** - In grass pastures, rangeland and non-crop land, apply dicamba at 1.86 L per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water to actively growing weeds.

**Reclaim II** - In grass pastures and non-crop land, apply *Reclaim II A* at 69 g per acre plus *Reclaim II B* at 0.69 L per acre for 2 years of control.

**Tordon 22K** - In rangeland and grass pasture, apply 1.82 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Perennial Smartweed

**Glyphosate** - Apply 2.0 L per acre (360 g/L formulations or equivalent of other formulations) in 10 gallons per acre water. Apply when vines are a minimum of 8 inches (20 cm) tall, but before flowering.

## Poplar

**Dicamba + 2,4-D** - In grass pasture and rangeland only, apply dicamba at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

**Glyphosate** - As a non-selective spot treatment, apply 1.21 to 2.43 L per acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons per acre (45 to 135 L per acre) water in the summer through early fall when brush is actively growing.

**Navius** - In grass pastures and rangeland, apply *Navius* at 135 grams per acre for control of black and balsam poplar as well as plains cottonwood and trembling aspen.

## Poverty Weed

**Dicamba** - As a spot treatment or in grass pasture or rangeland apply 1.86 L per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water when weed is actively growing. Dicamba at 0.61 L per acre will provide only top growth control.

**Restore II** - For season long control in grass pastures and rangeland, apply *Restore II* at 0.97 L per acre (on 10 L container treats 10 acres).

**Tordon 22K** - In rangeland and grass pasture, apply 1.82 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Prairie Everlasting, Prairie Sage

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L per acre to the foliage of actively growing plants in the early fall, and repeat in the spring.

## Purple Loosestrife

(dryland situations only)

**Glyphosate** - Apply 2.43 L per acre (360 g/L formulations or equivalent of other formulations) in 30 to 60 gallons per acre (135 to 270 L per acre) water when purple loosestrife is actively growing and at or beyond the bloom stage. If using hand held equipment, apply a 1 to 2 percent solution until plants are wet. Use a 33 percent product solution if using a wiper applicator. Do not treat plants over open water. If possible, remove and destroy the flower heads before treatment to ensure prevention of seed set. For large monocultures of purple loosestrife, gradually work from the periphery inward over a number of years to allow competing vegetation to invade the treated area. Sprayed areas should be monitored for new seedlings to prevent re-infestation of purple loosestrife.

## Red Bartsia

**2,4-D amine or LV ester** - Apply 0.57 L per acre of formulations containing 500 g/L 2,4-D in 10 gallons per acre (45 L per acre) water. On hayland, treat within 10 days after first cutting. Roadsides and pastures should be sprayed as soon as the red bartsia appears, usually in early July. Repeat treatment if necessary for later germination.

## Roses

**Dicamba + 2,4-D amine or LV ester (500 g/L)** - In grass pastures, rangeland and non-crop land, apply dicamba at 1.48 L per acre with 2,4-D LV ester or amine at 1.78 L per acre to the foliage of actively growing brush in the spring or early summer.



**Escort** - In pasture and rangeland, apply *Escort* at 12 g per acre with non-ionic surfactant at 0.2 L per 100 L spray solution in 10 to 20 gallons per acre (45 to 90 L per acre) water. Apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control of wild rose.

**Reclaim II** - In grass pastures and non-crop land, apply *Reclaim II A* at 81 g per acre plus *Reclaim II B* at 0.69 L per acre for 2 years of control.

## Russian Knapweed

**Dicamba** - In grass pasture and rangeland only, apply 3.72 L per acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

**Restore II** - In grass pastures and rangeland, apply *Restore II* 0.97 L per acre (one 10 L jug treats 10 acres) when actively growing for suppression.

**Tordon 22K** - In rangeland and grass pasture, apply 1.82 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Saskatoon

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L per acre to the foliage of actively growing brush.

## Scentless Chamomile

**Barricade II + MCPA Ester (190 mL per acre)** - In registered crops apply to scentless chamomile in the 1 to 6 leaf stage.

**Bromoxynil/MCPA ester** - Apply in registered crops at label rates when scentless chamomile is in the 2 to 4 leaf stage.

**Curtail M** - In registered crops, apply 0.81 L per acre in 10 gallons per acre (45 L per acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

**Clopyralid** - In registered crops, apply 0.23 L per acre in 10 gallons per acre (45 L per acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

**Dicamba** - Apply 0.51 L per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water to actively growing weeds for top growth control.

**Escort** - In pastures, rangeland and rough turf, apply 8 grams per acre in 10 to 20 gallons per acre (45 to 90 L per acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Express SG** - Apply in a mix with glyphosate prior to seeding registered follow crops.

**Liberty** - In registered crops, apply 1.1 L per acre to plants up to 4 inches (10 cm) in height.

**Metsulfuron plus 2,4-D** - Apply 3 grams per acre metsulfuron plus 0.34 to 0.45 L per acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons per acre (45 L per acre) water for control

of scentless chamomile up to the 4 leaf stage in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control.

**Restore II** - In grass pastures and rangeland, apply *Restore II* at 0.86 L per acre (one 10 L container treats 11.6 acres) when actively growing.

**Thifensulfuron/tribenuron** - Apply 8 grams per acre of DG formulations or 12 grams per acre of *Refine SG* in 10 gallons per acre (45 L per acre) water to actively growing seedlings for suppression. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Tordon 22K** - In rangeland and grass pasture, apply 0.445 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

**Triton C** - Apply at label rates to suppress scentless chamomile up to 10 cm across or high.

## Stinging Nettle

**2,4-D amine** - Apply 0.91 to 1.82 L per acre of formulations containing 500 g/L 2,4-D amine.

## Stork's Bill

**Altitude FX2, Ares, Everest GBX, florasulam + MCPA, Prestige XC, Pulsar, Stellar, Tandem, thifensulfuron/tribenuron, Trophy** - Apply at label rates to provide suppression in registered crops. See product pages for Crops, Rates and Staging.

**Barricade II** - In registered crops apply to stork's-bill in the 1 to 6 leaf stage

**Basagran** - In registered crops apply 0.91 L per acre at the 2 to 6 leaf stage.

**Dichlorprop/2,4-D** - Apply at 0.71 L per acre to registered crops when stork's-bill is in the 2 to 4 leaf stage.

**Fluroxypyr + 2,4-D, OcTTain** - Apply at the maximum labelled rate to registered crops when stork's-bill is in the 1 to 8 leaf stage.

**Glyphosate** - In glyphosate tolerant crops, apply 0.5 L per acre (360 g/L formulations or equivalent of other formulations) from emergence to the 6 leaf stage.

**Liberty** - In registered crops apply 1.35 L per acre to plants in 1 to 3 leaf stage.

**Linuron** - Apply with MCPA amine in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

**Metsulfuron** - Apply with 2,4-D or MCPA amine or LV ester in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control.

**Odyssey** - In registered crops, apply 17 grams per acre plus adjuvant.



**Spectrum** - In registered crops apply at 20 acres per case to control from the 2 to 4 leaf stage.

**Travallas** - In registered crops apply at 200 mL per acre up to 10 cm tall or wide.

## Toadflax (Yellow)

**Amitrol 240** - Apply 7.6 to 11.3 L per acre in 10 to 30 gallons per acre (45 to 135 L per acre) water in non-cropped areas and pastures when the weed is in the advanced rosette to prebud stage.

**Dichlorprop/2,4-D** - Apply 0.71 L per acre in 10 to 18 gallons per acre (45 to 80 L per acre) water in wheat or barley for toadflax suppression. Apply when majority of toadflax is no taller than 6 inches (15 cm). The use of Dichlorprop/2,4-D for suppression of toadflax in wheat or barley should be part of a long-term planned approach for toadflax control, which includes spring and fall tillage, fall patch spraying, fallow.

**Glyphosate** - Apply 2.83 to 4.86 L per acre (360 g/L formulations or equivalent of other formulations) when most plants have reached the early bud stage of growth. Allow 7 more days after application before tillage. A rate of 1.0 L per acre may be used with Preharvest applications or when controlling in summerfallow situations.

**Metsulfuron plus 2,4-D** - Apply 2 to 3 grams per acre *Ally* plus 0.34 to 0.45 L per acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons per acre (45 L per acre) water for toadflax suppression in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for suppression.

**Thifensulfuron/tribenuron** - In registered crops, apply 8 grams per acre of DG formulations or 12 grams per acre of *Refine SG* in 10 gallons per acre (45 L per acre) water for suppression of toadflax. Apply when toadflax is less than 15 cm (6 inches) in height. Add non-ionic surfactant at 0.2 L per 100 L spray solution.

**Tordon 22K** - In rangeland and grass pasture, apply 3.6 L per acre in 90 to 180 gallons per acre (400 to 800 L per acre) of water to actively growing weeds. **WARNING** - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

## Western Snowberry (Buckbrush)

**2,4-D amine or LV ester (500 g/L)** - Apply 1.82 L per acre 2,4-D amine or LV ester in a minimum of 20 gallons per acre (90 L per acre) water in spring or early summer. Retreatment may be necessary the following year.

**Dicamba plus 2,4-D LV ester (500 g/L)** - Apply 1.48 L per acre dicamba tank mixed with 1.82 L per acre 2,4-D LV Ester in 20 gallons per acre (90 L per acre) water in spring or early summer after the leaves are fully expanded.

**Escort** - Apply 10 grams per acre in 10 to 20 gallons per acre (45 to 90 L per acre) water between mid-June and mid-August after the brush has leafed out, but before the leaves turn their fall colours.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control.

**Reclaim II** - In grass pastures and non-crop land, apply *Reclaim II A* at 81 g per acre plus *Reclaim II B* at 0.69 L per acre for 2 years of control.

## White Cockle

**2,4-DB** - Apply Embutox 625 at 1.1 L per acre or Caliber 400 at 1.7 L per acre or Cobutox 600 at 1.1 L per acre for top growth control to registered crops only.

**Barricade II + MCPA Ester (190 mL per acre)** - In registered crops apply to white cockle up to 10 cm in height.

**Express SG** - Apply in a mix with glyphosate prior to seeding registered follow crops to control spring rosettes.

**Mecoprop** - Apply 2.2 L per acre in 18 gallons per acre (\*80 L per acre) of water for top growth control of established plants. Will also control seedlings. Apply to registered crops only.

**Navius** - In grass pastures and rangeland, apply *Navius* at 68 grams per acre for control.

**Travallas** - In registered crops apply to white cockle up to 10 cm tall or across.

## Wolf Willow (Silverwillow)

**Dicamba + 2,4-D amine or LV ester (500 g/L)** - In grass pastures with no legumes, apply dicamba at 2.1 L per 1000 L of water with 2,4-D LV ester or amine at 4.0 L per 1000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

**Reclaim II** - In grass pastures and non-crop land, apply *Reclaim II A* at 81 g per acre plus *Reclaim II B* at 0.69 L per acre for 2 years of control.

## Wild Tomato

**2,4-D or MCPA amine or ester (500 g/L)** - Apply 0.34 to 0.45 L per acre to registered crops up to the 8 leaf stage of wild tomato.

**Bromoxynil+MCPA ester** - Apply 0.40 L per acre to registered crops from the 1 to 6 leaf stage of wild tomato.

## Willow

**2,4-D LV ester** - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L per acre to the foliage of actively growing brush.

**Dicamba + 2,4-D** - In grass pasture and rangeland only, apply dicamba at 1.7 L plus 2,4-D 500 amine at 3.24 L per acre in 20 to 30 gallons (90 to 135 L) of water per acre when leaves are fully expanded.

**Glyphosate** - As a non-selective spot treatment, apply 1.21 to 2.43 L per acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons per acre (45 to 135 L per acre) water in the summer through early fall when brush is actively growing.

**Navius** - In grass pastures and rangeland, apply *Navius* at 135 grams per acre for control.

## Soil Residual Herbicides

When applied at recommended rates in a crop, most herbicide residues will disappear within a few weeks after application and impose no restriction on cropping options the next year. However, some herbicide residues do not degrade quickly, and can persist in the soil for months or years following application, thereby restricting the crops that can be grown in rotation. Herbicide residues in the soil are deactivated in various ways including:

- Break down by chemical reactions,
- Break down by soil microbes,
- Escape to the atmosphere as a gas (volatilization),
- Break down by light (photodegradation),
- Leaching,
- Binding to soil particles.

Herbicides often disappear from the environment by more than one of these mechanisms. Many herbicides considered to be non-residual are bound temporarily to soil particles while they are broken down gradually by either soil microbes or chemical reactions. The binding action insures that the herbicide is not available to the crop in quantities that will cause damage.

As a general rule, breakdown processes are favoured by warm, moist soil conditions. During the winter, when the ground is frozen, and in the summer when the soil is dry, herbicide degradation is reduced. The residual activity of certain herbicides is also affected by soil organic matter and soil pH. These soil factors are seldom uniform across a field.

Herbicide carryover is aggravated by low levels of organic matter and is more likely to occur on eroded hilltops than in other parts of a field. The risk of herbicide carryover will also be greater in sprayer overlaps which are most common around headlands and slough margins.

Growers should be aware of the residual properties before applying any herbicide if they are to avoid cropping restrictions in following years. Knowledge of the limitations associated with herbicides that leave a soil residue, along with an accurate record of application (i.e. rates, locations) will serve to minimize rotational problems. Each herbicide used in mixes should be considered separately.

Soil tests using chemical extraction cannot always give a good indication of the potential injury risk from herbicide residue because of the influence of organic matter, clay and pH. Because of this, a field bioassay or laboratory bioassay, where plants are grown directly in the treated soil are best for detecting the potential for injury. These tests are not intended to be used to shortcut restrictions on the label, but provide information on rotational crops where none is available.

Injury symptoms from other causes can resemble herbicide carryover injury (i.e. cold weather, flooding, drought, insects, diseases, etc.). Consult with your local agronomist on potential causes before spending money on testing.

Herbicides that leave a soil residue and are of particular concern in Western Canada are found in the following chart.

## Re-cropping Restrictions for Residual Herbicides:

Figures listed are the number of cropping seasons before each crop can be grown ("1" means that the crop can be grown the year following application). For plant-back restrictions less than one season; the delay is indicated with a "d" for number of days or with "mths" for the number of months. A blank space means that there are no recommendations given on the product label and a field bioassay is recommended by many product manufacturers to determine if these crops are safe to plant. A field bioassay is a strip of a test crop that covers an area of the field that is representative of the field variation and should include an untreated area.

PRODUCT	Alfalfa	Barley	Canaryseed	Clearfield canola	Non-Clearfield canola	Fababeans	Field corn	Dry beans	Field Peas	Flax	Forage grasses	Lentils	Mustard <sup>1</sup>	Oats	Potatoes	Rye	Soybeans	Sunflowers	Wheat (durum)	Wheat (spring)	Wheat (winter)
2,4-D*	1	1	1	1	1		1	1	1	1	1	1		1		1			1	1	1
Accent	10 mths	10 mths		10 mths	10 mths		10 mths										10 mths			1	4 mths
Altitude FX2		1		1	1				1	1		1	2	1				1		1	3 mths
Amitrol 240		1d	1	1d	1d		10d*	10d*	5d*	1		1	1	1			6d	1	1d	1d	1d
AAtrex, Primextra II Magnum						1*	1		1*	1*											
Ares		1	1	1	2		1		1	2		1		1				2	2	1	
Authority / Authority Charge	1	1		1	1	0	1		0	0		2	0				0	0	1	1	1
Authority Supreme							1		0								0	1	1	1	1
Avadex	0	0	0	0	0	1	1	1	0	0		1	0	2		1	1	1	0	0	0
Barricade II, Predicade, Retain, Signal FSU, TraxosTwo	2	1	2	1	1	2	2	2	1	1	1	1	1	1	2	1	2	2	1	1	1
Command 360 ME	2	2	2	1	1	2	1	1	2	2	2	2	2	2	1	2	1	2	2	1	16 mths
Curtail M, Prestige XC	2	1	2	1	1	2	1	2	1*	1	1	2	1	1		1	2	2	1	1	1
Dicamba*		1		1*	1*		1	1*						1			1		0*	0*	1
Dual II Magnum							1								1		1				4.5 mths
Eclipse III, Clopyralid		1		1	1				10 mths*	1	1		1	1		1			1	1	
Edge	0		2	0	0	0		0	0		2	0	0	2			0	0	1*	1*	
Fierce							7 days										0			7 days	
Flextstar GT							10 mths	10 mths									10 mths			10 mths	4 mths
Florasulam/fluroxypyr + MCPA		1		1	1				1					1					1	1	1
Florasulam + glyphosate (prior to Aug 1)		0d		1	1				1					0d					0d	0d	0d
Flucarbazone, Everest GBX (Brown soils)																				1	
Flucarbazone, Everest GBX (Dark Brown soils)		1*		1*	1*				1*	1*							1	1	1	1	
Flucarbazone, Everest GBX (Black soils)		1*		1*	1*			1***	1*	1*							1	1	1	1	
Flucarbazone, Everest GBX (Grey-Wooded soils)		1*		1*	1*				1*											1	
Focus, Heat Complete							1										1			1	4 mths
Fortress MicroActiv		0	2	0	0				0	0		0	0	2		1	1	1	0	0	0
Frontier Max, Outlook							0*	0*													1
Florasulam + MCPA, florasulam + 2,4-D, florasulam + Curtail M***	1		1	1		1	1	1*	1		1	1	1	1		1	1	1	1	1	

PRODUCT	Alfalfa	Barley	Canaryseed	Clearfield canola	Non-Clearfield canola	Fababeans	Field corn	Dry beans	Field peas	Flax	Forage grasses	Lentils	Mustard <sup>†</sup>	Oats	Potatoes	Rye	Soybeans	Sunflowers	Wheat (durum)	Wheat (spring)	Wheat (winter)
Imazamethabenz (Black and Grey Wooded soils)		1	2	1	1				1	1				2				1	1	1	
Imazamethabenz (Brown and Dark Brown soils)		1	2	1	2				2	2				2				1	1	1	
Imazethapyr	1	1		0					0			1								1	
<i>Infinity / Tundra / Velocity m3</i>	1	1	1	1	1		1		1	1		2		1			1		1	1	
<i>Kerb</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
<i>Korrex</i>		0		1	1		1	1	1	1		1	1	0	1		1	1	0	0	0
Metribuzin				2	2	0			0						0*		0*	2			
Metsulfuron (pH less than 7, Brown and Dark Brown)		1	4		2					2		3	4	1					1	1	
Metsulfuron (pH less than 7, other soils)		1	4		1					1		3	4	1					1	1	
Metsulfuron (pH 7 to 7.9, Brown and Dark Brown soils)		1	4		3					3		4	4	2					1	1	
Metsulfuron (pH 7 to 7.9, other soils)		1	4		2					3		4	4	1					1	1	
<i>Muster</i>	2	1	2		2	2		2	2	1	2*	2	2	1					1	1	1
<i>Odyssey/Odyssey NXT*, Duet*, Odyssey Ultra/Ultra NXT*</i>	1	1	1	1	2		1		1	2		1		1				2	1	1	
<i>Option</i>	1	1		1	1		1	1	1					1	1		1			1	1
<i>Paradigm</i>		1		1	1				1	1		2	1				1			1	
<i>Permit WG</i>		2 mths		2	2		1 mths	0	1					2 mths	1		1	2	2 mths	2 mths	2 mths
<i>Pixxaro</i>		1		1	1		1		1	1		2	1	1			1	1		1	
<i>Prism, Sortan IS</i>		1		1	1	1	0	1	1	1		1		1	1		1	1	1	1	4 mths
<i>Pulsar</i>	mths	1	2	1	1	2	2	2	1	1	1	1	1	2	2	1	2	2	1	1	1
Quinclorac		0		1	1				1	2		2						1	0	0	
<i>Reflex*</i>							1	0									1			1	0
<i>Rexade</i>		1		1	1				1	1		2	1	1			1	1		1	
<i>Salute</i>		1		1	1				10 mths	1	1		1	1		1			1	1	
<i>Signal FSU</i>		1		1	1				1	1	1	1	1	1		1			1	1	
<i>Simplicity</i>		1		1	1				1	1		1	1	1			1			1	
<i>Solo, Viper ADV</i>		1	1	1	1				1	1		1	2	1					1	1	
<i>Tandem</i>		1		1	1				1	1		1	1	1						1	
<i>Travallas</i>		10 mths		10 mths	10 mths				10 mths	10 mths		22 mths		10 mths					10 mths	10 mths	
Tribenuron/Metsulfuron		1d		10 mths	10 mths				10 mths			22 mths		11					1d	1d	1d
Trifluralin	0	1*	2	0	0	0	1*	0	0	1*	2	0	0	2		0	0	0	1*	0*	1*
<i>Triton C*</i>		0		1	1				1	2*		2*						1	0	0	
<i>Ultim</i>		1					1														1
<i>Valtera (Crop uses)</i>	11 mths	11 mths	1	11 mths	11 mths	1	1	9 mths	0	1	1	1	1	1	1	1	0	9 mths	1	0	4 mths
<i>Varro</i>	1	1	1	1	1		1	1	1	1		1		1			1	1	1	1	10 mths

\* The minimum re-cropping intervals are listed. These intervals may be longer than those listed depending on the use rates, region, province, soil types, environment, time of application and crop variety. Refer to product page for more information.

\*\* Drought restrictions apply to drought conditions (80% of normal June to September rainfall) for high pH soils (greater than pH 7.5) and severe drought (less than 65% of normal June to Sept. rainfall) for all soils.

\*\*\* May not be supported for all products; see product page for details.

† May not be valid for all varieties or crop types. See product page for details.

†† DO NOT grow dry beans the year following Everest GBX application.

0 - May be seeded or reseeded the year of application. No re-cropping restrictions. 1 - Next cropping season after application. 2 - Two cropping seasons after application.

NR - Not recommended.

Note: The re-cropping intervals listed may not be sufficient to prevent crop injury during periods of below average rainfall.

## Effect of Rainfall on Herbicide Efficacy

Required Interval	Product
15 minutes	Diquat
30 minutes	clodinafop
1 hour	<i>Axial</i> , <i>Axial Xtreme</i> , <i>Barricade II</i> , <i>Broadband</i> , Bromoxynil, Bromoxynil/MCPA ester, Bromoxynil/MCPA+fluroxypyr, clethodim, <i>Enforcer D</i> , <i>Everest GBX</i> , fenoxaprop, flucarbazone, fluroxypyr, <i>Gramoxone</i> , <i>Infinity</i> , <i>Paradigm</i> , <i>Pixxaro</i> , <i>Poast Ultra</i> , <i>Predicade</i> , <i>Pulsar</i> , quizalofop, <i>Refine SG</i> , tralkoxydim, <i>Traxos</i> , <i>Tundra</i> , <i>Varro</i> , <i>Velocity m3</i>
2 hours	2,4-D LV Ester, <i>Aatrex</i> (post-emergent application), <i>Ares</i> , metsulfuron+2,4-D LV Ester, fluroxypyr + 2,4-D ester, MCPA Ester, <i>Simplicity</i> , <i>Travallas</i>
3 hours	<i>Altitude FX2</i> , dicamba/mecoprop-p/MCPA, imazamox, imazamox/imazethapyr, <i>Odyssey Ultra</i> , <i>Solo Ultra</i>
4 hours	<i>Accent</i> , metsulfuron + 2,4-D Amine, 2,4-D Amine, <i>Cirpreme</i> , <i>Distinct</i> (post-emergent application), <i>Enforcer MSU</i> , <i>Liberty</i> (both), <i>Manipulator 620</i> , MCPA Amine, <i>Overdrive</i> , <i>Permit WG</i> (post-emergent applications), <i>Prism</i> , <i>Reflex</i> , <i>Rexade</i> , <i>Signal FSU</i> , <i>Tandem</i> , thifensulfuron/tribenuron 75% WDG, <i>Ultim</i>
6 hours	<i>Curtail M</i> , <i>Glykamba</i> , imazamethabenz, MCPA-K, MCPA Sodium Salt, metribuzin, <i>Muster</i> , <i>Option</i> , <i>Prestige XC</i> , quinclorac, <i>Tordon 22K</i> , Tribenuron, <i>Triton C</i> , <i>Triton K</i> , <i>Ultra Blazer</i>
8 hours	<i>Basagran</i> , <i>CleanStart</i>
No specific recommendation*	2,4-DB, <i>Aim</i> , <i>Amitrol 240</i> , Bromoxynil/2,4-D ester, clopyralid, dicamba, dichlorprop/2,4-D, <i>DyVel</i> , <i>DyVel DSp</i> , <i>Enforcer D</i> , <i>Escort</i> , <i>Express FX</i> , florasulam/fluroxypyr + MCPA, florasulam + 2,4-D, florasulam + <i>Curtail M</i> , florasulam + glyphosate, florasulam + MCPA, fluroxypyr+MCPA, fluroxypyr+MCPA+bromoxynil, glyphosate, <i>Grazon</i> , imazethapyr, <i>Korrex</i> , Linuron, MCPB/MCPA, mecoprop-p, <i>Momentum</i> , <i>Optica Trio</i> , <i>Pinnacle</i> , <i>Pulsar</i> , <i>Reclaim</i> , <i>Restore II</i> , <i>Salute</i> , <i>Tensile</i> , topramazine, tribenuron/metsulfuron, <i>Viper ADV</i>

\* The products listed make no specific time recommendation on the label. The required rainfree period could be up to 8 hours. See the product page in the guide or consult the product label.

Note: The term "Rainfastness" refers to the time needed between application and rainfall to avoid significant reduction in efficacy. Rainfall shortly after application of most post-emergent herbicides may reduce weed control. Effect will vary with product, the interval between spraying and rainfall and the intensity and duration of the rainfall. These guidelines are based on label information. Use the longest time interval on the component products when considering tank mixes.



## Products Available as Prepackaged Tank Mixes

Product Name (Manufacturer)	Component 1 or A	Component 2 or B	Component 3 or C	Crops	Weeds Controlled	Area Treated per Package	
						Acres	Ha
<i>Authority Charge</i> (FMC)	<i>Aim</i>	<i>Authority</i>		Chickpea, field pea, flax, soybean, sunflower, fababean	See component products	80 to 64	32 to 26
<i>Axial IPak</i> (Syngenta)	<i>Axial</i>	<i>Infinity</i>		Spring wheat (NOT including durum), barley	See component products	40	16
<i>Black Hawk</i> - carfentrazone (Nufarm)	<i>Aim</i>	2,4-D 700 ester		Prior to seeding: Wheat (spring, durum, winter), barley, rye	See component products	80	32
<i>Cirpene</i> (XC) (Corteva)	<i>Paradigm</i>	<i>Lontrel</i> 360 (XC) (see Clopyralid)	Must be mixed with MCPA purchased separately	Wheat (including durum) and barley	See component products includes Canada thistle, cleavers and dandelion	40	16
<i>Conquer</i> (Nufarm)	<i>Aim</i>	<i>Bromoxynil</i> (Koril)		Prior to seeding canola	Weeds controlled by component products plus: Volunteer canola	80	32
Glyphosate + clopyralid (Corteva, Agracity)	clopyralid ( <i>Lontrel</i> = <i>Eclipse</i> A) (Clobber)	glyphosate ( <i>VP480</i> = <i>Eclipse</i> II B) ( <i>Disruptor</i> 360)		Glyphosate tolerant canola varieties	See component products	40	16
<i>Enforcer</i> MSU (Nufarm)	<i>Enforcer</i> M	Thifensulfuron/tribenuron ( <i>Boost</i> )		Barley, Wheat (spring, durum)	Weed controlled by component products plus suppression of narrow-leaved hawk's-beard	40	16
<i>Express</i> FX (FMC)	Tribenuron ( <i>Express</i> SG)	Dicamba 480 ( <i>Dicamba</i> L)	Must be mixed with glyphosate – (purchased separately)	Prior to seeding	Weeds controlled by <i>Express</i> SG plus glyphosate plus Group 2 & 9 resistant kochia	80	32
<i>Ko-Act</i> (Nufarm) <i>MPower</i> X-KO (Agracity)	tribenuron	2,4-D 700 ester		Wheat, barley, rye	See component products	80	32
<i>Luxxur</i> (Bayer CropScience)	Tribenuron ( <i>Express</i> SG)	<i>Varro</i>		Wheat (spring, winter durum)	Weeds controlled by <i>Varro</i> plus Canada thistle, Cow cockle, dandelion, Narrow-leaved hawk's-beard, perennial sow-thistle, scentless chamomile	80	32
<i>Odyssey Ultra</i> / <i>Odyssey Ultra</i> NXT (BASF)	<i>Odyssey</i> / <i>Odyssey</i> NXT	<i>Poast Ultra</i>	<i>Merge</i> (adjuvant)	Field peas, CLEARFIELD lentil	See component products	40	16
<i>Predicade</i> (FMC)	<i>Barricade</i> II (Predicade Broadleaf)	<i>Varro</i> ( <i>Predicade</i> Grass)	MCPA 600 Ester	Wheat (spring, durum, winter)	See component products	40	16
<i>Refine</i> M (FMC), <i>Broadside</i> (Loveland)	thifensulfuron/tribenuron ( <i>Refine</i> SG)	MCPA Ester		Wheat (durum, spring, winter), barley, oat	See component products	80	32
<i>Retain</i> SG (Loveland)	thifensulfuron/tribenuron ( <i>Refine</i> SG)	Fluroxypyr + 2,4-D		Wheat (spring, durum) barley	Weeds Controlled by <i>Refine</i> SG plus non-Group 2 resistant cleavers	40	16
<i>Salute</i> (Dow)	<i>Ares</i>	<i>Lontrel</i> Dry		CLEARFIELD canola	Weeds controlled by <i>Ares</i> plus Canada thistle, Sow-thistle (annual, perennial)	40	16
<i>Solo Ultra</i> (BASF)	<i>Solo</i> ADV	<i>Poast Ultra</i>		CLEARFIELD lentil, CLEARFIELD canola	See component products	40	16
<i>Tensile</i> (BASF)	<i>Solo</i>	<i>Lontrel</i> Dry		CLEARFIELD canola	See component products	40	16
<i>Traxos</i> Two (Syngenta)	<i>Traxos</i>	<i>OctTain</i> (fluroxypyr+ 2,4-D)		Wheat (spring, durum)	See component products	20	8
<i>Triton</i> K (FMC)	Tribenuron ( <i>Express</i> SG)	2,4-D LV Ester	Dicamba ( <i>Banvel</i> II)	Spring wheat, barley	See component products	40	16

Note: See the component products listed for information concerning staging, application information, safety precautions, the effect of weather and grazing, re-cropping, harvest interval and storage precautions. The more stringent recommendation of the two products should be followed. Mix products in the order listed.



## Product Pages

# 2,4-D

## Herbicide Group

### 4 - 2,4-D

(Refer to page 45)

### Company and Formulation:

	PCP # (Product Name)	
	600 Amine*	700 Ester**
ADAMA Canada		31698
AgraCity	31332	30460 (MPower 2,4-D)
Albaugh		29979 (Agri Star 2,4-D)
Federated Cooperatives Ltd.		32882
IPCO	17511	27819
Loveland Products Canada	5931	27818 ( <i>Salvo</i> )
Nufarm Agriculture	14726	27820

\* formulated as a solution.

\*\* formulated as an emulsifiable concentrate.

- **600 Amine:** 564 g ae per L present as dimethylamine salt and formulated as a solution.
- **700 Ester:** 660 g ae per L present as 2-ethylhexyl ester and formulated as an emulsifiable concentrate.
  - Container size - various

### Crops, Rates and Staging:

Application rates for individual products may vary from those listed. Refer to the label for product specific use rates. Rates greater than those listed may cause crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

#### Post-emergent:

Crop	Maximum Safe Rate (g ae per acre)	Stage
Wheat, barley, spring rye	227 to 283** (Esters) 227 (Amines)	4 leaf to early flag leaf.
Fall rye, winter wheat*	213 (Esters) 205 (Amines)	In spring, apply after winter cereals begin to grow but before emergence of the flag leaf. From full tillering to prior to flag leaf stage.
Corn*	227 (Amines) 213 (Esters)	Apply as an overall spray before corn is 6 inches (15 cm) tall and before the 6 leaf stage. After 6 inches (15 cm) use a directed spray. Avoid making applications under hot/humid conditions onto corn.
Seedling and established grasses for forage and seed production*	213 (Esters and Amines)	Apply from the 3 leaf stage to emergence of the flag leaf of seedling grasses. For established grasses for seed production, apply in spring up to emergence of the flag leaf.
Established forage grass (not for seed production)*	426 (Esters and Amines)	Apply in spring up to emergence of the flag leaf of established grasses, or in the fall after harvest.
Established grass pastures	907 (Esters and Amines)	No restrictions, apply when weeds are actively growing. For control of brush species, apply at time of rapid growth (usually May to mid-June, and September prior to colour change).

\* Note: Registered for use only with certain brands of 2,4-D; use of non-registered products is at the risk of the user.

\*\* Note: Rates above 227 g ae per acre can result in crop injury. This injury is typically offset by the benefits of improved weed control.

**Pre-plant or Pre-emergent:**

- **Barley, rye, wheat (spring, winter):** Apply 134 to 213 g ae per acre (weeds less than 8 cm) to a maximum of 294 g ae per acre (weeds greater than 8 cm) of *Nufarm 2,4-D Ester 700* or *ADAMA 2,4-D Ester 700 Liquid Herbicide* only prior to seeding or after seeding but prior to emergence of the crop.
- **Soybean:** Apply from 134 to 213 g ae per acre of 2,4-D 700 Ester (*Nufarm 2,4-D Ester 700*, *ADAMA 2,4-D Ester 700 Liquid Herbicide* and *Loveland Salvo* only) 7 days prior to seeding.

Rate Per Acre*		Formulation	
(g ae)	(oz. ae)	600 g/L	700 g/L
113	4	201 mL	172 mL
125	4.4	222 mL	189 mL
134	4.75	225 mL	202 mL
170	6	301 mL	258 mL
205	7.25	364 mL	311 mL
213	7.5	377 mL	322 mL
227	8	402 mL	344 mL
283	10	503 mL	430 mL
340	12	603 mL	515 mL
483	17	854 mL	730 mL
510	18	905 mL	773 mL
907	32	1608 mL	1374 mL

\* Actual product rates vary somewhat between products for similar uses. Check the product labels for the specific use rate for the product selected.

**Weeds, Rates and Staging:**

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet).

For pre-seed or pre-emergent application of *NuFarm 2,4-D 700 Ester* or *ADAMA 2,4-D Ester 700 Liquid Herbicide* only, apply 134 to 213 g ae per acre to control weeds less than 8 cm tall or 294 g ae per acre before the emergence of cereals to control weeds greater than 8 cm tall or harder to control weeds.

*Note: The rates listed differ slightly from product to product. Check individual product labels for exact use rates.*

**Susceptible Weeds:**

125 to 227 g ae per acre

- Bluebur
- Burdock
- Cocklebur
- False flax
- Flixweed (late fall application or spring seedlings)
- Goat's-beard
- Kochia
- Lamb's-quarters
- Mustards (except dog and tansy mustard)
- Narrow-leaved hawk's-beard (fall application to seedlings or spring application at 1 to 2 leaf stage)
- Plantain
- Prickly lettuce
- Ragweed (common, false and giant)
- Russian pigweed
- Russian thistle
- Shepherd's-purse\*\*
- Stinging nettle
- Stinkweed\*\*
- Sweet clover
- Thyme-leaved spurge
- Volunteer canola (including all herbicide tolerant varieties)
- Wild radish
- Wild sunflower

**Harder to control weeds:**

227 to 340 g ae per acre

- Annual sow-thistle
- Blue lettuce\*
- Burdock (top growth only of bolting plants)
- Canada thistle\*\*\*
- Common chickweed
- Common groundsel\*\*
- Common peppergrass
- Dandelion\*
- Flixweed (spring prior to bolting)
- Knotweed
- Lady's-thumb
- Leafy spurge\*
- Mustard (dog & tansy)
- Narrow-leaved hawk's-beard (spring prior to bolting)
- Oak-leaved goosefoot
- Pineappleweed
- Prostrate pigweed
- Purslane
- Redroot pigweed
- Russian thistle
- Sheep sorrel
- Tumble pigweed

**Top growth control only (at rates for harder to control weeds):**

- Biennial wormwood
- Bull thistle
- Buttercup
- Curled dock
- Field bindweed
- Gumweed
- Hedge bindweed
- Hoary cress
- Horsetail
- Mouse-eared chickweed
- Perennial sow-thistle
- Russian knapweed
- Tartary buckwheat
- Volunteer sunflower

\* Control of seedlings at rates given above and top growth control only of established plants.

\*\* Spring seedlings. Winter annual weeds - apply in late fall or early spring prior to bolting.

\*\*\* Suppression only - Apply when Canada thistle plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth.

Regrowth will be present the following spring and in-crop treatments will be required.

**Formulation Characteristics:**

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low

**Application Information:**

- **Water Volume:** Minimum 20 L per acre - ground application. Water rates depend on product and use. Consult label for details. Higher application volumes (40 L/acre or greater) reduce the risk of crop injury.
- **Nozzles and Pressure:** 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with **ASABE coarse** droplets.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
2,4-D	POST (foliar)	Synthetic auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

**Effects of Growing Conditions:**

Best weed control occurs when temperatures are above 21°C (daytime) or 10°C (nighttime) and humidity is above 70 percent. DO NOT apply if temperature exceeds 27°C.

**Tank Mixes:**

None listed on 2,4-D label.

**Restrictions:**

- **Rainfall:**
  - **2,4-D amine:** within 4 hours will reduce control.
  - **2,4-D LV ester:** within 2 hours will reduce control.
- **Re-entry:** DO NOT enter treated fields for at least 12 hours
- **Grazing:** DO NOT permit lactating dairy animals to graze fields within 7 days of application. DO NOT harvest forage or cut for hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

- **Re-cropping:** No recropping guidelines are provided on the labels. As a general guideline, there should be no cropping restrictions the year following an in-crop treatment.
- **Aerial Application:** Some formulations may be applied by air. Check the label for detailed instructions.
- **Storage:** 2,4-D LV ester may be frozen. 2,4-D amine requires heated storage.
- **Buffer Zones:**  
Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Crop	Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Field Crops	Ground*	1	1	1
	Fixed wing aircraft	10	0	45
	Helicopter	10	0	40
Fallow, pastures, rangeland	Ground*	1	1	2
	Fixed wing aircraft	15	0	60
	Helicopter	15	0	50

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to pages 12 and 13.

## Hazard Rating:

**Amine 600 formulations:**



Warning – Poison

**Ester 700 formulations:**



Danger – Poison



Warning – Skin Irritant

Potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# 2,4-DB

**Herbicide Group**

**4 - 2,4-DB**

(Refer to page 45)

## Company:

IPCO (*Cobutox 625* – PCP#27911)

Nufarm Agriculture (*Embutox* – PCP#27912)

Loveland Products Canada (*Caliber 625* – PCP#27910)

## Formulation:

625 g/L 2,4-DB formulated as an emulsifiable concentrate.

- Container size - 10 L

## Crops and Staging:

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Crop	Stage
Seedling alfalfa, bird's-foot trefoil*	1 to 4 trifoliate leaf stage
Clover (alsike**, red**, white, Dutch but NOT sweet clover)*	As soon as possible after emergence of the 1 <sup>st</sup> trifoliate leaf
Wheat, barley or oats	5 leaf to emergence of the flag leaf
Field corn	15 inches (40 cm) to prior to tasseling using drop nozzles.
Pastures containing forage legumes	After cutting or grazing and regrowth less than 3 inches (7.5 cm)

\* With or without a cereal cover crop.

\*\* Alsike and red clovers may be damaged by 2,4-DB applications.

### Seedling Forage Grasses\*:

Apply from 2 to 4 leaf stage of:

- Bromegrass (smooth)
- Fescue (creeping red, meadow, tall)
- Orchard grass
- Timothy
- Wheatgrass (crested, intermediate, streambank, tall)

\* Not for seed production. Not for feeding in the establishment year.

## Weeds and Staging:

Weeds controlled at the 0.71 L per acre rate from the 2 to 4 leaf stage:

- Lamb's-quarters
- Mustard (ball, wild, wormseed)
- Ragweed
- Redroot pigweed
- Shepherd's-purse
- Stinkweed

Weeds controlled at higher recommended rates (0.91 to 1.1 L per acre):

Weed	Stage
Bull thistle	Rosette to early bud stage
Canada thistle*	6 in. (15 cm) to early bud
Chicory	Rosette
Curled dock**	Young and actively growing
Dandelion*	Prior to bud
Field bindweed*	Late summer
Horsetail*	4 to 5 inches (10 to 13 cm)
Narrow-leaved hawk's-beard	Apply at rosette stage after alfalfa has gone dormant
Oak-leaved goosefoot	Up to 2 leaf stage
Perennial sow-thistle*	Rosette
Plantain	Prior to flowering
Smartweed (green, lady's-thumb)**	Seedlings
Wild buckwheat	Up to 2 leaf stage
Wild radish	Up to 2 leaf stage
Yellow rocket	Late September to mid-October

\* Top growth control

\*\* Suppression

Refer to individual product labels for details on application rates to use for different weed species.

## Rates:

Crop	Rate (L per acre)	Acres Treated Per Container
Cereals, seedling forage legumes and grasses	0.71 to 0.91	14.1 to 11.0
Corn and pastures containing forage legumes	0.71 to 1.11	14.1 to 9.0

## Application Information:

- **Water Volume:** 61 to 81 L per acre.
- **Nozzles and Pressure:** 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with a minimum of fine droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
2,4-DB	POST (foliar)	Synthetic auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Severe damage to legumes can occur if high temperatures (more than 27°C) or high humidity prevail at the time of application. DO NOT apply under dry soil/drought conditions.

## Tank Mixes:

### Herbicides:

#### *Underseeded Legumes:*

- MCPA amine (35 g ae per acre\*)
- **\* 500 g/L formulation**
- This tank mix may increase crop damage (stunting).
- Follow all precautions and restrictions on both product labels.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on 2,4-DB labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Not specified on the label. A period of up to 8 hours may be required. Contact the manufacturer for more details.
- **Grazing Restrictions:** DO NOT graze or cut treated crops or forage until 30 days after application.
- **Re-cropping Interval:** No restrictions the year after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.

## Sprayer Cleaning:

Refer to page 12.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# AAtrex Liquid

Herbicide Group

5 - atrazine

(Refer to page 45)

## Company:

Syngenta Canada (PCP#18450)

## Formulations:

480 g/L atrazine formulated as a liquid suspension.

- Container size - 2 x 10 L

## Crops, Rates and Staging:

**Corn (silage, field, sweet):** 0.85 to 1.25 L per acre\* using the following application methods;

- **Pre-plant incorporated (PPI).**
- **Pre-emergent surface (after planting but before emergence of weeds and crop):** Recommended only on irrigated fields. Inconsistent weed control will occur if 0.5 inches (1.25 cm) of water/precipitation does not occur within 7 days of application.
- **Post-emergence:** 1 to 6 leaf stage and when corn is less than 12 inches (30 cm) tall. Add 1.11 to 2.23 L per acre of oil concentrate or 6.88 L per acre crop oil. Crop injury may occur when AAtrex and oil is applied post-emergence during cold weather.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

**\* Use the low rate on crops grown on sandy soils, and where weed infestations are light.**

It is recommended that any products containing atrazine not be used in areas treated with this product during the previous season.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Weeds and Staging:

**For pre-plant incorporated, pre-emergent and post-emergent (when weeds are less than 4 inches or 10 cm tall) control of the following weeds:**

- Lamb's-quarters
- Mustard (wild, wormseed)
- Purslane
- Ragweed
- Redroot pigweed
- Smartweed (including lady's-thumb)
- Volunteer clover
- Wild buckwheat
- Wild oats

## Application Information:

- **Water Volume:** Minimum 61 L per acre.
- **Nozzles and Pressure:** 30 to 45 psi (200 to 300 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
atrazine	PPI (soil active) POST (foliar)	PSII Inhibitor/ Membrane disruptor	Little foliar; upward soil applied (Apoplast)	Broadleaf & grass	5

## Effects of Growing Conditions:

Post-emergent applications made during periods of cold weather may cause crop lightening. Hot, dry weather preceding post-emergent applications may result in reduced weed control. AAtrex will move with soil if eroded.



## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **Pre-Emergent and Pre Plant Incorporated:**

- *Dual II Magnum*
- Glyphosate

- **Post-Emergent\*:**

- Dicamba (*Banvel II* only - 0.24 L per acre)<sup>†</sup>
- *Dual II Magnum*
- Bromoxynil/MCPA (*Buctril M* only)\*\*
- Bromoxynil (*Pardner* only)

<sup>†</sup> **DO NOT use in sweet corn.**

\* **DO NOT use oils or adjuvants with post-emergent tank mixes.**

\*\* **DO NOT treat after the 6 leaf stage, crop injury may occur.**

**Fertilizers:** For pre-emergent applications, nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier. AAtrex may be impregnated onto dry granular fertilizers. DO NOT impregnate onto nitrate, super- phosphate or limestone.

DO NOT apply AAtrex with nitrogen fertilizer after corn has emerged, as crop injury will occur.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the AAtrex label only.

Syngenta also supports the following mixes that are not on the AAtrex label. Apply mixes according to the most restrictive use limitations for either product:

**Herbicides:** Glyphosate (*glyphosate tolerant corn varieties only*)

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

## Restrictions:

- **Rainfall:** Within 2 hours of post-emergence applications may result in reduced weed control.
- **Grazing Restrictions:** DO NOT graze or cut for feed before ear emergence.
- **Pre-harvest Interval:** Leave at least 45 days from application to harvest for sweet corn and 60 days for field corn.
- **Re-cropping Interval:** All crops, except corn and triazine-tolerant canola, may be affected the year following the use of atrazine. Flax, peas and faba beans have some tolerance to atrazine residues and are usually not affected by rates of up to 0.9 L per acre applied the previous year. Other more sensitive crops may be affected 2 or more growing seasons after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground only*	10	10

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- DO NOT mix or load within 30 m of any wells, lakes, streams, ponds, dugouts or sinkholes.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

**Hazard Rating:**

Caution – Eye Irritant

KEEP OUT OF REACH OF CHILDREN.

Harmful if swallowed.

For an explanation of the symbols used here see pages 7 and 8.

# Accent 75DF/Accent Grande\*

Herbicide Group  
2 - nicosulfuron  
(Refer to page 45)

**Company:**

Corteva Agriscience (PCP#25116)

**Formulation:**

75% nicosulfuron formulated as a water dispersible granule.

- Container size - 133.6 g (4 x 33.4 g water soluble bags per pouch).

**Crops and Staging:\*****Field Corn:** 1 to 8 leaf stage (six visible collars), coleoptile (short, blunt leaf) is counted as the first leaf.**Sweet corn \*\*:** 1 to 6 leaf stage (4 visible collars).

**\* NOTE -** Since applications to field and sweet corn in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. **Application to corn is at the risk of the user.**

**\*\* Note that Accent is registered for use on all sweet corn varieties but tolerance may vary depending on variety. Krispy King, Jubilee and Jubilee Supersweet are the only varieties that have been tested for tolerance in western Canada. Test on small areas planted to other varieties for tolerance prior to widespread use.**

**Weeds and Staging:**

Weeds	Staging
Barnyard grass, foxtail (green, yellow*), witchgrass	1 to 6 leaves (up to 2 tillers)
Quackgrass	3 to 6 leaves (with extended leaf 4 to 8 inches (10 to 20 cm) long)
Wild oats	3 to 6 leaves

**\* Suppression only**

The best control and yield response is achieved by applying at the earlier end of the leaf stage ranges.

**Rates:**

13.5 g per acre. Add a non-ionic surfactant (*Citowett Plus*, *Agsurf* or *Agral 90*) at 0.2 L per 100 L of spray solution. One water soluble bag will treat 2.5 acres (1 ha). One pouch will treat 10 acres (4 ha).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

**Application Information:**

- **Water Volume:** Minimum 40 L per acre; optimum 56 to 77 L per acre.
- **Nozzles and Pressure:** 25 to 40 psi (175 to 275 kPa) when using conventional flat fan nozzles tilted forward at a 45° angle. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with **ASABE medium** droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
nicosulfuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Grasses	2

## Effects of Growing Conditions:

Poor weed control or crop injury may result if at the time of application, plants are under stress from disease, insect or nematode injury, carryover of herbicide from a previous years application, abnormally hot or cold weather, drought, water-soaked soils, hail damage or frost. Delay application until stress passes and both corn and weeds have resumed growth. When corn is injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying *Accent*. Stress conditions after application may also result in injury or poor weed control.

## Tank Mixes:

### Herbicides:

- *Banvel II* (0.24 L per acre) plus surfactant.
- *Pardner* (0.4 L per acre) plus surfactant.

**Fertilizers:** DO NOT mix with fertilizers.

**Insecticides:** None registered. *Accent* should not be applied to corn that has been treated with organophosphate insecticides. Leave 7 days between the application of *Accent* and that of a foliar organophosphate insecticide.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the *Accent* label only.

## Restrictions:

- **Rainfall:** Within 2 to 4 hours of application may result in reduced weed control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze or feed treated corn forage, silage, fodder or grain for at least 30 days.
- **Pre-harvest Interval:** Leave at least 30 days in field corn and 40 days in sweet corn from application to harvest.
- **Re-cropping Interval:** Spring cereals, canola, field pea, flax, corn, potato, dry beans<sup>†</sup>, sunflower, alfalfa may be seeded 10 months from application. For all other crops a field bioassay is recommended before planting.
- <sup>†</sup> Since not all dry bean varieties have been tested for rotational crop tolerance, the first planting of each variety to previously treated fields should be limited to a small area to confirm tolerance prior to widespread recropping.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store product in original container in a secure, dry area away from other pesticides, food or feed.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of Terrestrial habitat
Ground only*	2

See page 36 for an explanation of the different habitats.

\*Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup>Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Leave a 5 m buffer between the last spray path and woodlots or shelterbelts. Leave a 22 m buffer before wetland areas or water bodies.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Eye Irritant

KEEP OUT OF REACH OF CHILDREN.

Avoid breathing spray mist.

Avoid contact with skin, eyes and clothing.

For an explanation of the symbols used here see pages 7 and 8.

# Aim EC

**Herbicide Group**  
**14 - carfentrazone**  
*(Refer to page 45)*

## Company:

FMC Corporation (PCP#28573)

## Formulations:

240 g/L carfentrazone formulated as an emulsifiable concentrate.

- Container size - 1.2 L, 2 L, 4.8 L

## Crops, Rates and Staging:

### Pre-Seeding:

*From 14.8 to 29.5 mL per acre prior to the seeding of:*

- Sorghum

*From 14.6 to 47.3 mL per acre prior to the seeding of:*

- |                          |                            |  |
|--------------------------|----------------------------|--|
| ◦ Barley                 | ◦ Field pea                | ◦ Rye  |
| ◦ Buckwheat              | ◦ Flax                     | ◦ Safflower                                  |
| ◦ Canola (rapeseed)      | ◦ Lentil                   | ◦ Soybean                                    |
| ◦ Chickpea               | ◦ Millet (pearl and proso) | ◦ Sunflower                                  |
| ◦ Corn (field and sweet) | ◦ Mustard                  | ◦ Triticale                                  |
| ◦ Dry bean               | ◦ Oats                     | ◦ Wheat (including spring, winter and durum) |
| ◦ Faba bean              | ◦ Potatoes                 |  |

Use *Agral 90* or *Ag-Surf* at 0.25 L per 100 L of spray solution or use *Merge* at 1 L per 100 L of spray solution when used alone.

### Harvest aid treatment\*:

**Note:** As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from crops treated with this product prior to harvest may have market access concerns. Please see page 10 for more information AND consult potential grain buyers before using this product.

Crop	Rate (mL per acre)
Barley, oats, wheat, millet, dry bean, chickpea, faba bean, field pea, soybean, triticale	29.5 to 47.3
Sorghum	29.5
Potato**	94 to 142

Use *Agral 90* or *Ag-Surf* at 0.25 L per 100 L of spray solution or use *Merge* at 1 L per 100 L of spray solution when used alone.

\* DO NOT apply as a tankmix with glyphosate to crops if grown for seed purpose.

\*\* A second application of 94 to 142 mL per acre may be applied in potato.

## Weeds, Rates and Staging:

Apply to listed weeds up to 10 cm in height unless otherwise indicated:

Weeds	Rate (mL per acre)
Eastern black nightshade (up to 5 cm), Lamb's-quarters (up to 7.5 cm), Redroot pigweed, Tall waterhemp (up to 5 cm), Velvetleaf	14.8
<i>Above weeds plus:</i> Flixweed, Hairy nightshade, Lamb's-quarters, Pigweed (prostrate, smooth, tumble), Pennsylvania smartweed (seedling), Purslane, Round-leaved mallow, Stinkweed, Tansy mustard, Waterhemp (common, tall)	23.5
<i>Above weeds plus:</i> Carpetweed, Cleavers, Cocklebur, Eastern black nightshade, Kochia, Jimsonweed, Russian thistle (up to 5 cm), Shepherd's-purse, Volunteer canola (all varieties)	29.5

Weeds	Rate (mL per acre)
<i>Above weeds plus:</i> Burclover, Corn spurry, Prickly lettuce, Venice mallow (up to 5 cm)	47.3

## Application Information:

- **Water Volume:** Use a minimum of 40 L per acre. Higher spray volumes is required for dense weed stands. Weed control improves with the amount of coverage.
- **Nozzles and Pressure:** Maximum 35 psi (210 kPa) if using conventional nozzles. Low drift nozzles may require higher pressure for proper performance. Use nozzles and pressure designed to deliver proper coverage with **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
carfentrazone	POST (foliar)	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Non-selective Broadleaf	14

## Effects of Growing Conditions:

Extremes in environmental conditions such as temperature, moisture, soil conditions, and cultural practices may affect activity. Under warm moist conditions, herbicide symptoms may be accelerated. While under very dry conditions, the expression of herbicide symptoms may be reduced as weeds hardened off by drought are less susceptible.

## Tank Mixes:

### Herbicides:

- Glyphosate\* (180 to 360 g ae per acre)
- 2,4-D Ester (227 g ae per acre) (fallow only)
- Bromoxynil (57 g active ingredient per acre – canola, wheat, barley, oats)
- Bromoxynil + glyphosate (rates and crops above)

### Harvest aid treatment:

- **Barley, chickpea, dry beans, faba bean, field pea, millet, oats, sorghum, and wheat:**
  - Glyphosate\* (360 g ae per acre)

- **Potato only:** Reglone\*\* (0.51 to 0.9 L per acre)

\* IPA or K salt only.

\*\* For potato desiccation – should a second desiccation application be required after a first application of *Aim EC* plus *Reglone* tank mix, use *Aim EC* at 94.3 to 142 mL/acre alone or as a tank mix with *Reglone* at 0.51 L/acre.

**Note:** The above mixes are those listed on the *Aim EC* label only.

FMC Corporation supports the following tank mixes that are not on the *Aim EC* label. Apply mixes according to the most restrictive use limitations for either product. See tank mix partner page for supported crops:

### Herbicides:

- MCPA Amine/Ester (114 g ae per acre prior to the seeding of wheat, barley, oats, rye, flax and field pea), 2,4-D (134 g ae per acre preseed only – see 2,4-D page for crop options)

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall within 1 hour after application may reduce activity. Heavy rainfall shortly after application may reduce activity.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Pre-harvest Interval:** Leave 7 days between application and harvest for potatoes and 3 days for all other registered crops for harvest aid uses.
- **Grazing Restrictions:** No information is provided on the label.
- **Re-cropping Interval:** There are no rotational restrictions on crops registered for pre-seed use. All other crops may be planted 12 months after application.
- **Aerial Application:** DO NOT apply by air.

- **Storage:** Store in a cool, dry place and avoid excess heat.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of Terrestrial Habitat
Ground only*	5

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches above the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat. DO NOT apply in areas where surface water from the treated area can run off into aquatic habitats.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Eye and skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Altitude FX2

Herbicide Group

2 - imazamox

4 - fluroxypyr

(Refer to page 45)

## Company:

BASF Canada

## Formulations:

*Altitude FX2* contains 2 separate components. Each case contains:

**AC 299,263 120 AS (PCP#26705):** 120 g/L imazamox formulated as a solution.

- Container size - 2.68 L

**Starane (PCP#24815):** 180 g/L of fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 9.6 L

MCPA, 2,4-D, or *Curtail M* must be added and are purchased separately.

## Crops and Staging:

**CLEARFIELD wheat varieties:** 3 leaf (after appearance of first tiller) to 6 leaf stage to ensure optimal crop tolerance. Apply only to CLEARFIELD wheat varieties; application to any other variety of wheat or any other crop will result in crop death.

## Weeds and Staging:

### Grasses:

Apply from 1 to 4 leaf stage to a maximum of two tillers.

- Barnyard grass
- Foxtail (green, yellow)
- Japanese brome\*
- Persian darnel
- Volunteer cereals (barley, canary seed, oat, non-CLEARFIELD spring wheat, durum)
- Wild oat

### Broadleaves:

Apply up to 4 leaf stage unless otherwise indicated.

- Cleavers (1 to 4 whorls)
- Cow cockle
- Green smartweed
- Kochia
- Lamb's-quarters
- Redroot pigweed
- Round-leaved mallow\*
- Russian thistle\*
- Shepherd's-purse
- Stinkweed
- Stork's-bill (1 to 8 leaf)\*
- Volunteer canola (except Clearfield varieties)
- Volunteer flax (1 to 12 cm)
- Wild buckwheat
- Wild mustard

\* **Suppression**

## Rates:

*Altitude FX2* (1 case treats 40 acres)

**AC 299,263 120 AS:** 67 mL per acre.

**Starane:** 0.24 L per acre.

*Altitude FX2* must be tank mixed with one of the registered tank mix options found under the "tank mix" section below. Add a non-ionic surfactant (such as *Agral 90* or *Ag-Surf II*) at 0.25 L per 100 L of spray solution. Surfactant not included.

DO NOT apply *Altitude FX2* or other products containing imazamox, or fluroxypyr more than once per season.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** 20 to 40 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE coarse** droplets.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
imazamox	POST (foliar)	ALS Amino Acid inhibitor	Toward regions of growth (Symplast)	Broadleaf & grass	2
fluroxypyr	POST (foliar)	Synthetic Auxin	Toward regions of growth (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury will occur as a result of spray overlap. AVOID SPRAYER OVERLAP.

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

## Tank Mixes:

### Herbicides:

- ***Altitude FX2* must be mixed with one of the following:**
  - 2,4-D Ester (213 g ae per acre)
  - *Curtail M* (0.61 to 0.81 L per acre)

## Restrictions:

- **Rainfall:** Rainfall within 3 hours after application may reduce activity.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze the treated crop within 14 days of application or cut for hay within 42 days of application.
- **Pre-harvest Interval:** DO NOT apply within 79 days of harvest.
- **Re-cropping Interval:** Winter wheat may be seeded 3 months after application. Barley, canola (all varieties), field peas, flax, lentils, oats, and spring wheat may be grown safely the year following application. Condiment mustard may be grown the second season following *Altitude FX2* application. Conduct a field bioassay the year before growing any other crop than those listed above.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze. Store in a cool, dry place above 5°C. Combustible – DO NOT store near heat or open flame.



• **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	15	15	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.


## Sprayer Cleaning:


Refer to 'Method C' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:

*Starane:*

 Danger – Poison

 Warning – Eye Irritant

 Caution – Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Amitrol 240\*

**Herbicide Group**  
**11 - amitrole**  
(Refer to page 45)

\* Note: This product is no longer manufactured but inventories still remain in distribution.  
This product may be removed from future editions.

## Company:

Nufarm Agriculture (PCP#25684)

## Formulation:

231 g/L amitrole formulated as a liquid.

- Container size - 10 L, 450 L

## Crops, Rates and Staging:

**Fall Stubble:** Perennial weed control prior to spring seeding. No planting restrictions for barley, canola, field corn, field pea, soybean, wheat, or navy bean, but leave 8 months between application and the seeding of any other crops.

**Alfalfa stand renovation/removal:** 4 to 6 inches (10 to 15 cm) high.

**Pastures (spot treatment only):** For non-selective patch treatment of dandelion, Canada thistle, perennial sow-thistle, hoary cress, milkweed, poison ivy and toadflax apply 165 mL in 25 L of water to treat a 10 m x 10 m area. For treatment of leafy spurge and horsetail, apply 460 mL in 25 L of water to treat a 10 m x 10 m area. DO NOT mow treated plants for 3 weeks after application.

**Established shelterbelts:** up to 11.3 L per acre - Keep spray away from tree foliage or trunks.

**Pre-seeding:**

Crop	Rate (L per acre)	Delay seeding after application
Barley, wheat, canola	1.7	0 to 1 days
Field pea	1.7	5 to 7 days
Soybean (low rate)	1.7	6 days
Soybean (high rates)	5.1 to 6.7	10 to 14 days
Field corn, navy bean, soybean	3.3 to 6.7	10 to 14 days

- Adhere to the maximum pre-seeding rates and delays between application and seeding indicated above to avoid the risk of damage to the emerging crop or excess residues in the grain.
- Avoid using rates higher than 6.7 L per acre for pre-plant applications prior to soybeans, dry beans and corn on very light textured soils with low organic matter, as crop damage can occur.

**Fallow areas:** Apply according to weed stage and rates in the next section.

## Weeds, Rates and Staging:

**Fall stubble:** Canada thistle, perennial sow-thistle - Spray when thistle has 4 to 6 inches (10 to 15 cm) of new growth. DO NOT cultivate for 2 weeks after application. DO NOT apply after October 1. DO NOT replant crops in treated areas within 8 months of application except those registered for pre-seeding uses.

**Pre-seeding:** Dandelion and annual weeds - Apply 1.7 L per acre to actively growing weeds less than 10 cm tall or across. DO NOT cultivate for 10 to 14 days after treatment.

### Fallow, Pastures and Shelterbelts:

Weed	Rate (L per acre)	Weed Stage
Canada thistle	5.1 to 6.7	Early bud to bloom stage.
Cattails	15.2 to 18.5	After seed heads have formed.
Dandelion	1.7 to 5.1	Young and actively growing plants.
Hoary cress	7.6 to 11.3	Advanced rosette and bud stage.
Horsetail	5.0 to 6.7	Actively growing plants.
Leafy spurge	15.2 to 18.5	Advanced flowering to early seed set.
Milkweed	7.6 to 11.3	Early summer after majority of shoot emergence.
Perennial sow-thistle	5.1 to 6.7	Early bud to bloom stage.
Poison ivy	3.7	Fully developed green foliage.
Quackgrass	5.1 to 6.7	When plants are 4 to 6 inches (10 to 15 cm) high and actively growing.
Toadflax	7.6 to 11.3	Advanced rosette to prebud.

## Application Information:

- **Water Volume:**
  - **Fall stubble:** 20 to 81 L per acre.
  - **Pastures, shelterbelts:** 40 to 121 L per acre. For poison ivy, apply 202 to 405 L per acre.
  - **Pre-seeding:** 20 to 81 L per acre.
- **Nozzles and Pressure:** Maximum 45 psi (less than 300 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with **ASABE coarse** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
amitrole	POST (foliar) with slight soil activity	Pigment inhibitor (unknown mechanism)	Moves throughout the plant (Apoplast & Symplast)	Broadleaf & grass	11

## Effects of Growing Conditions:

Less than acceptable results may occur in dry weather.

## Tank Mixes:

Nufarm supports the following mixes that are not on the *Amitrol 240* label. Mixes must be applied according to the most restrictive use limitations for either product:

**Herbicides:** glyphosate

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT re-enter treated areas for 12 hours.
- **Grazing Restrictions:** DO NOT graze treated crops or weeds or use for hay or feed.
- **Re-cropping Interval:** DO NOT plant any crop for 8 months following application except those registered for pre-seeding uses.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT store where temperatures may exceed 50°C or near open flames. DO NOT store below 4°C.
- **Buffer Zones:** DO NOT contaminate any body of water. Use cautions to prevent spray, spray mist, or vapours from drifting off target. Spray drift may cause damage to crops or vegetation.

## Sprayer Cleaning:

Refer to 'Method C' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Ares

Herbicide Group  
2 - imazamox & imazapyr  
(Refer to page 45)

## Company:

BASF Canada (PCP#30188)

## Formulation:

33 g/L imazamox and 15 g/L imazapyr formulated as a solution.

- Container size - 1 x 9.8 L jug, Merge 8.1 L jug

## Crops and Staging:

**CLEARFIELD canola:** 2 to 7 leaf stage.

**CLEARFIELD lentil:** 1 to 9 node stage.

**CLEARFIELD oilseed mustard (*Brassica juncea*):** 2 to 7 leaf stage.

## Weeds, Rates and Staging:

Merge adjuvant must be used at a rate of 0.5 L per 100 L of spray solution.

**At 244 mL per acre (40 acres per case), Ares will control:**

- **Grasses** - From 1 to 6 true leaf stage with up to 2 tillers:
  - Barnyard grass
  - Foxtail (green and yellow)
  - Japanese brome\*
  - Persian darnel
  - Volunteer cereals (barley, canaryseed, durum, oats and wheat - NOT including CLEARFIELD varieties)
  - Wild oats

\* Spring germinating Japanese brome maximum 4 leaf stage.

- **Broadleaf Weeds** - up to 4 leaf stage unless otherwise indicated:
    - Chickweed
    - Cleavers (up to 4 whorls)\*\*\*
    - Cow cockle
    - Green smartweed
    - Hemp-nettle
    - Lamb's-quarters \*\*
    - Redroot pigweed
    - Round-leaved mallow
    - Russian thistle
    - Shepherd's-purse
    - Stinkweed
    - Stork's bill
    - Volunteer canola (not CLEARFIELD varieties)
    - Volunteer tame mustard (not CLEARFIELD oilseed varieties - *B. juncea*)
    - Wild buckwheat\*\*
    - Wild mustard\*\*\*
- \*\* up to 6 leaf stage  
 \*\*\* NOT Group 2 resistant biotypes.

DO NOT apply *Ares* more than once per year or follow *Ares* with other products containing the active ingredient imazamox (e.g. *Solo*, *Odyssey*) or imazapyr (*Salute*) in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general mixing guide can be found on page 11.

## Application Information:

- **Water Volume:** 20 to 40 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.
- **Screens:** Use 50 mesh or coarser filter screens for both nozzles and in-line screens.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
imazamox	POST (foliar)	ALS Amino Acid inhibitor	Toward regions of growth (Symplast)	Broadleaf & grass	2
imazapyr	POST (foliar)	ALS Amino Acid inhibitor	Toward regions of growth (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

## Tank Mixes:

### Herbicides:

- **In CLEARFIELD canola only. DO NOT apply to CLEARFIELD oilseed mustard or CLEARFIELD lentils:**
  - *Lontrel 360* (84 mL per acre)

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Ares* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall within 2 hours after application may reduce activity.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Pre-harvest Interval:** DO NOT apply within 60 days of harvest of registered crops.
- **Grazing Restrictions:** No information is provided on the label. DO NOT feed treated crops to livestock prior to crop maturity.
- **Re-cropping Interval:** Barley, canaryseed, chickpea, CLEARFIELD canola/oilseed *B. juncea*, field corn, field pea, lentil, oat, and spring wheat may be seeded the first full season after application. Non-Clearfield canola, durum, flax and sunflower may be seeded the second full season after application. The company recommends that a field bio-assay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place.
- **Buffer Zones:** Avoid drift. Leave at least 11 m between the downwind edge of the boom and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

## Sprayer Cleaning:

Refer to 'Method C' in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:

No specific hazards.

# Authority 480

Herbicide Group  
14 - sulfentrazone  
(Refer to page 45)

## Company:

FMC Corporation (PCP#29012)

## Formulation:

480 g/L sulfentrazone formulated as a suspension concentrate.

- Container size - 4 x 3.79 L

## Crops, Rates and Staging:

**Pre-plant surface:** Apply to the soil surface prior to seeding the crop.

**Pre-emergent surface:** Apply to the soil surface up to 3 days after seeding. Crops emerging or near emerging at application may be injured.

**At 88 mL per acre:**

- Mustard

**From 88 to 118 mL per acre:**

- |             |             |             |
|-------------|-------------|-------------|
| ◦ Chickpea  | ◦ Field pea | ◦ Soybean   |
| ◦ Faba bean | ◦ Flax      | ◦ Sunflower |

All applications require rainfall for proper activation. (See "Effects of Growing Conditions")

**Note:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sand, loamy sand or sandy loam) and/or the depth to the water table is shallow.

## Weeds, Rates and Staging:

Controls the following weeds when applied to the soil prior to emergence:

**At 88 mL per acre (43 acres per jug):**

- Kochia

**At 118 mL per acre (32 acres per jug):**

- **Above weeds plus:**

◦ Cleavers (suppression)	◦ Lamb's-quarters	◦ Waterhemp (common)
◦ Common groundsel	◦ Purslane	◦ Wild buckwheat
◦ Eastern black nightshade	◦ Pigweed (green, redroot)	◦ Yellow woodsorrel

Use the higher rates within the rate range for soils with pH less than 7.0 and organic matter greater than 3%.

**DO NOT APPLY Authority 480 to:**

- coarse-textured (sand, loamy sand, sandy loam) soils,
- fine textured soils with less than 1.5% organic matter,
- soils with organic matter content greater than 6%,
- soils with a pH of 7.8 or greater.

DO NOT apply Authority 480 to fields treated with Authority 480 (or other products containing sulfentrazone) in the previous year.

## Application Information:

- **Water Volume:** Minimum 40 L per acre. Use as high water volume as practical to achieve even distribution over the soil surface.
- **Nozzles and Pressure:** Maximum 30 psi (175 kPa) if using conventional nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with **ASABE medium** droplets or larger.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
sulfentrazone	PRE (residual soil activity)	PPO Inhibitor/ Membrane disruptor	Little movement (Symplast)	Broadleaf	14

## Effects of Growing Conditions:

All applications require rainfall for proper activation. If weed growth begins before activation occurs, poor control may result on larger weeds. A moderate rainfall (10 to 20 mm) or equivalent irrigation is required within 10 to 14 days to activate pre-emergent surface treatments. Dry conditions that persist after any application may reduce weed control. On sandy soils, heavy rainfall following application may cause leaching of *Authority 480*, resulting in reduced weed control.

## Tank Mixes:

### Herbicides:

- **Field Peas only:** Imazethapyr (28.3 mL per acre) – black and grey wooded soils only.

FMC Corporation supports the following tank mixes that are not on the *Authority 480* label. Apply mixes according to the most restrictive use limitations for either product:

### Herbicides:

- **Pre-seed to all crops:** *Aim EC*; glyphosate (180 to 360 g ae per acre)
- **Pre-seed (flax only):** MCPA Amine + *Aim EC* + glyphosate

## Restrictions:

- **Rainfall:** Rainfall following application is required for adequate weed control.
- **Grazing Restrictions:** No information is provided on the label.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Re-entry Interval:** DO NOT re-enter treated area within 12 hours.
- **Re-cropping Interval:**
  - Registered crops may be planted anytime after application.
  - Winter wheat may be seeded 4 months after application.
  - Alfalfa, barley, canola, field corn, and spring and durum wheat may be seeded the season following application (after one winter).
  - Sweet corn, lentils and sorghum may be seeded the second season (two winters) after application.
  - For all other crops three winters must pass following application and a successful bioassay indicating adequate tolerance before planting. For each year of drought experienced, add one year to the intervals above and conduct a bioassay to confirm tolerance of the rotational crop. Longer re-cropping intervals should be used under dry conditions.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store above 5°C to keep from freezing. If frozen, and solid crystals are observed, warm to above 15°C and shake or roll container periodically to dissolve solids.
- **Buffer Zones:** DO NOT fill mix or clean sprayer within 15 metres of any water source, unless the well is properly capped or activities take place on impervious pads or properly diked mixing/loading areas. Leave a 1 meter buffer between the last spray path and water or wetland habitats and 10 metres to sensitive plants and upland habitats when applying by ground. Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. Leaving cleaning solution in the sprayer tank and plumbing for an extended period will improve cleaning effectiveness.

## Hazard Rating:



Caution – Poison.

For an explanation of the symbols used here see pages 7 and 8.

# Authority Charge

*This product is a co-pack of Aim EC (page 93) and Authority 480 (page 101). Information is restricted to Crop, Weeds, Rates and Tank Mixes. For other detailed information on the component products see the product pages listed above. Note: this product is based on an unlabeled tank mix supported by the manufacturer.*

**Herbicide Group**  
**14 - carfentrazone**  
**& sulfentrazone**  
*(Refer to page 45)*

## Company:

FMC Corporation

## Formulation:

**Aim EC (PCP#28573):** 240 g/L carfentrazone formulated as an emulsifiable concentrate.

- Container size – 1 x 1.2 L

**Authority 480 (PCP#29012):** 480 g/L sulfentrazone formulated as a suspension concentrate.

- Container size – 2 x 3.79 L

## Crops and Staging:

**Note:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sand, loamy sand or sandy loam) and/or the depth to the water table is shallow.

**Pre-plant surface:** Apply to the soil surface prior to seeding chickpea, faba bean, field pea, flax, soybean and sunflower.

Soil applied in the spring only, tank mixed with glyphosate.

## Weeds and Staging:

Weeds controlled by component products.

## Rates

**Aim:** 15 to 18.75 mL per acre.

**Authority:** 88 to 118 mL per acre.

(One case treats 86 to 64 acres at the respective rates above)

## Tank Mixes:

*Authority Charge* should be tank mixed with glyphosate at 180 to 360 g ae per acre (See glyphosate page for equivalent product rates) based on the *Aim EC* component label only.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Authority Supreme

**Herbicide Group**  
**14 - sulfentrazone**  
**15 - pyroxasulfone**  
*(Refer to page 45)*

## Company:

FMC Corporation (PCP#32562)

## Formulation:

250 g/L pyroxasulfone and 250 g/L sulfentrazone formulated as a suspension concentrate.

- Container size – 2 x 8 L



## Crops, Rates and Staging:

Apply prior to seeding of or up to 3 days after seeding chickpea, field pea, or soybean:

**Note:** Maximum ONE APPLICATION of products containing pyroxasulfone per season.

Maximum of ONE APPLICATION of *Authority Supreme* or other products containing sulfentrazone over TWO SEASONS. In case of extremely low rainfall in any of those years, a subsequent application of herbicides containing sulfentrazone should be further delayed by the equivalent number of years in which extremely low rainfall occurred.

**Note:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sand, loamy sand or sandy loam) and/or the depth to the water table is shallow.

Treatment	Rate (per acre)		Acres Treated per Jug	
	Soil Type		Soil Type	
	Coarse to Medium Texture (1 to 4% O.M.)*	Medium to Fine Texture (4 to 7% O.M.)*	Coarse to Medium Texture (1 to 4% O.M.)*	Medium to Fine Texture (4 to 7% O.M.)*
Setup Treatment	162 mL		50	
Residual Treatment	202 mL	243 mL	40	33

\* O.M. = organic matter content

Coarse to Medium soils	Medium-Fine to Fine soils
Sand, Loamy sand, Sandy loam, Loam, Silt loam, Silt	Sandy clay loam, Sandy clay, Silty clay loam, Silty clay, Clay loam, Clay

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

**DO NOT apply *Authority Supreme* to:**

- soils with 7% or more organic matter content.
- coarse soils classified as sand with less than 1% organic matter content.

## Weeds and Staging:

Control of the following weeds emerging from seed (not controlled if emerged at application):

- Barnyard grass
- Brome (downy, Japanese)
- Cleavers
- Cow cockle
- Foxtail (green, yellow)
- Kochia
- Lamb's-quarters
- Pigweed (green, redroot)
- Ragweed, common\*
- Stinkweed
- Waterhemp (common)
- Wild buckwheat
- Wild mustard\*
- Wild oats\*
- Witchgrass

\* Suppression only.

## Application Information:

- Water Volume:** Minimum of 40 L per acre
- Nozzles and Pressure:** Maximum 30-40 psi (200-275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
sulfentrazone	PRE (surface) with residual soil activity	PPO Inhibitor/ Membrane disruptor	Little movement (Symplast)	Broadleaf	14
pyroxasulfone	PRE (surface) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

Moisture is necessary to activate both the pyroxasulfone and sulfentrazone components in soil for effective weed control. Moderate rainfall will improve weed control activity. A minimum of 12.5 mm (0.5 inches), or more, of rainfall or irrigation is required to activate the product. Dry weather following applications may reduce effectiveness. Heavy rainfall shortly after application may reduce weed control and increase the risk of injury. Extremes in environmental conditions such as temperature, moisture, soil conditions, and cultural practices may affect activity.

## Tank Mixes:

### Herbicides:

#### Prior to All Crops:

- Glyphosate (180 to 360 g ae per acre)

**Note:** The above mixes are those listed on the *Authority Supreme* label only.

FMC also supports the following mixes that are not on the *Authority Supreme* label. Apply mixes according to the most restrictive use limitations for either label.

- Pre-seed to all registered crops: *Aim EC*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Avoid application when heavy rain is forecast. A minimum of 12.5 mm (0.5 inches), or more, of rainfall or irrigation is required after application to activate the product.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** No information is provided on the label.
- **Pre-harvest Interval:** Not applicable.
- **Re-cropping Interval:** Registered crops may be seeded any time after treatment. Winter wheat may be seeded 4 months after application. Field corn, sunflower, or wheat (spring and durum) may be seeded the season following application (after one winter). All other crops require 36 months (three winters) from application to seeding. **Note:** *Moisture is required for breakdown; therefore, for each year where in-season rainfall is extremely low, the recropping interval must be extend by a year and a field bioassay (conducted under normal moisture conditions) must indicate it is safe to plant a sensitive crop.*
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place over 5°C in original container. DO NOT freeze, but if frozen raise product temperature to 15°C and shake or roll to dissolve crystals.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	5	3	10

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning – Contains the allergen sulfites.

For an explanation of the symbols used here see pages 7 and 8.

# Avadex Brands

Herbicide Group

**8 - triallate**

(Refer to page 45)

## Company:

Gowan Canada

## Formulation:

*Avadex Liquid EC* (PCP#16759): 480 g/L triallate formulated as an emulsifiable concentrate.

- Container size - 2 x 10 L, 115 L, 946 L

*Avadex MicroActiv* (PCP#25112): 10% triallate formulated as a granular.

- Container size - 22.7 kg, 451.3 kg

## Crops, Rates and Application Timing:

### *Avadex Liquid EC* Rates – Spring Treatment

Crop	Application Timing	Rate (L per acre)		Acres Treated per 115 L Container	
		Organic Matter		Organic Matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before Seeding*	1.0	1.2	115	98
	After Seeding	1.2	1.4	98	82
Barley	Before and After Seeding	1.2	1.4	98	82
Canola, flax <sup>†</sup> , mustard	Before Seeding	1.4	1.9	82	62
Field pea	Before Seeding	1.4	1.4	82	82

\* DO NOT apply this product before seeding wheat in soils with 4% or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

<sup>†</sup> Excluding Solin (low linolenic acid flax).

### *Avadex MicroActiv* Rates – Fall Treatment

Crop	Rate (Kg per acre)			Acres Treated per 451.3 Kg		
	Organic Matter			Organic Matter		
	Less than 2%*	2 to 4%	Greater than 4%	Less than 2%*	2 to 4%	Greater than 4%
Spring and durum wheat	4.5	5.7	6.9	101	80	66
Barley, canaryseed	4.5	5.7	6.9	101	80	66
Canola, flax <sup>†</sup> , mustard, field pea	5.7	6.9	8.9	80	66	51

\* Fall treatments conducted under minimum tillage are not recommended on soils with less than 2% organic matter.

<sup>†</sup> Excluding Solin (low linolenic acid flax).

### Avadex MicroActiv Rates – Spring Treatment

Crop	Application Timing**	Rate (Kg per acre)		Acres Treated per 451.3 Kg Container	
		Organic Matter		Organic Matter	
		4% or less*	Greater than 4%	4% or less*	Greater than 4%
Spring and durum wheat	Before seeding***	4.5	5.7	101	80
	After seeding	5.7	6.9	80	66
Barley, canaryseed	Before and after seeding (barley only)	5.7	6.9	80	66
Canola, flax <sup>†</sup> , mustard, field pea	Before seeding	6.9	8.9	66	51

\* Minimum tillage treatments must be applied to fields with at least 2% organic matter.

\*\* Minimum tillage treatments must be applied 10 to 14 days before seeding or incorporating. For minimum tillage treatments on spring and durum wheat, apply 5.7 kg per acre on soils with 4% organic matter or less and 6.9 kg per acre on soils with greater than 4% organic matter.

\*\*\* DO NOT apply this product before seeding wheat in soils with 4% or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

<sup>†</sup> Excluding Solin (low linolenic acid flax).

#### Seedling Forage Legumes (under-seeded only):

Apply recommended rates for the companion crop.

- Alfalfa
- Bird's-foot trefoil
- Clover (alsike, red, sweet)

### Weeds and Staging:

For control of wild oats prior to their emergence (pre-emergent).

### Application Information:

- **Water Volume (Avadex Liquid EC only):** 45 L per acre.
- **Nozzles and Pressure (Avadex Liquid EC only):** maximum 30 psi (200 kPa) when using conventional flat fan nozzles. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets
- **Direct Seeding Systems (minimum tillage systems)**
  - Avadex MicroActiv herbicide may be applied in the fall or spring into standing stubble. If excessive crop residue exists at the time of application, a vigorous harrowing prior to application can be used to ensure that the herbicide granules make adequate contact with the soil. Under zero-till conditions it is recommended incorporation be conducted with suitable implement such as heavy harrow that allows for shallow incorporation while maintaining a uniform concentrated layer that provides adequate wild oat control.
  - Low disturbance seeding systems will not disturb the soil enough to control emerged weeds; therefore, a pre-seeding burnoff treatment using a herbicide such as glyphosate may be necessary. Ensure that cereals are seeded at least 1.25 cm (1/2 inch) below the treated layer.
  - **Fall Application:**
    - Applications of Avadex MicroActiv granules should be made to standing stubble. DO NOT apply to smooth, hard packed soils that may allow granules to drift. If excessive crop residue exists at the time of application, a vigorous harrowing prior to application should be conducted to ensure the granules are in good contact with the soil. Apply after October 1 when the soil begins to cool (less than 4°C) and 3 weeks prior to soil freeze-up. Incorporation using harrow operation following application in the fall is recommended but can be performed in the spring before seeding.
  - **Spring Application:**
    - Applications of Avadex MicroActiv granules should be applied and incorporated using harrow operation in spring 10 to 14 days before seeding.
- **Conventional Tillage Systems**
  - **Fall Application:**
    - Apply Avadex Microactiv granules to fields that are in good working condition, without excessive crop residue. Heavy crop residue or lumpy, wet fields may require tillage prior to application. Apply after September 15 until soil freeze-up. Incorporation using a harrow operation following application in the fall is recommended. Only one incorporation is required in the fall. The second incorporation may be done in the fall (before soil freeze-up) or in the spring.

- **Spring Application**

- Apply *Avadex* to fields that are in good working condition, without excessive crop residue. Heavy crop residue or lumpy, wet fields may require tillage prior to application. *Avadex* applications require two incorporations, with the second incorporation at right angles to the first. Incorporation using a harrow operation following application is recommended. Using a seeder that provides soil disturbance equivalent to a cultivator may replace one of the incorporations. The first incorporation should be completed within 48 hours of application and the second incorporation should be delayed an additional 48 hours or more.
- The liquid formulation must be incorporated into soil that is free of lumps or crop residue. Liquid formulations should be applied to fields with 30 percent or less residue cover. Heavy crop residue or lumpy, wet fields may require tillage prior to application. The liquid formulation is recommended for spring use because soils are left in an erosion prone state if the liquid is fall- applied. The first incorporation of the liquid formulation should be completed as soon as possible after spraying, while the second incorporation may be done any time prior to crop emergence. Incorporation using a harrow operation following application is recommended.
- Ensure that cereals are seeded at least 1.25 cm (1/2 inch) below the treated layer.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
triallate	PPI (soil active)	Lipid Synthesis Inhibitor (Non-ACCase)	Little movement in plant (Apoplast)	Wild oat	8

## Effects of Growing Conditions:

Reduced control may result if prolonged cool conditions or dry soil conditions prevail at the time weeds are emerging. If conditions are dry or wild oats germinate from below the treated zone, the weeds may emerge, but will usually be controlled. Thinning of wheat can occur under conditions of heavy rainfall or if cold soil conditions persist as the crop emerges.

DO NOT apply to fields where crop residue has been burned in the previous 12 months. Efficacy will be reduced.

## Tank Mixes:

**Herbicides:** *Avadex* liquid may be tank mixed with liquid formulations of trifluralin for control of wild oats, green and yellow foxtail in wheat and barley. Apply after seeding but prior to crop emergence. Consult the recommendations for trifluralin for rates in different soil types.

**Insecticides:** None registered.

**Fertilizer:** *Avadex Liquid EC* alone, or tank mixed with liquid formulations of trifluralin, may be tank mixed with liquid fertilizer. Compatibility of the herbicide and liquid fertilizer should be checked. Follow the instructions on the herbicide label prior to adding the herbicide to the spray tank.

- *Avadex Liquid EC* may be sprayed on dry urea fertilizer. A minimum of 60 kg per acre (150 kg/ha) of dry urea fertilizer must be used. Only commercial blending is recommended.

**Note:** The above mixes are those listed on the *Avadex* labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** At least 0.5 inches (1.5 cm) within 2 weeks of application is required for activation.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze the treated crop or use as hay or feed prior to crop maturity or in year of treatment.
- **Re-cropping Interval:** DO NOT seed tame oats the year after treatment.
- **Aerial Application:**
  - *Avadex Liquid EC*: DO NOT apply by air
  - *Avadex MicroActiv*: Granular formulations may be applied by air with attachments designed for applying low volumes of granules.
- **Storage:** DO NOT freeze liquid formulations. Store granular formulations in a cool, dry place.

- **Buffer Zones:** (Liquid formulations only)

Application method	Buffer Zones (metres†) Required for the Protection of:			
	Aquatic Habitats of Depths			Terrestrial habitat
	Less than 1 m	1 to 3 m	Greater than 3 m	
Ground only*	5	2	1	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method C' on pages 12 and 13 for *Avadex Liquid EC*.

## Hazard Rating:



Warning – Poison (Liquid formulation)



Warning – Contains the allergen soy (Liquid and Granular) Skin and Eye Irritant (Granular formulation)

For an explanation of the symbols used here see pages 7 and 8.

# Axial

Herbicide Group

1 - pinoxaden

(Refer to page 45)

## Company:

Syngenta Canada (PCP#30431)

## Formulation:

50 g/L pinoxaden formulated as an emulsifiable concentrate.

- Container size - 2 x10 L, 80 L, 400 L

## Crops and Staging:

**Spring wheat (NOT including durum), winter wheat and barley:** Up to the emergence of the flag leaf.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates, and Staging:

Apply from the 1 to 6 leaf up to the emergence of the 4<sup>th</sup> tiller. Apply at the 2 to 3 leaf stage for optimum control.

**Axial at 0.5 L per acre (no adjuvant required)\* (one case treats 40 acres):**

- Barnyard grass
- Foxtail (green, yellow)
- Proso millet
- Volunteer oat
- Volunteer canary seed
- Wild oat

\* DO NOT mix with any other adjuvant other than what is provided in the package.

Maximum ONE APPLICATION per year of this or other products containing the active ingredient pinoxaden.

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre
  - **Aerial:** 12 L per acre
- **Nozzles and Pressure:** 40 to 45 psi (275 to 310 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE medium** droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
pinoxaden	POST (foliar)	ACCase Lipid synthesis inhibitor	Toward growth areas (Symplast)	Grasses only	1

## Effects of Growing Conditions:

DO NOT apply to crops that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury may result.

Weed control may be reduced if *Axial* is applied under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- Bromoxynil/MCPA (*Buctril M* and *Mextrol 450* only)<sup>†</sup>
  - Florasulam + *Curtail M* (*Spectrum* only)<sup>\*\*\*†</sup>
  - Florasulam + MCPA (*Frontline XL* only)
  - Fluroxypyr + MCPA (*Trophy* only)<sup>†</sup>
  - *Infinity*
  - MCPA ester<sup>†</sup> (0.34 to 0.45 L per acre - 500 g/L form)
  - *Refine SG* + MCPA ester<sup>\*\*\*†</sup> (12 g per acre + 0.23 to 0.28 L per acre)
  - Thifensulfuron/tribenuron (*Refine SG* only)<sup>\*\*</sup>
- \* Always consult the label of the broadleaf herbicide prior to use.
- \*\* Addition of surfactants other than those included in *Axial* are not required.
- \*\*\* Suppression only of green foxtail.
- † A reduction in barnyard grass control may be observed.

**Insecticides:** None registered.

### Fungicides:

- Propiconazole (*Tilt* only).

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Axial* label only.

Syngenta also supports the following mixes that are not on the *Axial* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Barricade II*; *Broadside*; *Cirpreme* + MCPA Ester 600 (189 mL per acre)<sup>††</sup>, *Enforcer M*; florasulam/fluroxypyr + MCPA (*Stellar* only); *Infinity FX*, *Momentum* + MCPA ester; *Paradigm*; *Paradigm* + MCPA Ester 600 (189 mL per acre)<sup>††</sup>, *Pixxaro*; *Prestige XC*; *Pulsar*; *Pulsar* (low rate) + MCPA ester, *Stellar XL*, *Travallas* (no MCPA Ester).
- †† Only wild oat is controlled with this mix.
- **Fungicides:** Propiconazole (*Propel* only), *Quilt*, *Trivapro*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour of treatment may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Pre-harvest Interval:** Leave at least 60 days between treatment and harvest of grain and straw.
- **Grazing Restrictions:** DO NOT graze livestock within 7 days or cut for hay within 30 days of application.
- **Re-cropping Interval:** No restrictions the year following treatment. DO NOT seed any crops in the year of treatment following application (emergency re-crop).
- **Aerial Application:** May be applied by air.
- **Storage:** Store in a cool, dry place. May be frozen.



- **Buffer Zones:** Buffers are not required for hand-held and backpack applications.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of Terrestrial habitat
Ground only*	1
Aerial by airplane or helicopter	25

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Warning – Eye and skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Axial iPak\*

*This product is a prepackaged tank mix of Axial (page 109) and Infinity (page 269). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.*

*\*Note: The Axial iPak co-pack is no longer manufactured but inventories still remain in distribution. This product may be removed from future editions.*

## Herbicide Group

1 - pinoxaden

6 - bromoxynil

27 - pyrasulfotole

(Refer to page 45)

## Company:

Syngenta Canada

## Formulation:

The *Axial iPak* package contains the following:

**Axial (PCP#30431):** 50 g/L pinoxaden formulated as an emulsifiable concentrate.

- Container Size - 1 x 10 L, 80 L

**Infinity (PCP#28738):** 37.5 g/L pyrasulfotole and 210 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 1 x 6.7 L, 53.6 L

## Crops and Staging:

**Spring wheat (NOT including durum) and barley:** up to the emergence of the flag leaf.

## Weeds and Staging:

Weeds controlled by the component products.

## Rates:

**Axial:** 0.5 L per acre (no adjuvant required)

**Infinity:** 0.33 L per acre.

(One case treats 20 acres)

**Note:** Ammonium sulphate is required to be added at 202 g per acre (99% dry) or 0.4 L per acre (49% solution) at 4 to 6 whorls for certain weeds controlled by *Infinity*.

Maximum ONE APPLICATION of this or other products containing the active ingredients pinoxaden, pyrasulfotole or bromoxynil per year.

**See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.**

# Axial Xtreme

Herbicide Group

1 - pinoxaden

4 - fluroxypyr

(Refer to page 45)

## Company:

Syngenta Canada (PCP#30391)

## Formulation:

50 g/L pinoxaden and 87.5 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 2 x 10 L, 80 L, 400 L

## Crops and Staging:

Spring wheat (NOT including durum) and barley:

1 to 6 leaf stage prior to the emergence of the 4<sup>th</sup> tiller and before the first node can be felt in the stem.

## Weeds, Rates and Staging:

Apply *Axial Xtreme* at 0.5 L per acre (no adjuvant required)

**Grasses** - 1 to 6 leaf prior to the emergence of the 4<sup>th</sup> tiller

- Barnyard grass
- Foxtail (green, yellow)
- Proso millet
- Volunteer oat
- Volunteer canary seed
- Wild oat

**Broadleaf Weeds** - stages indicated below:

- Cleavers (up to 4 whorls)
- Kochia (2 to 8 leaf)
- Stork's bill (up to 6 leaf)\*
- Wild buckwheat (up to 4 leaf)\*

\* **Suppression.**

Maximum ONE APPLICATION per year of this or other products containing pinoxaden or fluroxypyr.

## Application Information:

- **Water Volume:** 20 to 40 L per acre.
- **Nozzles and Pressure:** Maximum 40 to 45 psi (275 to 310 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** classification droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
pinoxaden	POST (foliar)	ACCase Lipid synthesis inhibitor	Toward growth areas (Symplast)	Grasses only	1
fluroxypyr	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Tolerance and efficacy is best when applied during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under prolonged stress caused by excessive cool or heat, flooding or drought, or poor fertility, control of some weeds may be reduced and or crops may be injured.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

**Herbicides:**

- Bromoxynil/MCPA<sup>†</sup>
- *Curtail M*<sup>†</sup>
- Florasulam + MCPA (*Frontline XL* only)<sup>††</sup>
- *Infinity*<sup>††</sup>
- MCPA ester (0.28 to 0.37 L per acre – 600 g/L form)<sup>†</sup>
- Thifensulfuron/tribenuron (*Refine SG* only)
- Thifensulfuron/tribenuron (*Refine SG* only) + MCPA ester (rates above)<sup>†</sup>

<sup>†</sup> A reduction in barnyard grass control may be observed with this mix.

<sup>††</sup> A reduction in green foxtail control may be observed with this mix.

**Fungicides:**

- Propiconazole (*Tilt* only at 101 to 202 mL per acre)

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Axial Xtreme* label only.

Syngenta also supports the following mixes that are not on the *Axial Xtreme* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicide:** *Broadside*, *Cirpreme* + MCPA Ester 600 (189 mL per acre)<sup>††</sup>, *Paradigm* + MCPA Ester 600 (189 mL per acre)<sup>††</sup>
- **Fungicide:** *Quilt*, *Trivapro*

<sup>††</sup> A reduction in green foxtail control may be observed with this mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**Restrictions:**

- **Rainfall:** Within 1 hour of application may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Pre-harvest Interval:** DO NOT apply within 60 days of harvest.
- **Grazing Restrictions:** Must not be grazed within 7 days or cut for livestock feed within 30 days of treatment.
- **Re-cropping Interval:** Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat may be seeded the first full season after application or fields can be fallowed.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. DO NOT freeze.
- **Buffer Zones:** Avoid drift. Leave at least 15 metres between the downwind edge of the boom and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs. Buffer zones can be reduced by 70% when using shrouds or by 30% when using cones mounted less than 12 inches from the crop canopy.

**Sprayer Cleaning:**

Refer to 'Method B' on pages 12 and 13. Use 500 g or mL per 100 L of rinsate for alkali detergents or 250 g or mL per 100 L of rinsate for concentrated laundry detergents. DO NOT use chlorine based cleaners.

**Hazard Rating:**

Warning – Eye and skin irritant

Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Axial Xtreme iPak

*This product is a prepackaged tank mix of Axial Xtreme (page 112) and Infinity (page 269). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.*

## Herbicide Group

**1 - pinoxaden**  
**4 - fluroxypyr**  
**6 - bromoxynil**  
**27 - pyrasulfotole**  
*(Refer to page 45)*

### Company:

Syngenta Canada

### Formulation:

The *Axial Xtreme iPak* package contains the following:

**Axial Xtreme (PCP#30391):** 50 g/L pinoxaden and 87.5 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container Size - 1 x 10 L, 80 L

**Infinity (PCP#28738):** 37.5 g/L pyrasulfotole and 210 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 1 x 6.7 L, 53.6 L

### Crops and Staging:

**Spring wheat (NOT including durum) and barley:** 1 to 6 leaf stage prior to the emergence of the 4<sup>th</sup> tiller and before the first node can be felt in the stem.

### Weeds and Staging:

Weeds controlled by the component products.

### Rates:

**Axial Xtreme:** 0.5 L per acre (no adjuvant required)

**Infinity:** 0.33 L per acre

(One case treats 20 acres)

Maximum ONE APPLICATION of this or other products containing the active ingredients pinoxaden, pyrasulfotole or bromoxynil per year.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Barricade II

## Herbicide Group

**2 - thifensulfuron & tribenuron**  
**4 - fluroxypyr**  
*(Refer to page 45)*

### Company:

FMC Corporation

### Formulation:

The *Barricade II* package contains two components:

**Barricade SG (PCP#29544):** 25% thifensulfuron methyl plus 25% tribenuron methyl formulated as a water soluble granule.

- Container size - 486 g

**Perimeter II (PCP#30094):** 333 g ae/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 3.4 L

## Crops and Staging:

**Barley and spring wheat (including durum) only:** 2 leaf until first node can be felt at the base of the stem.

**Winter wheat:** In the spring from the 3 tiller stage until the emergence of the flag leaf.

## Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

### Weeds Controlled:

- Annual smartweed (green, lady's-thumb)
- Canada thistle (less than 6 inches (15 cm) tall or across and prior to budding)\*
- Cleavers (1 to 6 whorls)
- Common chickweed (1 to 6 leaf)
- Cow cockle
- Flixweed
- Kochia (seedling to 8 leaf)
- Hemp-nettle
- Lamb's-quarters
- Narrow-leaved hawk's-beard
- Night-flowering catchfly
- Redroot pigweed
- Round-leaved mallow (1 to 5 leaf)
- Russian thistle
- Shepherd's-purse (up to 20 cm)
- Sow-thistle (perennial)
- Stinkweed
- Stork's-bill (1 to 6 leaf)
- Volunteer canola (not CLEARFIELD varieties)
- Wild buckwheat (1 to 8 leaf)
- Wild mustard
- Volunteer flax (up to 12 cm)

\*Suppression only.

## Rate:

**Barricade SG:** 12 g per acre.

**Perimeter II:** 85 mL per acre.

(One package treats 40 acres)

Add *Agral 90*, *Agsurf II*, *Citowett Plus*, *Enhance*, *HiActivate*, *Liberate* or *Super Spreader* at 0.2 L per 100 L of spray solution.

*Barricade SG* may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Maximum of ONE APPLICATION per year of this or other products containing thifensulfuron/tribenuron or fluroxypyr.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 40 L per acre.
  - **Aerial:** 12 to 20 L per acre
- **Nozzles and Pressure:** Flat fan nozzles are recommended. Sprayers without drift reduction nozzles should use between 30 to 40 psi (210 to 275 kPa). Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets by ground or **ASABE coarse** droplets by air.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
thifensulfuron, tribenuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf only	2
fluroxypyr	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

DO NOT apply to registered crops that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, and wide fluctuations in day/night temperatures), lightening in crop colour and reduction in crop height may occur.

## Tank Mixes:

### Herbicides:

Tank mix partners are applied at all label rates and include recommended adjuvants unless otherwise noted.

- **All crops:**
  - MCPA Ester\* (190 mL/acre)
- **Spring wheat including Durum:**
  - Horizon NG
  - Simplicity OD
  - Simplicity OD + MCPA
  - Traxos + MCPA Ester\* (190 mL/acre)

\* Rate for MCPA Ester 600.

**Fertilizers:** None registered.

FMC Corporation supports the following mixes that are not on the *Barricade II* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Axial*, *Assert*, Clodinafop, Flucarbazone 3.0, Flucarbazone 2.0, Flucarbazone 2.0 + 2,4-D Ester, *Puma Advance*, *Simplicity GoDRI*, *Varro*.
- **Fungicides:** *Acapela*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall within 1 hour of application may reduce efficacy.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Grazing Restrictions:** MUST NOT be grazed or fed to livestock for 7 days after treatment.
- **Re-cropping Interval:** Alfalfa, barley, corn, canola, dry beans, flax, forage grasses, lentils, mustard, oats, peas, potatoes, rye, soybeans, sugar beets, sunflowers, wheat or fields can be fallowed the year after treatment.
- **Aerial Application:** May be applied by aircraft.
- **Storage:** Store in a cool, dry place. Avoid freezing. If frozen, bring to room temperature and agitate before use. DO NOT store near heat or open flame.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	1	0	15
Fixed wing aircraft	5	0	125
Helicopter	3	0	100

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Follow the sprayer cleaning instructions on the thifensulfuron/tribenuron page. The addition of a wetting agent (detergent) will also aid the cleaning process. Refer to pages 12 and 13 for additional information.

## Hazard Rating:



Danger – Poison



Warning – Contains the allergens milk and sulfites

For an explanation of the symbols used here see pages 7 and 8.

# Basagran Brands (this referring text to be removed in the 2021 edition)

See Bentazon on page (117).

## Bentazon

Herbicide Group

6 - bentazon

(Refer to page 45)

### Company:

BASF Canada (*Basagran* - PCP#12221, *Basagran Forté* - PCP#22006)

AgraCity (*MPower Boa* – PCP#33011)

Sharda CropChem Canada (*Benta Super* - PCP#32827)

### Formulation:

480 g/L bentazon formulated as a solution in both products. *Basagran Forté* has a built-in adjuvant. Other products require the addition of an adjuvant.

- Container size
  - *Basagran, Benta Super*: 2 x 9 L
  - *MPower Boa*: 2 x 7.25 L
  - *Basagran Forté*: 2 x 10 L

### Crops and Staging:

*Basagran, Basagran Forté, MPower Boa and Benta Super:*

Crop	Stage
Soybean	No restrictions
Dry bean ***	After the first trifoliate leaf
Corn	No restrictions
Pea	After 3 leaf pairs but prior to flowering
Faba bean	After 2 to 3 leaf stage or at least 4 inches (10 cm) tall
Flax	After 2 inches (5 cm) in height

*Basagran Forté only:*

Crop	Stage
Forage millet and forage sorghum (forage and seed production)*	3 to 10 inches (7.5 to 25 cm) prior to canopy closure
Established clover (alsike, red) for seed production only*	3 to 10 inches (7.5 to 25 cm) prior to canopy closure

*Basagran, MPower Boa and Benta Super only:*

Crop	Stage
Spring wheat (excluding durum)**	No restrictions (limited to the 4 leaf to flag leaf by 2,4-D staging)
Solin (low linolenic acid flax)	After 2 inches (5 cm) in height
Forage grasses for seed production*: Bromegrass, creeping red fescue, crested wheatgrass, meadow foxtail, orchardgrass, timothy.	1 to 7 leaf stage
Forage legumes (seedlings) for seed production*: Alfalfa, alsike clover, red clover, sainfoin.	After the third trifoliate leaf
Established alfalfa for seed production.*	Prior to flowering



Crop	Stage
Established clover (Sweet, or Red) and sainfoin for seed production.*	3 to 10 inches (7.5 to 25 cm) prior to canopy closure

\* One application per season.

\*\* *Basagran, Benta Super and MPower Boa* only at 0.4 L per acre. Must be tank mixed with 2,4-D (no adjuvant required).

\*\*\* Test a small area of a new variety for tolerance before widespread use. Refer to product labels for a list of dry bean types registered for *Basagran, Benta Super and MPower Boa*. *Basagran Forté* registered for all dry bean types but not tested for tolerance on all types.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

***Basagran Liquid, MPower Boa and Benta Super* only:** Add *Assist* or *XA Oil Concentrate* at 0.4 to 0.8 L per acre. Use the low rate of *Assist* or *XA Oil Concentrate* only if hot, humid conditions (above 28°C and 80% relative humidity) prevail. *Citowett Plus* may be used on peas at 0.25 L per 100 L spray mixture. Ammonium sulphate can be added for applications to soybean and dry beans.

*Benta Super* can also be applied with *Citowett Plus* at 0.25L per 100L of spray solution.

***Basagran Forté* only:** *Basagran Forté* does not require the addition of *Assist* or *XA oil concentrate*. Ammonium sulphate can be added for applications to soybean only.

Apply the rate listed when weeds in the table are within the recommended height:

Annual Weeds	0.71 L per acre		0.91 L per acre	
	Inches	Maximum Leaf Stage	Inches	Maximum Leaf Stage
Buttercup			2 to 4	6*
Cleavers			1 to 3 whorl stage	
Cocklebur	3 to 7	6*	7 to 12	10*
Common chickweed			1 to 3 weeks after emergence	
Common groundsel			2 to 4	
Common ragweed			1 to 2	6
Corn spurry			1 to 4	
Flower-of-an-hour	1 to 2	6*	2 to 4	10*
Giant ragweed			2 to 6	4
Hairy galinsoga			2 to 3	6*
Hairy nightshade			0.2 to 0.8	6
Jimsonweed			2 to 6	10
Lady's-thumb (smartweed)	1 to 3	6*	3 to 8	10
Lamb's-quarters			0.5 to 1.0	8
Purslane			1 to 2	6
Redroot pigweed (suppression only)			0.5 to 1.5	4
Russian thistle (suppression only*)			1 to 3	4*
Shepherd's-purse	Rosette to 4	6*	4 to 10	6
Stinkweed	Rosette to 2	6*	2 to 6	6
Stork's-bill			1.5 to 4	2 to 6 leaf stage
Volunteer canola	0.75 to 6	8**	0.75 to 6	8
Wild mustard	1 to 5	6*	5 to 10	10
Wild radish			1 to 2	6
Canada thistle	6 to 8			
Field bindweed	1 to 2.5			
Yellow nutsedge	6 to 8			

\* *Basagran Forté* only.

\*\* *Basagran, MPower Boa and Benta Super* only.

*Basagran*, *Mpower Boa* and *Benta Super* may be applied in spring wheat (except durum) at 0.4 L per acre when tank mixed with 2,4-D amine or ester at 143 to 190 g ae per acre to control the weeds controlled by 2,4-D plus lady's-thumb, redroot pigweed and daisy fleabane. No adjuvant is required for this mix.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
    - **Ground:** 40 to 160 L per acre. A minimum of 80 L per acre is recommended for optimum control.\*
    - **Aerial:** 23 to 45 L per acre.
  - **Nozzles and Pressure:** Maintain 40 to 60 psi (275 to 425 kPa)\* when using conventional flat fan nozzles capable of delivering high water volumes with **ASABE medium** droplets. Low drift nozzles may require higher pressures for proper performance. Contact the herbicide manufacturer regarding the suitability of low drift nozzles for use with this product. Direct nozzles 45° forward to improve contact with vertical targets.
- \* **Higher water volumes and pressures should be used when the weeds are at the upper end of their recommended treatment stage.**

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
bentazon	POST (foliar)	PSII Inhibitor/Membrane disrupter	Little (Apoplast)	Broadleaf only	6

## Effects of Growing Conditions:

Poor results will occur if temperatures are cool. Optimum results are achieved when applied at daytime temperatures between 20 and 28°C. Applications at temperatures greater than 28°C may result in crop injury. May result in crop injury when applied to crops that are stressed due to severe weather conditions such as frost, drought or water saturated soil.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **In soybean:**
    - *Pinnacle* (2.2 to 3.2 g per acre)
  - **In dry bean\*:**
    - *Basagran*, *Mpower Boa* and *Benta Super* only (0.71 L per acre) plus *Reflex*\* plus *Agral 90*.
  - **In spring wheat (not including durum):**
    - *Basagran*, *Mpower Boa* and *Benta Super* only (0.4 L per acre) must be tank mixed with 2,4-D amine or ester at 143 to 190 g ae per acre. This tank mix DOES NOT need any adjuvant.
- \* **For use in the Red River Valley of Manitoba only.**

**Fungicides:** None registered.

**Insecticides:** None registered

### Fertilizers:

- **In soybean:**
  - *Basagran* or *Basagran Forté* plus UAN (4 L per acre)
- DO NOT add fertilizer with *Assist* or *XA Oil Concentrate* when tank mixing with *Pinnacle*. The risk of crop injury increases with the use of fertilizer mixes under hot, humid conditions.
- Use of fertilizer mixes is not recommended for use under western Canadian environmental conditions for other crops.

When mixing Bentazon refer to the tank mix partner label for any additional restrictions and precautions.

Allow 4 days between application of Bentazon and other herbicides, fertilizers or insecticides.

**Note: The above mixes are those listed on the Bentazon labels only.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 to 8 hours will reduce control.
- **Re-entry Interval:** DO NOT enter treated field for 12 hours.
- **Grazing Restrictions:** Allow 30 days between treatment with *Basagran Forté* and harvest of forage sorghum and millet for hay. Otherwise DO NOT graze treated crops or cut for feed prior to crop maturity.
- **Pre-harvest Interval:** 50 days for Bentazon + 2,4-D in wheat, 84 days for Bentazon + *Reflex* in dry beans in Manitoba. Other uses are restricted only by appropriate staging.
- **Re-cropping Interval:** No restrictions the year after application.
- **Aerial Application:** May be applied by air for weed control in dry beans or soybeans only. *Assist* or *XA Oil Concentrate* at 0.05 to 0.1 L per acre must be added. DO NOT use *Assist* or *XA Oil Concentrate* in excess of 0.1 L per acre as substantial crop injury could occur. DO NOT apply fertilizer mixes in soybean or 2,4-D tank mix in wheat by air. Crop canopy should NOT cover the weeds.
- **Storage:** May be frozen.
- **Buffer Zones:**

Application method	Crop	Buffer Zones (metres <sup>††</sup> ) Required for the Protection of: Terrestrial habitat
Ground <sup>†</sup>	Sorghum**, Forage millet**, Forage grasses and legumes, Peas*	1
	Corn, Dry bean, Faba bean, Flax, Pea**, Soybean, Spring wheat*	2
Fixed wing airplane***	Dry bean	20
	Soybean	35
Helicopter***	Dry bean	20
	Soybean	30

See page 36 for an explanation of the different habitats.

\* *Basagran*, *MPower Boa* and *Benta Super* only

\*\* *Basagran Forté* only

\*\*\* *Basagran* only

<sup>†</sup> Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>††</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method B' in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:

*Basagran*, *MPower Boa*, *Benta Super*:



Caution – Poison

*Basagran Forté*:



Warning – Poison



Danger – Corrosive to Eyes



Warning – contains the allergen soy.

For an explanation of the symbols used here see pages 7 and 8.

# BlackHawk\* (with carfentrazone)

Herbicide Group

4 - 2,4-D

14 - carfentrazone

(Refer to page 45)

*This product is a prepackaged tank mix of Aim EC (page 93) and 2,4-D (page 83). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

*\* Note: The BlackHawk co-pack is no longer manufactured but inventories still remain in distribution. This product may be removed from future editions.*

## Company:

Nufarm Agriculture

## Formulation:

The *BlackHawk* co-package contains the following components:

**Aim EC (PCP#28573):** carfentrazone-ethyl 240 g/L as an emulsifiable concentrate.

- Container size - 2 x 600 mL

**2,4-D 700 ester (PCP#27820):** 2,4-D 660g/L as an emulsifiable concentrate.

- Container size - 2 x 8.69 L

## Crops and Staging:

Pre-seed burndown prior to seeding the following crops:

- Spring wheat
- Winter wheat
- Rye
- Durum wheat
- Barley
- Chemfallow

Soybean - 7 days prior to seeding.

## Weeds and Staging:

Emerged weeds controlled by the component products up to 10 cm or 3 leaf rosette stage plus:

- Kochia\*
- Volunteer canola\*

\* All biotypes.

## Rates:

**Aim EC:** 15 mL per acre

**2,4-D 700 ester:** 212 mL per acre

(One case treats 80 acres)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Tank Mixes:

### Herbicides:

- Glyphosate (180 to 360 g ae per acre)

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

BlackHawk

(with pyraflufen-ethyl)

Herbicide Group

4 - 2,4-D

14 - pyraflufen-ethyl

(Refer to page 45)

Company:

Nufarm Agriculture (PCP#32111)

Formulation:

473 g/L 2,4-D ester and 6.1 g/L pyraflufen-ethyl formulated as an emulsifiable concentrate.

- Container size - 2 x 9 L, 96 L

Crops and Staging:

Apply pre-seeding or up to 3 days after seeding the following crops:

- Wheat (spring, durum, winter)
- Barley
- Corn (field)
- Canary seed
- Rye (spring, fall)
- Soybean
- Triticale
- Chemfallow

Oat - 7 days prior to seeding.

**Post-harvest:** Apply in the fall (up until soil freeze). Crops not listed above can be planted one month after application.

Weeds, Rates and Staging:

Apply 300 mL per acre (one 9 L container treats 30 acres) to young, actively growing weeds that are less than 5 cm in height or width, unless indicated otherwise.

- Annual sow-thistle
- Bluebur (up to 4 leaf)
- Burdock (up to 4 leaf)
- Cleavers
- Cocklebur
- Dandelion (spring seedlings)
- Cow cockle\*
- False flax
- Fleabane (Canada\*, daisy)
- Flixweed
- Goat’s-beard
- Kochia (including glyphosate resistant)
- Lamb’s-quarters
- Mallow
- Mustards (except dog and tansy)
- Narrow-leaved hawk’s-beard\*\*
- Plantain
- Pigweed (redroot, Russian)
- Prickly lettuce
- Ragweed (common, false, giant)
- Shepherd’s-purse
- Stinging nettle
- Stinkweed
- Sweet clover (seedling)
- Thyme-leaved spurge
- Volunteer canola (all varieties)
- Wild buckwheat\*
- Wild mustard\*
- Wild sunflower

\* **Suppression**

\*\* **Up to 5 cm in the fall, up to 2 leaf in spring**

† **Blackhawk applied alone requires the addition of a non-ionic surfactant (Nufarm Enhance, Agral 90) at 0.25 L per 100 L of spray solution.**

Maximum TWO APPLICATIONS of this product or *Goldwing* at the rates listed in this Guide WITHIN A TWO YEAR TIME SPAN.

*Blackhawk* may degrade if left in the sprayer for an extended period under alkaline conditions. Apply within 24 hours of mixing.

Application Information:

- **Water Volume:** Minimum 20 L per acre up to 40 L per acre (recommended).
- **Nozzles and Pressure:** Flat fan nozzles operated at a pressure of 30 to 40psi (210 to 275 kPa) are recommended. Use nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Boom height must be 60 cm or less above the crop or ground.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens.

How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
2,4-D	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
pyraflufen	POST (foliar), with slight soil activity	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Non-selective Broadleaf	14

## Effects of Growing Conditions:

Control may be reduced if weeds are under stress (e.g. drought, heat or cold stress). Weeds hardened off by cold weather or drought may not be adequately controlled or suppressed.

## Tank Mixes:

### Herbicides:

*Pre-seed and Pre-emergent:*

- Glyphosate (180 to 360 g ae per acre) (no surfactant required)

**Note:** The above mixes are those listed on the *Blackhawk* label only. Nufarm Agriculture also supports the following mixes that are not on the *Blackhawk* label.

- Herbicides:**
  - In fall:** *Valtera* (spring seeded chickpea, field pea, lentil, soybean, spring wheat)
  - In spring:** *Valtera* (soybean only)

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- Rainfall:** No rainfast period is specified on the label. Consult the manufacturer.
- Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- Pre-harvest Interval:** DO NOT harvest for feed or forage for 30 days.
- Grazing Restrictions:** DO NOT graze the treated crop or cut for hay for 30 days after application. DO NOT allow lactating dairy cows to graze for 7 days after application. Animals intended for meat should be withdrawn from treated fields 3 days before slaughter.
- Storage:** Store in a cool, dry place away from direct sunlight. May be frozen. If frozen, allow to warm to 10 to 20°C and shake thoroughly before use.
- Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	1	1	2

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Danger – Poison



Warning – contains the allergen soy. Skin and eye irritant. Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Broadband

Herbicide Group  
1- pinoxaden  
2- florasulam  
(Refer to page 45)

**Company:**  
Syngenta Canada

**Formulation:**  
*Broadband* (PCP#29138): 92.7 g/L pinoxaden and 7.7 g/L florasulam formulated as an emulsifiable concentrate.  
• Container size - 10.5 L, 84.2 L  
*Adigor Adjuvant* (PCP#28151): 11.3 L, 90.4 L

**Crops and Staging:**  
Barley, spring wheat (NOT including durum): up to the emergence of the flag leaf.  
When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

**Weeds, Rates and Staging:**  
Apply *Broadband* at 263 mL per acre and *Adigor* adjuvant at 280 mL per acre (package sizes listed above will treat 40 or 320 acres)

- Grass weeds - 1 to 6 leaves and prior to the emergence of the 4<sup>th</sup> tiller:**
- Barnyard grass
  - Proso millet
  - Volunteer canary seed
  - Foxtail (green, yellow)
  - Volunteer oat
  - Wild oat

- Broadleaf weeds - 1 to 6 leaf stage:**
- Annual smartweed (including lady's-thumb)
  - Hemp-nettle<sup>†</sup>
  - Stinkweed
  - Common chickweed
  - Pigweed, redroot<sup>†</sup>
  - Volunteer canola\*
  - Cleavers
  - Shepherd's-purse
  - Wild buckwheat
  - Sow-thistle (annual, perennial\*\*)†
  - Wild mustard

† **Suppression only.**  
\* **Not Clearfield varieties.**  
\*\* **Applications made at advanced leaf stages will reduce product effectiveness.**

Maximum ONE APPLICATION per year of this or other products containing the active ingredient pinoxaden.  
Maximum ONE APPLICATION of this or other products containing florasulam over a TWO YEAR TIME SPAN.

- Application Information:**
- **Water Volume:** 20 to 40 L per acre.
  - **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Low drift nozzles may require higher pressures for proper performance.

**How it Works:**  
Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
pinoxaden	POST (foliar)	ACCCase Lipid synthesis inhibitor	Toward growth areas (Symplast)	Grasses only	1
florasulam	POST	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf	2



## Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

Temporary crop injury may occur with tank-mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures.

## Tank Mixes:

### Herbicides:

- *Curtail M* (0.6 L per acre)
- MCPA LV500 ester (0.28 L per acre)

### Fungicides:

- Propiconazole (*Tilt* only at label rates)

**Fertilizers:** None registered

**Note:** The above mixes are those listed on the *Broadband* label only.

Syngenta also supports the following mixes that are not on the *Broadband* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** Fluroxypyr+MCPA (*Trophy* only); *Infinity*; *Prestige XC* (low rate).
- **Fungicides:** Propiconazole (*Propel*, *Tilt* 80 acres/8L jug); *Quilt*; *Trivapro*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour of application may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated fields within 12 hours.
- **Pre-harvest Interval:** Leave 60 days between treatment and harvest.
- **Grazing Restrictions:** DO NOT cut for livestock feed within 30 days or grazed by livestock within 7 days of treating the crop.
- **Re-cropping Interval:** No restrictions the year following treatment.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in dry, heated storage.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground only*	5	30

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Bromoxynil

Herbicide Group

6 - bromoxynil

(Refer to page 45)

## Company:

Bayer (*Pardner*)

IPCO (*Brotex 240, Brotex 480*)

Nufarm Agriculture (*Koril 235*)

ADAMA Canada (*Bromotril II*)

AgraCity (*MPower Bromoxynil*)

Loveland Products Canada (*Loveland Bromax*)

## Formulation:

**Pardner (PCP#18001):** 280 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 2 x 8 L

**Koril 235 (PCP#25341):** 235 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 2 x 9.71 L

**Bromotril II (PCP#30371), MPower Bromoxynil (PCP#32911) & Brotex 240 (PCP#28519):** 240 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 2 x 9.7 L, 115 L (*Brotex 240* only), 116.4 L (*Bromotril II* only).

**Brotex 480 (PCP#31348) & Loveland Bromax (PCP#31431):** 480 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 2 x 9.7 L

## Crops, Staging and Rates:

**Pardner:** At 0.40 to 0.48 L per acre one 8 L jug treats 20 to 16.5 acres.

**Koril, MPower Bromoxynil, Brotex 240 & Bromotril II:** At 0.49 to 0.57 L per acre one 9.71 L jug treats 20 to 17 acres.

**Brotex 480 & Loveland Bromax:** At 0.24 to 0.28 L per acre one 9.7 jug treats 40 to 34 acres. See the following chart for registered crops and specific rates and stages. NR = Not Registered.

Crop	Stage	Rate (L per acre)				
		<i>Pardner</i>	<i>Koril</i>	<i>Bromotril II</i>	<i>Brotex 240/ MPower Bromoxynil</i>	<i>Brotex 480/ Bromax</i>
Barley, oats, triticale, wheat (spring and durum**)	2 leaf stage to early flag	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57	0.24 to 0.28
Winter wheat	2 to 4 leaf stage (fall application) First growth to early flag leaf (spring application)	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57	0.24 to 0.28
Corn (field or sweet)	4 to 8 leaf	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57	0.24 to 0.28
Corn (field or sweet) with drop pipes	Beyond 8 leaf	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57	0.24 to 0.28
Canaryseed (seed production only)	3 to 5 leaf	0.40	0.49	0.49	0.49	0.24
Seedling alfalfa	2 to 6 trifoliate leaf stage	0.40	0.49	0.49	0.49	0.24

Crop	Stage	Rate (L per acre)				
		<i>Pardner</i>	<i>Koril</i>	<i>Bromotril II</i>	<i>Brotex 240/ MPower Bromoxynil</i>	<i>Brotex 480/ Bromax</i>
Established alfalfa (seed production only)	Up to 10 inches (25 cm). Apply no more than twice in one growing season.	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57	0.24 to 0.28
Fall rye	First growth to early flag leaf (spring application only)	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57	0.24 to 0.28
Flax and Solin (low linolenic acid flax)	2 to 4 inches (5 to 10 cm)	0.40	0.49	0.49	0.49	0.24
Forage millet and sorghum	4 leaf to 8 inches (20 cm)	0.40	NR	NR	0.49	0.24
Seedling grasses (seed production only): Bromegrass, Fescue (creeping red, meadow), Orchard grass, Reed canary grass, Russian wildrye, Timothy, Wheatgrass (crested, intermediate, slender, tall)	2 to 4 leaf (Establishment year only)	0.40 to 0.48	NR	NR	0.49 to 0.57	0.24 to 0.28
Pearl millet and sorghum (grain)*	4 leaf to 8 inches (20 cm)	0.40	NR	NR	0.49 <sup>†</sup>	NR
Prior to direct-seeding cereal crops (mixed with glyphosate only)	Apply according to weed stage.	0.40	0.49	NR	0.49	0.24
Pre-seed/pre-plant prior to seeding canola (mixed with glyphosate only)	Apply according to weed stage	0.40 to 0.51	0.61	NR	NR	0.29***

\* NOTE: Since application to grain pearl millet and sorghum is registered under User Requested Minor Use Label Expansion program, the manufacturer assumes no responsibility for herbicide performance. *Users of this on product grain pearl millet and sorghum do so at their own risk.*

\*\* *Pardner* only.

\*\*\* *Brotex 480* only.

<sup>†</sup> *MPower Bromoxynil* only.

## Weeds and Staging:

### Weeds controlled at the 1 to 4 leaf stage:

- American nightshade
- Annual smartweed (green, pale, lady's-thumb)
- Bluebur
- Cocklebur
- Common ragweed
- Cow cockle\*
- Kochia\*\*
- Pigweed\*<sup>†</sup>
- Russian thistle\*\*
- Stinkweed\*
- Volunteer Canola\*
- Wild mustard\*

### Weeds controlled at the 1 to 8 leaf stage:

- Buckwheat (tame, Tartary, wild)
  - Common groundsel
  - Lamb's-quarters
- \* Controlled with high rate only.  
 \*\* Apply before plants are 2 inches high.  
<sup>†</sup> Not controlled in seedling alfalfa.

## Application Information:

- **Water Volume:**
  - **Ground:**
    - *Corn, Millet & Sorghum:* 80 to 120 L per acre.
    - *Seedling grasses:* 60 L per acre.
    - *Other crops:* 40 L per acre.
  - **Aerial (*wheat and barley only*):** 8 to 16 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
bromoxynil	POST (foliar)	PSII Inhibitor/Membrane disrupter	Little (Apoplast)	Broadleaf only	6

## Effects of Growing Conditions:

Avoid spraying if temperatures are greater than 25°C. Leaf scorching may occur in corn and flax if applied during or after adverse growing conditions, such as cool and wet or hot (greater than 27°C) and humid weather.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

Crop	Tank Mixes
Spring wheat	2,4-D <sup>†</sup> , <i>Achieve Liquid</i> , MCPA
Winter wheat	2,4-D, <i>Achieve Liquid</i> , MCPA
Barley	2,4-D <sup>†</sup> , <i>Achieve Liquid</i> , MCPA <sup>†</sup>
Oats	MCPA
Fall rye, canaryseed	MCPA*
Flax	MCPA (amine, ester or K salt)
Seedling forage grasses***	MCPA
Corn	<i>Accent</i> * + surfactant (field corn only), <i>AAtrex</i> ** (0.4 L per acre), <i>Banvel II</i> (field corn only)**
Prior to seeding: Cereals, Canola <sup>††</sup>	Glyphosate
Prior to seeding ( <i>Koril</i> only)	<i>Aim</i> , <i>CleanStart</i>

\* The ester formulations are preferred but other formulations can be used.

\*\* DO NOT add oil or surfactant to this mix. DO NOT use atrazine formulations that contain oil.

\*\*\* *Bromax*, *Brotex 240*, *Brotex 480*, *MPower Bromoxynil* and *Pardner* only.

<sup>†</sup> May be applied by air.

<sup>††</sup> *Bromax 480*, *Koril 235* and *Pardner* only. Not all glyphosate products/formulations are registered for this use. Refer to individual product labels.

♦ *Since the use of this tank mix on corn is registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Users of this tank mix on corn do so at their own risk.*

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the bromoxynil labels only.

Bromoxynil manufacturers may also support mixes with pesticides that are not on the bromoxynil labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour of application will reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 24 hours.
- **Grazing Restrictions:** DO NOT graze treated wheat, barley, oats, forage millet, sorghum or seedling alfalfa crops or cut for feed within 30 days of application. DO NOT graze other treated crops or cut for hay prior to crop maturity.
- **Re-cropping Interval:** No restrictions.
- **Aerial Application:** Registered for aerial application on wheat and barley. The use of low water volumes, 8 to 16 L per acre may result in less effective weed control than seen with ground application.
- **Storage:** *IPCO Brotex 480* and *Loveland Bromax* must be stored at temperatures of 7°C or higher. Others may be stored at freezing temperatures and they will return to original state by warming to room temperature (20 to 22°C) and shaking thoroughly.
- **Buffer Zones:**

Application method	Buffer Zones (metres †) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	1
Fixed wing aircraft**	20	5	55
Helicopter**	20	3	45

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy

\*\* Wheat and barley crops only.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to pages 12 and 13.

## Hazard Rating:

All:



Warning – Poison

*Brotex 240, Bromotril II, MPower Bromoxynil:*



Warning – Eye and Skin Irritant

*Koril 235:*



Danger – Eye and Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Bromoxynil/2,4-D Ester

Herbicide Group

4 - 2,4-D

6 - bromoxynil

(Refer to page 45)

## Company:

Bayer (*Thumper*)ADAMA Canada (*Thrasher II*)Nufarm Agriculture (*Approve*)IPCO (*Leader*)

## Formulation:

**Thumper (PCP#22659):** 280 g/L bromoxynil and 280 g/L 2,4-D ester formulated as an emulsifiable concentrate.

- Container size - 8 L

**Approve (PCP#28123), Leader (PCP#28853) & Thrasher II (PCP#30372):** 225 g/L bromoxynil and 225 g/L 2,4-D ester formulated as an emulsifiable concentrate.

- Container size - 10 L, 100 L\*, 115 L\*\*, 120 L\*\*\*, 500 L\*

\* *Approve only*\*\* *Leader only*\*\*\* *Thrasher II only*

## Crops and Staging:

Spring wheat (including durum) and barley at the 4 leaf to early flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

### Weeds controlled at the 1 to 4 leaf stage:

- |                       |                            |   |
|-----------------------|----------------------------|---|
| ◦ American nightshade | ◦ Cow cockle               | ◦ Shepherd's-purse                      |
| ◦ Ball mustard        | ◦ Flixweed                 | ◦ Smartweed (green, lady's-thumb, pale) |
| ◦ Bluebur             | ◦ Jimsonweed               | ◦ Volunteer canola                      |
| ◦ Cocklebur           | ◦ Night-flowering catchfly | ◦ Volunteer sunflower                   |
| ◦ Common ragweed      | ◦ Redroot pigweed          |   |

### Weeds controlled at the 1 to 8 leaf stage:

- |                                    |                   |                |
|------------------------------------|-------------------|----------------|
| ◦ Buckwheat (tame*, Tartary, wild) | ◦ Lamb's-quarters | ◦ Wild mustard |
| ◦ Common groundsel                 | ◦ Stinkweed       |                |
- \* up to 4 leaf stage with *Approve*

### Weeds Controlled from 1 to 12 leaf (max. 2 inches tall):

- |          |                   |
|----------|-------------------|
| ◦ Kochia | ◦ Russian thistle |
|----------|-------------------|

## Rates:

**Thumper:** 0.4 L per acre (one 8 L container treats 20 acres).

**Approve, Leader or Thrasher II:** 0.5 L per acre (One 10 L container treats 20 acres).

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre.
  - **Aerial:** 12 to 16 L per acre. Use the higher volume when there is a heavy crop canopy, or when the majority of weeds are cow cockle, smartweed, or pigweed.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets.
- **Screens:** All strainer and nozzle screens must be 50 mesh or coarser.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
bromoxynil	POST (foliar)	PSII Inhibitor/Membrane disrupter	Little (Apoplast)	Broadleaf only	6
2,4-D	POST (foliar)	Synthetic Auxin	Symplast	Broadleaf only	4

## Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- *In wheat (spring, durum) and barley:*
  - *Liquid Achieve*
- In wheat (spring, durum, winter):
  - *Varro\**
- *In wheat (spring, durum) only:*
  - *Clodinafop 240EC<sup>Δ</sup>*
  - \* *Thumper only.*
  - <sup>Δ</sup> **Manufacturers may only support specific mixes. Contact the manufacturer for more information.**

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the Bromoxynil/2,4-D Ester labels only.

Bromoxynil/2,4-D ester manufacturers may also support mixes with pesticides that are not on the Bromoxynil/2,4-D ester labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for at least 24 hours.
- **Grazing Restrictions:** DO NOT graze or cut for livestock feed within 30 days of application. Withdraw meat animals 3 days before slaughter.
- **Pre-harvest Interval:** DO NOT harvest within 30 days of application.
- **Re-cropping Interval:** No restrictions the year after application.
- **Aerial Application:** May be applied by air.
- **Storage:** May be frozen. Shake well before using after being frozen.



• **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	1
Fixed wing aircraft	20	5	55
Helicopter	20	3	45

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method C' on pages 12 and 13.

## Hazard Rating:

**All Products:**



Warning – Poison

**Thumper and Approve:**



Caution – Skin and Eye Irritant

**Leader and Thrasher II:**



Warning – Skin and Eye Irritant



Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Bromoxynil/MCPA ester

Herbicide Group

4 - MCPA

6 - bromoxynil

(Refer to page 45)

## Company:

Bayer (*Buctril M*)

Nufarm Agriculture (*Mextrol 450*)

ADAMA Canada (*Badge II*)

AgraCity (*MPower Buck M*)

IPCO (*Logic M*)

## Formulation:

**Buctril M (PCP#18022):** 280 g/L bromoxynil and 280 g/L of MCPA ester formulated as an emulsifiable concentrate.

- Container size - 8 L

**Mextrol 450 (PCP#26999), Badge II (PCP#30370), Logic M (PCP#28109) & MPower Buck M (PCP#32685):** 225 g/L bromoxynil and 225 g/L of MCPA ester formulated as an emulsifiable concentrate.

- Container sizes:
  - *Logic M* - 10 L, 115 L
  - *Badge II* - 120 L
  - *Mextrol* - 100 L, 500 L
  - *Buck M* - 2x10 L, 115 L

## Crops and Staging:

### Field Crops:

#### • All Products:

Crop	Stage
Barley, oats, spring wheat (including durum)	2 leaf to early flag
Winter wheat	2 to 4 leaf stage in the fall or after growth resumes up to early flag leaf.
Fall rye	When growth commences in spring to early flag leaf
Canaryseed	3 to 5 leaf stage
Flax and Solin (low linolenic acid flax)	2 inches (5 cm) to early bud stage. Best tolerance occurs when flax is 2 to 4 inches (5 to 10 cm) tall.
Corn	4 to 6 leaf stage

### Seedling forage grasses<sup>†</sup>: 2 to 4 leaf stage<sup>†</sup>.

#### • All Products:

- Bromegrass
- Fescue (creeping red, meadow)
- Reed canarygrass
- Russian wild-rye
- Timothy
- Wheatgrass (crested, intermediate, slender, tall)

#### • Buctril M, Logic M and Badge only:

- Fescue (tall)
- Meadow bromegrass
- Meadow foxtail
- Orchard grass
- Wheatgrass (streambank)

### Established Forage Grasses:

- Timothy (seed<sup>†</sup> or hay<sup>††</sup>)\*\* - prior to emergence of the flag leaf.

<sup>†</sup> Maximum of two treatments per year at least 21 days apart.

<sup>††</sup> Maximum of two treatments per year at least 90 days apart.

### Perennial Cereal Rye\* (Buctril M only):

- **Established stands:** 2 leaf up to early flag leaf stage.
  - **Establishment year:** 2 to 4 leaf stage in the fall, or from the time growth commences to early flag leaf stage in the spring.
- \* Since the use of this tank mix on perennial cereal rye is registered under the User Requested Minor Use Label Expansion program, the manufacturer assumes no responsibility for herbicide performance. Users of this tank mix on perennial cereal rye do so at their own risk.*
- \*\* Applications onto timothy for hay production registered with Buctril M, Logic M, and Mextrol 450 only.**

## Weeds and Staging:

### Weeds up to 4 leaf stage:

- American nightshade
- Annual smartweeds (green, lady's-thumb, pale)
- Bluebur
- Ball mustard
- Cocklebur
- Cow cockle
- Flixweed
- Jimsonweed
- Kochia\*\*
- Night-flowering catchfly
- Redroot pigweed\*
- Russian thistle\*\*
- Scentless chamomile\*\*\*
- Shepherd's-purse
- Volunteer canola
- Volunteer sunflower

\* May not be controlled in flax.

\*\* Control before plants are 2 inches tall.

\*\*\* Spring seedlings only.

### Weeds up to 6 leaf stage:

- Wild tomato (Buctril M, Logic M & Badge II only)

### Weeds up to 8 leaf stage:

- Buckwheat (tame, tartary, wild)
- Common ragweed
- Mustard (wild, wormseed)
- Common groundsel
- Lamb's-quarters
- Stinkweed

### Weeds suppressed in winter wheat from the 2 to 12 leaf stage:

- Prickly lettuce (All except Logic M and Buck M)

### Weeds where top growth is controlled:

- Canada thistle
- Perennial sow-thistle

## Rate:

**Buctril M:** 0.4 L per acre. (One 8 L jug treats 20 acres).

**Mextrol 450, Badge II & Logic M:** 0.5 L per acre. (One 10 L jug treats 20 acres).

## Application Information:

- **Water Volume:**
  - **Corn:** 80 to 120 L per acre.
  - **Flax, Solin:** 20 to 40 L per acre.
  - **Cereals:** 20 to 40 L per acre.
  - **Seedling forage grasses:** 60 L per acre.
  - **Established timothy:** 60 L per acre.
  - **Perennial Cereal Rye:** Not less than 20 L per acre.
  - **Aerial:** 8 to 16 L per acre.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets

Refer to specific labels for recommended water volumes.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
bromoxynil	POST (foliar)	PSII inhibitor/Membrane disrupter	Little (Apoplast)	Broadleaf only	6
MCPA	POST (foliar)	Synthetic Auxin	Symplast	Broadleaf only	4

## Effects of Growing Conditions:

Best weed control when humidity is high at the time of spraying and for the following day or two. Prolonged cool conditions may result in reduced weed control. Spraying during early morning may increase the risk of flax injury.

Avoid spraying in temperatures greater than 25°C.

DO NOT apply to flax, canaryseed or corn if daytime temperatures exceed 27°C within 48 hours before or after application.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicide Tank Mix Table:

Crop & Tank Mixes	Badge	Buctril M	Logic M	Mextrol 450	Buck M
<b>Flax (including Solin):</b>					
Poast Ultra + Merge adjuvant	✓	✓	✓	✓	✓
Clethodim + adjuvant	✓*	✓**	✓	✓*	✓
<b>Spring wheat (including durum) and Barley:</b>					
Liquid Achieve	✓	✓	✓	✓	✓
Ally	✓	✓	✓	✓	✓
MCPA (amine, ester & K)	✓	✓	✓	✓	✓
Refine SG (4 g per acre) #		✓	✓		✓
Cordon				✓	
Puma Advance		✓			
Puma Advance + Refine SG (rates above)		✓			

Crop & Tank Mixes	Badge	Buctril M	Logic M	Mextrol 450	Buck M
<b>Spring wheat (including durum):</b>					
Everest 2.0		✓			
Varro		✓			
<b>Spring wheat only (NOT including durum):</b>					
Axial	✓	✓			
<b>Spring wheat only (NOT including durum) and Barley:</b>					
Axial		✓			
<b>Winter Wheat:</b>					
Refine SG (4 g per acre)#			✓		✓
<b>Oats:</b>					
MCPA (amine, ester & K)	✓	✓	✓	✓	✓
<b>Corn:</b>					
AAtrex	✓	✓	✓	✓	✓

\* *Select* only

\*\* *Select* and *Centurion* only.

\*\*\* *Buctril M* only

# Requires the addition of a surfactant as per *Refine SG*.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the bromoxynil/MCPA ester labels only.

Bromoxynil/MCPA manufacturers may also support mixes with pesticides that are not on the bromoxynil/MCPA labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall within 1 hour of application may reduce weed control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 24 hours, or 15 days for corn to be harvested by hand.
- **Grazing Restrictions:** DO NOT graze treated grain or established timothy crops or cut for feed within 30 days of application. DO NOT graze meadow foxtail in the year of treatment. DO NOT graze other treated forage grasses within 56 days of treatment.
- **Pre-harvest Interval:** DO NOT harvest perennial cereal rye within 30 days of application, or flax or solin within 60 days of application.
- **Re-cropping Interval:** No re-cropping restrictions the year after treatment.
- **Aerial Application:** May be applied by air to wheat, barley, and oats only. Use higher water volume (see 'Application Information') when the majority of weeds are cow cockle, smartweed, hemp-nettle, pigweed, and Canada thistle.
- **Storage:** May be frozen. Shake the container well when thawed to reconstitute components before use.

• **Buffer Zones:**

Application method	Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground only*	All	1	1	4
Fixed wing aircraft	Oats	15	2	60
	Barley & wheat	20	5	60
	Rye	1	0	60
Helicopter	Oats	15	1	50
	Barley & wheat	20	3	50
	Rye	1	0	50

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to pages 12 and 13.

## Hazard Rating:

*Badge II, Buctril M, Logic M:*



Warning

*Mextrol 450:*



Danger – Poison



Warning – Skin Irritant. Potential Skin sensitizer



Caution – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Bromoxynil + MCPA+Fluroxypyr

**Herbicide Group**  
**4 - fluroxypyr & MCPA**  
**6 - bromoxynil**  
(Refer to page 45)

## Company:

Nufarm Agriculture (*Enforcer M*)

ADAMA Canada (*ForceFighter M*)

## Formulation:

**Enforcer M (PCP#30691):** 80 g/L fluroxypyr, 200 g/L bromoxynil and 200 g/L MCPA ester co-formulated as an emulsifiable concentrate.

- Container size – 2 x 10 L, 120 L or 480 L

-or-

**ForceFighter M** package contains two components:

**Badge II (PCP#30370):** 225 g/L bromoxynil and 225 g/L MCPA ester formulated as an emulsifiable concentrate.

- Container size – 2 x 10 L, 2 x 120 L

**Fluroxypyr 180 EC (PCP#30815):** 180 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size – 9.6 L, 115.2 L

## Crops and Staging:

**Wheat (durum, spring) and barley:** 2 leaf stage until the flag leaf is fully emerged.

**Winter wheat\*:** in spring once tillered until the flag leaf is fully emerged.

**Canaryseed\*:** from the 3 to 5 leaf stage.

**\* Enforcer M only.**

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Apply to emerged weeds up to the 6 leaf stage unless otherwise indicated.

**Enforcer M only applied at the 0.25 L per acre rate will control the following weeds (see "Rates:" below):**

- Kochia (up to 5 cm tall)
- Wild buckwheat\*
- Wild mustard
- Lamb's-quarters

**Enforcer M (high rate) or ForceFighter M will control the following weeds (see "Rates:" below):**

*Weeds listed prior plus:*

- American nightshade<sup>†</sup>
- Bluebur<sup>†</sup>
- Buckwheat (tame, Tartary, wild)
- Canada thistle (top growth control only)
- Chickweed
- Cleavers (up to 6 whorls)
- Cocklebur<sup>†</sup>
- Common groundsel
- Common ragweed
- Cow cockle<sup>†</sup>
- Flixweed<sup>†</sup>
- Hemp-nettle
- Mustard (ball<sup>†</sup>, wild, wormseed)
- Night-flowering catchfly<sup>†</sup>
- Perennial sow-thistle (top growth control only)
- Redroot pigweed\*
- Russian thistle (< 5 cm tall)<sup>†</sup>
- Scentless chamomile<sup>†</sup>
- Shepherd's-purse<sup>†</sup>
- Smartweed<sup>†</sup> (green, lady's-thumb, pale)
- Stinkweed
- Stork's-bill\*
- Velvetleaf<sup>†</sup>
- Volunteer canola/rapeseed<sup>†</sup>
- Volunteer flax
- Volunteer sunflower<sup>†</sup>

**\* Suppression only.**

**<sup>†</sup> Up to 4 leaf stage only.**

## Rates

**Enforcer M:** 0.25 to 0.51 L per acre

-or-

**ForceFighter M:**

- **Badge II:** 0.5 L per acre
- **Fluroxypyr 180 EC:** 0.24 L per acre

## Application Information:

- **Water Volume:**
  - **Enforcer M:** minimum 20 to 40 L per acre; Use the higher volume when there is a heavy crop canopy or weeds are at an advanced stage.
  - **ForceFighter M:** minimum 40 L per acre.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE coarse** droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
MCPA, fluroxypyr	POST (foliar)	Synthetic auxin	Moves throughout the plant (Symplast)	Broadleaf only	4
bromoxynil	POST (foliar)	PSII Inhibitor/ Membrane disrupter	Little (Apoplast)	Broadleaf only	6

## Effects of Growing Conditions:

Optimum activity is experienced between 12 to 24°C when weeds are actively growing. Weeds may not be actively growing and as a result reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after an application may reduce crop tolerance and weed control efficacy.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **In wheat (durum, spring, winter) and barley:**
  - Tralkoxydim (*Liquid Achieve* and *Nufarm Tralkoxydim* only)
- **In wheat (spring and durum only) and barley:**
  - Fenoxaprop (*Cordon* or *Puma Advance* only)
- **In spring wheat (including durum) only:**
  - Clodinafop 240 EC (*Signal* only)
  - Flucarbazone (*Everest 2.0* only)
  - *Simplicity*
  - *Varro*

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Enforcer M* label only. Bromoxynil+MCPA+Fluroxypyr manufacturers may also support mixes with pesticides that are not on the *Enforcer M* or *ForceFighter M* labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

- **Herbicides:** *Axial*, *Traxos*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-Entry Interval:** DO NOT enter treated fields for 24 hours.
- **Grazing Restrictions:** DO NOT graze or cut for livestock feed within 30 days of application. Withdraw meat animals from treated feed 3 days before slaughter.
- **Pre-harvest Interval:** DO NOT harvest within 60 days of application.
- **Re-cropping Interval:** Barley, canola, flax, forage grasses, lentil, mustard, oat, pea, rye and wheat can be seeded the following year or fields can be fallowed.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a ventilated room above freezing. If frozen, allow container to warm and shake well before using.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- Spray when winds are under 16 km/hr, but not dead calm.

## Sprayer Cleaning:

The manufacturer provides no recommendations on how to clean equipment used to apply this product. As a petroleum based emulsifiable concentrate, 'Method B' in the general section on sprayer cleaning on pages 12 and 13 may be the most effective.



**Hazard Rating:**

Warning – Poison



Caution – Skin and Eye Irritant. Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Casoron

**Herbicide Group  
20 - dichlobenil***(Refer to page 45)***Company:**

Arysta LifeScience Canada (PCP#12533)

**Formulation:**

4% dichlobenil formulated as a granular.

- Container size - 22.7 kg

**Crops:****Poplar plantations****Shelterbelts consisting of the following species:**

- |                              |                           |               |
|------------------------------|---------------------------|---------------|
| ◦ Ash                        | ◦ Euonymus (Burning bush) | ◦ Maple       |
| ◦ Barberry                   | ◦ Forsythia               | ◦ Mock orange |
| ◦ Birch (cutleaf-weeping)    | ◦ Honeysuckle             | ◦ Poplar      |
| ◦ Boxwood Caragana           | ◦ Juniper                 | ◦ Rose        |
| ◦ Cedar (White, Eastern Red) | ◦ Lilac                   | ◦ Spirea      |
| ◦ Crabapple                  | ◦ Linden                  | ◦ Willow      |
| ◦ Elm                        | ◦ Locust                  |               |

**NOTE:** DO NOT apply to shelterbelts with mugo pine, firs, hemlock, holly, spruce or other shallow rooted species or injury may result. DO NOT apply in or around greenhouses. DO NOT use on light sandy soils.

**Weeds and Staging:**

Apply in early spring or late fall prior to annual weed emergence, or after cultivation has removed existing weeds.

- |   |                   |                    |
|---|-------------------|--------------------|
| ◦ Annual blugrass                       | ◦ Horsetail       | ◦ Purslane         |
| ◦ Artemisia (absinthe,* wormwood, sage) | ◦ Knotweed        | ◦ Quack grass*     |
| ◦ Bindweed*                             | ◦ Kochia          | ◦ Sheep sorrel*    |
| ◦ Canada thistle*                       | ◦ Lamb's-quarters | ◦ Shepherd's-purse |
| ◦ Chickweed                             | ◦ Loosestrife     | ◦ Smartweed        |
| ◦ Dandelion*                            | ◦ Mustard         | ◦ Sow-thistle      |
| ◦ Foxtail (green and yellow)            | ◦ Nutsedge*       | ◦ Spurge           |
| ◦ Groundsel                             | ◦ Pigweed         | ◦ Vetch*           |
|   | ◦ Plantain        | ◦ Wild buckwheat*  |

\* Controlled with fall applications at the higher rates.

**Rates:**

45 to 70 kg per acre.

At the low rate, a 15 kg bag will treat a 4 yd by 407 yd (4 m by 340 m) strip of shelterbelt. At the high rate, a 15 kg bag will treat a 4 yd by 256 yd (4 m by 214 m) strip of shelterbelt. If application is followed by 0.5 to 1.0 inches (1.3 to 2.5 cm) of irrigation, the lower rates are recommended.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dichobenil	PRE (soil active)	Cellulose synthesis inhibitor	Upward (Apoplast)	Broadleaf & grass	20

## Effects of Growing Conditions:

DO NOT apply during periods of high soil temperatures (more than 15°C).

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** Does not reduce activity.
- **Re-entry Interval:** DO NOT enter treated areas for at least 24 hours.
- **Grazing Restrictions:** DO NOT graze in treated area.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. DO NOT freeze.
- **Buffer Zones:** Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g., soils that are compacted, fine textured or low in organic matter). Avoid application of this product when heavy rain is forecast.

## Equipment Cleaning:

Refer to pages 12 and 13.

## Hazard Rating:

No specific rating. Keep out of reach of children. Harmful if swallowed.

Avoid skin or eye contact.

# Cirpreme/Cirpreme XC

*This product is a co-pack of Paradigm (page 317) and Lontrel 360 or Lontrel XC (page 151). Information is restricted to Crop, Weeds, Rates and Tank Mixes. For other detailed information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - florasulam**  
**4 - halauxifen & clopyralid**  
*(Refer to page 45)*

## Company:

Corteva Agriscience

## Formulation:

The *Cirpreme* package contains two components:

**Paradigm (PCP#31304):** 20% halauxifen and 20% florasulam formulated as a water dispersible granule

- Container size – 1 X 800 gm

**Lontrel 360 (PCP#23545):** 360 g/L clopyralid formulated as a solution.

- Container size – 1 X 6.7 L

The *Cirpreme XC* package contains:

**Paradigm (PCP#31304):** 20% halauxifen and 20% florasulam formulated as a water dispersible granule

- Container size – 1 X 800 gm

**Lontrel XC (PCP#23545):** 600 g/L clopyralid formulated as a solution.

- Container size – 1 X 4.1 L

## Crops and Staging:

**Spring wheat (including durum), Winter wheat and barley:**

3 leaf to just prior to emergence of the flag leaf

## Weeds and Staging:

Apply to emerged, young and actively growing weeds that are less than 8 leaf stage unless otherwise stated.

The use of MCPA 600 Ester is recommended at 189 to 280 mL per acre.

**Weeds Controlled - Cirpreme + MCPA 600 Ester at 280 mL per acre:**

*Weeds listed as controlled or suppressed by Paradigm in-crop (page 318) plus:*

- |   |   |   |
|---|---|---|
| ◦ American dragonhead<br>(up to bud stage or 15 cm)               | ◦ Hemp-nettle   | ◦ Redroot pigweed   |
| ◦ Burdock   | ◦ Henbit (up to 8 leaf or 15 cm)                                | ◦ Scentless chamomile (suppression<br>only up to the bud stage)         |
| ◦ Cocklebur   | ◦ Mustard, ball*  | ◦ Sow-thistle, perennial (up to the<br>bolting stage & 20 cm in height) |
| ◦ Cow cockle  | ◦ Night- flowering catchfly (up to<br>bolting, 15 cm in height) | ◦ Sunflower (annual wild, volunteer)                                    |
| ◦ Dandelion (seedlings, overwintered<br>rosettes & mature plants) | ◦ Plantain (top growth)   | ◦ Thistle, Canada (up to the bud stage)                                 |
| ◦ Field horsetail (top growth)                                    | ◦ Prickly lettuce   | ◦ Vetch   |
|   | ◦ Radish, wild  |   |

\* Best results are obtained when applied to actively growing weeds in the 1 to 4 leaf (seedling) stage

## Rate:

**Paradigm:** 10 g per acre.

-plus-

**Lontrel 360:** 84 mL per acre.

-or-

**Lontrel XC:** 52 mL per acre.

(One package treats 80 acres)

**It is recommended that Cirpreme/Cirpreme XC be mixed with MCPA ester 600 at 280 mL per acre (not supplied).**

Add *Agral 90*, *Agsurf II*, or *Citowett Plus* at 0.2 L per 100 L of spray solution; *Intake Adjuvant* at 0.5 to 1.0 L per 100 L of spray solution or *Merge* at 0.5 L per 100 L of solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **All Registered Crops:**
  - MCPA 600 Ester at 189 to 280 mL per acre.
  - *Axial*
- **Wheat (Spring, durum, winter) only:**
  - *Simplicity OD*
  - *Simplicity GoDRI*
- **Wheat (spring and durum only):**
  - Flucarbazone 2.0

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Cirpreme/Cirpreme XC* labels only.

**Corteva Agriscience also support the following mixes with pesticides that are not on the Cirpreme/Cirpreme XC labels.**

- **Herbicides:** *Axial Xtreme* (barley and spring wheat, not durum)

Adding ingredients in the correct order is critical for optimum performance. Add water dispersible granule *Paradigm* first, followed by the grass tank-mix then add the *Lontrel* component, add MCPA ester and recommended surfactant as required.

General guidelines can be found on page 11.

**See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.**

# CleanStart

Herbicide Group  
9 - glyphosate  
14 - carfentrazone  
(Refer to page 45)

## Company:

Nufarm Agriculture

## Formulation:

One case of *CleanStart* contains 2 components:

**Credit (PCP#25866):** 356 g/L glyphosate formulated as a solution.

- Container size - 2 x 10, 450 L

**Aim EC (PCP#28573):** 240 g/L carfentrazone formulated as an emulsifiable concentrate.

- Container size - 1 x 600 mL, 4 x 3.38 L

## Crops and Staging:

Prior to the seeding of most crops\* including the following:

- Barley
- Beans, dry
- Buckwheat
- Canola
- Chickpea
- Corn
- Faba bean
- Flax
- Lentil
- Millet (pearl and proso)
- Mustard
- Oats
- Peas, field
- Potato\*
- Rye
- Safflower
- Sorghum
- Soybean
- Sunflower
- Triticale
- Wheat

\* Note – before using any pesticide on potatoes, consult the list of “Agricultural Pesticides Approved for Use”, available from Simplot Canada and McCain Foods (Canada).

## Harvest Aid Treatment:

**Note:** As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from crops treated with this product prior to harvest may have market access concerns. Please see page 10 for more information AND consult potential grain buyers before using this product.

*CleanStart* may be applied to the following crops when seed is at less than 30% moisture to speed the rate of dry-down of the following crops and green weedy material. See glyphosate preharvest uses for additional staging information.

Crop*	Rate		
	Credit (glyphosate) (g ae per acre) <sup>†</sup>	Aim (mL per acre)	Acres per case
Barley, chickpea, dry bean, field pea, oats, wheat	360 <sup>†**</sup>	30	20

\* DO NOT apply to crops if grown for seed purpose.

<sup>†</sup> See the glyphosate page for equivalent product rates.

## Weeds, Rates and Staging (Pre-seeding):

*Credit* at 0.5 to 1.0 L per acre plus *Aim EC* at 15 to 30 mL per acre (40 to 20 acres per case or 900 to 450 acre bulk):

*Weeds controlled by glyphosate at the above rates plus rapid burnoff of:*

- Chickweed
- Dandelion (spring seedlings only)
- Shepherd's-purse
- Kochia (including glyphosate resistant biotypes<sup>\*\*</sup>)
- Tansy mustard
- Volunteer canola (including all herbicide tolerant varieties)\*

Apply to actively growing weeds up to 10 cm in height.

\* 1 to 3 leaf stage for glyphosate tolerant volunteer canola

\*\* Use highest registered rate to control glyphosate resistant kochia.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Minimum 40 L per acre. Higher water volumes will give better performance from the carfentrazone active. Use higher volumes when weed populations are dense.
- **Nozzles & Pressure:** Sprayers without drift reduction nozzles should use maximum pressure of 30 psi (210 kPa). Low drift nozzles may require higher pressures for proper performance. Apply using nozzle and pressure combination that deliver an even spray pattern with good coverage with *ASABE medium* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
glyphosate	POST (foliar weeds)	EPSP Amino Acid Synthesis Inhibitor	Toward growth areas (Symplast)	Non-selective broadleaf & grass except HT crops	9
carfentrazone	POST (foliar weeds)	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Broadleaf	14

## Effects of Growing Conditions:

Most effective control is achieved when grasses are actively growing. Weeds stressed by drought, flooding, hot or prolonged cool temperatures (<15°C) and poor fertility are more difficult to control. Symptoms of carfentrazone activity on weeds may be accelerated by warm moist conditions. Weeds hardened off by drought may be more difficult to control.

## Tank Mixes:

### Herbicides:

- *Aim EC* (17 mL per acre)

**Fungicides:** None registered.

**Insecticides:** None registered

**Fertilizers:** None registered.

DO NOT use with additives that are used to modify spray pH.

## Restrictions:

- **Rainfall:** Rainfall within 6 to 8 hours after application may reduce activity. Avoid application when heavy rainfall is forecast.
- **Re-entry Interval:** DO NOT re-enter treated fields for at least 12 hours.
- **Pre-harvest Interval:** Leave a minimum of 3 days between harvest aid treatment and harvest.
- **Grazing Restrictions:** DO NOT graze the treated crop or cut for feed.
- **Re-cropping Interval:** *CleanStart* may be applied as a preseed burnoff prior to the seeding of most crops. Check the product label for a complete list. There are no rotational restrictions 12 months after application.
- **Aerial Application:** DO NOT apply by air
- **Storage:** Store in a cool dry location.
- **Buffer Zones:** Leave a buffer of 3 metres from the downwind edge of the boom to sensitive upland habitats. Apply near wetlands only when wind is blowing away from wetlands. Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Skin and Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Clethodim

Herbicide Group

1 - clethodim

(Refer to page 45)

## Company:

Arysta LifeScience Canada (*Select* - PCP#22625; *Amigo* - PCP#22644)

ADAMA Canada (*Arrow* - PCP#28224; *X-ACT Adjuvant* - PCP#28225; *Arrow-All-In* - PCP#33225; built in adjuvant)

AgraCity (*MPower Independence* - PCP#32851; *MPower Tonto* - PCP#32615)

Agri-Star (*Clethodim 250* - PCP#32334; *Surf-Act* - PCP#32313)

BASF Canada (*Centurion* - PCP#27598; *Amigo* - PCP#22644)

Federated Cooperatives Ltd. (*Patron 240 EC* - PCP#32495; *Patron Adjuvant* - PCP#32496)

Loveland Products Canada (*Shadow RTM* - PCP#29277; *Amigo* - PCP#22644)

Nufarm Agriculture (*Statue* - PCP#32885; *Nufarm Carrier* - PCP#30639)

Winfield United (*Antler* - PCP#32880; *X-ACT Adjuvant* - PCP#28225)

## Formulation:

**Clethodim 250:** 252 g/L clethodim formulated as an emulsifiable concentrate.

- Container size - 3 L clethodim + 9 L adjuvant

**Arrow-All-In:** 120 g/L clethodim formulated as an emulsifiable concentrate.

- Container size - 2 x 6 L

**Other products:** 240 g/L clethodim formulated as an emulsifiable concentrate.

- Container size - 3 L clethodim + 9 L adjuvant

## Crops, Rates and Staging:

Crops are tolerant at all growth stages at maximum rates, but "Pre-harvest Intervals" must be observed to prevent excess residue in the grain (see "Restrictions:" section below).

To a maximum rate of 150 mL per acre for *Arrow-All-In* and 75 mL per acre for other formulations:

- Chickpea\*
- Dry bean<sup>#</sup> (black, great northern, navy, pink, pinto, red)
- Prairie Carnation\*\*†

To a maximum rate of 310 mL per acre for *Arrow-All-In* and 150 mL per acre for other formulations:

- Alfalfa (seedling only)
- Canola
- Caraway<sup>Δ†</sup>
- Carinata<sup>ΔΔ</sup>
- Coriander<sup>\*\*†</sup>
- Dill (seed production)<sup>\*\*\*ΔΔ†</sup>
- Faba bean<sup>ΔΔ†</sup>
- Fenugreek<sup>\*\*\*†</sup>
- Field pea
- Flax (including Solin)
- Hops<sup>ΔΔ†</sup>
- Lentil
- Mustard, condiment (brown, oriental, yellow)
- Mustard, oilseed types (*B. juncea*)<sup>Δ</sup>
- Potato
- Safflower (6 to 8 leaf)<sup>Δ†</sup>
- Soybean
- Sunflower

\* Apply up to the 9 node stage (7 inches or 18 cm maximum height)

\*\* Apply in the 2 to 5 leaf stage, one application per year.

\*\*\* Apply in the 3 to 5 leaf stage, one application per year.

<sup>#</sup> *Select*, *Centurion*, *Statue* and *MPower Independence* are registered for all *Phaseolus vulgaris* varieties. Since not all varieties of dry beans have been tested for tolerance to clethodim, first use of clethodim should be limited to a small area of each variety to confirm tolerance. *Antler*, *Arrow-All-In*, *Clethodim 250*, *Patron* and *Shadow RTM* are registered for use on black, great northern, navy, pink, pinto, and red dry bean types only.

<sup>Δ</sup> *Select*, *Centurion*, *Shadow RTM*, *Statue* and *MPower Independence* only.

<sup>ΔΔ</sup> *Select*, *Centurion* and *Shadow RTM* only.

<sup>†</sup> NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Those who apply these uses do so at their own risk.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

DO NOT apply more than a combined total rate of 37.5 g clethodim active ingredient (310 mL/acre *Arrow-All-In* or 150 mL per acre of other clethodim products), or other products containing clethodim, to the same field per season.

**Adjuvants:** Clethodim products must be applied with 0.5 L of *Amigo* adjuvant (*Centurion*, *Shadow RTM* or *Select*), *MPower Tonto* (*MPower Independence*), *Nufarm Carrier* adjuvant (*Statue*), *X-ACT* (*Antler*, *Arrow*), *Surf-Act* (*Clethodim 250*) or *Patron* adjuvant (*Patron 240 EC*) per 100 L of spray solution (unless otherwise indicated on the label). For spray water sources high in bicarbonate ions (CO<sub>3</sub>) see 'Effects of Growing Conditions' section following.

*Arrow-All-In* does not require the addition of an adjuvant since it is built into the formulation.

Weed	Rate (mL/ Acre)	Arrow-All-In (mL/acre)	Stage
Barnyard grass, foxtail (green, yellow)*†, proso millet, volunteer cereals (barley*†, canary seed, corn, oat*†, wheat*†), wild oat†	50**	100**	Apply at 2 to 6 leaf stage. † Apply at the 2 to 4 leaf stage when treated with the lowest rate.
Moderate to heavy infestations of the above grasses, plus Persian dandel	75	150	For best results in either case, apply at the 2 to 3 leaf stage
Quackgrass (suppression only)	75	150	2 to 6 leaf stage when 3 to 6 inches (6 to 15 cm) tall. For best results, apply at the 3 to 5 leaf stage
Quackgrass (season long control)	150***	310	

\* Apply to light infestations of these weeds only for the lowest rate. The manufacturers do not provide guidelines for weed densities under light infestations. When in doubt as to the level of weed infestation, use the higher rate or contact the manufacturer.

\*\* At this rate, clethodim should NOT be tank mixed with any other pesticide and should only be applied under the following growing conditions: good crop stand, within the recommended leaf staging (2 to 3 leaf is optimum timing) prior to tillering, light weed infestations, adequate moisture and fertility, absence of stress, and good growing conditions.

\*\*\* Apply with 1 L of adjuvant per 100 L of spray solution.

Refer to the product labels for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre. Use 40 L per acre under dense weed infestations or dense crop canopies.
  - **Aerial:** Minimum of 11.3 L per acre.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) when using conventional 80° flat fan nozzles tilted forward at a 45° angle. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with *ASABE medium* droplets or larger.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
clethodim	POST (foliar)	ACCCase Lipid synthesis inhibitor	Toward regions of growth (Symplast)	Grasses only	1

## Effects of Growing Conditions:

Clethodim will be less effective when plants are stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Re-growth of tillers may occur if application is made under any of the above stress conditions.

Clethodim activity is reduced by levels of bicarbonate ions in spray water equal to or greater than 500 ppm. The addition of ammonium sulphate at 1.6 L per acre (490 g/L liquid) or 0.8 kg per acre (99% dry), or the addition of 28-0-0 liquid fertilizer at 0.5 L per acre to the tank prior to the addition of clethodim has been shown to restore control.

## Tank Mixes:

Clethodim may be tank mixed with other pesticides at the all but the lowest rates. Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

Add the recommended amount of adjuvant with all tank mixes unless otherwise indicated.



**Herbicides:**

- **In flax (not including solin):**
  - Bromoxynil/MCPA ester (label rates) <sup>Δ</sup>
  - *Curtail M*<sup>†</sup>
  - MCPA ester (rates for flax)
  - *Lontrel* at 0.23 to 0.34 L per acre<sup>†</sup>
- **In Solin (low linolenic flax):**
  - Bromoxynil/MCPA ester (label rates) <sup>Δ</sup>
  - *Curtail M*<sup>†</sup>
  - *Lontrel* at 0.23 to 0.34 L per acre<sup>†</sup>
- **In canola:**
  - *Lontrel* <sup>†</sup>
  - *Muster*<sup>†</sup> (redroot pigweed is controlled at the 8 g per acre rate of *Muster* in this tank mix).
- **In Clearfield canola only:**
  - *Pursuit* at 42 to 85 mL per acre<sup>†</sup>
- **In field peas:**
  - *Pursuit*<sup>†</sup>
- **In Glyphosate tolerant soybean:**
  - Glyphosate (360 to 720 g ae per acre)<sup>†\*</sup>

<sup>†</sup> Apply with the 150 mL per acre rate of *Arrow-All-In* or the 75 mL per acre rate of other clethodim formulations only.

<sup>Δ</sup> Manufacturers may only support specific mixes. Contact the manufacturer for more information.

\* *Antler*, *Arrow*, *Arrow-All-In* and *Patron 240 EC* only.

Allow 4 days between application of clethodim and any other chemical not recommended as a tank mix combination on the label.

**Fertilizer:** None registered.

**Insecticide:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the clethodim labels only.

Clethodim manufacturers also support mixes with pesticides that are not on the clethodim labels.

**Herbicides:** *Liberty 150* (100 to 150 mL per acre of *Arrow-All-In* or 50 to 75 mL per acre for other clethodim formulations) When mixing add adjuvant to the water first, then *Liberty*, then clethodim. Consult labels for detailed mixing instructions.

Check with each manufacturer for other products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**Restrictions:**

- **Rainfall:** Within 1 hour may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or cut treated crops for forage until 60 days after application of clethodim to annual crops, and 30 days after application to seedling alfalfa.
- **Pre-harvest Interval:**

Pre-harvest Interval (days)	Crops
30	Alfalfa, fenugreek
40	Dill seed
60	Canola, chickpeas (Desi and Kabuli) coriander, dry beans, faba bean, flax (including Solin), lentils, or mustard (brown, yellow, oriental), potatoes
70	Safflower
72	Sunflower
75	field peas, soybeans

- **Aerial Application:** Only *Centurion*, *Shadow RTM* and *Select* may be applied by air in canola, chickpea, dry bean, faba bean, flax, field pea, lentil, mustard, potato, soybean, sunflower only.
- **Storage:** May be stored at any temperature. Shake well before use.

- **Buffer Zones:**

- **Antler, Arrow, Patron:** Leave a 15 meter buffer between the edge of sensitive habitats and the closest spray pass.
- **Select, Centurion, Arrow-All-In (ground only), MPower Independence, Statue:**

Application method	Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground only*	All	1	1	1
Fixed wing aircraft	Desi and Kabuli chickpeas, dry common beans, faba bean	1	1	20
	Other registered crops	5	5	40
Helicopter	Desi and Kabuli chickpeas, dry common beans, faba bean	1	1	20

- **Shadow RTM:**

Application Method	Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:
		Terrestrial habitat
Ground	All Crops	15
Aerial	Desi and Kabuli chickpeas, dry common beans	15
	Other Registered Crops	20

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method B' in the general Sprayer Cleaning section on pages 12 and 13.

## Hazard Rating:

**Select, Shadow, MPower Independence, Statue and Centurion:**



Warning – Skin and Eye Irritant

**Antler, Arrow, Arrow-All-In and Patron:**



Caution – Skin and Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Clodinafop

Herbicide Group

1 - clodinafop

(Refer to page 45)

## Company:

Syngenta Canada (*Horizon NG* - PCP#29089; built in adjuvant)

ADAMA Canada (*Ladder 240 EC* - PCP#29495; *ADAMA Adjuvant 80* - PCP#30419; *Ladder All In* - PCP#32497; built in adjuvant)

AgriStar (*Slam'R Herbicide* - PCP#31053; *Slam'R COC Adjuvant* - PCP#30138)

AgraCity (*Mpower Aurora* - PCP#29711; *Chem Spray COC Adjuvant* - PCP#29712)

Great Northern Growers (*Foax* - PCP#31261; *CropOil 83/17 Adjuvant* - PCP#30978)

Loveland Products Canada (*Foothills NG* - PCP#30341; built in adjuvant)

Nufarm Agriculture (*Signal* - PCP#29172; *Nufarm Enhance* - PCP#29952)

Winfield United (*Cadillac* - PCP#30428; *ADAMA Adjuvant 80* - PCP#30419; *Cadillac One* - PCP#32539; built in adjuvant)

## Formulation:

**Horizon NG\*, Foothills NG\*:** 60 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

- Container size\*\* - 2 x 7.57 L, 121.1 L

**Cadillac One\*, Ladder All In\*:** 80 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

- Container size\*\* - 2 x 5.66 L, 90.6 L

**Cadillac, Foax, Ladder 240 EC, Mpower Aurora, Signal, Slam'R Herbicide:** 240 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

- Container size\*\* - 3.68 L, 11 L, 14.72 L, 18.4 L, 2 x 11.04 L, 58.9 L, 115 L
  - *CropOil 83/17, and Slam'R COC:* 2 x 6.4 L
  - *Nufarm Enhance:* 4 L, 16 L, 64 L
  - *ADAMA Adjuvant 80:* 4 L, 12 L

\*These products have a built in adjuvant system and do not require the addition of an adjuvant.

\*\* Package size availability varies by company. Not all sizes may be available from each company.

## Crops and Staging:

*Spring wheat (including durum)* - prior to the emergence of the 4<sup>th</sup> tiller.

When tank mixing, check broadleaf product description for additional restrictions.

## Weeds, Rates and Staging:

**NG Formulations:** 376 mL per acre, no additional adjuvant required (packages listed above treats 40, 322 or 1129 acres).

-or-

**Cadillac One, Ladder All In:** 283 mL per acre, no additional adjuvant required (packages listed above treats 40, 320 acres).

-or-

**240 EC Formulations:** 93 mL per acre plus recommended adjuvant at 0.8 L per 100 L spray solution. For *Signal* only add *Nufarm Enhance* adjuvant, for *Ladder 240EC* only add *ADAMA Adjuvant 80* at 0.25 L per 100L spray solution.

### For control of:

Weed	Stage
Barnyard grass	1 to 5 leaf prior to tillering
Foxtail (green, yellow)	1 to 5 leaf stage, prior to emergence of 3rd tiller
Volunteer canaryseed, wild oats	1 to 6 leaf, maximum 3 tillers
Volunteer oats	3 to 6 leaf, maximum 3 tillers

**NG Formulations:** 474 mL per acre, no additional adjuvant required (package sizes above treats 32, 258 or 903 acres);

-or-

**Cadillac One, Ladder All In:** 356 mL per acre, no additional adjuvant required (packages listed above treats 32, 254 acres).

-or-

**240 EC Formulations:** 115 mL per acre plus recommended adjuvant at 1.0 L per 100 L spray solution of the recommended adjuvant. For *Signal* only add *Nufarm Enhance* adjuvant, or for *Ladder 240 EC* only add *ADAMA Adjuvant 80* at 0.32 L per 100L spray solution.

**For control of:**

Weed	Stage
Persian darnel	1 to 5 leaf prior to tillering

Apply at the 2 to 3 leaf stage for optimum control.

Optimum weed control and yield response occurs when weeds are controlled before tillering.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** 20 L to 40 L per acre.
  - **Aerial:** 12 L per acre.
- **Nozzles and Pressure:** 40 to 45 psi (275 to 310 kPa) when using conventional 80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°. Low drift nozzles may require higher pressures for proper performance. Consult with herbicide manufacturer regarding the suitability of low drift nozzles for use with this product.

## Tank Mixes:

Mixes provide control of wild oat, green foxtail, and weeds/insects controlled by the tank mix partner unless otherwise noted.

### Herbicides:

	<i>Aurora</i>	<i>Cadillac</i>	<i>Cadillac One</i>	<i>Foax</i>	<i>Ladder</i>	<i>Ladder All In</i>	<i>NG Formulations</i>	<i>Nufarm Clodinafop</i>	<i>Signal</i>	<i>Slam'R</i>
2,4-D amine (160 to 212 g ae per acre) <sup>††</sup>	•	•	•	•	•	•	•	•	•	•
Bromoxynil <sup>#</sup>	•	•	•	•	•	•	•	•	•	•
Bromoxynil/MCPA <sup>*** #</sup>	•	•	•	•	•	•	•	•	•	•
Bromoxynil/2,4-D (label rates)	•	•	•	•	•	•	•	•	•	•
<i>Curtail M</i> (0.6 to 0.81 L per acre)	•	•	•	•	•	•	•	•	•	•
Dichlorprop/2,4-D (0.71 L per acre) <sup>**</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>	• <sup>Δ</sup>
<i>DyVel</i> (0.4 to 0.50 L per acre)	•	•	•	•	•	•	•	•	•	•
<i>Lontrel 360</i> (0.17 to 0.34 L per acre)		•	•		•	•	•		•	
<i>Lontrel 360</i> (0.11 to 0.17 L per acre) + MCPA ester (0.45 L per acre) <sup>††</sup>	•	•	•	•	•	•	•	•	•	•
MCPA 600 amine or 600 ester <sup>††</sup> (0.34 to 0.45 L per acre)	•	•	•	•	•	•	•	•	•	•
MCPA Sodium Salt (0.48 to 1.09 L per acre) <sup>*</sup>		•	•		•	•	•		•	
Mecoprop-p (2.2 to 2.8 L per acre)		•	•		•	•	•		•	
Metsulfuron (3 g per acre) <sup>††† #</sup>	•	•	•	•	•	•	•	•	•	•
<i>Pulsar</i> (80 acres / case)			•			•	•			

	Aurora	Cadillac	Cadillac One	Foax	Ladder	Ladder All In	NG Formulations	Nufarm Clodinafop	Signal	Slam'R
<i>Pulsar</i> + MCPA Ester (rates above)			•			•	•			
<i>Refine SG</i> (12 g per acre) <sup>†††</sup>			•			•	•		•	
<i>Target</i> (0.4 to 0.6 L per acre) <sup>**</sup>		•	•		•	•	•		•	
<i>Trophy</i> (20 acres per case)		•	•		•	•	•		•	

Refer to the broadleaf herbicide label for crop staging, and other information. When tank mixing *Clodinafop 240 EC*, always add the broadleaf herbicide first, followed by clodinafop, with the adjuvant added last. Reductions in green foxtail and wild oat control may be observed when tank mixed with 2,4-D amine and MCPA amine.

#### Insecticides:

- *Lambda-cyhalothrin*<sup>#</sup> (25 to 33 mL per acre)<sup>Ⓒ</sup>

#### Fungicides:

- *Propiconazole*<sup>#</sup> (0.1 L<sup>#</sup> to 0.2 L per acre)<sup>Ⓒ</sup>
- Clodinafop may also be mixed with *Lambda-cyhalothrin*<sup>#</sup> plus *propiconazole*<sup>#</sup> at the rates above<sup>Ⓒ</sup>.

**Fertilizers:** None registered.

<sup>#</sup> Check product label for specific tank mix partners and appropriate rates

<sup>Δ</sup> NOT for use with *Estaprop XT* or *Dichlorprop DX*.

<sup>\*</sup> Rate above 0.81 L per acre may cause crop injury.

<sup>\*\*</sup> Barnyard grass also controlled.

<sup>\*\*\*</sup> Barnyard grass and Persian dandel also controlled. May be applied by air.

<sup>††</sup> See 2,4-D page for equivalent formulation rates.

<sup>†††</sup> Additional adjuvants are not required.

<sup>Ⓒ</sup> All products except *Aurora*.

**Note:** The above mixes are those listed on the clodinafop labels only.

Clodinafop manufacturers may also support mixes with pesticides that are not on the clodinafop labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
clodinafop	POST (foliar)	ACCCase Lipid synthesis inhibitor	Toward growth areas (Symplast)	Grasses only	1

## Effects of Growing Conditions:

For optimum results, apply to actively growing weeds. DO NOT apply to crops or weeds that are stressed by hot or cool conditions, frost, drought, low fertility, water-saturated soil, disease or insect damage as crop injury and poor weed control may result.

## Restrictions:

- **Rainfall:** Within 30 minutes may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze or harvest treated crops for forage within 3 days of application.
- **Pre-harvest Interval:** Leave at least 60 days from application to harvest.
- **Re-cropping Interval:** No restrictions in the year following treatment.
- **Storage:** May be frozen.

- **Aerial Application:** May be applied by air.
- **Buffer Zones:**

Application method	Buffer Zones (metres †) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground *	15	0
Aerial	72	76

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method B' in the general tank cleaning section on pages 12 and 13. If mixed with other pesticides, the cleaning method above should be combined with the method recommended for the tank mix partner if different from above.

## Hazard Rating:

240 EC formulations:



Caution – Poison



Warning – Eye and Skin Irritant

NG Formulations:



Caution – Skin Irritant

*Cadillac One, Ladder All In:*



Danger – Corrosive to Eyes

All products except *Ladder*:



Warning – contains the allergen soy.

For an explanation of the symbols used here see pages 7 and 8.

# Clopyralid

**Herbicide Group**  
**4 - clopyralid**  
*(Refer to page 45)*

## Company:

Corteva Agriscience (*Lontrel, Lontrel XC*)

Sharda CropChem Canada (*Pyralid*)

AgraCity (*MPower Clobber*)

## Formulation:

***Lontrel XC* (PCP#32795):** 600 g/L clopyralid formulated as a solution.

- Container size – 4 x 2.67 L

***Lontrel* (PCP#23545), *MPower Clobber* (PCP#33114):** 360 g/L clopyralid formulated as a solution.

- Container size:
  - *Lontrel 360* – 4.45 L
  - *MPower Clobber* – 2 x 8.9 L

***Pyralid* (PCP#32265):** 300 g/L clopyralid formulated as a solution.

- Container size – 4 x 4.45 L

## Crops Rates and Staging:

Clopyralid Rate (g ai per acre)	Formulation (mL per acre)					
	360 g/L forms		Lontrel XC		Pyralid	
	mL per acre	mL per 1000 sq m	mL per acre	mL per 1000 sq m	mL per acre	mL per 1000 sq m
31	85	-	52	-	102	-
41	112	28	68	17	136	34
61	170	42	102	25	204	50
82	240	56	137	34	272	67
121	340	83	202	50	403	100

Note: The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (for example, sandy soil) and/or the depth to the water table is shallow. Use should be avoided in these areas.

**Barley, spring wheat (NOT including durum), oat:** Apply at 41 to 61 g ai per acre from the 3 leaf to flag leaf emergence stage.

**Flax and Solin (low linolenic acid flax):** Apply at 82 to 121 g ai per acre from the 2 to 4 inches (5 to 10 cm) in height.

**Canola:** Apply at 61 to 121 g ai per acre from the 2 to 6 leaf stage. Argentine (*B. napus*) and Polish (*B. rapa*) varieties only; application to any other canola type oilseeds may cause crop injury.

**Seedling forage grasses\*:** Apply at 61 to 121 g ai per acre from the 2 to 4 leaf stage.

**Established grasses\*:** Apply at 61 to 121 g ai per acre at the shot blade stage, or in the fall after harvest or in early spring.

**Seedling and established grasses\* for forage and seed production include:**

- Bromegrass (smooth)
- Fescue (creeping red, meadow, tall)
- Kentucky bluegrass
- Meadow foxtail
- Orchardgrass
- Reed canarygrass
- Timothy
- Wheatgrass (crested, intermediate, slender, streambank, tall\*\*)
- Wildrye (Altai, Russian)

**Clopyralid at 121 g ai per acre:**

**Fallow:** Stage according to weeds.

**Shelterbelts\*:** containing villosa lilac, acute willow, Colorado spruce, white spruce, buffaloberry and chokecherry\*.

**Plantation poplar (including hybrid poplar)\***

**\* NOTE:** Since these uses are registered under the User Requested Minor Use Label Expansion program, the manufacturer assumes no responsibility for herbicide performance. Users of this product for these uses do so at their own risk.

**\*\* for forage use only**

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Apply to weeds when young and actively growing.

Weeds Controlled	Rate*(g ai per acre)
Alsike clover Canada thistle (top growth only) <sup>†</sup>	61
Canada thistle <sup>**†</sup> Common groundsel Common ragweed Knapweed (spotted and diffuse) <sup>Δ</sup> Ox-eye daisy (suppression) Perennial sow-thistle (top growth only)	82
Canada thistle <sup>**†</sup> Ox-eye daisy	121

<sup>Δ</sup> Lontrel Only

<sup>†</sup> Canada thistle - after all thistles have emerged and when the majority are in the rosette to pre-bud stage;

\* Provides season long control of Canada thistle. Not all root stalks will be killed and some regrowth may occur by the end of the growing season.

\*\* Provides season long control of Canada thistle with suppression into the following year.



## Application Information:

- **Water Volume:** 40 to 89 L per acre.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver thorough, even coverage with **ASABE coarse** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
clpyralid	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Poor control may occur under dry conditions. Injury to flax may occur when tank mixing with MCPA. To reduce the risk of crop injury, DO NOT apply tank mixes if temperature exceeds 27°C.

## Tank Mixes:

### Herbicides:

Clopyralid applications following applications of products containing bromoxynil (*Approve, Badge, Bromotril, Buctril M, Enforcer, Koril, Logic M, Mextrol, Pardner, Thumper*) should be delayed by 14 days to allow the Canada thistle to recover from leaf burn.

Recommended rates of clopyralid may be used for each crop unless otherwise indicated. Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

Herbicides	Crop (rate g ai per acre – if different from label rates range above)				
	Canola	Flax	Barley	Spring Wheat (Not durum)	Oats
<i>Poast Ultra</i>	(61 to 121)	(61 to 121)	-	-	-
<i>Select</i>	(61 to 121)	(82 to 121)	-	-	-
Glyphosate (glyphosate tolerant canola only)	(41)	-	-	-	-
<i>Odyssey</i> (CLEARFIELD canola only)	(61 to 82)	-	-	-	-
2,4-D ester or amine (170 to 227 g ae per acre)	-	-	(41 to 61)	(41 to 61)	-
MCPA ester or amine (0.28 to 0.38 mL per acre - 600 g/L)	-	(61)	(41 to 61)	(41 to 61)	(41 to 61)
<i>Poast Ultra</i> plus MCPA (rates above)	-	(61 to 121)	-	-	-
<i>Select</i> plus MCPA (rates above)	-	(31 to 41)	-	-	-
Tralkoxydim ( <i>Achieve</i> only) + MCPA ester (rates above)	-	-	(31 to 41)	(31 to 41)	-
Imazamethabenz ( <i>Assert</i> only) + MCPA ester (rates above)	-	-	(31 to 41)	(31 to 41)	-
Florasulam + MCPA ester	-	-	(31)	(31)	(31)
<i>Assert</i> + Florasulam + MCPA ester	-	-	-	-	-
Fluroxypyr + MCPA ester	-	-	(31 to 41)	(31 to 41)	-
Tralkoxydim + Fluroxypyr + MCPA ester	-	-	(31 to 41)	(31 to 41)	-
<i>Assert</i> + Fluroxypyr + MCPA ester	-	-	(31 to 41)	(31 to 41)	-

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the clopyralid labels only.

Corteva Agriscience also supports the following mixes that are not on the *Lontrel* label. Apply mixes according to the most restrictive use limitations for either product:

**Herbicides:** *Assure II*, *Muster*, *Muster* + any of *Assure II*, *Clethodim*, *Poast Ultra*, *Pursuit*, or *Solo*.

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** Crops or areas treated with this product may be grazed immediately following treatment.
- **Re-cropping Interval:** Clopyralid residues in the soil may affect succeeding crops. The year after application, replant to wheat, barley, oats, rye, flax, forage grasses, mustard or canola. DO NOT use manure from animals fed or bedded with clopyralid-treated straw, except on fields that are to be sown to clopyralid-tolerant crops.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in heated storage. If product is frozen, bring to room temperature and agitate before use.
- **Buffer Zones:** Avoid contamination of or drift toward non-target land, water or irrigation ditches.

## Sprayer Cleaning:

No detailed cleaning procedures are indicated on the label. Use a commercial all purpose spray sprayer cleaning product for adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Caution – Poison



Danger – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Clopyralid/MCPA

Herbicide Group  
4 - clopyralid & MCPA  
(Refer to page 45)

## Company:

Nufarm Agriculture (*Curtail M*)

AgraCity (*MPower Clobber M*)

## Formulation:

**Curtail M (PCP#30914):** 50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

- Container size - 8 L, 112 L, 960 L

The *MPower Clobber M* package contains two components:

- **MPower Clobber (PCP#33114):** 360 g/L clopyralid as a solution.
  - Container size - 2.23 L
- **MPower MCPA Ester 600 (PCP#32912):** 600 g/L MCPA ester formulated as an emulsifiable concentrate.
  - Container size - 7.5 L

## Crops and Staging:

Apply at the 3 leaf to just before the flag leaf stage of the following crops:

- Barley
- Flax and Solin (low linolenic acid flax)
- Timothy (established for seed, and
- Canaryseed\* at 2 to 6 inches (5 to 15 cm) height. hay or forage production)\*
- Oat
- Wheat (spring & durum)

\* **NOTE:** Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Those who apply these uses do so at their own risk.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

The following weeds are controlled at the 1 to 4 leaf stage unless specified:

### At 0.61 L per acre of *Curtail M* (8 L jug treats 13 acres):

- Burdock
- Canada thistle (low infestations)\*\*\*
- Cocklebur
- Field horsetail†
- Flixweed\*\*
- Lamb's-quarters
- Plantain†
- Prickly lettuce
- Ragweed
- Shepherd's-purse\*\*
- Stinkweed\*\*
- Sunflower (annual, volunteer)
- Wild mustard
- Wild radish
- Vetch

### At 0.81 L per acre of *Curtail M* (8 L jug treats 10 acres) or *MPower Clobber M* (1 case treats 20 acres) the above weeds and:

- Buckwheat (Tartary, wild)
- Canada thistle (medium to high infestations)\*\*\*
- Common groundsel
- Dandelion\*
- Kochia (suppression only)\*\*
- Pigweed (redroot, Russian)
- Scentless chamomile\*\*
- Smartweed
- Sow-thistle (annual, perennial†)
- Volunteer canola

\* Spring rosettes only.

\*\* 2 to 4 leaf stage, (spring seedlings only for winter annual weeds).

\*\*\* Season long control, some regrowth may occur in the fall. Apply from the 4 inch (10 cm) to prebud stage.

† Top growth control only.

## Application Information:

- **Water Volume:**
  - *Cereals and Flax*: 40 to 60 L per acre
  - *Canary seed and timothy*: 40 to 80 L per acre
- **Nozzles & Pressure:** Use 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE coarse** droplets while maintaining good coverage of foliage. Flat fan tips tilted forward at a 45° angle are recommended in flax.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
MCPA, clopyralid	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool (less than 15°C) temperatures, weeds are not actively growing and control may be reduced. DO NOT apply to weeds stressed longer than 20 days from lack of moisture as poor control can result.

## Tank Mixes:

*Curtail M* at 0.81 L per acre should be used in all tank mixes unless otherwise indicated. See labels for adjuvant rates.

### In spring wheat (including durum) and barley:

- *Achieve Liquid* (0.20 L per acre) plus *Turbocharge* adjuvant
- *Assert* (0.52 to 0.64 L per acre) plus water pH adjuster

Check product labels for additional crop staging restrictions.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the *Curtail M* label only.

Nufarm Canada supports the following mixes not found on the *Curtail M* label. Apply mixes according to the most restrictive use limitations for either product:

- **Wheat including Durum and Barley:** Assert 300SC, Achieve Liquid, Nufarm Tralkoxydim
- **Wheat (NOT Durum) and Barley:** Axial
- **Wheat (NOT Durum):** Varro, Everest 2.0, Signal, Fenoxaprop, Traxos, Simplicity
- **Flax:** Poast Ultra, clethodim (Select/Centurion only)

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

Restrictions:

- **Rainfall:** Within 6 hours will reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze treated fields or cut for hay within 7 days of application.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Re-cropping Interval:** Wheat, barley, oats, rye, corn, flax, canola, forage grasses and mustard may be planted the year after application. DO NOT under-seed crops to forage legumes the year after treatment.
  - DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Nufarm Agriculture Inc. representative or retailer for more information before seeding field peas following drought conditions in the previous year.
  - DO NOT sow any other crops until the second year after application. Apply manure bedded with straw from treated crops only to the crops listed above.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.
- **Buffer Zones:**

Application method	Buffer Zones (metres †) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.



† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Spray when winds are under 16 km/hr, but not dead calm.

Sprayer Cleaning:

No detailed cleaning procedures are indicated on the label. Use a commercial all purpose spray sprayer cleaning product for adequate cleaning. Contact the manufacturer for more information.

Hazard Rating:

-  Caution – Poison
-  Caution – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Clopyralid/MCPA + fluroxypyr

Company:

Corteva Agriscience (Prestige Brands)  
ADAMA (Esteem)  
AgraCity (MPower Foxy CM)

Herbicide Group  
4 - fluroxypyr,  
clopyralid & MCPA  
(Refer to page 45)

## Formulation:

The *Prestige XC* package has 2 components:

***Prestige XC A (PCP#29462)***: 333 g ae/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 3.3 L or in bulk package 4 x (2 x 9.9 L)

***Prestige XC B (PCP#29465)***: 50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrates.

- Container size - 2 x 8.0 L or bulk package 4 x 96 liter

-or-

The *Esteem* or *MPower Foxy CM* package has 3 components:

***ADAMA Fluroxypyr (PCP#30815)***; ***MPower Foxy (PCP#32952)***: 180 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size:
  - *Esteem* – 9.6 L
  - *MPower Foxy CM* – 6.4 L

***ADAMA Clopyralid 360 (PCP#32898)***; ***MPower Clobber (PCP#33114)***: 360 g/L clopyralid formulated as a solution.

- Container size:
  - *Esteem* – 3.34 L
  - *MPower Foxy CM* – 2.23 L

***ADAMA MCPA 2 EH Ester 600 (PCP#31669)***; ***MPower MCPA 600 Ester (PCP#32912)***: 360 g/L MCPA ester formulated as an emulsifiable concentrate.

- Container size:
  - *Esteem* – 11 L
  - *MPower Foxy CM* – 7.5 L

-or-

***Prestige XL (PCP#31428)***: 61.56 g/L fluroxypyr and 42.72 g/L clopyralid and 239 g/L MCPA ester formulated as an emulsifiable concentrate.

- Container size - 2 x 9.5 L per case, 113.6 L drum

## Crops and Staging:

Cereals:

- ***Spring wheat (including durum), barley, oat<sup>†</sup> and canaryseed<sup>\*†</sup>***: 3-leaf to just before the emergence of flag leaf stage
- ***Winter wheat***: Apply in the spring from the 3 tiller stage to just before the emergence of flag leaf

Forage Grasses<sup>\*†</sup> grown for seed production:

- ***Seedling and established stands***: 4 leaf until the emergence of the flag leaf.
  - Bromegrass (meadow, smooth, hybrid)
  - Fescue (creeping red, tall)
  - Timothy
  - Wheatgrass (crested, intermediate)

**\* NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Users of this product on forage grasses and canary seed do so at their own risk.**

**† Prestige Brands only.**

## Weeds, Rates and Staging:

Unless otherwise stated, the following weeds will be controlled if sprayed in the 2 to 4 leaf stage.

Only ***Prestige XC A*** at 0.13 L per acre plus ***Prestige XC B*** at 0.6 L per acre or ***Prestige XL*** at 0.71 L per acre controls:

- |                                       |                              |                                |
|---------------------------------------|------------------------------|--------------------------------|
| ◦ Burdock                             | ◦ Plantain <sup>***</sup>    | ◦ Volunteer flax (1 to 12 cm)  |
| ◦ Canada thistle (light infestations) | ◦ Prickly lettuce            | ◦ Volunteer sunflower          |
| ◦ Cleavers <sup>†</sup>               | ◦ Ragweeds                   | ◦ Wild annual sunflower        |
| ◦ Field horsetail <sup>***</sup>      | ◦ Shepherd's-purse           | ◦ Wild buckwheat <sup>††</sup> |
| ◦ Flixweed (spring seedlings only)    | ◦ Stinkweed                  | ◦ Wild mustard                 |
| ◦ Kochia                              | ◦ Stork's-bill (1 to 8 leaf) | ◦ Wild radish                  |
| ◦ Lamb's-quarters                     | ◦ Vetch                      |                                |

**Prestige XC A at 0.17 L per acre plus Prestige XC B at 0.8 L per acre or Esteem (ADAMA Fluroxypyr 180 at 323 mL per acre plus ADAMA Clopyralid 360 at 112 mL per acre) or MPower Foxy CM (MPower Foxy at 323 mL per acre plus MPower Clobber at 112 mL per acre) plus MPower MCPA 600 Ester at 378 mL per acre; or Prestige XL at 0.85 L per acre controls:**

*The weeds controlled by Prestige Brands above plus:*

- Annual sow-thistle
- Canada thistle\* (moderate to heavy infestations)
- Chickweed (up to 6 cm)<sup>Δ</sup>
- Cleavers<sup>††</sup>
- Common groundsel
- Dandelion<sup>\*\*</sup>
- Flixweed<sup>\*\*</sup>
- Hemp-nettle (2 to 6 leaf stage)<sup>Δ</sup>
- Kochia
- Lamb's-quarters
- Perennial sow-thistle\*
- Redroot pigweed
- Round-leaved mallow (1 to 6 leaf)
- Russian pigweed
- Scentless chamomile
- Shepherd's-purse
- Smartweed
- Stinkweed
- Stork's-bill (1 to 8 leaf)
- Tartary buckwheat
- Volunteer canola
- Volunteer flax (1 to 12 cm)
- Wild annual sunflower
- Wild buckwheat<sup>††</sup>
- Wild mustard

\* **Spray when 4 to 6 inches (10 to 15 cm) high. Season long control, with some regrowth in the fall.**

\*\* **Spring rosettes only.**

\*\*\* **Top growth control only.**

<sup>†</sup> **1 to 4 whorls with Esteem and MPower Foxy CM; 1 to 8 whorls with Prestige Brands.**

<sup>††</sup> **1 to 4 leaf with MPower Foxy CM, 1 to 8 leaf with Esteem and Prestige Brands.**

<sup>Δ</sup> **Suppression only with MPower Foxy CM, control with Esteem, Prestige Brands.**

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre.
  - **Aerial:** 12 to 20 L per acre. Consult label for buffer zones.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with **ASABE S572.1 coarse** droplets. Tilt nozzles forward at a 45° angle to improve coverage of vertical targets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
fluroxypyr	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
clopyralid	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
MCPA	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

The activity of clopyralid/MPCPA + fluroxypyr is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought or heat stress) or if heavy infestations exist.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **In spring wheat (including durum) and barley:**
  - *Liquid Achieve*
  - *Assert* (0.53 to 0.65 L per acre) plus acidifier

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the clopyralid/MPCPA + fluroxypyr labels only.

Corteva Agriscience also supports the following mixes that are not on the *Prestige XC* label. Apply mixes according to the most restrictive use limitations for either product. Contact the company for more information on use:

- **Herbicides:** *Axial*, Fenoxaprop 120 EC, Clodinafop 240 EC, *Everest 2.0*, *Simplicity OD*, *Simplicity GoDRI*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 hours of post-emergent application may result in reduced weed control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT cut or graze treated fields of wheat, barley or canaryseed for 7 days after application. DO NOT cut treated forage grass fields for hay or forage. DO NOT graze treated forage grass fields.
- **Pre-harvest Interval:** DO NOT harvest crop within 60 days of application.
- **Re-cropping Interval:** Wheat, oat, barley, rye (not under-seeded to forage legumes, clover or alfalfa), flax, canola, field pea\* and mustard may be seeded the season following application.
  - \* **NOTE: DO NOT seed to field pea for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field pea grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application).**
    - Contact the manufacturer for more information before seeding field peas following drought conditions in the previous year.
    - DO NOT seed legume forages or crops other than those listed above until the second season following application.
- **Aerial Application:** Only *Prestige Brands* may be applied by air.
- **Storage:** Store product in original containers in a secure, dry, heated area. If the product is frozen, bring to room temperature and agitate before use.
- **Buffer Zones:**
  - *Esteem*, *MPOWER Foxy CM* – Leave a 15 meter buffer between aquatic or sensitive non-target terrestrial habitats and the closest spray pass.
  - *Prestige Brands*:

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	0	1
Fixed Wing aircraft**	4	0	60 (XC)/65 (XL)
Helicopter**	1	0	50 (XC)/55 (XL)

See page 36 for an explanation of the different habitats.

\* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Only *Prestige Brands* may be applied by air.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method C' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Danger – Poison.



Warning – Eye and Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.



# Command 360 ME

Herbicide Group

13 - clomazone

(Refer to page 45)

## Company:

FMC Corporation (PCP#27827)

## Formulation:

360 g/L clomazone formulated as a microcapsule suspension.

- Container size – 2 x 5.4 L

## Crops and Staging:

Apply to soil prior to seeding to herbicide-tolerant canola (all varieties).

## Weeds, Rates and Staging:

Apply *Command 360 ME* pre-emergent to weeds at 101 mL per acre for suppression (one jug treats 54 acres) or at 135 mL per acre for control (one jug treats 40 acres) of:

- Cleavers

Maximum ONE APPLICATION per year of *Command 360 ME* or other products containing the active ingredient clomazone.

DO NOT APPLY *Command 360 ME* to:

- sandy soils
- soils with greater than 10% organic matter
- fields receiving applications of solid manure, unless it has been thoroughly incorporated to a depth of 10 to 15 cm

## Application Information:

- **Water Volume:** minimum 40 L per acre.
- **Nozzles & Pressure:** Use 30 psi (207 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE coarse** droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
clomazone	PRE (soil active)	DOXP Pigment synthesis inhibitor	Upward (Apoplast)	Broadleaf (& grass at higher rates)	13

## Effects of Growing Conditions:

Rainfall (5 to 10 mm), or equivalent irrigation, is required within 7 to 10 days for activation. Dry conditions that persist after application may reduce weed control. Heavy rainfall after application may dilute the active layer and result in reduced weed control.

DO NOT apply when temperature exceed 25°C due to increased risk of vapour drift. Temporary whitening/yellowing of the crop may occur when emerging from treated soil. Under some conditions, temporary whitening or yellowing of leaves may occur on approved rotational crops where undesirable soil residues of *Command 360 ME* exist. Refer to the label for more details.

## Tank Mixes:

None registered.

FMC Corporation supports the following tank mixes that are not on the *Command* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Aim EC*, Glyphosate (180 to 360 g ae per acre)

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Moderate rainfall after application is required for activation. Heavy rainfall shortly after application may reduce activity.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze the treated crop or cut for hay.
- **Re-cropping Interval:** Winter wheat may be sown 4 months after application. Canola, corn (field, sweet), dry bean (kidney, navy), field pea, potatoes, soybean, lentils, barley, oats and wheat (spring or durum) may be planted the year after application. All other crops may be planted 16 months after application. Under some conditions, temporary whitening or yellowing of leaves may occur on approved rotational crops where undesirable soil residues of *Command 360 ME* exist.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store above 5°C to keep from freezing. If frozen, thaw before use. If solid crystals are observed, warm to above 15°C and shake or roll container periodically to dissolve solids. DO NOT store near heat or open flame.
- **Buffer Zones:** DO NOT apply *Command 360 ME* within 90 metres of sensitive plants and sensitive terrestrial habitats or within 370 metres of fruit, nursery and greenhouse production. A buffer zone of 370 metres should also be observed for applications adjacent to residential areas and established vegetation. DO NOT apply *Command 360 ME* directly to surface water or to areas where runoff is likely to occur.

See page 36 for an explanation of the different habitats.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- Spray when winds are under 16 km/hr, but not dead calm.

## Sprayer Cleaning:

Refer to 'Method A or B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison

Potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Conquer

Herbicide Group  
6 - bromoxynil  
14 - pyraflufen-ethyl  
(Refer to page 45)

## Company:

Nufarm Agriculture (PCP#32528)

## Formulation:

15 g/L pyraflufen-ethyl and 467 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 2 x 9.71 L, 77.7 L

## Crops and Staging:

*Canola, wheat (spring, durum, winter), barley, fall rye, oats, triticale, corn, canary seed:* Apply prior to seeding or post-seeding but prior to crop emergence.

*Fallow:* Apply to small, actively growing weeds

## Weeds, Rates and Staging:

Apply *Conquer* at 122 mL per acre to control:

- |                      |   |  |
|----------------------|---|--|
| ◦ Annual Sowthistle* | ◦ Kochia – including resistant biotypes | ◦ Stinkweed*                             |
| ◦ Cleavers           | ◦ Lamb's-quarters                       | ◦ Volunteer Canola (cotyledon to 4 leaf) |
| ◦ Cow Cockle*        | ◦ Narrow-leaved hawk's beard*           | ◦ Wild buckwheat*                        |
| ◦ Dandelion*         | ◦ Night-flowering catchfly (Seedling)   | ◦ Wild mustard*                          |
| ◦ Flixweed*          | ◦ Redroot pigweed                       |  |

\* Suppression only, control when mixed with the appropriate rate of glyphosate. Refer to the glyphosate label for rate recommendation.

Apply *Conquer* at 122 mL per acre plus glyphosate\*\* to control all weeds controlled by *Conquer* alone and glyphosate alone plus:

- Pineappleweed\*
- Stinkweed
- Wild mustard\*
- Shepherd's-purse
- Wild buckwheat

\* Suppression only, control when mixed with the appropriate rate of glyphosate. Refer to the glyphosate label for rate recommendation.

\*\* present as isopropylamine or potassium salt

Apply *Conquer* at up to 242 mL per acre to control volunteer canola beyond the 3 leaf stage.

## Application Information:

- **Water Volume:** 20 to 40 L per acre.
- **Nozzles & Pressure:** Flat fan nozzles with a spray pressure of 30 to 40 psi (210 to 275 kPa) is recommended. DO NOT apply with spray droplets smaller than the *ASABE medium* classification.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
bromoxynil	POST (foliar)	PSII Inhibitor/ Membrane disrupter	Little (Apoplast)	Broadleaf only	6
pyraflufen-ethyl	POST (foliar) with slight soil activity	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Non-selective Broadleaf	14

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance the activity of *Conquer* by allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and regrowth may occur. Weed control may be reduced if the plants are beyond the recommended application growth stage, and during stress conditions, e.g. drought, heat or cold stress, or in heavy infestations where overlapping leaves prevent spray contact. For best results, ensure thorough spray coverage of target weeds.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides

- **Pre-Emergent and Pre Plant Incorporated:** Glyphosate (Follow label rates)

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

## Restrictions:

- **Rainfall:** Within 1 hour of application may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated fields for 24 hours.
- **Grazing Restrictions:** DO NOT use treated areas for grazing or green feed until 30 days after application.
- **Re-cropping Interval:** Registered crops can be seeded immediately after application. Any crops not listed can be seeded 30 days after an application of *Conquer*.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry, secure place. DO NOT freeze.

• **Buffer Zones:**

Application method/rate	Buffer Zones (metres †) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground* - 112 mL/acre	1	1	1
Ground* - 242 mL/acre	1	1	2

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy

† Distance measured as metres from the downwind edge of the spray boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12-13. Let solution stand for an extended period for better results. Flush sprayer system with water. See the label for product specific cleaning details.

## Hazard Rating:



Danger – Poison



Warning – contains the allergen soy. Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Dicamba

**Herbicide Group**

**4 - dicamba**

(Refer to page 45)

## Company:

BASF Canada (*Engenia*, *Banvel II\**, *Banvel VM*)

Gharda Chemicals (*Oracle* distributed by UAP)

Bayer (*Xtendimax*)

Corteva Agriscience (*FeXapan*)

## Formulation:

**Banvell II\*** (PCP#23957), **Banvel VM** (PCP#29249): 480 g ae/L dicamba formulated as a solution of a diglycolamine salt.

**Engenia** (PCP#32220): 600 g ae/L dicamba formulated as a solution of N,N-Bis-(3-aminopropyl)methylamine salt.

**Oracle** (PCP#26722): 480 g ae/L dicamba formulated as a solution of a dimethylamine salt.

**Xtendimax** (PCP#31896), **FeXapan** (PCP#32188): 350 g ae/L dicamba formulated as a solution of a diglycolamine salt.

**\*NOTE:** This product is no longer manufactured but product still remains in the distribution system. This product may be removed from future editions.

## Crops, Rates and Staging:

*Note: The use of these chemicals may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sand, loamy sand and sandy loam soils) and/or the depth to the water table is shallow (less than 2 m). Avoid use in these situations.*

*Banvel II* and *Oracle* are registered for the all of the uses below. *Banvel VM* is only registered for pasture and rangeland uses below.

Crop	Stage	Rate (mL per acre)			
		g acid equivalent per acre	480 g/L dicamba formulations	<i>Engenia</i>	350 g/L forms
Spring wheat*	2 to 5 leaf	45 to 56	93 to 117	75 to 95	127.5 to 161
Barley*	2 to 5 leaf	45 to 56	93 to 117	75 to 95	127.5 to 161
Oats*	2 to 5 leaf	45 to 56	93 to 117	75 to 95	127.5 to 161
Canaryseed*	3 to 5 leaf	56	117	95	161
Winter wheat*	In spring 6 to 10 inches (15 to 25 cm) - prior to flag leaf	45 to 56	93 to 117	75 to 95	127.5 to 161
Spring rye*	2 to 3 leaf	45 to 56	93 to 117	75 to 95	127.5 to 161
Corn, field	Broadcast up to 8 inches (20 cm).	117 to 242	243 to 505	200 to 400	333 to 692
Corn, field + 2,4-D	When higher, use drop-nozzles.  Apply no later than 2 weeks prior to tassel emergence and prior to 20 inches (50 cm).	56	117	95	161
Red fescue (for seed production)	Seedling: 2 inches (5 cm) tall. Established: up to the flag leaf stage.	117	243	200	333
Pastures	Established and actively growing	408 to 710	850 to 1,480 (0.85 to 1.48 L)	530 to 1182	1174 to 2550
<i>Seedling grasses (for seed and forage production):</i> Fescue (creeping red, meadow, tall), Meadow foxtail, Orchardgrass, Smooth brome grass, Timothy, Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall)	2 to 4 leaf	45 to 56	93 to 117	75 to 95	127.5 to 161
Fall stubble	Apply according to weed stage.	480	1000 (1.0 L)	800	1376
Fall stubble + glyphosate	Apply according to weed stage.	240	500	400	692
Pre-seeding cereals	Apply according to weed stage.	61	127	100	175
Chemfallow + 2,4-D	Apply according to weed stage.	45 to 56	93 to 117	75 to 95	127.5 to 161
Chemfallow + glyphosate	Apply according to weed stage.	56 to 117	117 to 243	95 to 200	161 to 333

\* Should be mixed with a tank mix partner for broad spectrum control

#### In Dicamba Tolerant Soybeans:

Apply to Roundup Ready 2 Xtend soybeans from prior to the emergence of the crop (Pre-plant or Pre-emergence) and/or after the emergence of the crop (Post-emergent) to the crop once or twice up to the early flower stage (R1) of the crop.

Crop	Rate (mL per acre)	
	<i>Engenia</i>	350 g/L forms
Dicamba tolerant Soybeans	200 to 400	333 to 692

## Weeds, Rates and Staging:

Apply to annual broadleaf weeds at the 2 to 3 leaf stage and to winter annual rosettes up to 2 in. (5 cm) across.

### Dicamba applied alone at 45 to 56 g ae per acre will control:

- Cleavers (high rate only)
- Cow cockle
- Corn spurry
- Canada thistle\*
- Perennial sow-thistle\*
- Smartweed (green, lady's-thumb)
- Tartary buckwheat
- Wild buckwheat

### Dicamba at 117 to 242 g ae per acre will control:

- Canada thistle\*\*
- Canada fleabane
- Field bindweed\*\*
- Lamb's-quarters
- Mustard (hare's-ear, Indian, tumble, wild, wormseed)
- Perennial sow-thistle\*\*
- Pigweed (redroot, Russian)
- Ragweed (common, false, giant)

### Dicamba at 408 g ae per acre in rangeland or 480 g ae per acre in fallow will control:

Weeds listed above plus:

- Curled dock\*
- English daisy
- Goldenrod
- Tansy ragwort

### Dicamba at 892 g ae per acre will control:

Weeds listed above plus:

- Diffuse knapweed
- Goat's-beard
- Ground cherry
- Pasture sage
- Povertyweed
- Sheep sorrel
- Thyme-leaved spurge

\* Top growth only.

\*\* Three consecutive years of treatment are required for complete control.

The following chart indicates weed and brush controlled by dicamba + 2,4-D mixes at the listed rates.

Weeds	Rate (g ae per acre) <sup>†</sup>	
	Dicamba	2,4-D
Poison ivy	322	426
Wild carrot	408	426
Aspen poplar	634	852
Prickly rose, western snowberry <sup>†††</sup>	710	852
Rate (L/1000 L of water) <sup>††</sup>		
Alder, aspen poplar, cherry, western snowberry, wolf willow, wild rose	408	745

<sup>†</sup> Applied by broadcast sprayer.

<sup>††</sup> Apply to the foliage and stems to the point of run-off using high volume equipment.

<sup>†††</sup> Ester formulations of 2,4-D only.

**Canada thistle, Perennial sow-thistle in fallow:** Apply prior to the bud stage. Must be applied to thistle plants with 6 to 10 inches (15 to 25 cm) of new growth.

**Canada thistle control in fall after harvest:** When thistles exhibit new growth and at least 2 weeks prior to a killing frost.

Refer to label for full lists of weeds controlled by dicamba plus tank mixes in cereals, pastures, fallow and other situations.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

**Brush control in pastures:** When brush is actively growing and is 6 feet (2 m) in height or less (in spring or early summer). Growth greater than 2 metres may be cut and allowed to regrow prior to treatment.

## Application Information:

- **Water Volume:**
  - **Preseeding burnoff:** 20 to 45 L per acre.
  - **Annual crops:** at least 45 L per acre.
  - **Pastures, fallow and stubble:** 45 to 90 L per acre.
  - **Corn:** 90 to 140 L per acre.
  - **Brush:** high volumes to the point of run-off.

- **Nozzles and Pressure:**

- **Broadcast application:**

- *Dicamba tolerant soybeans (Enginia, FeXapan and Xtendimax only):* Use nozzles that deliver **extremely coarse to ultra coarse** spray droplets (volume median diameter of **450 microns or more**) as defined by **ASABE standard S572.1** and as shown in the nozzle manufacturer's catalog.

- *Other Uses:* Maximum 40 psi (275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver even coverage of **ASABE coarse** droplets.

- **Brush Control:** Use high volume spray equipment producing large droplets including, but not limited to, hand-wand, boomless nozzle and Radi-Arc technologies.

**Note:** Refer to product labels for detailed application information

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba	POST (foliar) PRE (soil active)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Crop damage (stunting, reduced seed set) can occur if the chemical is applied at any time other than the recommended stage. DO NOT apply to crop under stress from adverse environmental conditions, such as excess moisture, drought and disease. Apply when air temperature is between 10 and 25°C.

**DO NOT apply:**

- when there is a risk of severe temperature fall in the night;
- under high humidity, temperatures above 30°C, or fog conditions, to prevent drift to sensitive crops;
- when wind is blowing toward a nearby sensitive crop;
- when winds are below 3 km/h or above 15 km/h.

## Tank Mixes:

**Herbicides:**

	Spring wheat	Winter wheat	Barley	Oats	Seedling grasses
2,4-D Amine 160 g ae/L	✓	✓	✓		✓
MCPA Amine (0.34 L per acre)	✓	✓	✓	✓	✓
MCPA K (0.44 L per acre)	✓	✓	✓	✓	✓
<i>Sencor</i> (0.11 to 0.17 L per acre)	✓		✓		
<i>Ally</i> (2 g per acre)	✓		✓		

**In Canaryseed:** MCPA amine (0.34 L per acre – 500 g ai/L formulation)

**In Corn, Spring rye:** 2,4-D amine (160 g ae per acre)

**In Corn (*Banvel II* only):**

- *Accent* (13.5 g per acre) plus non-ionic surfactant
- *Option 2.25 OD* (0.63 L per acre) plus liquid 28-0-0 (*Banvel II* at 0.12 L per acre) (Manitoba only).

**In Chemical fallow, stubble:** 2,4-D, glyphosate products.

**In Red fescue:** 2,4-D amine (287 g ae per acre)

**In Preseeding burnoff:** Glyphosate (136 g ae per acre - see glyphosate page for product rates)

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the dicamba labels only.



Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing and Harvest Intervals:**
  - **Canaryseed:** Use only as birdseed.
  - **Corn:** DO NOT graze cattle or harvest for silage until 7 days after treatment of dicamba alone or for at least 12 weeks following dicamba tank mixes with other herbicides.
  - **Cereals, seedling grasses, pasture:** DO NOT harvest for silage for or graze lactating dairy cattle until 7 days after treatment. If treated vegetation has been consumed by dry dairy animals or meat animals within 30 days of dicamba application, feed the animal with untreated diet for 30 days before slaughter. Meat animals or dry dairy animals may graze or feed on treated pasture 3 days after dicamba application without restrictions on slaughter. Feed untreated forage within 3 days of slaughter.
  - **Dicamba tolerant Soybeans:** Pre-harvest interval of 7 to 10 days for soybean forage and 13 to 15 days for soybean hay. A plant back interval of 120 days is required for those not on the dicamba label.
- **Re-cropping Interval:** Grow only cereals, corn, soybeans or white beans the year after treatment with the 1.0 L per acre rate. Grow only cereals, corn, field beans, soybeans or canola the year after applications of 0.5 L per acre. If applications are made after September 1, or if dry weather persists after application, crop injury may occur the following spring.
- **Aerial Application:** May be applied by air on cereals only. Use a minimum water volume of 8 L per acre.
- **Storage:** May be stored at freezing temperatures.
- **Buffer Zones:**  
Buffers are not required for hand-held and backpack applications.

Application method	Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground*	Barley, oats, rye, wheat, canary seed, seedling forage grasses	0	0	1
	Corn, established forage grasses, red fescue	1	1	4
	Dicamba tolerant soybeans ( <i>Engenia</i> and <i>Xtendimax</i> only)	1	1	4
	Stubble, fallow	1	1	5
	Pasture and rangeland	1	1	10
Winged airplane	Barley, oats, rye, wheat	0	0	50
Helicopter		0	0	45

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Dicamba/Mecoprop/MCPA

Herbicide Group  
4 - dicamba,  
mecoprop-p & MCPA  
(Refer to page 45)

## Company:

Syngenta Canada (*Target* – PCP#28028)

Loveland Products Canada (*Sword* – PCP#27892)

IPCO (*Tracker XP* – PCP#27790)

## Formulation:

275 g/L MCPA + 62.5 g/L mecoprop-p + 62.5 g/L dicamba formulated as a solution.

- Container size - 2x10 L and 160 L (*Target*), 500 L (*Sword*), 1000 L (*Sword*)

## Crops and Staging:

### All Products:

#### Cereals:

Crop	Stage
Barley	2 to 4 leaf (3 leaf for best crop safety)
Canaryseed, Oats, Spring wheat (including durum)	2 to 5 leaf (3 to 4 leaf for best crop safety)
Winter wheat	Spring application only; up to 12 inches (30 cm) high (top leaf extended)
Fallow	Fall stubble

### *Target* and *Sword* only:

- **Seedling grasses grown for forage only (NOT for seed production)\*:** Apply at the 2 to 4 leaf stage.
  - Creeping red fescue
  - Meadow foxtail
  - Smooth brome grass
  - Wheatgrass (crested, intermediate)
  - Orchardgrass
  - Timothy
- **Established grasses for forage only (NOT for seed production)\*:** Apply up to flag leaf stage.
  - Brome grass (meadow, smooth)
  - Meadow foxtail
  - Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall, western)
  - Fescue (creeping red, meadow, tall)
  - Orchardgrass
  - Kentucky bluegrass
  - Timothy

**\* NOTE:** Use only one application per year by ground. Since applications to forage grasses in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Application to forage grasses are at the risk of the user.

## Weeds and Staging:

Weeds controlled at 0.4 to 0.6 L per acre (10 L treats 25 to 16.7 acres) from the 2 to 3 leaf stage unless otherwise indicated:

- Bindweed\* (field, hedge)
- Hemp-nettle (less than 2 pairs of true leaves)
- Russian thistle (less than 2 inches (5 cm))
- Buckwheat (tame, tartary, wild)
- Kochia
- Shepherd's-purse
- Canada thistle (6 to 8 inches (15 to 20 cm))\*
- Lamb's-quarters
- Smartweed (green, lady's-thumb)
- Cleavers (1 to 2 whorls)
- Mustards (ball, tall, wild, wormseed, yellow)
- Sow-thistle (annual, perennial\*)
- Corn spurry
- Night-flowering catchfly
- Stinkweed
- Cow cockle
- Pigweed (prostrate, redroot)
- Volunteer canola
- Flixweed
- Ragweed, common
- Volunteer sunflowers

**\* Top growth control only**

Use the higher rate under adverse weather conditions, when weed density is high, for cleavers control, winter annual control and for suppression of Canada thistle and perennial sow-thistle.

Although dicamba/mecoprop-p/MCPA is registered up to the 5 leaf stage of the crop for the rates listed here, the low rate should be used when the crop is at the 5 leaf stage for optimum crop safety.

For Canada thistle, post-harvest or fallow application, use 0.81 L per acre (one 10 L container treats 12.4 acres).

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 40 L per acre.
  - **Aerial:** Minimum of 12 L per acre
- **Nozzles and Pressure:** 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE coarse** droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba, mecoprop, MCPA	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Hot and dry or cold and wet weather prior to spraying may result in reduced weed control and increased crop injury.  
DO NOT apply within 2 weeks of a killing frost.

## Tank Mixes:

### Herbicides:

- **Spring wheat (including durum):**
  - *Horizon NG* \*(label rates - no adjuvant required)
- **Wheat and Barley:**
  - *Sencor* or *linuron* for chickweed control.
  - \* **Target only.**

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the dicamba/mecoprop-p/MCPA labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Activity may be reduced if rainfall occurs within 3 hours of application. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or harvest for livestock feed within 7 days of application.
- **Pre-harvest Interval:** Leave at least 80 days from application to harvest.
- **Re-cropping Interval:** No restrictions the year after application.
- **Aerial Application:** All may be applied by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**  
Buffers are not required for hand-held and backpack applications.

Application method	Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground *	Standing Crops	1	1	5
	Fallow and stubble	1	1	5

Application method	Crops	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Fixed wing airplane	Cereals	1	0	60
	Canaryseed	1	0	75
	Forage	1	0	75
	Fallow and stubble	5	1	100
Helicopter	Cereals	1	0	50
	Canaryseed	1	0	60
	Forage	1	0	60
	Fallow and stubble	4	1	80

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to pages 12 and 13.

## Hazard Rating:



Caution – Poison



Warning – Eye Irritant. Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Dichlorprop/2,4-D

Herbicide Group  
4 - dichlorprop & 2,4-D  
(Refer to page 45)

## Company/Products:

Nufarm Agriculture (*Estaprop XT*)

IPCO (*Dichlorprop-DX*)

## Formulation:

*Estaprop XT* (PCP#29660); *Dichlorprop-DX* (PCP#29664): 210 g/L of dichlorprop-P and 400 g/L of 2,4-D ester formulated as an emulsifiable concentrate.

- Container sizes:
  - Estaprop XT* - 2 x 9.7 L, 97.1 L
  - Dichlorprop-DX* - 2 x 10L, 115 L

## Crops and Staging:

Wheat (spring, durum) and barley - 4 leaf until the early flag leaf stage.

Winter wheat - in spring from tillering to the early flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

Treat weeds when young and actively growing and before they are shielded by the crop. Additional stage restrictions indicated are the minimum indicated over all labels. Check individual labels for exceptions.

- Bluebur
- Burdock
- Canada thistle\*
- Cocklebur
- Curled dock\*
- Dandelion\*\*\*
- Flixweed
- Kochia (up to 2 inches)
- Lamb's-quarters
- Mustards (ball, dog, hare's-ear, Indian, tumble, wild, wormseed)
- Night-flowering catchfly♦
- Oak-leaved goosefoot
- Pigweed (redroot, Russian)
- Prickly lettuce (2 to 12 leaf)†
- Ragweed (Common, giant††♦♦)
- Round-leaved mallow
- Russian thistle (up to 2 inches)
- Shepherd's-purse
- Sow-thistle (annual, perennial\*)
- Spreading atriplex (cotyledon to 10 leaf)††
- Stinkweed
- Stork's-bill
- Toadflax\*\*
- Volunteer canola

Control the following weeds up to the 4 leaf stage:

- Smartweed (including lady's-thumb)
- Tartary buckwheat
- Volunteer Sunflower
- Wild buckwheat

\* Top growth control only

\*\* Suppression only. Treat before the majority reach 6 inches (15 cm).

\*\*\* Season long control in winter wheat.

♦ Spring annuals only

♦♦ Treat prior to the 6 leaf stage

† In winter wheat only.

†† *Estoprop XT* in winter wheat only.

## Rates:

486 mL per acre.

- (One jug treats 20 acres)

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dichlorprop, 2,4-D	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 97 L per acre\*. Use a minimum of 40 L of water per acre to reduce the risk of drift.
  - **Aerial:** Minimum 12 L per acre.
- **Nozzles and Pressure:** 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with **ASABE coarse** droplets or larger.

\* May vary by product. Check label closely.

## Effects of Growing Conditions:

Applications made under dry conditions may result in reduced control. Crops under stress from adverse environmental conditions, such as excess moisture, frost or drought, may be injured. Best weed control when adequate soil moisture is present and warm temperatures prevail. DO NOT apply when daytime temperatures exceed 27°C.

## Tank Mixes:

### Herbicides:

Tank Mix Partner (Mixed at label rates unless otherwise indicated)	Crops			
	Spring wheat	Durum	Winter wheat	Barley
Imazamethabenz <sup>Δ</sup>	•	•		•
Clodinafop <sup>Δ</sup>	•	•		
Fenoxaprop <sup>Δ</sup>	•	•		• <sup>†</sup>
Thifensulfuron/tribenuron <sup>Δ††</sup>	•	•	•	•
Tralkoxydim <sup>Δ</sup>	•	•	•	•

<sup>†</sup> *Cordon, Vigil WB and WildCat* only.

<sup>††</sup> *Estaprop XT* only.

<sup>Δ</sup> Manufacturers may only support mixes with specific products. Contact the manufacturer for more information.

Note: Always refer to the label or the page for the tank mix partner in this guide for additional restrictions on staging and varieties.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on dichlorprop-P+2,4-D labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** Leave 12 hours before entering treated fields.
- **Grazing Restrictions:** DO NOT graze the treated crop or harvest for hay or feed within 40 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.
- **Pre-harvest Interval:** Leave 40 days from spraying until harvest of winter wheat and 60 days for other crops.
- **Re-cropping Interval:** No restrictions the year after application. Fields treated with *Estaprop XT* may be replanted after a minimum of 30 days.
- **Aerial Application:** May be applied by air. Refer to specific product labels for full details for application by air.
- **Storage:** May be frozen.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat <sup>**</sup>
	Less than 1 m	Greater than 1 m	
Ground	1	1	1
Fixed wing aircraft	5	1	30
Helicopter	3	1	30

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Handheld or backpack sprayers do not require a buffer zone.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Diquat

Herbicide Group

22 - diquat

(Refer to page 45)

## Company:

Syngenta Canada (*Reglone*, *Reglone Ion*, *Desica*)

ADAMA Canada (*Armory 240*)

AgraCity (*MPower Clone*)

Sharda Cropchem (*Diquat 240*)

Federated Co-operatives Ltd. (*Co-op Bolster*)

IPCO (*Bolster*)

Loveland Products (*Stage*)

Nufarm Agriculture (*Drifast*)

Univar Canada Ltd (*Guardsman Diquat*)

Winfield United Canada (*Craven*)

## Formulation:

**Armory 240 (PCP#32726); Bolster (PCP #32540); MPower Clone (PCP#32997); Co-op Bolster (PCP#33005), Craven (PCP#32231), Desica (PCP#30488); Diquat 240 (PCP#31754); Drifast (PCP#32648); Stage (PCP#31597); Guardsman Diquat (PCP#32606); Reglone (PCP#26396):** 240 g/L diquat ion (present as dibromide) formulated as a solution.

- Container size - 2 x 10 L, 115 L

**Reglone Ion (PCP#31058):** 200 g/L diquat formulated as a solution. Comes with a built-in-adjuvant

- Container size - 2x10 L, 115 L, 450 L

## Crops and Staging:

**Note:** As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from crops treated with this product may have market access concerns. Please see page 10 for more information AND consult potential grain buyers before using this product.

Diquat is used to dry immature green material at top of indeterminate crops and green weeds to facilitate harvest. Diquat will not speed maturity of green crops. Treatment before the recommended stage can result in reduced yield and quality. Add 0.1 L of *Agral 90* or 0.25 L of *LI 700* per 100 L of spray solution for all applications of 240 g/L formulations. Refer to product labels for specific recommendations for adjuvant use.

Crop	Stage	Rate (L/Acre)			
		240 g/L formulations		Reglone Ion	
		Ground	Aerial	Ground	Aerial
Canola*†	90% or more of seed has turned brown.	0.50 to 0.69†	0.69 to 0.93	0.61 to 0.83†	0.83 to 1.11†
Dry Beans - Red and white kidney	Crop has lost 80 to 90 percent of leaves and 80 percent of pods are yellow.				
Soybeans					
Faba beans	Most plants are ripe and dry. Pods fully filled, bottom pods are tan or black in colour.				
Flax and Solin (low linolenic acid flax)	75 percent of bolls brown.				
Lentils	Lowest pods are light brown and rattle when shaken.				
Mustard (condiment type only)	75 percent of seed has turned brown.				
Peas	Bottom pods are ripe and dry, seeds detached from pods.				



Crop	Stage	Rate (L/Acre)			
		240 g/L formulations		<i>Reglone Ion</i>	
		Ground	Aerial	Ground	Aerial
Sunflowers	Backs of sunflower heads and bracts are turning yellow and seed moisture is 20 to 50 percent.	0.50 to 0.69 <sup>†</sup>	0.69 to 0.93	0.61 to 0.83 <sup>†</sup>	0.83 to 1.11 <sup>†</sup>
Chickpeas <sup>†</sup>	Plants yellow, pods mature, seeds changed colour and detached from pods.	0.50 to 0.69 <sup>†</sup>	0.69	0.61 to 0.83 <sup>†</sup>	0.83
Potatoes (top growth mature and few weeds)	Two weeks prior to harvest.	0.5	Requires 2 Passes	DO NOT use <i>Reglone Ion</i> on Potatoes	
Potatoes (some top growth and/or some weeds)		0.69 to 0.93 <sup>**†</sup>	Pass #1: 0.69 to 0.93 L/acre <sup>**</sup>		
Potatoes (dense crop, heavy weed infestations)		1.42 <sup>**†</sup>	Pass #2: (4 to 5 days later) at 0.5 L/acre		
Alfalfa, bird's-foot trefoil, red and white clover (for seed production only) <sup>***</sup>	Pods are ripe but before shattering. Harvest within 7 days.	0.69 to 1.09 <sup>†</sup>	0.69 to 1.09 <sup>†</sup>	0.83 to 1.32 <sup>†</sup>	0.83 to 1.32 <sup>†</sup>

<sup>†</sup> Use high rates for dense crops and/or heavy weed infestations. Use of high rates for canola and chickpea is recommended.

\* This product can cause shattering losses in non-shatter resistant canola.

\*\* DO NOT use an adjuvant on potatoes except at the 0.5 L per acre ground application rate.

\*\*\* DO NOT use on forage legumes that have been treated with a residual herbicide in the previous 12 months.

## Application Information:

### • Water Volumes:

- **Ground:** 91 to 222 L per acre. Use 222 to 445 L per acre on potatoes.
- **Aerial:** 18 L per acre.

Use the highest water volumes when crop canopy is heavy or if weed growth is dense.

- **Nozzles and Pressure:** 20 to 30 psi (150 to 200 kPa) when using conventional Flat fan nozzle tips are recommended for proper coverage. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets. Rotary atomizer nozzles and other low volume and ultra low volume application equipment are not recommended for use with diquat.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
diquat	POST (foliar)	PS I Inhibitor/Membrane disruptor	Little (Apoplast)	Non-selective	22

## Effects of Growing Conditions:

Best results under cloudy conditions or in evening. Shattering losses can increase if heavy winds, rain or hail occur after the crop has dried down.

## Tank Mixes:

**Herbicides:** None registered.

**Insecticides:** None registered.

**Fungicides:** Fungicides may be added when applying diquat to potatoes for vine killing.

**Fertilizers:** None registered.

## Restrictions:

- **Rainfall:** Within 15 minutes may reduce effectiveness.
- **Re-entry Interval:** Leave 24 hours before entering treated fields.
- **Grazing Restrictions:** Crop residues remaining after harvest may be fed to livestock.
- **Pre-harvest Interval (note these recommended intervals may be for functional or marketability reasons):**
  - **Faba bean, Lentil:** Wait 4 to 7 days to harvest.
  - **Forage Legumes:** DO NOT exceed 7 days.
  - **Canola, Mustard:** Wait 7 to 10 days; maximum 14.
  - **Sunflowers:** Wait 15 to 20 days.
  - **Flax, Peas:** When sample tests dry.
- **Re-cropping Interval:** No restrictions the year after application.
- **Aerial Application:** May be applied by air in a minimum of 18 L per acre water volume.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**

Application method	Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground*	Potatoes	10	5	5
	Other crops under "Crops:" section	5	3	3
Winged aircraft	Potatoes	200	100	100
	Beans, Legume forage seed	150	80	90
Helicopter	Potatoes	125	65	80
	Beans, Legume forage seed	100	55	70

See page 36 for an explanation of the different habitats.

\* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

When finished spraying diquat, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and *Agral 90* at 0.6 L per 1,000 L spray solution. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Refer to pages 12 and 13 for additional information.

## Hazard Rating:



Warning – Poison



Caution – May cause eye damage, Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Distinct

Herbicide Group  
4 - dicamba  
19 - diflufenzopir  
(Refer to page 45)

## Company:

BASF Canada (PCP#25811)

## Formulation:

20% diflufenzopir and 50% dicamba, sodium salt formulated as a water dispersible granule.

- Container size - 2 x 2.3 kg

## Crops and Staging:

### Fallow and Post-Harvest applications

Corn - 2 to 6 leaf stage

*Note: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sand, loamy sand and sandy loam soils) and/or the depth to the water table is shallow.*

## Weeds, Rates and Staging:

### Corn:

**Distinct applied post-emergent to weeds below at 115 grams per acre plus a non-ionic surfactant (see page 43) and UAN (liquid 28-0-0) at 1.25 L per 100 L of spray solution will control:**

- |                                    |                             |                                   |
|------------------------------------|-----------------------------|-----------------------------------|
| ◦ Biennial wormwood (2 to 8 leaf ) | ◦ Ragweed (common, giant**) | ◦ Velvetleaf                      |
| ◦ Canada thistle*                  | (2 to 8 leaf)               | ◦ Volunteer canola (up to 4 leaf) |
| ◦ Cocklebur (6 leaf)               | ◦ Redroot pigweed           | ◦ Wild buckwheat                  |
| ◦ Kochia (up to 15 cm)             | ◦ Sow-thistle, perennial**  |                                   |
| ◦ Lady's-thumb                     | (2 to 10 leaf)              |                                   |
| ◦ Lamb's-quarters                  | ◦ Tall waterhemp            |                                   |

### Fallow or post-harvest:

It is recommended that *Distinct* be tank-mixed with glyphosate and *Merge* adjuvant (200 mL per acre).

**Distinct at 58 g per acre (40 acres per jug), as a tank mix with glyphosate, provides enhanced control of the following weeds:**

- |                   |                              |                             |
|-------------------|------------------------------|-----------------------------|
| ◦ Dandelion*      | ◦ Narrow-leaved hawk's-beard | ◦ Sow-thistle, spiny annual |
| ◦ Kochia          | ◦ Redroot Pigweed            | ◦ Wild buckwheat            |
| ◦ Lamb's-quarters | ◦ Round-leaved mallow        |                             |

**Distinct at 115 g per acre (20 acres per jug) controls:**

- |  |                            |                                   |
|--|----------------------------|-----------------------------------|
| ◦ <u>Weeds listed</u> at 58 g per acre plus: |                            |                                   |
| ◦ Biennial wormwood                          | ◦ Lamb's-quarters          | ◦ Velvetleaf                      |
| (2 to 8 leaf)                                | ◦ Redroot pigweed          | ◦ Volunteer canola (up to 4 leaf) |
| ◦ Canada thistle*                            | ◦ Ragweed, common          | ◦ Wild buckwheat                  |
| ◦ Cocklebur                                  | ◦ Sow-thistle, perennial** |                                   |
| ◦ Lady's-thumb                               | ◦ Tall waterhemp           |                                   |

\* Top growth control only.

\*\* Suppression only.

A general guide to mixing can be found on page 11.

DO NOT exceed a maximum application rate of 115 g per acre of *Distinct* per season.

## Application Information:

- **Water Volume:** 20 to 80 L per acre. High water volumes are required for adequate coverage, particularly when weed densities are high or weed staging is large.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage a of *ASABE coarse* droplets.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
diflufenzopyr	POST (foliar)	Auxin transport inhibitor	To growth areas of the plant (Symplast)	Broadleaf only	19

## Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C or less are forecast within 3 days of application or when temperatures are expected to exceed +27°C on the day of application. Under cool or dry conditions, control of some weeds may be severely reduced.

## Tank Mixes:

### Herbicides:

- **Fallow and Post-harvest:**
  - Glyphosate (180 to 360 g ae per acre) - recommended
- **Corn:**
  - None registered in western Canada.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

## Restrictions:

- **Rainfall:** Rain within 4 hours may reduce control.
- **Re-entry Interval:** Leave 12 hours before entering treated fields.
- **Grazing Restrictions:** DO NOT graze or cut as feed for 75 days.
- **Pre-harvest Interval:** DO NOT apply within 120 days of harvesting corn.
- **Re-cropping Interval:** A plant back interval of 30 days is required for the planting of rotational crops. Consult BASF for further information on rotational cropping.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place above 5°C.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only	15	15	10

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

*Distinct* can cause injury to sensitive crops at very low concentrations. Sprayers used to spray this product should be flushed out immediately after use.

Use 'Method B' on pages 12 and 13 to clean sprayers after using *Distinct*.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Dual II Magnum

Herbicide Group  
15 - metolachlor  
(Refer to page 45)

Company:

Syngenta Canada (PCP#25729)

Formulation:

915 g/L s-metolachlor formulated as an emulsifiable concentrate.

- Container size - 2 x 10 L

Crops and Staging:

Pre-plant incorporated.

**Pre-emergent:** In areas with good rainfall or under irrigation, *Dual II Magnum* may be applied as a pre-emergence surface treatment. At least 0.5 inches of water (1.25 cm) is required within 10 days of application for proper activity.

Refer to product label for more specific information on timing and rates of applications for each crop type.

- Corn (field, sweet, silage)
- Potatoes
- Sweet white lupins
- Dry beans (navy, kidney, pinto)\*
- Soybeans

\* Beans should be planted at least 4 cm deep to avoid crop injury. Dry bean varieties vary in their tolerance to *Dual II Magnum*. Test a limited acreage on all new varieties first.

Weeds, Rates and Staging:

**Pre-emergent and Pre-Plant Incorporated Treatments:** Apply 0.47 to 0.7 L per acre (12 L treats 24 to 17 acres) prior to weed emergence.

- Barnyard grass
- Nightshade (American, Eastern black)
- Yellow nutsedge\*\*
- Foxtail (green, yellow)
- Redroot pigweed\*
- Witch grass

\* Suppression only.  
\*\* Pre-plant incorporated treatment only.

Use higher rates on heavy textured soils or when high populations of weeds are expected.  
Maximum ONE APPLICATION per year of this or other products containing the active ingredient s-metolachlor.

Application Information:

- **Water Volume:** A minimum of 60 L per acre.
- **Nozzles:** Use 30 to 45 psi (200 to 300 kPa) when using conventional flat fan nozzles.
- **Screens:** Use 50 mesh screens.
- **Incorporation:** Apply to a firm seed bed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 6 km/hr (4 mph). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 10 km/hr (6 mph). Incorporation equipment should include rolling or western harrows.

How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metolachlor	PPI, PRE (surface) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

A moderate rainfall or equivalent irrigation (0.5 inches) is required within 10 days to activate pre-emergent surface treatments. If rain does not occur, a shallow cultivation or use of a rotary hoe is necessary. Drought conditions that persist after any application may reduce annual grass control. On sandy soils, heavy rainfall following application may cause leaching of *Dual II Magnum*, resulting in reduced weed control.

## Tank Mixes:

### Herbicides:

- **In Corn:** *AAtrex* and glyphosate in both PPI and pre-emergent applications.
- **In Soybeans:** *Sencor*, and glyphosate, in both PPI and pre-emergent applications.

**Fertilizers:** May be applied with liquid fertilizer. May be impregnated onto dry bulk fertilizers (except nitrate fertilizers, superphosphate fertilizers or limestone).

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the *Dual II Magnum* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** When applying as a pre-emergent surface treatment, 0.5 inches (1.25 cm) of rain or irrigation is required after application for proper activity.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze the treated immature crop or cut for hay. In corn, immature means before ear emergence.
- **Pre-harvest Interval:** DO NOT harvest corn within 80 days of post-emergent application.
- **Re-cropping Interval:** In the year of treatment, seed only corn, soybeans, white beans, potatoes, snap beans, lima beans, processing peas, sweet white lupins, or (a minimum of 4.5 months after application) winter cereals.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.
- **Buffer Zones:** Leave a buffer zone of 29 metres between last spray swath and the edge of important wildlife habitats such as wetlands, sloughs and water bodies.

## Sprayer Cleaning:

No detailed cleaning procedures are indicated on the label. Use a commercial all purpose spray sprayer cleaning product for adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Warning – Eye Irritant



Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# DyVel\*

\* Note: This product is no longer manufactured but some still remains in the distribution system. This product will be removed from future editions when supplies are exhausted.

**Herbicide Group**  
**4 - dicamba & MCPA**  
(Refer to page 45)

## Company:

BASF Canada (PCP#16545)

## Formulation:

84 g/L of dicamba and 336 g/L of MCPA K+ formulated as a solution.

- Container size - 10 L, 55 L, 110 L, 1000 L

## Crops and Staging:

Spring wheat (including durum), barley or oats - 2 to 5 leaf stage.

Winter wheat - apply in spring when crop is 6 to 10 inches (15 to 25 cm) tall but before shot blade stage.

*Note: Crop damage can occur if applications are made at other than the recommended crop stage.*

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled in the 2 to 4 leaf stage unless otherwise stated:**

- Burdock
- Cleavers (suppression only)
- Cocklebur
- Corn spurry (2 to 3 leaf)
- Cow cockle (2 to 3 leaf)
- Flixweed
- Hemp-nettle (2 to 3 leaf)
- Kochia
- Lamb's-quarters
- Mustards (ball, hare's ear, Indian, tumble, wild, wormseed)
- Pigweed (prostrate, redroot, Russian)
- Ragweed (common, false, giant)
- Russian thistle
- Shepherd's-purse
- Smartweed (green, lady's-thumb)
- Stinkweed
- Tartary buckwheat
- Wild buckwheat
- Wild radish
- Volunteer canola (2 to 4 leaf)
- Volunteer sunflowers

**Top growth control:**

- Canada thistle
- Perennial sow-thistle

## Rate:

0.51 L per acre (one 10 L jug treats 19.7 acres)

## Application Information:

- **Water Volume:**
  - **Ground:** 40 L per acre.
  - **Aerial:** Minimum 8 L per acre
- **Nozzles and Pressure:** Maximum 40 to 45 psi (275 to 310 kPa) when using conventional flat fan nozzles. To reduce the risk of drift damage to sensitive non-target crops when using conventional nozzles, 20 to 30 psi (150 to 200 kPa) as well as higher water volumes are recommended. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
MCPA	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

For best weed control, apply when temperature is between 10 and 25°C. DO NOT treat crops under stress from excessive moisture or drought. To avoid crop injury, DO NOT apply when temperature is expected to exceed 30°C, or when there is a risk of a severe drop in overnight temperature.

## Tank Mixes:

None registered.

**Note: No mixes are listed on the DyVel label with currently marketed products.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Avoid applying this product when heavy rain is forecast. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.



- **Grazing Restrictions:** DO NOT graze treated crop or cut for hay within 30 days of application.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Re-cropping Interval:** No restrictions the year after treatment.
- **Aerial Application:** May be applied by air.
- **Storage:** May be frozen.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4
Fixed wing aircraft	1	0	60
Helicopter	1	0	50

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to "Method A" in the general sprayer cleaning section on pages 12 and 13. If mixed with other pesticides, the cleaning method should be combined with the method recommended for the tank mix partner if different.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# DyVel DSp\*

\* Note: This product is no longer manufactured but some still remains in the distribution system. This product will be removed from future editions when supplies are exhausted.

**Herbicide Group**  
**4 - dicamba,**  
**2,4-D & mecoprop**  
*(Refer to page 45)*

## Company:

BASF Canada (PCP#27856)

## Formulation:

110 g/L dicamba, 295 g/L 2,4-D amine and 80 g/L mecoprop-p formulated as a solution.

- Container size - 10 L, 55 L, 100 L

## Crops, Rates and Staging:

Crop	Stage	Rate	
		(L per Acre)	Acres Per 10 L Jug
Spring wheat (including durum)	3 to 5 leaf	0.34 to 0.45	29 to 22
Barley	2 to 3 leaf	0.34	29
Winter wheat	Before crop is 12 inches (30 cm) tall in spring	0.34 to 0.45	29 to 22
Corn (field)** (DO NOT apply to sweet corn)	Before corn reaches 6 inches (15 cm) in height with the top leaf extended or by directed spray with drop nozzles once over 12 inches (30 cm).	0.34 to 0.45	29 to 22
Native range and permanent grass pasture*	Established	1.3	7.7

Crop	Stage	Rate	
		(L per Acre)	Acres Per 10 L Jug
Fall stubble, fallow	Stage according to weed	0.45 to 0.71	22 to 14

\* Legumes will be severely injured by this application.

\*\* NOTE: Under environmental stress corn will become brittle for 2 weeks after application. In-field mechanical processes and strong winds may cause stalk lodging during that time.

Applications outside the recommended stage may result in crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

The low registered rate for each crop will control the following weeds at the 2 to 3 leaf stage unless otherwise indicated:

- Annual smartweed (including lady's-thumb)
- Annual sow-thistle
- Cocklebur
- Common ragweed
- Corn spurry
- Hedge bindweed
- Knotweed
- Kochia
- Lamb's-quarters
- Mustards (wild, ball, tall, wormseed, yellow)
- Pigweed (prostrate, redroot)
- Russian thistle
- Stinkweed\*
- Volunteer canola (2 to 4 leaf, prior to bolting)
- Volunteer tame buckwheat
- Wild buckwheat

Use the high registered rate for each crop to control the following weeds:

- Canada thistle (top growth only)\*\*\*
- Cleavers (1 to 2 whorls)\*\*
- Cow cockle
- Field bindweed†
- Velvetleaf
- Flixweed\*
- Jerusalem artichoke
- Round-leaved mallow\*\*
- Shepherd's-purse\*
- Tartary buckwheat

† Apply when actively flowering.

\* Rosette stage in winter wheat.

\*\* Suppression only.

\*\*\* Canada thistle should be treated when 6 to 8 inches (15 to 20 cm) of new growth is present after harvest and in the early bud stage in fallow.

Rates for Native Range and Pasture will control:

- Alder
- Bull thistle
- Chicory
- Goat's-beard
- Poison ivy
- Ragwort
- Sheep laurel
- White cockle

The high rate for each crop should be used for all weeds under adverse growing conditions, when weeds are at an advanced stage of growth or when weed densities are high. Guidelines are not provided for weed densities under light or heavy infestations. When in doubt as to the infestation level, use the high rate or contact the manufacturer.

NOTE: It is possible that poisonous plants such as ragworts, hemlocks and death camas could be more palatable to livestock after treatment with DyVel DSp. Suitable precautions should be taken to avoid livestock access when such plants are present.

## Application Information:

- **Water Volume:**
  - **Cereals:** Minimum 40 L per acre.
  - **Corn:** 81 to 142 L per acre.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** classification or larger droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
Mecoprop-p	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
2,4-D	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Crops under stress from excess moisture, drought or disease may suffer a setback when this herbicide is applied. DO NOT apply when temperature exceeds 27°C or when relative humidity is high. Stubble treatments for thistle control in fall should be made at least 2 weeks prior to killing frost.

DO NOT apply *DyVel DSp* at wind speed greater than 5 mph (8 km/hr).

## Tank Mixes:

### Herbicides:

- *AAtrex Liquid* (0.91 L per acre).

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *DyVel DSp* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information. DO NOT irrigate for 24 hours after application.
- **Re-entry Interval:** DO NOT enter fields for at least 12 hours for field corn and leave 14 days from application to hand harvest sweet corn.
- **Grazing Restrictions:** DO NOT harvest for livestock feed within 30 days of application. DO NOT permit lactating dairy animals to graze fields within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.
- **Pre-harvest Interval:** Leave 30 days between application and harvest.
- **Re-cropping Interval:** No restrictions the year after treatment.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.
- **Buffer Zones:** If there are sensitive plants within 400 m, apply only when there is a light breeze away from the sensitive area. DO NOT contaminate wetlands or water used for domestic or livestock consumption, irrigation or natural habitat. Buffers are not required for hand-held and backpack applications.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Cropland	1	1	5
Range and Pasture	1	1	10

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

No cleaning information provided on the label. Refer to 'Method B' in general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:



Warning – Poison



Warning – contains the allergen soy

For an explanation of the symbols used here see pages 7 and 8.

# Eclipse Brands (this referring text to be removed in the 2022 edition)

See Glyphosate + Clopyralid on page 242.

## Edge Granular

Herbicide Group  
3 - ethalfluralin

(Refer to page 45)

### Company:

Gowan Canada (PCP#20980)

### Formulation:

5% ethalfluralin formulated as a granular.

- Container size - 25 kg, 544 kg

### Crops and Staging:

*Edge Granular* can be applied prior to seeding the following crops:

- |  |  |                         |
|--|--|-------------------------|
| ◦ Seedling alfalfa<br>(seed production only) | ◦ Coriander                                    | ◦ Mustard (yellow only) |
| ◦ Canola                                     | ◦ Dry beans (navy, kidney)                     | ◦ Peas                  |
| ◦ Caraway                                    | ◦ Industrial hemp*                             | ◦ Safflower             |
| ◦ Chickpeas*                                 | ◦ Faba beans                                   | ◦ Soybeans              |
|  | ◦ Lentils (fall application only) <sup>†</sup> | ◦ Sunflowers            |

<sup>†</sup> Registered for use on lentils for fall application only. One incorporation must be completed in the fall. Seeding depth is critical - DO NOT seed more than 1.5 inches (4 cm) deep. Avoid loose seedbeds and planting into cold soils.

\* Since this use is registered under the User Requested Minor Use Label Expansion program, the manufacturers assume no responsibility for herbicide performance. Application to chickpeas and industrial hemp is at the risk of the user.

### Weeds and Staging:

For pre-emergent control of the following weeds:

#### Grassy Weeds:

- |                             |                           |               |
|-----------------------------|---------------------------|---------------|
| ◦ Barnyard grass            | ◦ Volunteer barley*       | ◦ Wild oat*   |
| ◦ Foxtail (green**, yellow) | ◦ Volunteer spring wheat* | ◦ Witch grass |

#### Broadleaf Weeds:

- |                |                                |                    |
|----------------|--------------------------------|--------------------|
| ◦ Cleavers*    | ◦ Kochia                       | ◦ Purslane         |
| ◦ Chickweed    | ◦ Lady's-thumb*                | ◦ Russian thistle* |
| ◦ Corn spurry  | ◦ Lamb's-quarters              | ◦ Wild buckwheat   |
| ◦ Cow cockle   | ◦ Nightshade*                  |                    |
| ◦ Hemp-nettle* | ◦ Pigweed (prostrate, redroot) |                    |

\* Suppression only.

\*\* Not including group 3 herbicide resistant biotypes.

## Rates:

**Note:** Successful use of this product requires proper field preparation and product incorporation. For instructions on proper application under various situations see 'Application Information' below.

Time of Application	Rate (Kg per Acre)				
	Light Textured Soils		Medium to Heavy Textured Soils		
	2 to 6% Organic Matter Dark Brown-Black	6 to 15% Organic Matter Deep Black	2 to 4% Organic Matter Dark Brown	4 to 6% Organic Matter Black	6 to 15% Organic Matter Deep Black
Spring	6.9	8.9	6.9	8.9	8.9 to 11.3
Fall	8.9	11.3	8.9	11.3	11.3

DO NOT apply to:

- soils containing less than 2% organic matter (including eroded knolls)
- soils containing greater than 15% organic matter.
- fields that received applications of manure within the last 12 months. After this period, manure must be thoroughly incorporated to a depth of 10 to 15 cm.

To reduce the possibility of injury to the treated crop, use good quality certified seed. Seed shallow into a warm, moist, firm seedbed using recommended agronomic practices that will promote rapid and even crop germination and emergence.

## Application Information:

Apply *Edge Granular* uniformly with a properly calibrated granular herbicide applicator. Avoid concentration of the herbicide in narrow bands. Calibrate the applicator according to manufacturer's directions and check frequently during application to be sure equipment is operating correctly.

### Direct Seeding Systems (minimum tillage systems):

- **General:**
  - Direct-seeding is defined as seed placement into standing stubble (including chemical fallow) with minimum soil disturbance (<30%) and maximum surface residue retention. *Edge Granular* may be used on fields that have been in direct-seeding systems for at least two consecutive years. When seeding, a one pass, direct-seeding operation is recommended.
  - *Edge Granular* applied to the soil surface provides residual control of susceptible weeds within the top 2.5 cm of the soil surface but will not control weeds that germinate from deeper (>2.5 cm).
- **Land Preparation:**
  - *Crop Residue Management:* Chopping, spreading and even distribution of straw and chaff residues will prevent plugging or hairpinning during the seeding operation. Poor and uneven crop emergence, cold wet soils, soil nutrient tie-up and delayed and uneven maturity may also be a result of inadequate residue management.
  - *Pre-seeding (Burn Off) Weed Control:* *Edge Granular* will not control emerged weeds. A pre-seeding burn-off herbicide treatment is required to eliminate weed competition prior to crop emergence.
- **Instructions:**
  - Use of a single harrow operation assists in managing straw residue to ensure good herbicide soil contact. Avoid excessive soil disturbance.
  - *Seeding Instructions:* Use direct-seeding equipment with seed placement at a uniform depth to ensure seed-soil contact and rapid crop emergence. Minimum soil disturbance ensures a uniform herbicide layer at the soil surface.
  - *Fall Application:* *Edge Granular* in direct-seeding systems may be applied in the fall between October 1 and prior to soil freeze-up for weed control the following year. Apply at the fall rates in the 'Rates' section using a harrow operation to manage crop residue and ensure herbicide soil contact. DO NOT apply to snow or frozen soil.
  - *Spring Application:* *Edge Granular* in direct-seeding systems may be applied in the spring as early as field conditions permit and at least 10 days prior to seeding. Apply at the spring rates in the 'Rates' section and use a shallow harrow incorporation within 24 hours of application.

### Conventional Tillage Systems:

- **General:**
  - *Edge Granular* for weed control in conventional tillage systems is intended for use on soils which have been conventionally tilled with > 30% soil disturbance within the previous two consecutive years or more.
- **Land Preparation:**
  - *Pre-seeding Weed Control:* *Edge Granular* will not control emerged weeds. If existing weed growth is too heavy to allow uniform application and incorporation, destroy established weeds by cultivation or a foliar herbicide application before application.
- **Application Instructions:**
  - Incorporate *Edge Granular* with a tandem disc, discer or field cultivator (Vibrashank type). Cultivators should have 3 to 4 rows of sweeps spaced 8 inches apart and staggered so that no soil is left untilled. Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 7 to 10 km per hour (4 to 6 mph), and cultivators at 10 to 13 km per hour (6 to 8 mph).

- **Fall and Spring Application:** In conventional tillage systems, *Edge Granular* can be applied in the fall between September 1 and prior to freeze-up for weed control the following year, or it may be applied in the spring any time up to seeding. DO NOT apply to snow or frozen soil.
- Apply to a soil surface free of large clods and incorporate in the same operation if possible.
- Two incorporations are required at right angles for thorough mixing. *The first incorporation must be completed within 24 hours of application.* Delay the second incorporation for at least three days after the first. When applying *Edge Granular* in the fall, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve crop residues; however, both incorporations must be done to the same depth.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
ethalfluralin	PPI (Soil active)	Mitosis Inhibitor/cell division	Little movement in plant (Apoplast)	Broadleaf & grass	3

## Effects of Growing Conditions:

Crops stressed by cold weather, excessive moisture or drought may be injured by *Edge Granular*. Dry soil conditions between application and emergence may result in decreased weed control.

## Tank Mixes:

Not applicable.

## Restrictions:

- **Rainfall:** No effect once incorporated.
- **Grazing Restrictions:** DO NOT graze or cut treated crops for livestock feed.
- **Re-cropping Interval:** DO NOT grow sugar beets, oats, and small-seeded annual grasses such as timothy, canaryseed and creeping red fescue in rotation following a crop treated with *Edge Granular*. DO NOT seed wheat as a rotational crop onto land that has been treated with trifluralin and/or *Edge Granular* at oilseed/special crop/barley rates for two consecutive crop years. Thinning of crop may occur in areas that have received abnormally low amounts of precipitation or in crops that are emerging slowly.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. May be frozen. DO NOT expose to prolonged sunlight or heat.
- **Buffer Zones:** Toxic to fish and other aquatic organisms. DO NOT contaminate water bodies or wetland areas.

## Sprayer Cleaning:

Not applicable.

## Hazard Rating:



Caution – Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Enforcer D

Herbicide Group  
4 - fluroxypyr & 2,4-D  
6 - bromoxynil

(Refer to page 45)

## Company:

Nufarm Agriculture (PCP#30690)

## Formulation:

80 g/L fluroxypyr, 190 g/L bromoxynil and 240 g/L 2,4-D ester formulated as an emulsifiable concentrate.

- Container size: 2 x 10 L, 120 L, 480 L

## Crops and Staging:

**Spring wheat (including durum) and barley:** 4 leaf stage until the flag leaf is fully emerged.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Apply to emerged weed seedlings up to the 5 leaf stage unless otherwise indicated.

### Weeds controlled at the 0.24 L per acre rate:

- Broadleaf plantain
- Cleavers
- Common groundsel
- Kochia (up to 5 cm tall)
- Hemp-nettle
- Knotweed
- Lady's-thumb
- Lamb's-quarters
- Night-flowering catchfly
- Shepherd's-purse
- Stinkweed
- Stork's-bill
- Volunteer canola
- Wild mustard

### Weeds controlled at the 0.48 L per acre rate:

- *Weeds listed above plus:*
  - Canada thistle (suppression)
  - Dandelion
  - Field horsetail
  - Redroot pigweed
  - Round-leaved mallow
  - Russian thistle
  - Volunteer flax
  - Wild buckwheat

## Application Information:

- **Water Volume:** Minimum 20 to 40 L per acre. Use the higher volume when there is a heavy crop canopy or weeds are at an advanced stage.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces **ASABE coarse** droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
fluroxypyr, 2,4-D	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4
bromoxynil	POST (foliar)	PSII Inhibitor/Membrane disrupter	Little (Apoplast)	Broadleaf only	6

## Effects of Growing Conditions:

Optimum activity is experienced between 12 to 24°C when weeds are actively growing. Weeds may not be actively growing and as a result reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after an application may reduce crop tolerance and weed control efficacy.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **In spring wheat (including durum) and barley:**
  - Tralkoxydim (*Nufarm Tralkoxydim* and *Liquid Achieve* only)
  - Fenoxaprop (*Cordon* or *Puma Advance* only)
  - Thifensulfuron/tribenuron (*Boost* only) - 2.7 g per acre.
- **In spring wheat (including durum) only:**
  - Clodinafop 240 EC (*Signal* only)
  - *Simplicity OD*
  - *Varro*

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Enforcer D* labels only. Nufarm Agriculture also supports the following mixes that are not on the *Enforcer D* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Everest 2.0*, *Traxos*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-Entry Interval:** DO NOT enter treated fields for 24 hours.
- **Grazing Restrictions:** DO NOT graze or cut for livestock feed within 30 days of application. Withdraw meat animals from treated feed 3 days before slaughter.
- **Pre-harvest Interval:** DO NOT harvest within 60 days of application.
- **Re-cropping Interval:** Barley, canola, flax, forage grasses, lentil, mustard, oat, pea, rye and wheat can be seeded the following year or fields can be fallowed.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a ventilated room above freezing. If frozen, allow container to warm and shake well before using.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

° Spray when winds are under 16 km/hr, but not dead calm.

## Sprayer Cleaning:

The manufacturer provides no recommendations on how to clean equipment used to apply this product. As a petroleum based emulsifiable concentrate, 'Method B' in the general section on sprayer cleaning on pages 12 and 13 may be the most effective.

## Hazard Rating:



Caution – Poison



Caution – Skin and Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Enforcer MSU

*This product is the equivalent of a prepackaged mix of Enforcer M (bromoxynil+MCPA+fluroxypyr - page 136) and Boost (thifensulfuron/tribenuron 75WDG – see page 373). Information listed is restricted to Crops, Weeds and Rates. For other detailed information on the component products see the product pages listed for the components.*

**Herbicide Group**  
**2 - thifensulfuron/  
 tribenuron**  
**4 - fluroxypyr & MCPA**  
**6 - bromoxynil**  
*(Refer to page 45)*

## Company:

Nufarm Agriculture

## Formulation:

The *Enforcer MSU* package has two components:

**Enforcer M (PCP#30691):** 80 g/L fluroxypyr, 200 g/L bromoxynil and 200 g/L MCPA ester formulated as an emulsifiable concentrate.

- Container size – 2 x 7.5 L

**Boost (PCP#30377):** 50% thifensulfuron and 25% tribenuron formulated as a water dispersible granule.

- Container size – 108 g



## Crops and Staging:

**Wheat (durum, spring) and barley:** 2 leaf up until the flag leaf is fully emerged.

**Winter wheat:** in spring from fully tillered up until the flag leaf is fully emerged.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

Weeds controlled by *Enforcer M* plus suppression of narrow-leaved hawk's-beard.

## Rates:

**Enforcer M:** 375 mL per acre

**Boost:** 2.71 g per acre

(One case treats 40 acres)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Tank Mixes:

None registered.

Nufarm Agriculture also supports the following mixes that are not on the *Enforcer M* and *Boost* labels. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** Axial, Cordon (Fenoxaprop), Everest 2.0, Signal (clodinafop), Simplicity, Traxos, Varro.

*Note: Enforcer MSU SHOULD NOT be tank-mixed with Tralkoxydim (Nufarm Tralkoxydim or Liquid Achieve) as reduced grass control may occur.*

*See bromoxynil+MCPA+fluroxypyr and thifensulfuron/tribenuron 75WG pages for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Eptam Liquid EC

Herbicide Group  
8 - EPTC

(Refer to page 45)

## Company:

Gowan Canada (PCP#11284)

## Formulation:

800 g/L of EPTC formulated as an emulsifiable concentrate.

- Container size - 10 L, 1000 L

**Caution:** The level of weed control may be reduced where *Eptam Liquid EC* is used on soils that have been treated with *Eptam Liquid EC* the previous growing season. It is expected that the reduction in control will be greater where *Eptam Liquid EC* have been used repeatedly for 2 or more years.

## Crops, Rates and Staging:

*Eptam Liquid EC* is applied as a pre-plant incorporated treatment prior to seeding the following crops:

Crop	Rate (L per Acre)	Acres Treated per 10 L Container
Dry beans	1.72 to 2.23	5.8 to 4.5
Alfalfa, Bird's-foot trefoil, Cicer milk-vetch** Sweet clover** Sunflowers*	1.72	5.8
Potatoes	1.72 to 3.44	5.8 to 2.9
Flax*	1.42 to 1.72	7.0 to 5.8

\* May also be applied in late fall prior to freeze-up

\*\* Seed production only

**NOTE:** The use of *Eptam Liquid EC* on flax is not recommended in Saskatchewan because of the risk of crop injury.

Where a rate range appears, use the lower rate on light textured soils and the higher rate on heavy textured soils.

DO NOT apply *Eptam Liquid EC* to:

- soils with less than 3 percent organic matter
- soil with more than 15 percent organic matter

## Weeds and Staging:

Must be applied prior to the emergence of the following weeds. Emerged weeds will not be controlled.

- |                           |   |   |
|---------------------------|---|---|
| ◦ Barnyard grass          | ◦ Henbit *                              | ◦ Quackgrass (suppression)**              |
| ◦ Chickweed*              | ◦ Lamb's-quarters*                      | ◦ Volunteer cereals (wheat, barley, oats) |
| ◦ Corn spurry*            | ◦ Nettleleaf goosefoot*                 | ◦ Wild oat                                |
| ◦ Foxtail (green, yellow) | ◦ Pigweed (prostrate, redroot, tumble)* | ◦ Yellow nutsedge**                       |
| ◦ Hairy nightshade*       | ◦ Purslane*                             |   |

\* Will be controlled only if treatment is made when conditions are favourable for germination and growth.

\*\* Roots of perennial weeds must be thoroughly chopped prior to application.

## Application Information:

- **Water Volume:** Minimum of 40 L per acre of water. May be mixed with liquid fertilizer in place of water (see label for liquid fertilizer compatibility).
- **Pressure:** 30 to 40 psi (200 to 275 kPa).
- **Equipment and Nozzles:** Since *Eptam Liquid EC* is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil). May also be applied to cleanly cultivated soil for potatoes, by metering into the irrigation water to achieve the recommended rate per acre ("herbigation" or "chemigation"). See label for detailed instructions.
- **Incorporation:** All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application preferably during the spraying operation as *Eptam Liquid EC* is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement. Speeds in excess of 8 km/h (5 mph) will result in excessive pulverization and crop residue destruction leaving the field susceptible to erosion. The maximum recommended tillage depth is 4 inches (10 cm).

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
EPTC	PPI (soil active)	Lipid Synthesis Inhibitor (Non-ACCase)	Little movement in plant (Apoplast)	Broadleaf & Grass	8

## Effects of Growing Conditions:

Crop injury can occur if stressful environmental conditions (cold, wet soils, drought or excessive heat) occur after seeding. To minimize crop injury, delay seeding 10 days if these conditions occur at the time of application, or select an alternative product. Very cold or dry soil conditions during weed emergence will reduce control.

## Tank Mixes:

**Herbicides:**

- *Dry beans (navy and red kidney only):* Liquid formulations of *Treflan* and *Rival*.

**Insecticides:** DO NOT tank mix with insecticides.

**Fungicides:** None registered.

**Fertilizers:** May be mixed with liquid fertilizer.

- Compatibility test should be conducted according to instructions on the herbicide label.
- Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with *Eptam Liquid EC*. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 0.5 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

**Note:** The above mixes are those listed on the *Eptam Liquid EC* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

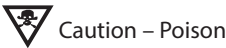
Restrictions:

- **Rainfall:** No effect once incorporated. DO NOT apply prior to irrigation.
- **Re-entry Interval:** DO NOT enter treated fields for 24 hours.
- **Grazing Restrictions:** DO NOT graze or feed treated crops to livestock in the year of application.
- **Re-cropping Interval:** Will not injure crops the year after spring application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.
- **Buffer Zones:** DO NOT apply within 15 m of fish bearing waters or wildlife habitat.

Sprayer Cleaning:

No detailed cleaning procedures are indicated on the label. Use a commercial all purpose spray sprayer cleaning product for adequate cleaning. Contact the manufacturer for more information.

Hazard Rating:



For an explanation of the symbols used here see pages 7 and 8.

**Escort**

**Herbicide Group  
2 - metsulfuron**  
*(Refer to page 45)*

Company:

Bayer (PCP#23005)

Formulation:

- 60% metsulfuron-methyl formulated as a water dispersible granule.
- Container size - 0.25 kg

Crops and Staging:

Pasture, rough turf, and rangeland - No stage restrictions.

Weeds, Rates and Staging:

For seedling weeds apply to young plants up to 4 inches (10 cm) tall or wide. For established non-woody plants (biennial or perennial) apply up to the early bud stage. For western snowberry, wild rose and other woody species, apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

Rate	Weeds Controlled	
8 g per acre	Canada thistle* Dandelion* Russian thistle Sow-thistle*	Common tansy Scentless chamomile Sweet clover
10 g per acre	<i>Above weeds plus:</i> Western snowberry	
12 g per acre	<i>Above weeds plus:</i> Wild rose	Dandelion
40 g per acre**	Balsam poplar	Willow

Rate	Weeds Controlled	
60 g per acre**	Cherry	Trembling aspen

At all rates add *Agral 90*, *Agsurf II*, or *Citowett* at 0.2 L per 100 L of spray solution.

\* **Suppression only.**

\*\* **Rangeland only. See label for detailed application instructions.**

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information

- **Water Volume:** 40 to 91 L per acre for weedy growth and up to 809 L per acre applied to the point of run-off for woody species. See the label for details.
- **Nozzles and Pressure:** 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metsulfuron-methyl	POST (foliar) also has soil activity	ALS Amino Acid Inhibitor	Toward growth areas of plant (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

DO NOT apply during periods of intense rainfall or to soil saturated with water. Warm, moist conditions following treatment enhance the activity of *Escort*, while cold, dry conditions may reduce or delay activity. Brush hardened off by cold weather and drought stress may not be controlled.

## Tank Mixes:

**Herbicides:** 2,4-D amine or ester (371 g ae per acre) plus surfactant.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Grazing Restrictions:** May be grazed by cattle on the day of treatment.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**  
Buffers are not required for hand-held and backpack applications.

Rate (g per acre)	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat**
	Less than 1 m	Greater than 1 m	
8 to 12	1	1	10
40	2	1	35
60	3	1	45

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Terrestrial buffers are not required for transport and utility rights of way

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

*Escort* can cause severe injury to sensitive crops at very low concentrations. Use 'Method A' on pages 12 and 13 to clean sprayers immediately after using *Escort*.

## Hazard Rating:



Caution – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Express FX

Herbicide Group  
2 - tribenuron  
4 - dicamba  
(Refer to page 45)

Weed Control

## Company:

FMC Corporation

## Formulation:

**Express FX (PCP#33039):** 60.87% dicamba and 6.52% tribenuron-methyl formulated as a wettable granule.

- Container size: 1.86 kg

*Express FX* is purchased alone, but it must be mixed with glyphosate before use.

## Crops and Staging:

For application to fallow, post-harvest and 1 day prior to seeding the following crops:

- Barley
- Wheat (spring, durum and winter)
- Oats

## Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 15 cm (6 inches) in height or width.

- |   |  |   |
|---|--|---|
| ◦ Annual smartweed<br>(green, lady's-thumb) | ◦ Hemp-nettle                                | ◦ Stinkweed   |
| ◦ Canada fleabane (up to 8 cm)              | ◦ Kochia** (up to 8 cm)                      | ◦ Volunteer canola<br>(including glyphosate tolerant) |
| ◦ Canada thistle (rosette)*                 | ◦ Lamb's-quarters                            | ◦ White cockle*                                       |
| ◦ Common ragweed (up to 8 cm)               | ◦ Narrow-leaved hawk's-beard<br>(up to 8 cm) | ◦ Wild buckwheat (up to 8 leaf)                       |
| ◦ Cow cockle (up to 3 leaf)                 | ◦ Redroot pigweed                            | ◦ Wild mustard  |
| ◦ Dandelion                                 | ◦ Russian thistle                            | ◦ Volunteer flax                                      |
| ◦ Flixweed                                  | ◦ Scentless chamomile*                       |   |

\* Suppression only.

\*\* Except biotypes multiple resistant to glyphosate, Group 2 and dicamba.

## Rates:

46.5 g per acre. One jug treats 40 acres. DO NOT apply more than 46.5 grams/acre per year.

Must be tank mixed with glyphosate

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 14.

## Application Information:

- **Water Volume:** Minimum 22 L per acre.
- **Nozzles and Pressure:** DO NOT apply with spray droplets smaller than **ASABE coarse** classification. Boom height must be 60 cm or less above the crop or ground.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
tribenuron	POST (foliar)	ALS Amino Acid Inhibitor	Toward growth areas of plant (Symplast)	Broadleaf only	2
dicamba	POST (foliar) with slight soil activity	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Apply *Express FX* when air temperature is between 10 and 25°C. DO NOT apply when there is a risk of severe drop in night temperatures. Control of weeds growing in wheel tracks may be reduced if *Express FX* is applied under dry, dusty conditions.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- Glyphosate

## Restrictions:

- **Rainfall:** If rain occurs soon after application, control may be reduced.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Grazing Restrictions:** MUST NOT be grazed or fed to livestock for 7 days after treatment.
- **Re-cropping:** Fields treated with *Express FX* may be seeded to wheat (spring, durum or winter), spring barley or oats a minimum of 24 hours after application. Fields treated with a chemfallow application can be seeded to any crop the following season. Fields treated with a post-harvest application in the fall may be seeded in spring to canola, corn, oats, spring barley, soybeans, wheat (spring or durum) or white beans.
- **Aerial Application:** DO NOT apply by aircraft.
- **Storage:** Store in original container only, away from fertilizer, seeds, food or feed. Not for use or storage in or around the home. Keep container closed.
- **Buffer Zones:**  
Buffers are not required for hand-held and backpack applications.

Rate (g per acre)	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	1	1	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Terrestrial buffers are not required for transport and utility rights of way

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' found in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Warning – Eye Irritant. Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

## Express FX (co-pack)\*

Herbicide Group  
2 - tribenuron  
4 - dicamba  
(Refer to page 45)

*This product is a prepackaged tank mix of Express SG (see tribenuron - page 390) and the equivalent of dicamba 480 (page 163). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

*\*Note: This product is no longer manufactured but some still remains in the distribution system. This product will be removed from future editions when supplies are exhausted.*

### Company:

FMC Corporation

### Formulation:

The *Express FX* package contains the following components:

**Express SG (PCP#28262):** 50% tribenuron formulated as a soluble granule.

- Container size: 486 g

**Dicamba L (PCP#31536):** 480g/L dicamba dimethylamine salt formulated as a solution.

- Container size: 4.7 L

### Crops and Staging:

Prior to seeding the following crops:

- Spring wheat
- Durum wheat
- Barley

### Rates:

**Express SG:** 6 g per acre

**Dicamba L:** 58.7mL per acre  
(One case treats 80 acres)

No adjuvant is required when mixing with glyphosate at 180 g ae per acre or more.

### Weeds and Staging:

Weeds controlled by the pre-seed use of *Express SG* and dicamba when mixed with glyphosate plus:

- Kochia resistant to Group 2 herbicides and glyphosate

### Tank Mixes:

Herbicides:

- Glyphosate (180 g ae per acre – see glyphosate page 231)

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

## Fenoxaprop

Herbicide Group  
1 - fenoxaprop  
(Refer to page 45)

### Company:

ADAMA Canada (Bengal WB)

Bayer (Puma Advance)

AgraCity (MPower HellCat)

IPCO (Vigil WB)

Loveland Products Canada (WildCat<sup>†</sup>, WildCat Enhanced)

Nufarm Agriculture (Cordon)

## Formulation:

**Bengal WB (PCP#30843), Cordon (PCP#29494), MPower HellCat (PCP#30055), Vigil WB (PCP#30844), WildCat<sup>†</sup> (PCP#29151):** 120 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate.

- Container size\* - 6.2 L, 12.4L, 18.6 L, 99.3L, 297.6, 312 L

**Puma Advance (PCP#29615), WildCat Enhanced (PCP#31272):** 90 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate.

- Container size - 8.25L, 123.75L, 412.5 L

\* Check with individual suppliers for the container sizes they have available.

<sup>†</sup> Note: This product is no longer manufactured but some still remains in the distribution system. This product will be removed from future editions when supplies are exhausted.

## Crops and Staging:

Application beyond the maximum rates provided below may result in crop injury.

Crop	Stage
Spring wheat (including durum), Barley <sup>†</sup>	1 to 6 leaves on the main stem plus 3 tillers
Barley <sup>††</sup>	1 to 5 leaves on the main stem plus 2 tillers
Perennial ryegrass for seed production only* (seedling or established <sup>†</sup> )	2 to 4 leaves
Meadow brome grass (seedling or established) (forage or seed production)**	

<sup>†</sup> *Puma Advance* and *WildCat Enhanced* only. Late application of other products could result in injury to barley.

<sup>††</sup> *Bengal WB, Cordon, MPower HellCat, Vigil WB, or WildCat* only. Apply to barley only when tank mixed with a registered broadleaf product.

NOTE: Application of other fenoxaprop products to barley can result in crop injury.

\* Perennial ryegrass with *Bengal WB, Cordon, Vigil WB* or *WildCat* by ground only.

\*\* Meadow brome grass with *Puma Advance* by ground only.

**NOTE:** Since the uses on forage grasses were registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. *Those who apply this use do so at their own risk.*

Durum wheat, forage grasses and barley may experience some initial, temporary stunting and yellowing that rarely results in yield loss. Injury is more likely under stress conditions (see "Effect of Growing Conditions" section).

Treatment at the 3 to 4 leaf stage of cereal crops and weeds will maximize crop tolerance and weed control. Temporary crop injury such as shortening or discolouration may be observed after application. Such injury is more likely to occur in barley and also when fenoxaprop is applied outside recommended stages.

## Application Information:

- **Water Volume:**
  - **Ground application:** 23 to 45 L per acre. Use higher water volumes for dense canopies.
  - **Aerial Application:** A minimum of 14 L per acre.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles. Angle nozzles forward at 45° to improve contact with vertical leaf surfaces. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with **ASABE medium** droplets or larger.
  - DO NOT use flood jet nozzles, controlled droplet application equipment or Spraying equipment.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
Fenoxaprop-p ethyl	POST (foliar)	ACCase Lipid synthesis inhibitor	Toward regions of growth (Symplast)	Grasses only	1

## Effects of Growing Conditions:

DO NOT apply fenoxaprop 2 to 3 days prior to, or following, temperatures of 3°C or lower as crop injury may occur. Under stressful conditions (hot/dry, water logging, disease or insect damage) or heavy crop canopy, early application will improve weed control.

DO NOT apply by air when both the temperature is greater than 25°C and the relative humidity is less than 30%.



## Weeds, Rates and Staging:

Apply from the 1 to 6 leaf stage up to emergence of 3rd tiller of the weeds below. Apply at the 3 to 4 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

DO NOT apply fenoxaprop or products containing fenoxaprop to a crop more than once per year.

Weeds	Rate (mL per acre)		Rate (Acres per Package <sup>†</sup> )
	<i>Puma Advance</i>	120 g/L forms	
Green foxtail only	206	156	80
Low wild oat infestations*	360	271	46
Moderate-heavy wild oat infestations, barnyard grass, green and yellow foxtail	413	312	40

<sup>†</sup> Based on 12.4 L for 120g/L formulations and 16.5 L for *Puma Advance* and *WildCat Enhanced*.

\* Low wild oat rate for use on WHEAT AND DURUM ONLY, and when applied alone and NOT in a tank-mix. NOT for use with perennial ryegrass or meadow bromegrass.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

DO NOT apply *Bengal WB*, *Cordon*, *Vigil WB* or *WildCat* in barley without a broadleaf herbicide mix. ALWAYS tank mix with a registered broadleaf herbicide.

2,4-D Ester (170 g ae per acre<sup>†</sup> -  
see 2,4-D page for product rates)

*Ally* (2 to 3 g per acre)<sup>†</sup>

*Attain XC* <sup>††</sup>

Bromoxynil/2,4-D ester<sup>Δ</sup>

Bromoxynil/MCPA ester<sup>Δ</sup>

*Curtail M*

*Dichlorprop/2,4-D*<sup>Δ</sup>

*Estaprop XT* <sup>†††</sup>

*Infinity* (0.33 L per acre)<sup>ΔΔΔ</sup>

*Lontrel 360*\*\*\* (0.17 L per acre)

*Lontrel 360*\*\*\* (0.17 L per acre) + MCPA 500

Ester (0.34 L per acre)\*

*Lontrel 360*\*\*\* (0.112 L per acre) + MCPA

500 Ester (0.34 to 0.45 L/ acre)\*

MCPA Amine or Ester (0.28 L per acre)

(600 g ai/L formulation)

*Mecoprop-p*\*\*\*Δ\*

*Prestige XC*<sup>††</sup>

*Refine SG*<sup>††</sup>

*Refine SG* + MCPA (rates above)<sup>††</sup>

*Refine SG* (4 g per acre)+ *Buctril M*

(0.4 L per acre)<sup>††</sup>

*Spectrum*\*\*<sup>†</sup>

*Triton C* (label rate)<sup>ΔΔΔ</sup>

*Trophy*\*<sup>††</sup>

<sup>†</sup> All products except *MPower HellCat*.

<sup>††</sup> *Puma Advance* and *WildCat Enhanced* only.

<sup>†††</sup> *Cordon* only.

<sup>Δ</sup> Manufacturers may only support mixes with specific brands. Contact the manufacturers for more information.

<sup>ΔΔ</sup> *Puma Advance*, *WildCat Enhanced* and *Cordon* only.

<sup>ΔΔΔ</sup> *Puma Advance* and *WildCat Enhanced* only.

\* Use only at the high rate of fenoxaprop.

\*\* Use only at the green foxtail rate of fenoxaprop.

\*\*\* Use in wheat only

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the fenoxaprop labels only.

Fenoxaprop manufacturers may also support mixes with pesticides that are not on the fenoxaprop labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Leave an interval of 7 days prior to application or 4 days after application of fenoxaprop, when applying any pesticide that is not registered as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.

- **Grazing Restrictions:** DO NOT graze or cut cereal crops or meadow brome grass for hay, within 25 days of application. DO NOT graze or cut perennial ryegrass crop for hay within 65 days of application.
- **Pre-harvest Interval:** DO NOT harvest within 65 days of application.
- **Re-cropping Interval:** No restrictions in the year after application. Only one application may be made per year.
- **Aerial Application:** May be applied by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground*	3	10
Aerial	3	33

See page 36 for an explanation of the different habitats.

\* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:

All:



Caution – Poison.



Warning – Contains the allergen soy

**MPower HellCat and WildCat:**



Warning – Eye and Skin Irritant.

**Bengal WB, Puma Advanced and WildCat Enhanced:**



Danger – Eye and Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Fierce

**Herbicide Group**  
**14 - flumioxazin**  
**15 - pyroxasulfone**  
*(Refer to page 45)*

## Company:

Valent Canada, Inc. Distributed by Nufarm Agriculture (PCP#31117)

## Formulation:

33.5% flumioxazin and 42.5% pyroxasulfone formulated as a wettable granule.

- Container size - 2.72 kg

## Crops, Rates and Staging:

**Note:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

DO NOT apply more than 127.5 g per acre during a single growing season.

**Pre-seed or pre-emergent:****Spring or Fall Application**

Crop	Rate (g per acre)	Acres Treated per Container
Corn*	85	128
Soybeans**	85	128
Wheat (NOT including durum)***	85	128

\* Apply *Fierce* between 7 and 30 days prior to planting field corn into no-till or minimum tillage fields, unless application is made as part of fall burndown program.

\*\* Seed soybean at least 1.5 inches (4cm) deep.

\*\*\* Seed wheat at least 1 inch (2.5cm) deep: apply *Fierce* a minimum of 7 days prior to seeding spring wheat.

If applied without glyphosate, add a non-ionic surfactant at 0.25% v/v.

DO NOT apply to snow or frozen ground.

**Weeds and Staging:**

Spray within 6 hours of mixing. *Fierce* will break down in the spray tank left to sit in the sprayer for an extended period.

Apply prior to crop and weed emergence. *Fierce* will not control emerged weeds. If weeds are emerged, apply *Fierce* in a mix with a foliar herbicide (see tank mix section). The duration of residual control may be reduced at lower rates.

**Apply at 85 to 127.5 g per acre to provide control or suppression of the following weeds:**

- Canada fleabane
- Chickweed (common)
- Dandelion
- Foxtail (green)
- Kochia\*\*
- Lamb's-quarters
- Nightshade (Eastern black, hairy)
- Pigweed (green, Redroot)
- Ragweed (common)
- Smartweed (Pennsylvania)
- Velvetleaf
- Volunteer canola (all varieties)\*
- Waterhemp
- Wild buckwheat
- Wild mustard

\* Suppression only.

\*\* Including Group 2, 4 and 9 resistant biotypes.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 14.

**Application Information:**

- **Water Volume:**
  - For pre-emergence application, use 40 to 120 L per acre.
  - For burndown application, prior to crop emergence, use 60 to 240 L per acre
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets
- **Screens:** The use of 50 mesh screens is recommended.

DO NOT perform any tillage operations after application otherwise weed control will be reduced. When applied prior to seeding crops must be direct seeded with minimum disturbance systems.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
flumioxazin	PRE (surface) with soil activity	PPO Inhibitor/ Membrane disruptor	Upward to leaves. Little downward movement due to rapid cell leakage (Apoplast)	Selective Broadleaf	14
pyroxasulfone	PRE (surface) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

Rainfall is required to activate *Fierce* in the soil. Crop injury may occur when soils are wet and cool following application or soils are poorly drained. Severe injury may occur with flooded soils. Newly emerging foliage can be temporarily injured by heavy rain splashing treated soil on leaves. Heavy crop residues may reduce weed control.

**Irrigation:** If rainfall is not received after application, 1.5 to 2.5 cm of irrigation may be applied to improve weed control activity. DO NOT apply irrigation to wheat between emergence and spike.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

#### *Prior to All Crops:*

- **Soybean:**
  - Glyphosate (IPA or K salts) 180 to 486 g ae per acre
  - *Liberty 200 SN*
  - *Gramoxone*
  - *Select*
  - *Sencor*
  - *Pursuit*

DO NOT apply with *Dual II Magnum* or *Frontier* or injury may occur.
- **Fallow Land:**
  - Glyphosate
- **Wheat:**
  - Glyphosate (IPA or K salts) 180 to 486 g ae per acre
- **Bare Ground on Non-crop Areas:**
  - Glyphosate, 2,4-D Ester and *Liberty 200 SN*.

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

Nufarm also supports the following mixes that are not on the *Fierce* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:**
  - Prior to Soybeans, Spring Wheat: *BlackHawk*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

## Restrictions:

- **Rainfall:** Rain or irrigation shortly after application is required for activation. If rainfall does not occur, irrigation with at least 1.5 cm of water is recommended before ground crack occurs.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or cut crops for livestock feed from treated fields.
- **Re-cropping Interval:** Soybeans may be seeded immediately after treatment or in the spring following a fall application. Spring wheat may be seeded into minimum and no-till fields 7 days after a spring *Fierce* application or anytime in the spring after a fall application. All other crops require a successful soil bio-assay to be performed prior to planting.
- **Aerial Application:** DO NOT apply by aircraft.
- **Storage:** Store in a cool, dry place. May be frozen

- **Buffer Zones:** (Liquid formulations only)

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Soybeans, Spring wheat and fallow land	4	2	10
Bare ground on non-crop areas	5	3	20

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. See product label for further information.

## Hazard Rating:

 Warning – Skin and Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Flexstar GT\*

\* For use only in the Red River Valley of Manitoba

**Herbicide Group**

**9 - glyphosate**

**14 - fomesafen**

(Refer to page 45)

## Company:

Syngenta Canada (PCP#30412)

## Formulation:

67 g/L fomesafen and 271 g/L glyphosate formulated as a solution.

- Container size: 2x10 L, 450 L

## Crops and Staging:

*Flexstar GT* may be applied as a pre-seed burn down or as pre-emergent to the crop of soybeans or as early post-emergent on 1 to 2 trifoliolate leaf stage of glyphosate tolerant soybeans only.

For use in the Red River Valley of Manitoba only.

Maximum ONE APPLICATION EVERY TWO CONSECUTIVE YEARS of *Flexstar GT* or other products containing the active ingredient fomesafen.

## Weeds, Rates and Staging:

*Flexstar* applied at 840 mL per acre control of the following weeds at the cotyledon to 3 or 4 true leaf stage. Add *Turbocharge* adjuvant at 0.25 L per 100 L spray solution only when weeds are under stress conditions and for larger weeds.

### Grass Weeds:

- Barnyard grass
- Bromegrass (smooth)
- Cattail (common)
- Downy brome
- Foxtail barley
- Foxtail (green, yellow)
- Persian darnel
- Proso millet
- Quackgrass
- Rye, tame
- Volunteer barley
- Volunteer corn (except glyphosate tolerant varieties)
- Volunteer wheat
- Wild oats
- Yellow nutsedge

**Broadleaf Weeds:**

- Absinthe
- Canada thistle
- Chickweed, common
- Cleavers
- Clover (white)
- Cocklebur
- Cow cockle
- Curled dock
- Dandelion
- Field bindweed
- Fleabane (Canada)
- Flixweed
- Hemp-nettle
- Horsetail
- Knotweed (Japanese, prostrate)
- Kochia
- Lamb's-quarters
- Milkweed (common)
- Narrow-leaved hawk's-beard
- Night-flowering catchfly
- Nightshade (Eastern black)
- Pigweed (redroot, smooth)
- Prickly lettuce
- Ragweed (common)
- Round-leaved mallow
- Russian thistle
- Shepherd's-purse
- Smartweed (green, lady's-thumb)
- Sow-thistle (annual, perennial)
- Stinkweed
- Stork's-bill
- Volunteer alfalfa
- Volunteer canola (all varieties)
- Volunteer flax
- Wild buckwheat
- Wild mustard
- Wild tomato

A general guide to mixing can be found on page 11.

**Application Information:**

- **Water Volume:** Minimum of 60 to 80 L clean, clear water per acre. Higher spray volume is required for dense weed stands.
- **Pressure:** 30 psi (210 kPa). Increase pressure to 60 psi (420 kPa) for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.
- **Nozzles:** Use nozzles capable of delivering appropriate pressures and volumes. DO NOT apply with spray droplets smaller than the *ASABE coarse* classification.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
fomesafen	POST (foliar) with little soil activity	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage(Symplast)	Non-selective Broadleaf	14
glyphosate	POST (foliar)	EPSP Amino Acid Synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf & grass	9

**Effects of Growing Conditions:**

Extremes in environmental conditions such as temperature, moisture, soil conditions, and cultural practices may affect activity.

**Tank Mixes:**

None registered.

Syngenta also supports the following mixes that are not on the *FlexStar GT* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicide:** Glyphosate (not all formulations, please refer to manufacturer for recommendations).

**Restrictions:**

- **Rainfall:** Within 4 hours may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Pre-harvest Interval:** Leave at least 90 days from application to harvest.
- **Grazing Restrictions:** DO NOT graze treated crop or cut for hay.
- **Re-cropping Interval:** Winter wheat may be sown 4 months after application. Spring wheat, dry beans, soybeans and field corn may be grown the year following an application. These re-cropping restrictions refer only to the Red River Valley of Manitoba. Use outside this region is not registered as re-cropping options have not been determined.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store above -10°C, in a dry place in original container, away from food or feed.
- **Buffer Zones:** Leave a buffer zone of at least 15 m between the last spray swath and the edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands as well as aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs. DO NOT apply when winds are greater than 15 km/hr.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning – Eye Irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Florasulam

Herbicide Group

**2 - florasulam**

(Refer to page 45)

## Company:

Corteva Agriscience (*PrePass Flex*)

AgraCity (*MPower Battlefront*)

Loveland Canada (*Blitz*)

Winfield United (*FirstPass*)

## Formulation:

**PrePass Flex (PCP#31259)\*:** 25% florasulam formulated as a water dispersible granule.

- Container size - 8 x 648 g case

**Priority (PCP#30831)\*, Blitz (PCP#31687)\*, FirstPass (PCP#31671)\*, MPower Battlefront (PCP#33003)\*:** 50 g/L florasulam formulated as a suspension concentrate.

- Container size:
  - *Priority, Blitz, MPower Florasulam* - 2 x 6.4L
  - *FirstPass* - 3.2 L

*\*NOTE: PrePass Flex, Priority, Blitz and FirstPass are intended to be applied with glyphosate only. Best practice is to mix florasulam products with herbicides from other resistance groups to prevent the development of resistant weed biotypes.*

## Crops and Staging:

**Preseed burndow, Fallow or PostHarvest:** Florasulam + glyphosate can be applied either in the fall or in the spring prior to seeding spring wheat (including durum), barley or oats or as an initial fallow treatment. *PrePass Flex* may be applied in fall prior to seeding winter wheat.

**Spring wheat (including durum), barley:** 2 to 6 leaf stage.

When mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Broadleaf weeds controlled at the 2 to 4 leaf stage:**

- |                    |                                      |                  |
|--------------------|--------------------------------------|------------------|
| ◦ Chickweed        | ◦ Smartweed (including lady's-thumb) | ◦ Wild buckwheat |
| ◦ Cleavers         | ◦ Stinkweed                          | ◦ Wild mustard   |
| ◦ Shepherd's-purse | ◦ Volunteer canola†                  |                  |

**Broadleaf weeds suppressed:**

- |                      |                           |                   |
|----------------------|---------------------------|-------------------|
| ◦ Annual sow-thistle | ◦ Perennial sow-thistle   | ◦ Redroot pigweed |
| ◦ Hemp-nettle        | (top growth control only) |                   |

\* Seedlings and overwintered rosettes

† Not Including Clearfield canola varieties

## Rates:

40 mL per acre

(One package treats 40 acres)

Refer to the product label for complete mixing instructions for this product and its mixes. A general mixing guide can be found on page 11.

## Application Information:

- **Water Volume:** 40 L per acre.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
florasulam	POST (foliar) with little soil activity	ALS Amino Acid synthesis inhibitor	Toward regions of growth (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of florasulam. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at, or following time of application may reduce weed control and increase the risk of crop injury at all stages of growth.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### *Preseed Burndown, Fallow or Post-harvest:*

- Glyphosate (180 to 360 g ae per acre)

### *In spring wheat (including durum):*

- *Assert 300 SC* (0.65 L per acre) plus *Acidulate*
- *Everest 2.0\**

\* Refer to the *Everest 2.0* product label for additional information on rates. Application of this tank mix to wheat under environmental stress may result in injury.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the florasulam labels only.

Florasulam manufacturers may also support mixes with pesticides that are not on the product labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information. DO NOT apply excessive irrigation following application as product may leach.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application.
- **Pre-harvest Interval:** Leave 60 days between application and harvesting mature crop.
- **Re-cropping Interval:** Wheat, barley, canola, chickpea\*, corn\*, dry beans\*, flax\*, lentil\*, mustard\* (brown, oriental, yellow, and oilseed quality *B. juncea* types), oats, peas, potato\* (except seed potato), soybean\* or sunflower\* may be grown the year following an application.

\* *PrePass Flex* or other Corteva products only.



- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in dry, heated area. If frozen, bring to room temperature and agitate before use.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	5	5	30

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. Check the cleanout requirements of pesticides mixed with this product. Additional cleanout measures may need to be integrated into those provided here.

## Hazard Rating:

**PrePass Flex:**



Warning – Irritant

**Other Products:**



Caution – Poison



May cause skin and eye irritation.

For an explanation of the symbols used here see pages 7 and 8.

# Florasulam + 2,4-D

**Herbicide Group**

**2 - florasulam**

**4 - 2,4-D**

(Refer to page 45)

*This product is a prepackaged tank mix of Florasulam (page 203) and the equivalent of 2,4-D (page 83). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

## Company:

Corteva Agriscience (Frontline 2,4-D)

AgraCity (MPower Battlefront 2,4-D)

## Formulation:

The Florasulam + 2,4-D packages have 2 components:

**Frontline 2,4-D XC A (PCP#30060) or MPower Battlefront (PCP#33003)\*:** 50 g/L florasulam formulated as a suspension concentrate

- Container sizes:
  - **Frontline 2,4-D XC A:** 1.6 L
  - **MPower Battlefront:** 2 x 6.4 L

**Frontline 2,4-D XC B (PCP#30061); MPower 2,4-D Ester 700 (PCP#30460):** 660 g/L 2,4-D LV ester formulated as an emulsifiable concentrate.

- Container sizes:
  - **Frontline 2,4-D XC B:** 2 x 6.8 L
  - **MPower 2,4-D Ester 700:** 115 L

## Crops and Staging:

**Spring wheat (including durum):** 3<sup>rd</sup> leaf fully expanded to 6 leaf stage.

When mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Broadleaf weeds controlled at the 2 to 4 leaf stage:**

- |                             |                              |                                      |
|-----------------------------|------------------------------|--------------------------------------|
| ◦ Bluebur                   | ◦ Lamb's-quarters            | ◦ Shepherd's-purse                   |
| ◦ Burdock                   | ◦ Mustard (ball, wild)       | ◦ Smartweed (including lady's-thumb) |
| ◦ Buckwheat (Tartary, Wild) | ◦ Narrow-leaved hawk's-beard | ◦ Sow-thistle (annual)               |
| ◦ Chickweed (Common)        | (up to 2 leaf )              | ◦ Stinkweed                          |
| ◦ Cleavers                  | ◦ Plantain                   | ◦ Sunflower (annual)                 |
| ◦ Cocklebur                 | ◦ Prickly lettuce            | ◦ Vetch                              |
| ◦ Cow cockle <sup>††</sup>  | ◦ Ragweed (common)           | ◦ Volunteer canola <sup>†</sup>      |
| ◦ Dandelion*                | ◦ Redroot pigweed            | ◦ Wild radish                        |
| ◦ Flixweed                  | ◦ Russian thistle            |                                      |

**Broadleaf weeds suppressed:**

- |                           |               |   |
|---------------------------|---------------|---|
| ◦ Canada thistle          | ◦ Hemp-nettle | ◦ Perennial sow-thistle (top growth control only) |
| (top growth control only) |               |   |

\* Seedlings and overwintered rosettes

<sup>†</sup> Including all herbicide-tolerant canola varieties

<sup>††</sup> MPower Battlefront 2,4-D only

## Rates:

**Frontline 2,4-D XC A:** 40 mL per acre.

**Frontline 2,4-D XC B:** 340 mL per acre.

(One package treats 40 acres)

**MPower Battlefront:** 40 mL per acre. (2 x 6.4 L treats 320 acres)

**2,4-D Ester:** 227 g ae per acre.

(One package/pallet treats 320 acres)

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

**In spring wheat (including durum):**

- Assert 300 SC (0.65 L per acre) plus Acidulate
- Everest 2.0\*

\* Refer to the Everest 2.0 product label for additional information on rates. Application of this tank mix to wheat under environmental stress may result in injury.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.**

# Florasulam + Clopyralid + MCPA

This product is a prepackaged tank mix of Florasulam (page 203) and the equivalent of Clopyralid+MCPA (page 154). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.

Herbicide Group  
2 - florasulam  
4 - clopyralid & MCPA  
(Refer to page 45)

## Company:

Corteva Agriscience (*Spectrum*)  
AgraCity (*MPower Battlefront CM*)

## Formulation:

Each case of *Spectrum* contains 2 components:

***Spectrum A (PCP#27031)***: 50 g/L florasulam formulated as a suspension concentrate.

- Container size - 0.8 L

***Spectrum B (PCP#27032)***: 50 g/L clopyralid and 280 g/L of MCPA ester formulated as an emulsifiable concentrate.

- Container size - 12 L

-or-

Each case of *MPower Battlefront CM* contains 3 components:

***MPower Battlefront (PCP#33003)***: 50 g/L florasulam formulated as a suspension concentrate.

- Container size - 0.8 L

***MPower Clobber (PCP#27032)***: 360 g/L clopyralid formulated as a solution.

- Container size - 1.7 L

***MPower MCPA Ester 600 (PCP#27032)***: 600 g/L of MCPA present as an ester salt and formulated as an emulsifiable concentrate.

- Container size - 5.7 L

## Crops and Staging:

### All Products:

- Spring wheat (including durum), barley and oats in the 2 to 6 leaf stage.

### *Spectrum* only:

- ***Forage Grasses\* (seedling and established) grown for seed production:***

- No staging indicated for forage grasses.
- Bromegrass (meadow, smooth, hybrid)
- Fescue (chewings, creeping red, hard, tall)
- Perennial Ryegrass
- Timothy
- Wheatgrass (crested, intermediate)

**\* NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Users of this product on forage grasses do so at their own risk.**

## Weeds and Staging:

### Broadleaf weeds controlled at the 2 to 4 leaf stage:

- Canada thistle
- Chickweed (common)
- Cleavers
- Cow cockle
- Dandelion\*\*
- Flixweed\*
- Hemp-nettle
- Lamb's-quarters
- Narrow-leaved hawk's-beard (*Spectrum* only – up to 20 cm tall)
- Redroot pigweed
- Shepherd's-purse
- Smartweed
- Sow-thistle (annual)
- Sow-thistle (perennial)<sup>†</sup>
- Stinkweed
- Stork's-bill
- Volunteer canola (all varieties)
- Wild mustard
- Wild buckwheat

\* Spring seedlings only.

\*\* Control of seedlings and overwintered rosettes < 15 cm and suppression of overwintered rosettes > 15 cm; mature plants.

<sup>†</sup> Top growth control only. Control not observed until a minimum of 40 days after treatment.

## Rates:

**Spectrum A:** 40 mL per acre

**Spectrum B:** 600 mL per acre

(One case treats 20 acres)

-or-

**MPower Battlefront:** 40 mL per acre

**MPower Clobber:** 85 mL per acre.

**MPower MCPA Ester 600:** 283 mL per acre.

(One package treats 20 acres)

Refer to the product label for complete mixing instructions for this product and its mixes. A general mixing guide can be found on page 11.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **In spring wheat (including durum) and barley:**
  - Imazamethabenz (*Assert* – 0.65 L per acre) plus *Acidulate*
  - Flucarbazone (*Everest 2.0\**) plus non-ionic surfactant
    - \* Refer to the *Everest 2.0* product label for additional information on rates. Application of this tank mix to wheat under environmental stress may result in injury.
- **In spring wheat (including durum) and winter wheat:**
  - *Simplicity OD* or *Simplicity GoDRI*<sup>†</sup>
  - † *Simplicity GoDRI* with *Spectrum* only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Florasulam + glyphosate

*This product is a prepackaged tank mix of Florasulam (page 203) and glyphosate (page 233). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - florasulam**  
**4 - glyphosate**  
*(Refer to page 45)*

## Company:

Corteva Agriscience (*PrePass XC, PrePass Flex*)

ADAMA Canada (*Priority*)

AgraCity (*MPower Kickoff*)

Loveland Products Canada (*Blitz*)

United Suppliers Canada (*FirstPass*)

## Formulation:

The *PrePass XC* package contains 2 components:

**PrePass XC A (PCP#29651):** 50 g/L florasulam formulated as a suspension concentrate.

- Container size - 1.6 L (40 acre), 4 x 12 L (1200 acre)

**PrePass XC B (PCP#29652):** 480 g/L glyphosate DMA salt formulated as a solution.

- Container size - 2 x 7.5 L (40 acre); 4 x 112.5 L or 450 L (1200 acre)

-or-

The *MPower Kickoff* package contains two components:

***MPower Battlefront* (PCP#33003):** 50 g/L florasulam formulated as a suspension concentrate.

- Container size – 2 x 6.4 L (320 acre); 2 x 80 L (1280 acre)

***MPower Disruptor 360* (PCP#29290):** 360 g/L glyphosate as an isopropylamine (IPA) salt formulated as a solution.

- Container size – 8 x 6.4 L (320 acre); 640 L (1280 acre)

-or-

***PrePass Flex\** (PCP#31259):** 25% florasulam formulated as a water dispersible granule.

- Container size - 8 x 0.65 kg (640 acres)

-or-

***Priority\** (PCP#30831), *Blitz\** (PCP#31687), *FirstPass* (PCP#31671)\*:** 50 g/L florasulam formulated as a suspension concentrate.

- Container size - 2 x 6.4 L (320 acre)

**\* *PrePass Flex*, *Priority*, *FirstPass* and *Blitz* DO NOT come packaged with glyphosate. Glyphosate must be purchased separately.**

## Crops and Staging:

Florasulam + glyphosate can be applied either in the fall or in the spring prior to seeding spring wheat (including durum), barley or oats or as an initial fallow treatment.

*PrePass XC* or *PrePass Flex* may be applied in fall prior to seeding winter wheat.

## Weeds and Staging:

**Florasulam + glyphosate will control the following weeds:**

*Weeds controlled by glyphosate at the 180 g ae per acre rate plus enhanced control of the following weeds:*

- ***Broadleaf weeds controlled at the 2 to 4 leaf stage:***

- |   |  |                                      |
|---|--|--------------------------------------|
| ◦ Canada fleabane (up to 8 cm) <sup>†</sup> | ◦ Lamb's-quarters                            | ◦ Stinkweed                          |
| ◦ Common chickweed                          | ◦ Narrow-leaved hawk's-beard                 | ◦ Smartweed (including lady's-thumb) |
| ◦ Cleavers                                  | ◦ (up to 8 cm) <sup>††</sup>                 | ◦ Volunteer canola (all varieties)   |
| ◦ Cow cockle <sup>††</sup>                  | ◦ Ragweed (common) (up to 8 cm) <sup>†</sup> | ◦ Wild buckwheat (up to 5 leaf)      |
| ◦ Dandelion (up to 30 cm across)            | ◦ Redroot pigweed                            | ◦ Wild mustard                       |
| ◦ Flixweed <sup>†</sup>                     | ◦ Russian thistle <sup>†</sup>               |                                      |
| ◦ Hemp-nettle                               | ◦ Scentless chamomile <sup>†</sup>           |                                      |
| ◦ Kochia*                                   | ◦ Shepherd's-purse                           |                                      |

- ***Broadleaf weeds suppressed:***

- |                      |                            |
|----------------------|----------------------------|
| ◦ Annual sow-thistle | ◦ Perennial sow-thistle*** |
|----------------------|----------------------------|

**\* Note:** Florasulam + glyphosate will not control glyphosate resistant kochia.

**\*\* Earlier applications provide better results.**

**† *PrePass XC* and *PrePass Flex* only.**

**†† *PrePass XC*, *PrePass Flex*, *Priority* and *Blitz* only.**

## Rate:

See "Formulations:" section for package rates.

**For *PrePass XC*:**

***PrePass XC A*:** 40 mL per acre.

***PrePass XC B*:** 375 mL per acre.

-or-

**For *MPower Kickoff*:**

***MPower Battlefront*:** 40 mL per acre.

***MPower Disruptor 360*:** 500 mL per acre.

-or-

***Prepass Flex*:** 8.1 g per acre.

-plus-

**Glyphosate (purchased separately):** At least 180 g ae per acre (see glyphosate page for product rates).

-or-

***Priority*, *Blitz* or *FirstPass*:** 40 mL per acre. (320 acre or 1280 acres)

-plus-

**Glyphosate (purchased separately):** 180 g ae per acre (see glyphosate page for product rates).

## Tank Mixes:

### Herbicides

- **PrePass XC:** *Vantage Plus Max II*\*\*.
  - **PrePass Flex:** glyphosate IPA, DMA or K<sup>+</sup> salt at 180 to 1020 g ae per acre.
  - **Priority, FirstPass, or Blitz:** must be mixed with glyphosate IPA or DMA salt at 180 g ae per acre.
- \*\* NOTE: Corteva Agriscience does not support the topping up of *PrePass XC* with other salts of glyphosate as they may have a negative reaction with the florasulam component. *PrePass Flex* may be topped up with any formulation of glyphosate, as indicated above.

**Note:** The above mixes are those listed on the florasulam + glyphosate labels only.

Manufacturers may also support the following mixes that are not on the florasulam + glyphosate labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

### Restrictions:

- **Re-cropping Interval:**
    - Applications after August 1: Spring wheat (including durum), barley and oat, may be seeded the following year, or the field may be fallowed.
    - Applications **before August 1:** Barley, canola, chickpeas\*, dry beans\*, field peas, flax\*, lentils\*, mustard\* (brown, oriental, yellow and oilseed quality *B. juncea*) oat, soybeans\*, sunflower\* and wheat, may be grown the following year.
- \* *PrePass XC*, *PrePass Flex*, and *Priority* only.

See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.

# Florasulam + MCPA Ester

Herbicide Group

2 - florasulam

4 - MCPA

(Refer to page 45)

### Company:

Corteva Agriscience (*Frontline XL*)

ADAMA Canada (*Topline*)

AgraCity (*MPower Battlefront M*)

### Formulation:

**Frontline XL (PCP#28804):** 4 g/L florasulam and 280 g/L MCPA ester formulated as a co-formulated emulsifiable concentrate.

- Container size - 2 x 10 L or 120 L drum

-or-

The *Topline* or *MPower Battlefront M* packages contain two components:

**Florasulam SC (PCP#30814); MPower Battlefront (PCP#33003):** 50 g/L florasulam formulated as a suspension concentrate.

**Checkmate MCPA Ester 600 (PCP#27804); MPower MCPA 600 Ester (PCP#32912):** 600 g/L MCPA Ester formulated as an emulsifiable concentrate.

- Container size -
  - **Florasulam SC; MPower Battlefront:** 1.6 L
  - **MCPA Ester (both):** 9.33 L

### Crops and Staging:

#### All Products:

- Spring wheat (including durum), barley and oats: 2 to 6 leaf stage.

**Frontline XL only:**

- **Seedling and established timothy for forage and seed production\*:**
    - Seedlings: from the 2 leaf fully expanded stage up to the flag leaf stage.
    - Established: no stage restrictions.
- \* **NOTE** - Since applications to timothy has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Application to timothy is at the risk of the user.

When tank-mixing, always check the tank mix partner recommendations for additional staging restrictions.

**Weeds and Staging:****Broadleaf weeds controlled at the 2 to 4 leaf stage:**

- |                |                     |                        |
|----------------|---------------------|------------------------|
| ◦ Ball mustard | ◦ Lamb's-quarters   | ◦ Stinkweed            |
| ◦ Burdock**    | ◦ Prickly lettuce** | ◦ Sunflower (annual)** |
| ◦ Chickweed    | ◦ Ragweed (common)  | ◦ Volunteer canola*    |
| ◦ Cleavers     | ◦ Redroot pigweed♦  | ◦ Wild mustard         |
| ◦ Cow cockle†† | ◦ Russian pigweed** | ◦ Wild buckwheat       |
| ◦ Flixweed**   | ◦ Shepherd's-purse  |                        |
| ◦ Hemp-nettle♦ | ◦ Smartweed         |                        |

**Broadleaf weeds suppressed:**

- |                              |                        |                            |
|------------------------------|------------------------|----------------------------|
| ◦ Canada thistle             | ◦ Plantain†            | ◦ Sow-thistle (perennial)† |
| ◦ Dandelion***♦              | ◦ Stork's-bill         |                            |
| ◦ Narrow-leaved hawk's-beard | ◦ Sow-thistle (annual) |                            |

\* including all herbicide-tolerant canola varieties

\*\* up to the 4 leaf stage of development

\*\*\* seedlings and overwintered rosettes less than 15 cm (6 inches)

♦ for improved control of this weed add an additional 47.5 mL per acre of MCPA LV600.

† top growth control

†† Frontline XL and Priority only.

**Rate:**

**Frontline XL:** 0.5 L per acre

- (40 acres per case, 240 acre per 120 liter drum)

-or-

**Topline or MPower Battlefront M:**

**Florasulam SC or MPower Battlefront:** 40 mL per acre

-plus-

**MCPA 600 Ester:** 0.23 L per acre

- (One case treats 40 acres.)

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

**Tank Mixes:**

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

**Herbicides:**

- **In spring wheat (including durum) and barley only:**
  - Assert (0.65 L per acre) plus Acidulate.
- **In spring wheat (including durum) only:**
  - Simplicity OD (0.2 L per acre)†
  - Everest 2.0†

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

† Frontline XL or MPower Battlefront M only.

**Note:** The above mixes are those listed on the florasulam + MCPA ester labels only.

Manufacturers may also support additional mixes that are not on the Florasulam + MCPA labels. Check with the manufacturers for mixes they may support.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

### Restrictions:

- **Re-cropping Interval:** Wheat, barley, canola, chickpea\*, corn\*, dry beans\*, flax\*, lentil\*, mustard\* (brown, oriental, yellow and oilseed quality *B. juncea* types), oats, field peas, potato\* (except seed potato), soybean\* or sunflower\* may be grown the year following an application.  
\* *Frontline XL* only.

See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.

## Florasulam/fluroxypyr + MCPA ester

Herbicide Group  
2 - florasulam  
4 - fluroxypyr, MCPA  
(Refer to page 45)

### Company:

ADAMA Canada (*Outshine*)

Corteva Agriscience (*Stellar* and *Stellar XL*)

### Formulation:

**Stellar A (PCP#29286), Outshine (PCP#31646):** 2.5 g/L florasulam and 100 g/L fluroxypyr formulated as a suspension concentrate.

- Container size - 2 x 8 L

**Stellar B (PCP#29165), MCPA 2 EH Ester 600 (PCP#31699):** 600 g/L of MCPA ester formulated as an emulsifiable concentrate.

- Container size - 1 x 9.33 L

-or-

**Stellar XL (PCP #32099):** 2.5 g/L florasulam, 100 g/L fluroxypyr and 350 g/L of MCPA as a co-formulated emulsifiable concentrate.

- Container size – 2 x 8.1 L, 97.1 L, 518 L

### Crops and Staging:

Barley, oat (*Stellar* or *Stellar XL* only) and spring wheat (including durum): 2 to 6 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

### Weeds and Staging:

Apply when weeds are at the 2 to 4 leaf stage unless otherwise indicated.

- |                           |  |                            |
|---------------------------|--|----------------------------|
| ◦ Burdock <sup>†</sup>    | ◦ Plantain <sup>††</sup>                   | ◦ Sunflower (annual)       |
| ◦ Chickweed (Common)      | ◦ Prickly lettuce <sup>†</sup>             | ◦ Vetch <sup>††</sup>      |
| ◦ Cleavers <sup>†††</sup> | ◦ Ragweed                                  | ◦ Volunteer canola         |
| ◦ Cocklebur <sup>†</sup>  | ◦ Pigweed (redroot, Russian <sup>†</sup> ) | ◦ Volunteer flax           |
| ◦ Flixweed                | ◦ Shepherd's-purse                         | ◦ Wild buckwheat           |
| ◦ Hemp-nettle             | ◦ Smartweed                                | ◦ Wild mustard             |
| ◦ Kochia                  | ◦ Stinkweed <sup>†</sup>                   | ◦ Wild radish <sup>†</sup> |
| ◦ Lamb's-quarters         | ◦ Stork's-bill*                            |                            |

\* **Suppression only**

<sup>†</sup> *Stellar/Outshine* weeds indicated on B or MCPA component only. All weeds controlled with *Stellar XL*.

<sup>††</sup> *Stellar XL* only.

<sup>†††</sup> 1 to 8 whorl for *Stellar XL*. No staging given for *Stellar/Outshine*.



## Rates:

**Stellar/Outshine A:** 0.4 L per acre

**Stellar/Outshine B (MCPA):** 0.24 L per acre

(One case treats 40 acres)

-or-

**Stellar XL:** 0.4 L per acre

(One case treats 40 acres; one 97.1 L drum treats 240 acres; one 518 L tote treats 1280 acres)

## Application Information:

- **Water Volume:** Minimum 40 L per acre.
- **Nozzles & Pressure:** For conventional flat fan nozzles use a pressure of 30 to 40 PSI (200 to 275 kPa). Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets. Low drift nozzles may require higher pressures for proper performance.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
florasulam	POST (foliar)	ALS Amino Acid Synthesis Inhibitor	Toward regions of growth (Symplast)	Broadleaf only	2
fluroxypyr	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
MCPA	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

## Tank Mixes:

### Herbicides:

- **Barley, spring wheat:**
  - *Axial*\*\*\*
- **Barley, spring wheat, and durum only:**
  - *Assert* (0.65 L per acre)\*
- **Spring Wheat (including durum) only:**
  - *Everest 2.0* (19.4 to 29.1 mL per acre plus adjuvant - see flucarbazone)\*\*
  - *Simplicity*\*\*
  - *Simplicity GoDRI*\*\*\*

\* All products

\*\* *Stellar* and *Stellar XL* only.

\*\*\* *Stellar XL* only

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the florasulam/fluroxypyr + MCPA labels only.

Manufacturers may also support the following mixes that are not on the florasulam/fluroxypyr + MCPA ester labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

## Restrictions:

- **Rainfall:** Rainfall within 2 hours of application may reduce efficacy.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Pre-harvest Interval:** Leave 60 days between treatment and harvest.
- **Grazing Restrictions:** DO NOT graze or harvest for livestock feed within 7 days of treating the crop.

- **Re-cropping Interval:** Wheat, barley, oat, canola, and pea may be grown the season following application or the field may be fallowed. The following crops may be grown the season following application: barley, canola, corn\*, field beans (*Phaseolus vulgaris*)\*, flax\*, lentils\*, mustard\*, oats, peas, potato\*†, soybean\*, sunflower\* or wheat or fields can be summerfallowed. There are no recropping restrictions the second year after application.  
\* *Stellar* and *Stellar XL* only.  
† Except seed potatoes for *Stellar*
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen. If frozen, bring to room temperature and agitate before use. This product is combustible. DO NOT store near heat or open flame.
- **Buffer Zones:** Leave 30 metres between the downwind edge of the boom and sensitive terrestrial habitats such as forested areas shelterbelts, woodlots, hedgerows, and shrub lands and 15 metres to sensitive freshwater habitats such as lakes, rivers, sloughs ponds, prairie potholes, creeks marshes streams reservoirs and wetlands.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. If mixed with another pesticide additional clean-out measures may be necessary.

## Hazard Rating:



Warning – Poison



Warning – Eye and Skin Irritant.



Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Flucarbazone

**Herbicide Group**  
**2 - flucarbazone**  
(Refer to page 45)

## Company:

Arysta LifeScience Canada (*Everest 2.0\**, *Everest 3.0*)

Syngenta Canada (*Sierra 2.0\**, *Sierra 3.0*)

## Formulation:

**Everest 2.0 (PCP#30342)\*, Sierra 2.0 (PCP#30430)\*:** 397 g/L flucarbazone formulated as a suspension concentrate.

- Container size - 1.94 L

**Everest 3.0 (PCP#32602), Sierra 3.0 (PCP#32941):** 200 g/L formulated as a suspension concentrate.

- Container size - 3.88 L

**\*Note:** This product is no longer manufactured, but some may remain in the distribution system. This product may be removed in future editions of this guide.

## Crops and Staging:

**Spring application to wheat (spring, durum, winter):** 1 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves).

*Note: Several of the tank mix partners have more limiting staging than flucarbazone alone. When tank mixing use the most restrictive application state or injury may result.*

## Weeds, Rates and Staging:

**Grass weeds:** Maximum of 4 main stem leaves and 2 tillers

**Broadleaf weeds:** 2 to 6 leaf stage

Weed	Rate	
	Everest 2.0/ Sierra 2.0	Everest 3.0/ Sierra 3.0
	mL per Acre	mL per Acre
Green foxtail*	14.6	29.1
<b>Weeds listed above plus:</b> Wild oat* (light infestations) (< 100 plants/m <sup>2</sup> ), volunteer oat, green smartweed, redroot pigweed*, shepherd's-purse*, volunteer canola*, wild mustard*, stinkweed* (2 to 9 leaf stage)	19.4	38.4
<b>Weeds listed above plus:</b> Wild oat* (heavy populations) (> 100 plants/m <sup>2</sup> , Japanese brome up to 4 leaf stage pre-tillering, both growing under ideal growing conditions, <b>Suppression of:</b> Wild buckwheat (1 to 4 leaf stage), barnyard grass**, yellow foxtail**	24.3	48.2
<b>Grass weeds listed above</b> growing under poor growing conditions or when mixing with herbicides containing the a.i. dicamba (see pages 11 to 18)	29.1	58.2

Requires the addition of a non-ionic surfactant (*Agral 90, Agsurf II, Liberate, ProSurf, Super Spreader, LI700*) at 0.25 L per 100 L of spray solution.

\* Will not control imidazolinone tolerant (CLEARFIELD) canola volunteers or Group 2 resistant weed biotypes.

\*\* Control with a mix of *Inferno WDG*.

DO NOT apply more than the equivalent of 29.1 mL per acre flucarbazone 2.0 or 58.2 mL flucarbazone 3.0 or other source of flucarbazone (*Inferno Duo*) per growing season.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** 22.5 to 45 L per acre.
  - **Aerial:** 11 L per acre.
- **Nozzles and Pressure:** Use 30 to 50 psi (200 to 345 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Orienting nozzles at a 45 degree angle forward may improve coverage of vertical leaves (grasses).

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
flucarbazone	POST (foliar) with soil residual activity	ALS Amino Acid Inhibitor	Toward growth areas of plant (Symplast)	Broadleaf & grass	2

## Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water-logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application. Adopting practices to increase crop vigour will improve crop tolerance.

## Tank Mixes:

### Herbicides:

Note:

- All mixes must be applied with a registered surfactant unless otherwise indicated. Only one registered surfactant is required.
- All products below may be mixed at label rates with Flucarbazone unless otherwise indicated.
- Flucarbazone at all rates may be mixed with the products listed below unless otherwise indicated.
  - **In wheat (spring and durum) only:**
    - 2,4-D Amine or Ester (rates up to 227 g ae per acre)\*
    - *Enforcer D*
    - *Enforcer M*
    - *Florasulam + Curtail M (Spectrum only)\**
    - *Paradigm*
    - *Paradigm + MCPA Ester*
    - *Paradigm + Curtail M*
    - *Pixxaro*
    - *Pixxaro + MCPA*
    - *Pixxaro + Curtail M*
    - *Tribenuron (Inferno WDG)*

- **In wheat (spring and winter) only:**
  - 2,4-D Amine or Ester (rates up to 227 g ae per acre)
  - Bromoxynil/MCPA (*Buctril M/Logic M* only)
- **In spring wheat (NOT including durum) only:**
  - Bromoxynil (*Brotex 240/Pardner* only)
  - Bromoxynil/2,4-D (*Leader/Thumper* only)
  - *Curtail M*\*\*
  - Dicamba/mecoprop/MCPA (*Target* only)†\*\*
  - Dichlorprop+2,4-D (*Estaprop/Dichlorprop-D* only)
  - *Dyvel*††
  - MCPA Amine or Ester at rates up to 0.38 L per acre (600 g/L formulation)
  - Florasulam + 2,4-D (*Frontline 2,4-D* only)
  - Florasulam + MCPA (*Frontline XL* only)\*
  - Florasulam/Fluroxypyr+MCPA (*Stellar* only)\*\*
  - Fluroxypyr + 2,4-D (*Attain XC* only)\*\*
  - Fluroxypyr+MCPA (*Trophy* only)
  - Thifensulfuron/tribenuron (*Refine SG/Deploy WDG* only)
  - Metsulfuron (*Ally* only) + 2,4-D Amine or Ester up to rates above\*\*
  - *OcTTain XL*\*
  - *Optica Trio*††
  - *Prestige XC*\*\*
  - Thifensulfuron/Tribenuron (*Refine SG/Deploy* only) plus 2,4-D Amine or Ester at rates above
  - *Triton C*

\*Apply in 40 L per acre of water only.

\*\* Apply in 40 L per acre of water only with 24.3 to 29.1 mL per acre of *Flucarbazone 2.0* or 38.4 to 58.3 mL per acre of *Flucarbazone 3.0*.

† Wild oat control may be reduced with this mix.

# Tank mix only with the highest rate of flucarbazone.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the flucarbazone labels only.

Both manufacturers also support the following mixes that are not on Flucarbazone labels.

- **Herbicides:**
  - *Barricade II, Enforcer MSU, Momentum* + MCPA Ester, *Retain SG, Stellar XL*. Apply mixes according to the most restrictive use limitations for either product.

Flucarbazone manufacturers may also support other mixes with pesticides that are not listed above. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall within 1 hour of application may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated area within 12 hours.
- **Grazing Restrictions:** DO NOT graze treated fields. Mature grain or straw may be fed to livestock.
- **Pre-harvest Interval:** Leave at least 80 days from application to harvest
- **Re-cropping Interval:** See the following chart below:

Soil Zones and Rotational Crops			
Grey-Wooded	Black	Dark Brown	Brown
Spring Wheat Barley Canola (all varieties) Field Pea*	Spring Wheat Barley Canola (all varieties) Durum Wheat Field Pea* Flax Field Bean Soybean† Sunflower†	Spring Wheat Barley Canola (all varieties) Durum Wheat Field Pea* Flax Soybean† Sunflower†	Spring Wheat

† Not including *Sierra 3.0* at this time.

\* NOTE: Field pea may be grown the year following flucarbazone application in fields where precipitation has been equal to or above the 10-year average during the growing season, and where organic matter content is above 4%, and pH is below 7.5. The company suggests a minimum of 100 mm (4 inches) of rain is needed in the 60 days following application for adequate breakdown to take place.

NOTE: Other rotational crops may also be affected if rainfall is less than the 10-year average for the area. Soils in the grey wooded, black and dark brown soil zones with a combination of low organic matter (less than 2%), light textured soils or high pH (greater than 7.5) (i.e. eroded knolls, sandy soils) may result in delayed growth and development in rotational crops.

- **Aerial Application:** May be applied by aircraft.
- **Storage:** Store in closed original container in a cool, dry area away from fertilizers, food or feed. DO NOT freeze.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitat	Terrestrial habitat
Field sprayer*	5	2
Fixed wing aircraft	100	65
Helicopter	85	55

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. When mixing with other pesticides, combine the method above with cleanout methods for the tank mix partner.

## Hazard Rating:



Warning – Contains the Allergen Milk

For an explanation of the symbols used here see pages 7 and 8.

# Fluroxypyr

**Herbicide Group**  
**4 - fluroxypyr**  
*(Refer to page 45)*

## Company:

AgraCity (*MPower Foxy*)

Great Northern Growers and UAP (*Ikwin*)

## Formulation:

**MPower Foxy (PCP#32952); Ikwin (PCP#33047):** 180 g ae/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size – 7.28 L (*MPower Foxy*), 9.68 L (*Ikwin*)

**Perimeter II (PCP#30094)\*:** 333 g ae/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size – 3.4 L.

\* *Perimeter II* is only available as a component of co-packaged products or tank mixes with FMC products.

## Crops and Staging:

**Spring wheat (including durum), barley:** 2 leaf up to the initiation of stem elongation (nodes can be felt at the base of the stem).

**Winter wheat (*Perimeter II* only):** Apply to winter wheat in the spring from the 3 tiller stage to just before the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Weeds Controlled	180 g/L		333 g/L	
	Rate (mL/acre)	Stage	Rate (mL/acre)	Stage
Cleavers	162	(1 to 4 whorls)	85	(1 to 6 whorls)
Cleavers	-	-	125	(1 to 8 whorls)
Kochia	243	(2 to 8 leaf)	125	(2 to 8 leaf)

Weeds Controlled	180 g/L		333 g/L	
	Rate (mL/acre)	Stage	Rate (mL/acre)	Stage
Round-leaved mallow	324	(1 to 6 leaf)	162	(1 to 6 leaf)
Volunteer flax	243	(1 to 12 cm)	125	(1 to 12 cm)
Chickweed <sup>††</sup>	324	(up to 8 cm)	162	(up to 8 cm)
Hemp-nettle <sup>†</sup>	324	(2 to 6 leaf)	162	(2 to 6 leaf)
Stork's-bill <sup>†</sup>	243	(1 to 8 leaf)	125	(1 to 8 leaf)
Wild buckwheat <sup>†</sup>	324	(1 to 4 leaf)	85	(1 to 8 leaf)

<sup>†</sup> Suppression only

<sup>††</sup> Suppression only with 180 g/L formulations, control with 333 g/L formulations

Make only ONE APPLICATION per year of any of these products or other products containing the same active ingredients. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre. All other uses minimum 40 L per acre.
  - **Aerial:** *Perimeter II* only – 12 to 20 L per acre.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE coarse** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
fluroxypyr	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

The activity these products are influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

The following mixes may be used with each of the products above unless noted otherwise.

- **In all labelled crops:**
  - 2,4-D ester (up to 560 g ae per acre)
  - MCPA ester (up to 560 g ae per acre)
  - *Curtail M* (0.61<sup>††</sup> to 0.81 L per acre)

The following mixes may be used with fluroxypyr alone or in combination with the broadleaf tank mix partners above unless otherwise indicated.

- **In spring wheat (including durum) and barley:**
  - Imazamethabenz (*Assert* only – 0.53 to 0.65 L per acre)
  - Tralkoxydim<sup>†\*</sup>
- **In spring wheat (including durum) only:**
  - Clodinafop 240EC<sup>†</sup> (93 mL per acre)
  - Fenoxaprop<sup>†</sup>
  - *Simplicity OD*<sup>††Δ</sup>

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizer:** None registered.

\* Temporary crop injury or reduced wild oat control may occur with this tank mix.

† See product labels for specific brands registered.

†† *Perimeter II* only.

Δ Only with tank mix with 2,4-D ester.

**Note:** The above mixes are those listed on the fluroxypyr + 2,4-D product labels only.

Manufacturers may also support mixes between their products and other pesticides that are not on their labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour will reduce control.
- **Re-entry Interval:** DO NOT re-enter treated area within 12 hours.
- **Grazing Restrictions:** Livestock may be grazed 3 days after application. DO NOT feed or cut forage grasses for hay.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Re-cropping Interval:**
  - **All Products:** Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye, and wheat, may be grown the year after application. There are no re-cropping restrictions the second year after application.
  - **Perimeter II only:** Alfalfa, corn, dry beans, potatoes, soybeans, and sunflowers may also be seeded the year following.
- **Aerial Application:** *Perimeter II* only may be applied by air.
- **Storage:** Avoid freezing. If frozen, bring to room temperature and agitate before use. These products are combustible. DO NOT store near heat or open flame.
- **Buffer Zones:**
  - **Ikwin, MPower Foxy:** Leave a buffer of 15 metres from water bodies, wetland areas and plants that may be injured.
  - **Perimeter II:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	3
Fixed wing aircraft	6	0	100
Helicopter	6	0	80

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:

*Ikwin, MPower Foxy:*



Danger – Poison.

**All products:**



Warning – Eye Irritant.



Caution – Skin Irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Fluroxypyr + 2,4-D

Herbicide Group  
4 - fluroxypyr & 2,4-D  
(Refer to page 45)

*This product is a prepackaged tank mix of Fluroxypyr (see Fluroxypyr – page 217) and 2,4-D ester (page 83). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

## Company:

AgraCity (MPower Foxy Pro)  
Corteva Agriscience (Attain XC)  
Nufarm Agriculture (Flurox-24)  
ADAMA Canada (Rush 24)

## Formulation:

The Attain XC package has 2 components:

**Attain XC A (PCP#29463):** 333 g/L fluroxypyr formulated as an emusifiable concentrate.

- Container size - 5 L, 8 x 15 L

**Attain XC B (PCP#29264):** 660 g/L 2,4-D LV ester formulated as an emusifiable concentrate.

- Container size - 2 x 6.8 L, 4 x 82 L

-or-

The packages for Flurox-24, Rush 24 or MPower Foxy Pro have 2 components:

**Nufarm Fluroxypyr (PCP#30194), Fluroxypyr 180 EC (PCP#30815), MPower Foxy (PCP#32952):** 180 g/L fluroxypyr formulated as an emusifiable concentrate.

- Container size:
  - Nufarm Fluroxypyr – 7.28 L
  - Fluroxypyr 180 EC, MPower Foxy – 9.6 L

**2,4-D Ester 700 (PCP#27820), Salvo 2,4-D Ester 700 (PCP#27818), MPower 2,4-D Ester (PCP#30460):** 660 g/L 2,4-D LV ester formulated as an emusifiable concentrate.

- Container size -
  - Flurox-24 package – 10.3 L.
  - Salvo (Rush 24) and MPower Foxy Pro package – 9.8 L<sup>§</sup>

<sup>§</sup> **NOTE:** The amount of 2,4-D 700 Ester provided in the Rush 24 and MPower Foxy Pro packages is roughly 75% of the 2,4-D Ester required to achieve the rates listed below. Additional 2,4-D Ester will need to be purchased to achieve labelled use rates.

## Crops and Staging:

**Spring wheat (including durum), barley:** 4 leaf up to the emergence of the flag leaf.

**Winter wheat:** Apply to winter wheat in the spring from the 3 tiller stage to just before the flag leaf stage. (Attain XC only)

**Forage Grasses for seed production only\*:**

- Seedling and established grasses at the 4 leaf up to the emergence of the flag leaf.
  - Bromegrass (meadow, smooth)
  - Timothy
  - Wheatgrass (crested, intermediate)
  - Fescue (creeping red, tall)

<sup>\*</sup> **NOTE:** Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Those who apply these uses do so at their own risk.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

The following weeds are controlled at the 2 to 4 leaf stage, unless otherwise specified:

<sup>§</sup> **NOTE:** The amount of 2,4-D 700 Ester provided in the Rush 24 and MPower Foxy Pro packages is roughly 75% of the 2,4-D Ester required to achieve the rates listed below. Additional 2,4-D Ester will need to be purchased to achieve labelled use rates.



- *Attain XC A* at 95 mL per acre plus *Attain XC B* at 260 mL per acre or;  
*Nufarm* or *ADAMA Fluroxypyr 180* or *MPower Foxy* at 180 mL per acre plus 2,4-D Ester 700 component<sup>§</sup> at 260 mL per acre (*Flurox-24* treats 40 acres per case, *Rush 24* or *MPower Foxy Pro* plus additional 2,4-D<sup>§</sup> treats 52 acres per case) controls the weeds controlled by 2,4-D ester at 170 gae/acre (see 2,4-D page) plus the following weeds:
  - Cleavers\*
  - Kochia
  - Vetch
  - Wild buckwheat\*\*
- \* 1 to 4 whorls with *Flurox-24*, *Rush 24* and *MPower Foxy Pro*; 1 to 6 whorls with *Attain XC* only.
- \*\* 1 to 4 leaf with *Flurox-24* and *MPower Foxy Pro*; 1 to 6 leaf with *Attain XC* and *Rush 24* only.
- *Attain XC A* at 125 mL per acre plus *Attain XC B* at 340 mL per acre or;  
*Nufarm* or *ADAMA Fluroxypyr 180* or *MPower Foxy* at 240 mL per acre plus 2,4-D Ester 700 component<sup>§</sup> at 340 mL per acre (*Flurox-24* treats 30 acres per case, *Rush 24* or *MPower Foxy Pro* plus additional 2,4-D<sup>§</sup> treats 40 acres per case) controls the weeds controlled by 2,4-D ester at 227 gae/acre (see 2,4-D page) plus the following weeds:
  - All weeds listed above plus:
    - Cleavers (1 to 8 whorls)<sup>Δ</sup>
    - Kochia (2 to 8 leaf)
    - Wild buckwheat\*\*\*
    - Hemp-nettle (2 to 6 leaf stage)<sup>†</sup>
- \*\*\* 1 to 4 leaf with *Flurox 24* and *MPower Foxy Pro*; 1 to 8 leaf with *Attain XC* and *Rush 24* only
- Δ *Attain XC* only
- † Suppression only

Make only ONE APPLICATION per year of any of these products or other products containing the same active ingredients. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** *Attain XC* use 20 to 40 L per acre. All other products minimum 40 L per acre.
  - **Aerial:** *Attain XC* only use 12 to 20 L per acre.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE coarse* droplets.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

The following mixes may be used with each of the combinations above unless noted otherwise.

- **In spring wheat (including durum) and barley:**
  - Imazamethabenz (*Assert* only – 0.53 to 0.65 L per acre)
  - Tralkoxydim<sup>†\*</sup>
- **In spring wheat (including durum) only:**
  - Clodinafop 240EC<sup>†</sup> (93 mL per acre)
  - Fenoxaprop<sup>†</sup>
  - *Simplicity OD*<sup>††</sup>
  - *Simplicity GoDRI*<sup>††</sup>

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizer:** None registered.

\* Temporary crop injury or reduced wild oat control may occur with this tank mix.

† See product labels for specific brands registered.

†† Low rate of *Attain XC* only.

**Note:** The above mixes are those listed on the fluroxypyr + 2,4-D product labels only.

Manufacturers may also support mixes between their products and other pesticides that are not on their labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Grazing Restrictions:** DO NOT permit lactating dairy animals to graze cereal fields within 7 days of application. DO NOT harvest cereal crops for forage or cut hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT feed or cut forage grasses for hay
- **Re-cropping Interval:**
  - **All products:** Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye, and wheat, may be grown the year after application. There are no re-cropping restrictions the second year after application.
  - **Attain XC only:** Alfalfa, corn, dry beans, potatoes, soybeans, and sunflowers may also be seeded the year following.
- **Aerial Application:** *Attain XC* may be applied by air.
- **Buffer Zones:**
  - **Flurox-24, Rush 24:** Leave a buffer of 15 metres from water bodies, wetland areas and plants that may be injured.
  - **Attain XC:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	3
Fixed wing aircraft	6	0	100
Helicopter	6	0	80

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.

# Fluroxypyr + MCPA

**Herbicide Group**  
**4 - fluroxypyr & MCPA**  
*(Refer to page 45)*

This product is a prepackaged tank mix of Fluroxypyr (see Fluroxypyr – page 217) and MCPA ester (page 284). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.

## Company:

ADAMA Canada (*Rush M*)

AgraCity (*MPower Foxy M*)

Nufarm Agriculture (*Trophy*)

## Formulation:

The Fluroxypyr + MCPA package has 2 components:

**Nufarm Fluroxypyr (PCP#30194), MPower Foxy (PCP#32952) or ADAMA Fluroxypyr 180 EC (PCP#30815):** 180 g/L fluroxypyr.

- Container size – 4.8 L

**NuFarm MCPA Ester 600 (PCP#27803), MPower MCPA Ester 600 (PCP#32912) or ADAMA MCPA 2 EH Ester 600 (PCP#31669):** 600 g/L MCPA ester.

- Container size – 7.5 L

All components above are formulated as emulsifiable concentrates.

## Crops and Staging:

**Spring wheat (including durum), canaryseed\* & barley:** 3 leaf up to full emergence of the flag leaf.

**\*Trophy only** - Since the use of this product on canaryseed is registered under the User Requested Minor Use registration system, the manufacturer assumes no responsibility for herbicide performance. **Users of this product on canaryseed do so at their own risk.**

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Weeds controlled at the 2 to 4 leaf stage, unless specified, include weeds controlled by MCPA 600 ester at 380 mL/acre plus:**

- Cleavers (1 to 4 whorls)
- Kochia
- Volunteer flax (1 to 12 cm)
- Hemp-nettle (2 to 6 leaf)
- Vetch

**Weeds suppressed include:**

- Stork's-bill (1 to 8 leaf)
- Wild buckwheat (1 to 4 leaf)

## Rate:

**Fluroxypyr component:** 0.24 L per acre

**MCPA Ester 600 component:** 0.38 L per acre.

(One case treats 20 acres)

Maximum ONE APPLICATION per year of *Trophy* or *Rush* or other products containing fluroxypyr.

## Tank Mixes:

Tank mix partners may be mixed at all label rates and include recommended adjuvants unless otherwise noted.

**Herbicides:**

- **In spring wheat (including durum) and barley:**
    - Imazamethabenz (Assert only – 0.53 to 0.65 L per acre)
    - Tralkoxydim<sup>†</sup>
  - **In Spring wheat (including durum) only:**
    - Clodinafop<sup>†</sup>
- <sup>†</sup> See product labels for specific brands registered.

**Note:** The above mixes are those listed on the Fluroxypyr + MCPA ester labels only.

Individual manufacturers may also support additional mixes that are not on the Fluroxypyr+MCPA labels. Check with manufacturers for more details.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Re-cropping Interval:** Wheat, barley, oat, rye, forage grasses, flax, canola, mustard, lentil and pea may be grown the year after application. There are no re-cropping restrictions the second year after application.
- **Aerial Application:** DO NOT apply by air.
- **Buffer Zones:**
  - Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	15	15	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.

# Focus

Herbicide Group  
**14 - carfentrazone**  
**15 - pyroxasulfone**  
*(Refer to page 45)*

## Company:

FMC Corporation

## Formulation:

**Focus (PCP#32292):** 447 g/L pyroxasulfone and 53 g/L carfentrazone formulated as a suspension emulsion.

- Container size – 4 x 4.5 L

-or-

**Focus** co-pack<sup>†</sup>, containing:

**Aim EC Herbicide (PCP#28573):** 240 g/L carfentrazone formulated as an emulsifiable concentrate.

- Container size - 1 x 2 L

**Pyroxasulfone 85 WG (PCP#30572):** 85% pyroxasulfone formulated as a water dispersible granule.

- Container size - 2 x 2 kg

<sup>†</sup> **Note:** This product is no longer manufactured but inventories still remain in distribution. This product may be removed from future editions.

## Crops, Rates and Staging:

**Note:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

Apply prior to seeding or up to 3 days after seeding of:

- Corn
- Lentil<sup>†</sup>
- Soybean
- Wheat (spring and winter, NOT durum)\*

Treatment	Product	Rate (per acre)		Acres Treated per Jug	
		Soil Type		Soil Type	
		Coarse to Medium Texture (1 to 4% O.M.)**	Medium to Fine Texture (4 to 7% O.M.)	Coarse to Medium Texture (1 to 4% O.M.)	Medium to Fine Texture (4 to 7% O.M.)
Non-residual	Focus co-formulated	90 mL		50	
	Focus co-pack Aim EC Pyroxasulfone 85 WG	24 mL 48 g		84	
Residual	Focus co-formulated	113 mL	136 mL	40	33
	Focus co-pack: Aim EC Pyroxasulfone 85 WG	30 mL 60 g	36 mL 73 g	66	55

\* DO NOT apply prior to seeding durum wheat.

\*\* O.M. = organic matter content

<sup>†</sup> Under certain conditions, Focus can affect lentil growth. See details under "Effects of Growing Conditions" below.

Coarse to Medium soils	Medium-Fine to Fine soils
Sand, Loamy sand, Sandy loam, Loam, Silt loam, Silt	Sandy clay loam, Sandy clay, Silty clay loam, Silty clay, Clay loam, Clay

Maximum ONE APPLICATION of Focus or other products containing carfentrazone or pyroxasulfone per season.

Use Agral 90 or Ag-Surf at 0.25 L per 100 L of spray solution or Merge at 1 L per 100 L of spray solution for emerged broadleaf weeds, if using Focus without glyphosate.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

**WARNING** – application to emerged crops will result in severe damage to the crop.

DO NOT apply *Focus*:

- to soils with 7% or more organic matter content.
- to sandy soils with less than 1% organic matter content.
- in conjunction with products containing saflufenacil (*Heat*), before or after the application of *Focus* as crop injury may occur.

## Weeds and Staging:

Control of the following weeds emerging from seed (not controlled if emerged at application):

- Barnyard grass
- Brome (downy, Japanese)
- Cleavers
- Foxtail (green, yellow)
- Foxtail barley\*
- Kochia\*
- Lamb's-quarters\*
- Mustard (wild\*, wormseed)
- Pigweed (green, redroot)
- Ryegrass (Italian)
- Stinkweed\*
- Waterhemp, common
- Wild buckwheat\*
- Wild oats\*
- Velvetleaf

\* **Suppression only.**

## Application Information:

- **Water Volume:** Minimum of 40 L per acre. Higher spray volume is required for dense weed stands. Weed control improves with the amount of coverage.
- **Nozzles & Pressure:** Maximum 35 psi (210 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
carfentrazone	POST (foliar)	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Non-selective Broadleaf	14
pyroxasulfone	PPI, PRE (surface) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

**All Crops:** Moisture is necessary to activate the Pyroxasulfone component in soil for effective weed control. Dry weather following applications may reduce effectiveness. Extremes in environmental conditions such as temperature, moisture, soil conditions, and cultural practices may affect activity. Excessive rainfall, irrigation, or prolonged wet soil conditions after application of *Focus* from seed germination through seedling emergence may increase the risk of seedling injury, especially with shallow seeded crops.

**Lentils:** Under certain conditions, *Focus* can affect lentil growth. These conditions include high pH (7.5 and above), cool weather, prolonged and excessive moisture, seedling diseases, and any other conditions, including poor agronomic practices, that are unfavorable to vigorous crop growth. Such effects are often observed as stunting and discoloration. The duration of these effects is somewhat dependent on the duration of the adverse growing conditions. These effects lessen and generally diminish with the return to normal growing conditions.

## Tank Mixes:

**Herbicides:**

- **Prior to Corn only:**
  - AAtrex (0.85 to 1.25 L per acre) (soil activity).
- **Prior to All Crops:**
  - Glyphosate (180 to 360 g ae per acre)

**FMC also supports the following mixes that are not on the *Focus* label. Apply mixes according to the most restrictive use limitations for either label:**

- **Herbicides:** 2,4-D amine or ester + glyphosate

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall within 1 hour of application or heavy rainfall shortly after application may reduce weed control of the *Aim* component. Moderate rainfall beyond the above limitations will improve the activity of the *Pyroxasulfone 85WG* component.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT allow livestock to graze or feed on wheat grain, forage, hay or straw within 42 days after application.
- **Pre-harvest Interval:** Not applicable.
- **Re-cropping Interval:** Conduct a field bioassay to confirm crop safety prior to seeding any rotational crops other than wheat (spring or winter), field corn, lentils or soybeans.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place in original container.
- **Buffer Zones:**

Application Method	Formulation	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground *	<i>Focus</i> co-formulated	5	3	5
	<i>Focus</i> co-pack	5	3	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:

No specific hazards.

# Fortress MicroActiv

**Herbicide Group**  
**3 - trifluralin**  
**8 - triallate**  
*(Refer to page 45)*

## Company:

Gowan Canada (PCP#19521)

## Formulation:

10% triallate and 4% trifluralin formulated as a granular.

- Container size - 22.7 kg, 454 kg

## Crops and Staging:

Prior to planting wheat (spring and durum), barley, canola, flax (not including Solin - low linolenic acid flax), mustard.

**Pre-plant incorporated:** In fall after September 15 until soil freeze-up or in the spring prior to seeding crop.

**Surface application:** Apply in the fall after October 1 and when soil temperature is less than 4°C at a depth of 2 inches (5 cm). Incorporation using a harrow operation is recommended. Incorporation can be delayed until the following spring.

Some wheat and barley injury may be noted on eroded knolls.

DO NOT apply *Fortress MicroActiv* to fields:

- after snowfall
- with heavy crop residue.

## Weeds and Staging:

### Pre-emergent control of:

- Foxtail (green, yellow)
- Wild oat

### Suppression of:

- Kochia
- Redroot pigweed
- Wild buckwheat
- Lamb's-quarters
- Russian thistle

## Rates:

### Fortress MicroActiv – Fall Treatment

Crop	Rate (Kg per acre)				Acres Treated per 454 Kg Bag			
	Organic Matter				Organic Matter			
	Less than 2%	2 to 4%	4 to 6%	Greater than 6%	Less than 2%	2 to 4%	4 to 6%	Greater than 6%
Wheat	N.R.*	4.4	5.7	5.7**	N.R.*	102	80	80
Barley	4.4	5.7	5.7	6.9	102	80	80	66
Canola, flax <sup>†</sup> , mustard	5.7	5.7	5.7	6.9	80	80	80	66

\* N.R. - Not Recommended.

\*\* For fall incorporated applications (not surface) apply 6.88 kg per acre when organic matter exceeds 8 percent.

<sup>†</sup> Excluding Solin (low linolenic acid flax).

### Fortress MicroActiv – Spring Treatment

Crop	Rate (Kg per acre)				Acres Treated per 454 Kg Bag			
	Organic Matter				Organic Matter			
	Less than 2%	2 to 4%	4 to 6%	Greater than 6%	Less than 2%	2 to 4%	4 to 6%	Greater than 6%
Wheat	N.R.*	N.R.*	4.4	5.7	N.R.*	N.R.*	102	80
Barley	N.R.*	4.4	5.7	6.9	N.R.*	102	80	66
Canola, flax <sup>†</sup> , mustard	5.7	5.7	6.9	6.9	80	80	66	66

\* N.R. - Not Recommended.

<sup>†</sup> Excluding Solin (low linolenic acid flax).

## Application Information:

- *Fortress MicroActiv* may be applied in the fall with or without a fall tillage operation, or in the spring as a pre-plant incorporated treatment. Before application of this product, the soil must be in good working condition. Application to a field that is wet, lumpy, rough or ridged will result in reduced weed control and promote crop thinning.
- *Fall Surface Application:* Where fields are prone to water and/or wind erosion, and tillage is therefore undesirable, fall surface application should be made within 3 weeks of soil freeze-up, when the soil begins to cool (less than 4°C), which typically begins on or around October 1. Application can be made to standing stubble or to previously worked fields with incorporation delayed until spring. Incorporation using a harrow operation is recommended. For best results on heavy wild oat infestations, use the incorporated treatment.
- *Fall Incorporated Application:* *Fortress MicroActiv* must be applied after September 15 and before soil freeze-up. Application prior to September 15 may result in reduced weed control. Initial incorporation may be completed within 24 hours of application. Incorporation using a harrow operation is recommended. The second incorporation may be done in the fall (prior to soil freeze-up) or in the spring. Fall incorporation is not recommended on soils where a lack of crop residue cover combined with the required incorporation operation could result in soil erosion.
- *Spring Application:* *Fortress MicroActiv* can be applied before seeding but must be incorporated within 24 hours of application. The second incorporation must be delayed at least 48 hours after the first and may be performed at any time prior to crop emergence. Incorporation using a harrow operation is recommended.
- **Incorporation:**
  - *Fortress MicroActiv* applications require two incorporations, with the second incorporation at right angles to the first. Seeding with a seeder that provides soil disturbance equivalent to a cultivator may replace one incorporation. Incorporate to a maximum depth of 2 inches (5 cm) by setting disk or cultivator implements to cut a maximum of 3 inches (7.5 cm) into the soil.

- Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. If the second incorporation is conducted after seeding, it should be done with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective in-corporation if compact soil prevents penetration of harrow teeth, if crop residue accumulates in the harrow sections, or if the harrows bounce.
- **Seeding Requirements:** Accurate seeding depth control is critical. Thinning of wheat and barley has been known to occur when seeding depth has been inadequate. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). DO NOT seed deeper than 3 inches (7.5 cm). To ensure an even crop stand, increase the usual seeding rate of wheat or barley by 10 percent, especially if soil conditions are cold or dry. See product label for more information.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
trifluralin	PPI (Soil active)	Mitosis Inhibitor/cell division	Little movement in plant (Apoplast)	Broadleaf & grass	3
triallate	PPI (soil active)	Lipid Synthesis Inhibitor (Non-ACCase)	Little movement in plant (Apoplast)	Wild oat	8

## Effects of Growing Conditions:

Crop injury can occur on fields where *Fortress MicroActiv* has been applied and heavy rainfall or cold weather occur after seeding but prior to crop emergence. Seeding under warm soil conditions (greater than 10°C and generally after May 15) will ensure optimum crop germination and emergence and will reduce the risk of crop injury. Very dry conditions in spring or prolonged cool soil temperatures at time of wild oat germination will result in reduced control.

Poor results may be expected from incomplete incorporation due to wet, cloddy soil or heavy crop residues. Ridges left at seeding may disrupt the treated layer and allow weed escapes.

## Restrictions:

- **Rainfall:** Moisture is required for activation. Rainfall of at least 0.6 inches (1.5 cm) within 2 weeks of seeding is required to ensure optimum results.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hour
- **Grazing Restrictions:** DO NOT graze or cut treated crops for livestock feed prior to crop maturity.
- **Re-cropping Interval:** *Fortress MicroActiv* will leave a residue in the soil. Oats, canaryseed, and small seeded forage grasses may be injured if planted within 24 months of application. DO NOT apply on land to be sown to wheat if the land has been treated with trifluralin since June 1 of the previous year.
- **Aerial Application:** May be applied by airplane with attachments designed for applying low volumes of granules.

## Hazard Rating:



Warning – contains the allergen soy.

May cause Skin and Eye Irritation

For an explanation of the symbols used here see pages 7 and 8.

# Frontier Max

**Herbicide Group**  
**15 - dimethanamid**  
*(Refer to page 45)*

## Company:

BASF Canada (PCP#29194)

## Formulation:

720 g/L dimethanamid-P formulated as an emulsifiable concentrate.

- Container size - 3 L to 1000 L



## Crops and Staging:

### Pre-plant incorporated:

- Corn (NOT sweet corn, popcorn, or corn grown for seed).
- Dry beans (navy and kidney beans only).

### Pre-emergence surface:

- Dry beans (navy and kidney beans only).
- Potatoes – after planting or after hilling, but before emergence of the crop or weeds.

## Weeds and Staging:

Pre-emergent control of green foxtail.

## Rates:

### Pre-plant incorporated treatments:

- Apply at 0.35 to 0.39 L per acre. Apply at the higher rate on fine-textured or high organic soils and for heavier anticipated weed problems.

### Pre-emergence surface treatments:

Soil Type (Texture)	Rate (L per Acre)		
	Less than 3% Organic Matter	3 to 6% Organic Matter	7 to 10% Organic Matter
Coarse	0.31	0.31	0.35
Medium and Fine	0.31	0.35	0.39

## Application Information:

- **Water Volume:** A minimum of 40 L per acre.
- **Pressure:** 30 to 43 psi (200 to 300 kPa).
- **Nozzles:** Flat fan or flood-jet. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets.
- **Screens:** Use 16 mesh suction screen, 50 mesh elsewhere on sprayer.
- **Incorporation:** For pre-plant incorporated treatments, apply *Frontier Max* as a broadcast treatment and incorporate using a harrow, rolling cultivator or other implement capable of giving uniform, shallow incorporation into the top 5 cm (2 inches) of soil within 7 days of planting. Avoid deeper incorporation or reduced weed control and/or crop injury may result. Immediate incorporation after application is not necessary.
  - Beans must be planted at least 4 cm (1.5 inches) deep or crop injury may occur.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dimethanamid-P	PPI, PRE (surface) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

Rainfall is required within 7 to 10 days of application to activate and move *Frontier Max* into the soil zone. If dry conditions persist, a shallow cultivation or the use of a rotary hoe is necessary to move the herbicide into moist soil and control weed escapes. Shallow tillage is important to minimize dilution of the herbicide. If drought conditions persist after pre-plant incorporated or pre-emergence applications, weed control may not be adequate.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** May be applied with a liquid fertilizer carrier. Test compatibility with liquid fertilizer by mixing a small amount of herbicide with a proportional quantity of liquid fertilizer in a jar. May also be impregnated on dry bulk fertilizers for pre-plant incorporated treatments. A minimum of 90 kg per acre of dry bulk fertilizer should be applied. DO NOT impregnate *Frontier Max* on nitrate fertilizers, superphosphates or limestone.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the *Frontier Max* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall after application is important for good weed control.
- **Re-entry Interval:** DO NOT enter treated fields for 24 hours.
- **Grazing Restrictions:** DO NOT graze or feed the treated corn crop within 40 days of application. DO NOT graze the treated bean crop or feed bean forage, hay or straw to livestock.
- **Re-cropping Interval:** DO NOT plant winter wheat within 120 days of application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze. Must be stored under heated warehouse conditions.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	3

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. When mixing with other pesticides, combine the method above with the method recommended for the tank mix partner if different from above for thorough cleaning.

## Hazard Rating:



Caution – Poison.



Warning – Eye Irritant and Potential Skin Sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Glufosinate 150SN

**Herbicide Group**  
**10 - glufosinate**  
*(Refer to page 45)*

## Company:

BASF Canada (*Liberty 150SN* - PCP#28837)

AgraCity (*MPower Vigor* – PCP#33267)

## Formulation:

150 g/L glufosinate ammonium formulated as a solution.

- Container sizes:
  - *Liberty 150SN* - 13.5 L, 108 L, 432 L
  - *MPower Vigor* - 2 x 10.8 L, 108 L

## Crops and Staging:

**Liberty Link Canola** - cotyledon to early bolting stage. Temporary crop discolouration (bronzing, speckling) may be observed after application.

*Note: A valid Liberty and Trait Agreement is required to purchase Liberty 150SN only.*

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed	Weed Stage (from emergence to stage)	Rate (L per acre)
Cow cockle	4 leaf	0.54
Green foxtail	6 leaf (max. 3 tillers)	
Barnyard grass	4 leaf	0.81
Wild mustard	5 leaf	
Lamb's-quarters, smartweed (lady's-thumb)	6 leaf	
Stinkweed	8 leaf	
Volunteer flax	2.5 inches (6 cm)	
Russian thistle	3 inches (8 cm)	
Wild buckwheat	3 leaf	1.08
Redroot pigweed, round-leaved mallow, quackgrass*	4 leaf	
Light to moderate infestations <sup>†</sup> of volunteer wheat	4 leaf volunteer barley* (max. 2 tillers)	
Hemp-nettle (1 to 3 leaf pairs), shepherd's-purse	6 leaf	
Common chickweed (max. 4 leaf pairs), sow-thistle	8 leaf	
Kochia	3 inches (8 cm)	
Canada thistle*, scentless chamomile	4 inches (10 cm)	
Cleavers	2 whorls (nodes)	1.35
Stork's-bill and heavy populations of wild buckwheat	3 leaf	
Quackgrass (light to moderate** or heavy infestations*) <sup>†</sup> , volunteer wheat, volunteer barley*, wild oat	4 leaf (max. 2 tillers except quackgrass)	
Hemp-nettle	8 leaf (1 to 4 leaf pairs)	
Dandelion rosettes	6 in. (15 cm) across	
Flixweed, Canada thistle*	4 inches (10 cm)	
Jimsonweed	1 to 6 leaf	
Quackgrass***	4 leaf	1.6
Canada thistle**	4 inches (10 cm)	

\* Temporary top growth control. Plants may return from surviving growing points.

\*\* Extended top growth control.

\*\*\* Season long control.

<sup>†</sup> The company does not provide guidelines for weed densities. When in doubt as to the infestation level, use the high rate or contact the manufacturer.

#### Second Application:

A second application of up to 1.35 L per acre may be made to fields that were treated initially with *Glufosinate 150SN* to a maximum total combined rate of 2.97 L per acre (1.62 L + 1.35 L). DO NOT apply more than 2.97 L per acre of *Glufosinate 150SN* in one season.

### Application Information:

- **Water Volume:**
  - **Ground applications:** 45 L per acre.
  - **Aerial applications:** 22 L per acre.
- **Nozzles and Pressure:**
  - **Ground Application:** Use 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles; 45 psi (310 kPa) when using check valves. Angle nozzles forward at 45° to improve coverage of vertical leaf surfaces. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** or larger droplets.
  - **Aerial applications:** DO NOT use raindrop nozzles. Use a combination of nozzles and pressure to provide **ASABE coarse** or larger droplet size distribution.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
glufosinate	POST (foliar)	Glutamine Synthase Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Broadleaf & grass	10

## Effects of Growing Conditions:

*Glufosinate 150SN* activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought, and low humidity conditions slow weed growth. Applications made under these stressed conditions may result in reduced weed control.

## Tank Mixes:

### Herbicides:

- Clethodim (*Centurion* or *Select* only) 50 mL to 77\* mL per acre plus *Amigo*. For *Centurion* or *Select* tank mixes add *Amigo* to the tank first followed by *Glufosinate 150SN* and then *Centurion* or *Select*. Consult label for specific mixing instructions.
- Facet* (quinclorac)\* (113 mL/acre) plus *Merge* adjuvant (0.2 to 0.4 L per acre)
- Clethodim + *Facet* plus *Merge* adjuvant (rates above)\*

\* *Liberty 150SN* only.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Glufosinate 150SN* labels only.

BASF Canada also supports the following mixes that are not on the *Liberty 150SN* label. Apply mixes according to the most restrictive use limitations for either product:

- Herbicides:** *Facet* at 227 mL/acre (with or without clethodim tank mix) plus *Merge*.
- Insecticides:** *Decis*, *Sevin XLR*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- Rainfall:** Within 4 hours may reduce control.
- Re-entry Interval:** DO NOT re-enter treated areas for 24 hours after application.
- Grazing Restrictions:** DO NOT graze the treated crop or cut for feed.
- Preharvest Interval:** DO NOT apply within 60 days of harvest.
- Re-cropping Interval:** No restrictions for field corn, canola and soybeans, dry common beans (not grown for seed), alfalfa, carrot, lettuce, onion and potato. 70 days for buckwheat, barley, millet, oats, rye, sorghum, triticale and wheat. Minimum 120 days for all other crops.
- Aerial Application:** May be applied by air.
- Storage:** DO NOT freeze.
- Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	1
Fixed wing airplane or Helicopter	1	0	30

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- DO NOT apply when dead calm or when winds exceed 16 km/hr when using unprotected booms or applying by air, or exceeding 25 km/hr when using shrouded booms.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning – Poison



Caution – Skin Irritant



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Glyphosate

Herbicide Group

**9 - glyphosate**

(Refer to page 45)

## Product names, Company, Formulation and Package sizes:

All products are formulated as solutions.

Container sizes available: Various

Product Name	Company	Salt type*	Active** content (g ae /L)
<i>ClearOut 41 Plus</i> (PCP#28322)	AgraCity	IPA	360
<i>Credit 45</i> (PCP#29124)	Nufarm Agriculture	IPA	450
<i>Credit Xtreme</i> (PCP#29888)	Nufarm Agriculture	IPA/K	540
<i>Crush'R Plus</i> (PCP#29995)	AgriStar	IPA	360
<i>Crush'R 540</i> (PCP#31655)	AgriStar	K+	540
<i>Factor 540</i> (PCP#27988)	IPCO	K+	540
<i>Guardsman Glyphosate</i> (PCP#32228)	Univar Canada Ltd.	IPA/K+	540
<i>Matrix</i> (PCP#29775)	IPCO	DMA	480
<i>MPower Disruptor 360</i> (PCP#29290)	AgraCity	IPA	360
<i>MPower Disruptor 540</i> (PCP#32817)	AgraCity	K+	540
<i>Roundup Transorb HC</i> (PCP#28198)	Bayer	K+	540
<i>Roundup WeatherMax</i> (PCP#27487)	Bayer	K+	540
<i>R/T 540</i> (PCP#28487)	Bayer	K+	540
<i>Smoke</i> (PCP#31063)	Great Northern Growers	IPA	360
<i>Sharda Glyphosate</i> (PCP#31493)	Sharda CropChem Canada	IPA	360
<i>StartUp</i> (PCP#29498)	Loveland Products Canada	K+	540
<i>Stonewall</i> (PCP#31655.01)	WinField United Canada	K+	540
<i>Vector</i> (PCP#30319)	Federated Co-operatives Ltd.	DMA	480
<i>Vector 540</i> (PCP#31327)	Federated Co-operatives Ltd.	K+	540
<i>VP480</i> (PCP#28840)	Corteva Agriscience	DMA	480

\* Salt type: IPA = Isopropylamine, MA = Monoammonium, DA = Diammonium, DMA = dimethylamine, K+ = Potassium

\*\* Formulation concentration is expressed as "grams of acid equivalent per litre of product (g ae/L)".

Glyphosate acid is the herbicidally active component of the formulation and is proportional to the activity of the formulation

Note: Some products may be more effective due to formulation differences (not related to higher glyphosate content) under adverse conditions, but that benefit is reduced when applications are made under optimal conditions for activity (i.e. rapid weed growth, clean leaf surfaces). When selecting a glyphosate product, consult the product labels.

Rate (g ae per acre)	Glyphosate formulation concentration (g ae/L)				
	356/360	450	480	500	540
36.5	100 mL	81 mL	76 mL	73 mL	67 mL
73	200 mL	162 mL	152 mL	146 mL	134 mL
110	0.3 L	0.24 L	0.23 L	0.2 L	0.2 L
120	0.33 L	0.27 L	0.25 L	0.24 L	0.22 L
136	0.38 L	0.30 L	0.28 L	0.27 L	0.25 L
145	0.4 L	0.32 L	0.3 L	0.28 L	0.27 L
180	0.5 L	0.4 L	0.38 L	0.36 L	0.33 L
275	0.77 L	0.61 L	0.57 L	0.54 L	0.51 L
325	0.91 L	0.73 L	0.68 L	0.65 L	0.61 L
360	1.0 L	0.81 L	0.76 L	0.73 L	0.67 L
510	1.42 L	1.13 L	1.1 L	1.0 L	0.94 L
540	1.5 L	1.21 L	1.13 L	1.09 L	1.0 L
690	1.9 L	1.54 L	1.44 L	1.38 L	1.28 L
720	2.0 L	1.62 L	1.5 L	1.46 L	1.34 L
1020	2.8 L	2.27 L	2.13 L	2.02 L	1.89 L
1750	4.9 L	3.88 L	3.6 L	3.48 L	3.24 L

### Crops and Uses:

1. Annual weed control prior to crop emergence or in fallow.
2. Quackgrass control prior to seeding or after harvest.
3. Dandelion control (other than Preharvest).
4. Canada thistle control in fallow, shelterbelts and post-harvest.
5. Alfalfa control (other than Preharvest).
6. Other perennial weeds control in fallow, shelterbelts and post-harvest.
7. Patch treatments of perennial weeds in cereals, corn, soybean and forages.
8. Preharvest perennial weed control.
9. For use in Glyphosate tolerant crops.
10. Tank Mixes.

### 1. Annual weed control prior to crop emergence or in fallow:

Weeds listed may not occur on all product labels. Check individual product labels for a specific list of weeds controlled.

Rate (g ae per acre)	Surfactant*	Weeds Controlled	Weed Stage
110	0.14 L per acre	<b>Grasses:</b> Green foxtail, volunteer cereals, wild oat (light infestations) <b>Broadleaves:</b> lady's-thumb, stinkweed, volunteer canola (NOT including glyphosate tolerant varieties), wild mustard.	Less than 3 inches (8 cm) high. Apply at the 1 to 3 leaf stage of wild oat.
145	0.14 L per acre	<i>Above weeds plus:</i> <b>Grasses:</b> heavy infestations of wild oat <b>Broadleaves:</b> suppression of flixweed, kochia.	1 to 3 leaves for wild oat Weeds 3 to 6 inches (8 to 15 cm).
180 to 275	Not required	<i>Above weeds plus:</i> <b>Grasses:</b> downy brome, Persian darnel. <b>Broadleaves:</b> Canada fleabane, cleavers, common ragweed, flixweed, hemp-nettle, lamb's-quarters, narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, volunteer flax, wild buckwheat.	Canada fleabane, common ragweed, less than 3 inches (8 cm) high. Other weeds less than 6 inches (15 cm). Use high rate for narrow-leaved hawk's-beard 3 to 6 inches (8-15 cm) or wild buckwheat at the 3-4 leaf stage.

Rate (g ae per acre)	Surfactant*	Weeds Controlled	Weed Stage
325	Not required	<i>Above weeds plus:</i> <b>Grasses:</b> annual blue grass, crabgrass. <b>Broadleaves:</b> annual sow-thistle, kochia, prickly lettuce, shepherd's-purse, narrow-leaved vetch**.	Less than 6 inches (15 cm) high
510	Not required	Above weeds.	Greater than 6 inches (15 cm) high

\* Unless otherwise specified on the product label, use one of the following surfactants: *Agral 90, Agsurf II, Companion or LI700*.

\*\* Note: Narrow-leaved vetch is an annual species. Established perennial vetches, such as American vetch, may not be controlled at this rate.

## 2. Quackgrass control prior to seeding or after harvest:

Rate (g ae per acre)	Quack Grass Stage
360	Season long control of light to moderate infestations. Apply when quack grass is 8 inches (20 cm) tall and has 3 to 4 actively growing leaves. Apply spring or fall.
360 to 1020	Apply when quack grass has 3 to 4 new leaves for long term control of heavy infestations. Use high rate for sod-bound quack grass (left undisturbed for at least 2 years).

DO NOT apply fall treatments if a hard frost has occurred (-5°C) or if plants are drought stressed. Spread straw to allow regrowth and good spray coverage.

Cultivation prior to application will result in reduced control. DO NOT cultivate between harvest and treatment when using fall applications. If using spring applications on fields which have been fall-tilled, delay application until the quack grass has reached the 4 to 5 leaf stage. (This will occur 1 to 4 weeks later on fall-tilled fields than in undisturbed fields).

Cultivation after application usually will improve control of quack grass. Wait a minimum of 3 days after application before cultivating. If growing conditions are poor (cold or dry), particularly in the fall, waiting longer than 5 days may improve control.

## 3. Dandelion control (other than Preharvest):

Apply up to and including dandelion bloom for best results.

Rate (g ae per acre)	Dandelion Growth Stage
360	Less than 6 inches (15 cm) diameter. Allow 3 or more days after treatment before tillage.
540 to 720	Greater than 6 inches (15 cm) diameter. Use higher rate when infestations are heavy.

## 4. Canada thistle control in fallow, shelterbelts and post-harvest:

Rate (g ae per acre)	Weed Staging
360	Rosettes at least 6 inches (15 cm) in diameter, treated in late summer, following tillage in spring and early summer (up to August 1). Allow thistles to regrow for 5 weeks following last tillage. Wait a minimum of 10 days after application before tillage. Treatment after a mild frost is possible if leaves are green and pliable and plants are actively growing.
690 to 1020	Bud stage or beyond. Allow at least 5 days after application before tillage. -or- Post-harvest treatment. Allow 8 to 10 inches (20 to 25cm) of new growth before application. Must be sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage.

## 5. Alfalfa Control (other than Preharvest):

Rate (g ae per acre)	Weed Staging
540 to 720	Fall control of alfalfa in early bud to full bloom stage. Use high rate when alfalfa populations are high or when perennial grasses are present. Allow at least 5 days before tillage. See tank mix section for minimum tillage or spring applications. Apply with 23 to 135 L per acre water.

## 6. Other perennial weed control in fallow, shelterbelts and post-harvest:

(Refer to individual product labels for detailed application information.)

### Foxtail Barley:

- Control from seedling to heading (all products) at 360 to 720 g ae per acre. Late fall applications may provide better control of established foxtail barley plants than spring applications.

**Yellow toadflax:** 360 g ae per acre.

**Other Perennial weeds\*:** 1020 to 1750 g ae per acre

\* Perennial weeds such as absinth, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

## 7. Patch treatments of perennial weeds in wheat, oat, barley, corn, soybean, forage legumes and forage grasses:

(Refer to individual product labels for detailed application instructions)

Rate (g ae per acre)	Weed
360 to 1020	Quack grass 8 in (20 cm) tall
690 to 1020	Canada thistle Bud or beyond
1750	Milkweed Bud to bloom
1020 to 1750	Other perennial weeds*
36.5 to 73	Spot treatment rates for hand held equipment (per 10 L water**)

\* Perennial weeds such as absinth, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

\*\* Use the low rate for quack grass and the high rate for all other perennials.

## 8. Preharvest perennial weed control:

**DO NOT apply to any crops grown for seed.**

**Note:** As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from crops treated with this product prior to harvest may have market access concerns. Please see page 10 for more information AND *consult potential grain buyers before using this product.*

Not all glyphosate products are registered for Preharvest applications on all crop species listed below. Refer to specific glyphosate labels for a list of registered uses and crop species.

### RATES:

- Prior to the harvest of annual grains (see staging chart below for specific crops):** 360 g ae per acre.
- Prior to the final cut of forages to be removed from production:** 360 to 720 g ae per acre.
- Weeds Controlled with Preharvest applications:**

Quack grass 4-5 green leaves	Canada thistle and perennial sow-thistle at bud stage or beyond	Common milkweed at bud to bloom stage	Toadflax at bud to full bloom stage	Dandelion from rosette to full bloom stage
X	X	X	X	X

- Crop Staging for Preharvest applications:**

- Apply to crops (except forage) when grain moisture is less than 30%. The following chart lists visual symptoms that can be used as guidelines to when 30% grain moisture has been reached.

Crop*	Visual Guide to Proper Application Stage
Wheat, Barley*, Oat*, Canaryseed***†	Hard dough stage – a thumbnail impression remains on seed.
Canola, Mustard****†	Pods are green to yellow and most seeds are yellow to brown.
Flax (and Solin - low linolenic acid flax)	Majority (75 to 80% of bolls) are brown.
Lentil	Lowermost pods (bottom 15%) are brown and rattle when shaken.
Pea	Majority (75 to 80%) of pods are brown.
Chickpea***†, Lupin***†, Faba bean***†, Dry Bean	Stems are green to brown in colour; pods are mature (yellow to brown in colour); 80%-90% leaf drop (original leaves).



Crop*	Visual Guide to Proper Application Stage
Camelina***†	When 95% of pods have changed colour, seed is firm and less than 40% of seed is green.
Soybean	Stems are green to brown in colour and pod tissue is brown and dry in appearance (80 to 90% leaf drop).
Forage	3 to 7 days prior to the last cut before rotation or forage renovation. DO NOT apply to forage stands that are to be maintained.

\* Registered for application to barley grown for malt and tame oat grown for milling. Contact malt barley or milling oat buyers prior to application to confirm acceptance of glyphosate-treated grain.

\*\* Preharvest applications on these crops are registered with *Roundup Transorb HC*, *Roundup WeatherMax*, *R/T 540*, *Stonewall* and *StartUp* only.

\*\*\* Preharvest applications on these crops are registered with *RoundUp Weather Max* only.

† Yellow/white, brown, oriental mustard only.

† NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Those who apply glyphosate to chickpea, lupin, faba bean, canaryseed, camelina or mustard do so at their own risk.

## 9. For use in glyphosate tolerant canola:

### Weeds, Staging and Rates:

#### Genuity (original) glyphosate tolerant canola:

All applications must be made within the cotyledon to 6 leaf stage. Temporary yellowing may occur if applied at the 4 to 6 leaf stage of the crop.

Not all glyphosate products are registered for use on glyphosate tolerant canola at all rates listed. Refer to individual product labels for specific uses and rates.

#### Single application of 120 g ae per acre:

- **Weeds controlled at all stages unless indicated otherwise:**
  - Annual grasses: barnyard grass, green foxtail, volunteer cereals, wild oat.
  - Annual broadleaves: annual smartweed spp.\*\*; chickweed, corn spurry, cow cockle\*, hemp-nettle, kochia, lamb's-quarters, night-flowering catchfly\*, redroot pigweed, Russian thistle, shepherd's-purse\*, stinkweed, volunteer canola (except glyphosate tolerant varieties), wild mustard, wild tomato.

#### Single application of 180 g ae per acre:

- **All stages of the weeds listed above plus:**
  - Annual broadleaves: cleavers, flixweed, wild buckwheat, stork's-bill, narrow-leaved hawk's-beard.
  - Perennial weeds suppressed: Canada thistle, dandelion, perennial sow-thistle, and season long quack grass control.

#### Double application of 180 g ae per acre plus 180 g ae per acre:

- **Additional flushes of the weeds listed above plus:**
  - Annual broadleaves: round-leaved mallow
  - Season long control of following perennials: Canada thistle, foxtail barley, and perennial sow-thistle.

#### Single application of 270 g ae per acre:

- **All weeds in single applications above plus:**
  - Season long control of following perennials: Canada thistle and perennial sow-thistle.

\* Low rates can be used only up to the 3 leaf stage of the crop otherwise use the high rate.

\*\* Low rates can be used only when annual smartweed is in the 4 to 6 leaf stage.

**NOTE: A maximum of 360 g ae per acre per season is allowed in glyphosate tolerant canola**

#### TruFlex canola varieties only:

*Roundup brands* and *R/T 540* only may be applied to *TruFlex* canola varieties only from emergence to first flower stage (50% of plants in field have no more than 1 flower) for rates up to one or two applications of the 360 g ae per acre rate. The maximum timing at the 720 g ae per acre rate is the 6 leaf stage.

#### Single application of 120 to 180 g ae per acre:

- **Weeds controlled at all stages unless indicated otherwise:**
  - Annual grasses: barnyard grass, green foxtail, volunteer cereals, wild oat.
  - Annual broadleaves: annual smartweed (incl. lady's-thumb)\*\*; chickweed, cleavers, corn spurry, cow cockle\*, flixweed, hemp-nettle, kochia, lamb's-quarters, narrow-leaved hawk's-beard, night-flowering catchfly\*, pigweed (redroot), Russian thistle, shepherd's-purse\*, stinkweed, stork's-bill, volunteer canola (except glyphosate tolerant varieties), wild buckwheat, wild mustard, wild tomato.
  - Perennial weeds suppressed: Canada thistle, dandelion, perennial sow-thistle, and season long quack grass control.

**Double application of 180 g ae per acre plus 180 g ae per acre:**

- **Additional flushes of the weeds listed above plus:**
  - Annual broadleaves: round-leaved mallow
  - Season long control of following perennials: Canada thistle, foxtail barley, and perennial sow-thistle.

**Single application of 270 g ae per acre:**

- **All stages of the weeds listed above plus:**
  - Season long control of following perennials: Canada thistle and perennial sow-thistle.

**Single application of 360 g ae per acre:**

- **All weeds above plus:**
  - Grasses: foxtail barley, yellow foxtail, wild proso millet.
  - Broadleaves: biennial wormwood (2 to 8 leaf), cocklebur, common milkweed<sup>†</sup>, nightshade (eastern black), pigweed (smooth), ragweed (common), smartweed (Pennsylvania).

**Double application of 360 g ae per acre plus 360 g ae per acre at least 2 weeks apart:**

- **Additional flushes of the weeds listed above plus:**
  - Season long control of following perennials: Dandelion, common milkweed (15 to 60 cm), field bindweed, tall waterhemp (up to 18 leaf stage).

**Single application of 720 g ae per acre (maximum 6 leaf stage of TruFlex canola):**

- **All weeds above.**

<sup>†</sup> Suppression only.

\* Low rates can be used only up to the 3 leaf stage of the crop otherwise use the high rate.

\*\* Low rates can be used only when annual smartweed is in the 4 to 6 leaf stage.

**NOTE: A maximum of 720 g ae per acre per season is allowed in TruFlex glyphosate tolerant canola.**

## 10. For use in glyphosate tolerant corn and soybean:

### Weeds, Staging and Rates:

All applications must be made within the following crop growth stages.

- **Corn:** up to and including 8 leaf stage
- **Soybean:** first trifoliate leaf through flowering.

**Not all glyphosate products are registered for use on glyphosate tolerant corn and soybeans at all rates listed. Refer to individual product labels for specific uses and rates.**

- **Single application of 360 g ae per acre controls the following weeds:**

◦ Barnyard grass	◦ Proso millet	◦ Volunteer barley and wheat
◦ Crabgrass spp.	◦ Quack grass	◦ Wild oats
◦ Foxtail (green, yellow, giant)		
- **Broadleaves:**

◦ Biennial wormwood	◦ Kochia	◦ Smartweed spp.
◦ Canada thistle	◦ Lamb's-quarters	◦ Stinkweed (suppression only)
◦ Chickweed	◦ Narrow-leaved hawk's-beard	◦ Stork's-bill
◦ Cleavers	◦ Night-flowering catchfly	◦ Velvetleaf
◦ Corn Spurry	◦ Nightshade (Eastern black)	◦ Volunteer canola (except glyphosate tolerant varieties)
◦ Cocklebur	◦ Perennial sow-thistle	◦ Wild mustard
◦ Common milkweed (suppression only)	◦ Pigweed (smooth, redroot)	◦ Wild buckwheat
◦ Common ragweed	◦ Round-leaved mallow	◦ Wild tomato
◦ Flixweed	◦ Russian thistle	
	◦ Shepherd's-purse	
- \* Registered for control in glyphosate tolerant soybean only with Roundup products and R/T 540 only.
- **Second applications of 360 g ae per acre controls the following weeds:**
  - **Late flushes of heavy infestations of the above weeds plus control of:**

◦ Common milkweed	◦ Round-leaved mallow	◦ Yellow nutsedge
◦ Field bindweed		
- **Single application of 720 g ae per acre in glyphosate tolerant soybean from the first trifoliate to flowering stage and corn up to and including 6 leaf stage:**
  - **Heavy infestations of the annual weeds listed above plus control of:**

◦ Field bindweed	◦ Canada thistle	◦ Yellow nutsedge
◦ Common milkweed	◦ Perennial sow-thistle	

- Single application of 1020 g ae per acre in glyphosate tolerant soybean (*Roundup Ready 2 Yield* soybeans only) from the first trifoliolate to flowering stage
    - *Weeds listed above plus control of:*
      - Volunteer alfalfa
      - Smooth brome grass
- \*\* The single application rate in glyphosate tolerant corn and soybean is not labeled for all glyphosate products. Refer to individual glyphosate labels for the registration status of this rate usage in glyphosate tolerant soybean and corn.**

## 11. Tank Mixes:

Tank mix partners may be mixed at all label rates and include recommended adjuvants unless otherwise noted. Not all glyphosate products are registered for all tank mix options below. Refer to individual glyphosate labels for registered tank mixes, glyphosate rates and registered crop species.

	Rate per Acre
Preseeding before all crops <sup>†††</sup>	<i>Aim</i>
Preseeding canola <sup>††</sup>	Bromoxynil – all bromoxynil products at the highest rate indicated on the Bromoxynil page
Preseeding cereals <sup>***</sup>	2,4-D (108 to 273 g ae)*
	<i>Banvel II</i> (0.12 L)*
	Bromoxynil - <i>Pardner</i> (0.51 L), <i>Koril</i> (0.48), <i>Brotex</i> (0.6 L)
	MCPA* (0.2 to 0.4 L)*
	Bromoxynil/MCPA* - <i>Buctril M</i> (0.2 to 0.4 L), <i>Logic M</i> (0.25 to 0.5 L)
Preseeding corn (field and sweet) & flax	MCPA <sup>♦♦</sup> (0.2 to 0.4 L)* <sup>♦</sup>
	Bromoxynil/MCPA* - <i>Buctril M</i> (0.2 to 0.4 L), <i>Logic M</i> (0.25 to 0.5 L)
Preseeding corn (field only)	<i>Banvel II</i> (0.12 L)*
Preseeding field pea, lentil <sup>†</sup> & chickpea <sup>†</sup>	MCPA Amine <sup>♦♦</sup> (0.2 to 0.28 L)* <sup>♦</sup>
Preseeding canaryseed & seedling forage grasses <sup>♦♦♦</sup>	Bromoxynil/MCPA* - <i>Buctril M</i> (0.2 to 0.4 L), <i>Logic M</i> (0.25 to 0.5 L)
Preseeding or prior to emergent of soybeans (all varieties)	Imazethapyr ( <i>Pursuit</i> )
Chem fallow	2,4-D (235 g ae)*
	Dicamba (0.12 L)*
	Bromoxynil - <i>Pardner</i> (0.51 L), <i>Koril</i> (0.48), <i>Brotex</i> (0.6)
Canada thistle control following harvest or in fallow	Dicamba (0.51 L) <sup>**</sup>
Alfalfa control in spring / fall	2,4-D (235 to 470 g ae)*

\* Volunteer glyphosate tolerant canola control: Tank mixes of 2,4-D at 108 to 160 g ae per acre, MCPA and Bromoxynil/ MCPA will control volunteer glyphosate tolerant canola up to the 4 leaf stage and 2,4-D at 212 to 320 g ae per acre will give control up to the 6 leaf stage. Earlier application will result in more consistent control. Dicamba at 0.12 L per acre will not control glyphosate tolerant canola.

\*\* See re-cropping restrictions for Dicamba with fall applications.

\*\*\* 2,4-D tank-mixes in cereals are registered for winter wheat, wheat, barley, and rye; Bromoxynil tank-mixes in cereals are registered on wheat, oats and barley; bromoxynil/MCPA and MCPA tank-mixes registered on cereals include wheat, barley oat and rye; *Banvel II* tank-mixes in wheat, barley, rye oats.

<sup>†</sup> Under drought conditions, deep seeding and/or brief rain showers after seeding may cause injury to emerging seedlings in sprayer overlaps. NOT for use with *Credit 45*, *Mpower Glyphosate*, *SharpShooter*, *SharpShooter Plus*, *Smoke*, or *Sharda Glyphosate*.

<sup>††</sup> *Roundup WeatherMax*, *R/T 540*, *Roundup Transorb*, *Mpower Disruptor 540*, *Startup* only.

<sup>†††</sup> *Credit 45*, *Credit Xtreme*, *Guardman Glyphosate* only.

<sup>♦</sup> Rates based on 500 g/L formulations. All formulation concentrations are registered unless indicated otherwise.

<sup>♦♦</sup> Use only amine formulations of MCPA prior to corn, lentil, chickpea and field peas.

<sup>♦♦♦</sup> Forage grasses include brome grass, crested wheatgrass, intermediate wheat grass, slender wheatgrass, tall wheatgrass, Russian wildrye, timothy, orchard grass, creeping red fescue, meadow fescue, meadow foxtail, tall fescue, meadow brome grass, streambank wheatgrass and reed canarygrass.

**Tank mixes in glyphosate tolerant crops:**

- **Tank mixes or rates listed may not occur on all product labels. Refer to individual product labels for registered tank-mixes.**
    - **Canola (Original Genuity varieties only):**
      - *Lontrel 360* (112 mL per acre)
    - **Soybean:**
      - *Assure II* (101 to 154 mL per acre)
      - *Pursuit* (65 to 85 mL per acre)
    - **Corn:**
      - *AAtrex* (0.63 to 0.84 L per acre)
      - 2,4-D single application (108 to 212 g ae per acre)\*
      - 2,4-D split application (108 g ae per acre followed by 80 to 108 g ae per acre)\*
- \* 2,4-D applications to corn may result in serious injury to some corn hybrids. Consult corn seed provider for varietal tolerance to 2,4-D applications. Apply prior to 4 leaf stage of corn.

**Note:** The above mixes are those listed on the glyphosate labels only.

Bayer also supports the following mixes that are not on the *Roundup* brand labels to manage glyphosate resistant kochia and other labelled weeds at the pressed burnoff timing prior to planting soybean. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Heat* (also glyphosate tolerant canola volunteers), *Valtera*, *Authority*, *Authority Charge*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

**Application Information:**

- **Water Volume:**
    - **Ground:** Use 20 to 40 L per acre in most situations; use of the lower volume may improve control when hard water (Ca or Mg) or iron (Fe) ions are present (See Effects of Growing Conditions below). For certain crop situations, perennial weeds and tank mixes may require up to 120 L per acre of clean low ion water.
    - **Aerial:** Use 8.1 to 20 L per acre for registered preharvest uses only (see Aerial Application below). Minimum 20 L per acre for preseed, fallow, glyphosate tolerant crops and post-harvest treatments with *Roundup WeatherMax* only.
- Refer to specific weed control situations or labels for more information on water volumes and adjuvants.
- **Nozzles and Pressure:** Use 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets for ground applications and **ASABE coarse** droplets for aerial applications.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
glyphosate	POST (foliar), Preharvest	EPSP Amino Acid Synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf & grass	9

**Effects of Growing Conditions:**

Best results are achieved under relatively warm sunny conditions when weeds are actively growing. Frost which kills more than 40% of the above ground tissue will reduce control. Control will also be reduced if foliage is heavily covered with dust. "Hard water" or water containing calcium (Ca), magnesium (Mg) or iron (Fe) ions will reduce the activity of glyphosate products proportional to the level hardness. Reducing application water volume and /or adding ammonium sulphate at 1.2 kg per acre (99% dry) or 2.4 L per acre (49% solution) will reduce the negative effects of low levels of hard water ions. If water is extremely hard (greater than 700 ppm or 40 grains), another water source should be found. Dirty water or water with suspended soil or organic matter will reduce control.

**Restrictions:**

- **Rainfall:** DO NOT apply if rainfall is forecast for the time of application, as weed control may be reduced. Consult manufacturer for more information.
- **Grazing Interval:** All portions of forage and crops treated with glyphosate products may be fed to livestock.
- **Re-cropping Interval:** No restrictions.

- **Aerial Application:** DO NOT apply *Credit 45*, *Crush'R Plus*, *Guardsman*, *Matrix*, *Sharpshooter*, or *Vector* brands of glyphosate to cropland by air.
  - All other glyphosate products listed in the "Product names, Company, Formulation and Packaging" chart are registered for aerial application for certain pre-harvest treatments. Not all crop species listed in the pre-harvest section are registered for aerial glyphosate application. Consult manufacturer for current aerial pre-harvest registration status.
  - ONLY *Roundup WeatherMax* may be applied by air when fields are too wet to access by ground sprayer (flooded) for preseed burndown, fallow treatment, or application to glyphosate tolerant crops (canola, corn, soybean).
  - Aerial applicators of *Roundup WeatherMax* for use prior to seeding, in glyphosate tolerant crops and to fallow must have successfully completed a *Roundup* herbicide aerial application training course provided by Bayer.
- **Storage:** May be stored below 0°C.
- **Equipment:** DO NOT mix, store or apply this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.
- **Buffer Zones:**

Application method	Uses	Buffer Zones (metres <sup>††</sup> ) Required for the Protection of:	
		Aquatic habitats	Terrestrial habitat
Ground *	All uses	15	15
Aerial	Preharvest only**	25	55
	Preharvest only***	100	100
	Glyphosate tolerant canola only <sup>†</sup>	5	40
	Preseed, fallow, glyphosate tolerant crops (corn, soybeans) <sup>†</sup>	30	70

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* *ClearOut 41 Plus*, *Roundup Transorb HC*, *Roundup WeatherMax*, *R/T 540*, *Mpower Disruptor 540*, *StartUp* only.

\*\*\* *Mpower Disruptor 360*, *SharpShooter Plus*, *VP480* only.

<sup>†</sup> *Roundup WeatherMax* only when conditions are too wet for access by ground sprayer.

<sup>††</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat. Glyphosate is very toxic to non-target plants.

## Sprayer Cleaning:

Refer to pages 12 and 13.

## Hazard Rating:

*Roundup Transorb HC*, *Roundup WeatherMax*, *Mpower Disruptor 540*, *Stonewall*, *R/T 540*:



Caution – Poison

*ClearOut 41 Plus*, *Mpower Disruptor 540*, *Guardsman Glyphosate*, *Roundup TransorbHC*, *Roundup WeatherMax*, *R/T 540*, *Sharpshooter Plus*, *Stonewall*:



Warning – Eye and Skin Irritant

All other products:



Caution – Skin and Eye Irritant. Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Glyphosate + clopyralid

Herbicide Group

4 - clopyralid

9 - glyphosate

(Refer to page 45)

*This product is a prepackaged tank mix of clopyralid (page 151) and glyphosate (page 233). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.*

## Company:

Corteva Agriscience (*Eclipse Brands*)

AgraCity (*MPower Clobber G*)

## Formulation:

The *Eclipse III/XC* packages contain 2 components:

***Eclipse III A (PCP#29032)***: 360 g/L clopyralid formulated as a solution.

- Container size - 4.45 L; 3 x 8.9 L

-or-

***Eclipse XC A (PCP#32883)***: 600 g/L clopyralid formulated as a solution.

- Container size - 2.67 L

-plus-

***Eclipse III B (PCP#29033); Eclipse XC B (PCP#32852)***: 480 g/L glyphosate present as an dimethylamine (DMA) salt and formulated as a solution.

- Container size - 2 x 7.5 L; 90L

-or-

The *MPower Clobber G* package contains 2 components:

***MPower Clobber (PCP#33114)***: 360 g/L clopyralid formulated as a solution.

- Container size - 2 x 8.9 L

-plus-

***MPower Disruptor 360 (PCP#29290)***: 360 g/L glyphosate present as an isopropylamine (IPA) salt and formulated as a solution.

- Container size - 80L

## Crops and Staging:

Glyphosate tolerant canola varieties only in the 2 to 6 leaf stage. Some yellowing may occur when applied at the 4 to 6 leaf stage. This effect is temporary and will not influence crop growth, maturity or yield.

## Weeds and Staging:

No staging is specified on the label.

The weeds controlled by glyphosate at 180 g ae per acre plus:

- ***Annual broadleaf weeds:***

- |               |                            |                     |
|---------------|----------------------------|---------------------|
| ◦ Chickweed   | ◦ Kochia                   | ◦ Smartweed         |
| ◦ Corn spurry | ◦ Night-flowering catchfly | ◦ Wild tomato       |
| ◦ Cow cockle  | ◦ Shepherd's-purse         | ◦ Volunteer canola* |

- ***Perennial weeds (season long control):***

- |  |  |                           |
|--|--|---------------------------|
| ◦ Canada thistle                       | ◦ Dandelion greater than 15 cm diameter*** | ◦ Perennial sow-thistle** |
| ◦ Dandelion less than 15 cm diameter** |  | ◦ Quackgrass              |

\* Not including glyphosate tolerant (*Roundup Ready*) varieties.

\*\* Top growth only.

\*\*\* Suppression only.

## Rates:

**Eclipse III A:** 112 mL per acre

**Eclipse III B:** 375 mL per acre

-or-

**MPower Clobber:** 112 mL per acre.

**MPower Disruptor 360:** 500 mL per acre

(Container size above treats 160 acres)

To prepare spray solution, add the clopyralid component to the spray tank. Once it is half filled with water, add the glyphosate component as the remaining water is added to the tank.

## Application Information:

- **Water Volume:** 40 L per acre.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift. **DO NOT use with galvanized sprayer tanks since explosive hydrogen gas can be produced.**

## Restrictions:

- **Re-cropping Interval:** Wheat, oat, barley, rye (not underseeded to legumes such as alfalfa and clover), forage grasses, flax, canola, mustard and field pea\* can be grown the year after application. Manure bedded with straw from treated crops may only be applied prior to the crops listed above with the exception of field pea.  
\* **DO NOT seed to field peas for at least 10 months following treatment.** Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local the manufacturer or retailer for more information before seeding field pea following drought conditions in the previous year.
- **Aerial Application:** DO NOT apply by air.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Glykamba\*

**Herbicide Group**  
**4 - dicamba**  
**9 - glyphosate**  
(Refer to page 45)

## Company:

Nufarm Agriculture (PCP#30870)

## Formulation:

194 g ae/L glyphosate and 46 g ae/L dicamba present as isopropylamine (IPA) salts formulated as a solution.

- Container sizes - 10 L, 115 L, 450 L, 750 L

\* Nufarm will manufacture on a pre-order basis.

## Crops and Staging:

Fallow.

Pre-seeding on fields to be sown to wheat, barley, oats and rye.

May also be applied prior to sowing field corn in fields with more than 2.5% organic matter (DO NOT use on sandy or sandy loam soils).

Glykamba SHOULD NOT be applied prior to broadleaf crops such as lentils, peas, canola and flax due to the risk of injury.



## Weeds, Rates and Staging:

**Annual Weeds:** 1 L per acre may be applied to emerged, actively growing weeds. Application at early growth stages generally provides the best results.

- **Annual grasses:** between emergence and heading.
  - Downy brome
  - Green foxtail
  - Persian darnel
  - Volunteer cereals
  - Wild oats
- **Annual broadleaves:** up to 6 inches (15 cm) height unless otherwise indicated.
  - Cow cockle
  - Flixweed
  - Kochia
  - Lamb's-quarters
  - Redroot pigweed
  - Russian thistle
  - Smartweed (including lady's-thumb)
  - Stinkweed
  - Volunteer canola\*
  - Wild buckwheat (1 to 4 leaf)
  - Wild mustard

\* NOT including glyphosate tolerant varieties.

**Foxtail barley suppression:** Apply 1.26 L per acre before initiation of the seedhead or bottom leaves beginning to brown off.

## Application Information:

- **Water Volume:** 20 to 40 L per acre water. Avoid the use of extremely hard water (greater than 700 ppm calcium and/or magnesium or high levels of iron). Use of the lower water volume may improve control in situations where hard water is the only source available.
- **Nozzles and Pressure:** Use 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE coarse* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba	POST (foliar) with slight soil activity	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4
glyphosate	POST (foliar)	EPSP Amino Acid Synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf & grass	9

## Effects of Growing Conditions:

Reduced effectiveness may result if application is made to weeds that are drought-stressed, damaged by disease or insects. Poor control under cool, cloudy weather can occur. Dust on foliage can also cause reduction in control.

## Tank Mixes:

### Herbicides:

- **Prior to seeding wheat, winter wheat, barley and rye only:**
  - 2,4-D Ester or Amine (113 to 170 g ae per acre)\* or (226 to 283 g ae per acre)\*\*
- \* to control volunteer glyphosate tolerant canola up to 4 leaf stage
- \*\* to control volunteer glyphosate tolerant canola up to 6 leaf stage.

## Restrictions:

- **Rainfall:** Within 6 hours may reduce weed control. Heavy rainfall within 2 hours of application may require a repeat treatment.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT allow lactating dairy animals to graze within 7 days of treatment or cut for feed or hay within 30 days. Remove meat animals from treated areas at least 3 days prior to slaughter.
- **Re-cropping Interval:** No restrictions in the season following treatment. DO NOT apply in fall or spring prior to broadleaf crops such as lentils, peas, canola and flax due to the risk of injury.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store above 5°C.
- **Equipment:** DO NOT mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.



• **Buffer Zones:**

Product	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Medium droplets	1	1	15
Coarse droplets	1	1	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to pages 12 and 13.

## Hazard Rating:



Caution – Poison



Danger – Corrosive to eyes.



Warning – Skin Irritant, Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# GoldWing

**Herbicide Group**  
**4 - MCPA Ester**  
**14 - pyraflufen-ethyl**  
*(Refer to page 45)*

## Company:

Nufarm Agriculture (PCP#32112)

## Formulation:

13.5g/L pyraflufen-ethyl and 420g/L MCPA ester formulated as an emulsifiable concentrate.

- Container size: 2 x 10.7 L, 85.5 L

## Crops and Staging:

For application up to 3 days after planting and prior to the emergence of:

- Barley
- Buckwheat
- Canaryseed
- Corn (Field, sweet)
- Field Pea
- Flax
- Oats
- Proso (Crown) or Pearl Millet
- Rye (spring and winter)
- Triticale
- Wheat (spring, durum, winter)

## Weeds, Rates and Staging:

Unless otherwise stated, apply to emerged, young, actively growing weeds that are less than 5 cm tall or across.

**GoldWing at 133 mL<sup>†</sup> per acre (10.7 L treats 80 acres and 85.5 L treats 643 acres) controls:**

- Annual sow-thistle\*
- Canada fleabane\*
- Cleavers\*
- Cow cockle\*
- Dandelion\*
- Flixweed\*
- Kochia\*\*
- Lamb's-quarters\*\*\*
- Mallow
- Mustards (except dog and tansy)
- Narrow-leaved hawk's-beard
- Night-flowering catchfly
- Redroot pigweed\*\*\*
- Stinkweed
- Volunteer canola (all varieties)
- Wild buckwheat\*
- Wild mustard\*

**GoldWing at 266 mL per acre (10.7 L treats 40 acres and 85.5 L treats 321 acres) provides control or suppression of the weeds above plus control of the following weeds:**

- Canada fleabane
- Cow cockle
- Flixweed
- Goat's-beard\*
- Wild buckwheat

\* Suppression only.

\* Including glyphosate resistant biotypes

\*\* Including Group 2 and glyphosate resistant biotypes

\*\*\* Including Group 2 and 5 resistant biotypes

† GoldWing applied alone requires the addition of a non-ionic surfactant (*Nufarm Enhance, Agral 90*) at 0.25 L per 100 L of spray solution.

Maximum TWO APPLICATIONS of this product or Blackhawk (with pyraflufen) at the rates listed in this Guide WITHIN A TWO YEAR TIME SPAN.

## Application Information:

- **Water Volume:** Minimum 20 to 40 L per acre. Higher water volumes may provide better performance.
- **Nozzles & Pressure:** Use 30 to 40 psi (210 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE medium** droplets while maintaining good coverage of foliage. Keep booms lower than 60 cm from crop canopy.
- **Screens:** Use 50 mesh filter screens or larger.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
MCPA	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4
pyraflufen	POST (foliar) with little soil activity	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Broadleaf only	14

## Effects of Growing Conditions:

Extreme growing conditions such as drought or near freezing temperatures prior to, at and following time of application may reduce weed control. Wet foliage at the time of application may result in reduced weed control.

## Tank Mixes:

Herbicides:

- Glyphosate (label rates)

**Note:** The above mixes are those listed on the *GoldWing* label only.

Nufarm Agriculture also supports the following mixes that are not on the *GoldWing* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Valtera* (field pea)

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No specific recommendation. May be up to 8 hours. Contact the manufacturer for more information.
- **Re-Entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or feed treated crop to livestock within 7 days of application. DO NOT cut for hay within 30 days of treatment. Withdraw meat animals from treated fields 3 days prior to slaughter and feed untreated feed.
- **Pre-harvest Interval:** N/A when used prior to emergence.
- **Re-cropping Interval:** Any crop may be seeded one month after application.
- **Aerial Application:** Apply by ground equipment only.
- **Storage:** Store in original containers in a secure, dry heated storage out of direct sunlight. Freezing will not impair effectiveness.
- If frozen, return to original state by allowing product to warm to 10 to 20°C and agitate thoroughly before use.

• **Buffer Zones:**

Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Canary seed	1	1	1
All other labelled crops	1	1	2

See the key to product pages on page 36 for an explanation of the different habitats.

\* Buffer zones may be reduced when using drift reduction measures. See the Buffer Zone Calculator on the Pest Management Regulatory Agency website.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Tank Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. The addition of detergent may improve the effectiveness of tank cleanout, especially when tank mixed.

## Hazard Rating:



Caution –Skin Irritant. Potential skin sensitizer.

Contains the allergen soy.

For an explanation of the symbols used here see pages 7 and 8.

# Gramoxone

Herbicide Group

22 - paraquat

(Refer to page 45)

*Note: As of December 31, 2018, this formulation of Gramoxone (PCP#8661) must not be used and must be properly disposed of. Growers that have any unused product can contact Syngenta Canada's Customer Interaction Centre (1-87-SYNGENTA or 1-877-964-3682) to arrange for pick-up and disposal of any remaining inventory.*

# Grazon XC

Herbicide Group

4 - picloram & 2,4-D

(Refer to page 45)

## Company:

Corteva Agriscience (PCP#31642)

## Formulation:

97.5 g/L picloram and 360 g/L 2,4-D formulated as a solution.

- Container size - 2 x 10 L and 110 L

Note: Available only through selected retail outlets.

## Crops and Staging:

Permanent grass pasture and rangeland. Apply in spring or early summer.

*Note: The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.*

## Weeds, Rates and Staging:

Apply at 1.0 L per acre for season long control ONLY:

- Canada thistle
- Common yarrow
- Dandelion

**Apply at 1.9 L per acre: for control of the above weeds and the following weeds:**

- Burdock
- Clovers (red, sweet)
- Dock
- Fleabane
- Goldenrod
- Leafy spurge\*†
- Plantain
- Ragweed (common)
- Prickly lettuce
- Toadflax\*†
- Vetch
- Wild carrot

\* For control of leafy spurge and toadflax, use a recommended surfactant (such as *Intake Adjuvant* or any non-ionic surfactant) at the rate of 250 mL per 100 L of water). If maximum rainfastness is desired increase the rate to 375 mL per 100 L of water.

† Research has shown that annual applications may be required for up to 4 years to achieve a high level of sustained control of leafy spurge.

**Apply at 2.5 L per acre for control of the following woody species:**

- Aspen
- Birch
- Wild rose
- Balsam poplar<sup>Δ</sup>
- Western snowberry<sup>Δ</sup>
- Willow

<sup>Δ</sup> Suppression

**Note:** Maximum one application per year.

**Application Information:**

- **Water volume\*:**
  - **Ground application:** 40 to 80 L per acre.
- \* Use higher water volumes for when foliage is dense. Higher water volumes provide more reliable control.
- **Nozzles and Pressure:** Use nozzles that will deliver coarse droplets in a uniform pattern. Maximum 30 psi (207kPa) by ground or air when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets.
- Drift of even small amounts of *Grazon XC* into sensitive plants or areas where sensitive crops may be grown can cause injury. DO NOT apply under conditions prone to drift (i.e. high winds, dead calm and temperature inversions).

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
picloram	POST (foliar) with residual soil activity	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
2,4-D	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

**IMPORTANT:** Picloram is a very persistent and water-soluble herbicide. Treated soil should not be moved from the treated area. DO NOT apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. DO NOT apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. When applying *Grazon XC* over sandy soils ensure that aquifers are not within 1.8 m of the soil surface. If shallow aquifers are present, DO NOT APPLY *Grazon XC*. *Grazon XC* must not be applied on range and pasture acres that are irrigated. DO NOT compost or mulch clippings or manure from grass treated with *Grazon XC* unless being reapplied to the treated area.

**Effects of Growing Conditions:**

Nothing listed on the *Grazon XC* label. Avoid application when pasture and target weeds are under stress from drought, flooding, extreme heat or cold, as injury to grass or unacceptable control may result. Avoid application when temperatures exceed 28°C.

**Tank Mixes:**

None registered.

**Note:** The above mixes are those listed on the *Grazon XC* label only.

Corteva Agriscience also supports the following mixes that are not on the *Grazon XC* label. Apply mixes according to the most restrictive use limitations for either product:

- Herbicides: *Reclaim II*

**Restrictions:**

- **Rainfall:** DO NOT apply if rainfall is forecast. No specific time frame is indicated on the label. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT re-enter pastures within 12 hours of application.

- **Grazing Restrictions:** DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application. Feed livestock untreated forage for 7 days prior to moving onto land that produce broadleaf crops; otherwise, urine or manure may contain picloram. See restrictions in "How it Works" section above.
- **Re-cropping Interval:** Legumes may not be established in a pasture for several years after treatment. If legumes are essential in a pasture, DO NOT use *Grazon XC*. DO NOT break up treated pasture and plant to sensitive broadleaf crops for at least 5 years after application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store product in original containers in a secure, dry, cool area. DO NOT freeze.
- **Buffer Zones:**

Product - Use Rate (L per acre)	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Field Sprayer (Rangeland Uses):	2	1	70

See page 36 for an explanation of the different habitats.

\* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat. Refer to the label for buffer zone requirements for aerial application.

° Heavy rains can move this product from its application site down slope toward sensitive areas. DO NOT load or mix near wells, dugouts or other water bodies.

## Sprayer Cleaning:

There are no sprayer cleaning recommendations on the product label. A combination of Method A and B found on the general page on sprayer cleaning on pages 12 and 13, or the use of a commercial tank cleaner, completed immediately after application is finished may be the best cleanout option.

## Hazard Rating:



Caution – Poison



May cause skin and eye irritation

For an explanation of the symbols used here see pages 7 and 8.

# Heat Brands

**Herbicide Group**  
**14 - saflufenacil**  
*(Refer to page 45)*

## Company:

BASF Canada

## Formulation:

**Heat WG (PCP#29368):** 70 % saflufenacil formulated as a water soluble granule.

- Container size - 8 x 844 g containers per case.

*Merge* sold separately.

-or-

**Heat LQ (PCP#31468):** 342 g/L saflufenacil formulated as a suspension concentrate.

- Container size - 1 x 1.73 L *Heat LQ*; 2 x 8.1 L *Merge* adjuvant or tote containing 4 x 10.79 L *Heat LQ* packaged with 1 x 400 L *Merge*.

## Crops, Rates and Staging:

Prior to the seeding of; or following seeding and prior to the emergence of the following crops; fallow or post-harvest:

*Note: Must be applied as part of a tank mix with glyphosate from 180 to 360 g ae per acre (see glyphosate page for specific product rates).*

Crop	Rate (per acre)	
	Heat WG (g)	Heat LQ (mL)
Barley, canaryseed, chickpea, corn (field and sweet*), field pea, oat, wheat (spring, winter and durum)	10.4 to 28.4	21.4 to 59
Bromegrass, seedling, grown for seed**	10.4 to 28.4	NR***
Lentil†, soybean†*	10.4	21.4
Fallow and post-harvest	10.4 to 28.4	21.4 to 59

\* Some varieties may be more sensitive to *Heat* and injury may occur

† DO NOT use rates higher than 10.4 g per acre of *Heat WG* or 21.4 mL per acre of *Heat LQ* or injury could result.

\*\* NOTE: Since this use registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility of herbicide performance. **Application to this crop is at the risk of the user.**

\*\*\* NR, not registered.

**Note:** Crop injury may occur in lentil when *Heat* is used in conjunction with certain soil applied/soil active herbicides. Consult with the manufacturer for more guidance.

Add either *Merge* or *Amigo* adjuvant or *MSO Concentrate* (sold separately with *Heat WG*) at 0.2 to 0.4 L per acre.

(One 844 g container of *Heat WG* or one 1.73 L container of *Heat LQ* treats 80 to 30 acres).

### Harvest Aid/ Desiccation:

**Note:** As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from crops treated with this product prior to harvest may have market access concerns. Please see page 10 for more information AND consult potential grain buyers before using this product.

Apply 14.4 to 28.4 grams per acre of *Heat WG* or 29.5 to 59 mL per acre of *Heat LQ* to speed the rate of dry-down of the following crops and green weedy material.

*Merge* adjuvant or *MSO Concentrate* (sold separately with *Heat WG*) must be added spray solutions of both formulations at 0.2 to 0.4 L per acre. The required delay before harvest of each crop is indicated below.

Crop	Pre-Harvest Interval (Days after application)	Application Stage
Barley††	3	Hard dough stage (Zaddok's growth stage 87) <30% seed moisture
Canola	3	Apply when 60 to 75% of seeds have changed colour.
Chickpea††	2	Desi – Apply when most seeds turned yellow/brown Kabuli – Apply when most seeds turned white/tan
Field Pea	3	A majority of the pods are brown (70 to 80%)
Red lentil varieties only	3	Lower most pods (15%) are brown and rattle when shaken
Dry bean	2	Stems are green to brown, pods are mature (yellow to brown), and 80 to 90% of leaves have dropped
Soybean	3	
Sunflower	7	The backs of flower heads and bracts are turning yellow, and seed moisture is 20 to 30%.
Wheat††	3	Hard dough stage (Zaddok's growth stage 87) <30% seed moisture

†† *Heat LQ only*

Apply *Heat WG* at 28.4 g per acre or *Heat LQ* at 59 mL per acre with 0.4 L per acre *Merge Adjuvant* when the product is not used as part of a tank mix.

*Heat (WG or LQ)* may be tank mixed with glyphosate on barley (feed only), field pea, lentil, dry beans, soybeans and wheat for additional pre-harvest weed control. When tank mixing with glyphosate, it is recommended to apply *Heat WG* at 20.4 g per acre or *Heat LQ* at 42.8 mL per acre. DO NOT tank mix with glyphosate when the harvested grain is to be used for seed.

## Weeds, Rates and Staging:

Apply up to the 8 leaf stage unless otherwise indicated to control the weeds controlled by glyphosate plus rapid burndown of:

- Canada fleabane<sup>†</sup>
- Cleavers (4 whorl-stage)\*\*
- Common ragweed<sup>†</sup>
- Dandelion\*\*\*
- Kochia (up to 15 cm)
- Lamb's-quarters
- Flixweed
- Narrow-leaved hawk's-beard (up to 8 cm)
- Pigweed (redroot)\*\*†
- Ragweed (common)
- Round-leaved mallow
- Stinkweed\*\*
- Volunteer canola\*\*\*†
- Wild buckwheat \*\*\*†
- Wild mustard\*\*

\* All varieties

\*\* Applications at the 28.4 g per acre rate of *Heat WG* or 59 mL per acre rate of *Heat LQ* will also provide suppression of the emergence of these weeds following application.

\*\*\* Top growth burndown of perennial plants, control of spring germinating plants.

<sup>†</sup> *Heat LQ* will control indicated weeds when applied for pre-harvest weed management in wheat and barley.

## Application Information:

- **Water volume:**
  - *Preseed, pre-emergent, fallow or post-harvest by ground only:* 20 to 40 L per acre.
  - *Harvest aid/Desiccation:*
    - *Ground:* 81 L per acre stand alone or 40 L per acre when tank mixed with glyphosate
    - *Aerial:* 20 L per acre.
- Higher volumes are required for dense weed stands. Weed control improves with the amount of coverage.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** classification droplets. Low drift nozzles may require higher pressures for proper performance. Higher pressures may be required to penetrate dense plant stands.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
saflufenacil	POST (foliar) with slight soil activity, or Preharvest	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Non-selective Broadleaf	14

## Effects of Growing Conditions:

Rainfall shortly after application can result in slight injury to the crop. See the 'Restrictions' section below for more details. Warm, moist growing conditions promote active weed growth. Weeds hardened off by environmental stress such as cold weather, drought or excessive heat may not be adequately controlled.

## Tank Mixes:

**Note:** Crop injury may occur in lentil when *Heat* is used in conjunction with certain soil applied/soil active herbicides. Consult with the manufacturer for more guidance.

### Herbicides:

- *Preseed, pre-emergent, fallow or post-harvest:* Glyphosate (180 g to 360 g ae per acre)\*  
\* must be mixed with glyphosate.
- *Harvest Aid/Desiccation:* Glyphosate (360 g ae per acre)<sup>†</sup>  
<sup>†</sup> NOT for use on crops to be used for seed. Mixes with glyphosate for harvest aid uses are for ground boom application only.  
DO NOT apply by air.  
(see glyphosate page for product concentrations and equivalent application rates)

**Fungicides:** None registered

**Insecticides:** None registered

**Note:** The above mixes are those listed on the *Heat (WG or LQ)* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall shortly after product application can result in slight injury to the crop. Lentils will be more susceptible to injury on coarse textured (sandy or gravelly) and low organic matter soils. Injury will appear usually as burning on the outer edges of the leaves. Lentils will grow out of injury symptoms, and yield will not be impacted at recommended rates.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Pre-harvest Interval:**
  - **Preseed and pre-emergent:** Leave 60 days between application and harvest.
  - **Harvest Aid/Desiccant:** Refer to table in 'Crops, Rates and Staging' section.
- **Grazing Interval:**
  - **Preseed and pre-emergent:** DO NOT graze or cut cereal crops for feed within 30 days of application or chickpea, corn, field pea, lentil and soybean within 60 days.
  - **Harvest aid/Desiccant:** DO NOT graze or feed dry bean, lentil or soybean. Treated field pea may be grazed or used as feed.
- **Re-cropping Interval:**

Crop	Application Rate (per acre) and Timing		
	Spring Application		Pre-harvest Application
Heat WG rate	10.4 g	up to 28.4g	up to 28.4g
Heat LQ rate	21.4 mL	up to 59 mL	up to 59 mL
Barley	PB	PB	1
Canary seed	PB	PB	1
Canola	1	1	1
Chickpea	PB	PB	1
Corn	PB	PB	1
Dry Bean	1	1	2
Flax	1	1	1
Lentil	PB	1	1
Mustard	1	1	1
Oat	PB	PB	1
Field Pea	PB	PB	1
Soybean	PB	1	1
Spring Wheat (including durum)	PB	PB	1
Winter wheat	PB	PB	1

PB = May be planted back in the same season

1 = May only be planted the season following application

2 = May only be planted the second season following application

- **Aerial Application:** May be applied by aircraft for desiccation use only. DO NOT apply by air for any other use.
- **Storage:** Store in dry, cool storage. May be frozen.
- **Buffer Zones:**

Application method	Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of Terrestrial Habitat
Ground only*	Lentil, Soybean	3
	All other crops	10
Fixed wing airplane	All desiccation uses	175
Helicopter	All desiccation uses	150

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- DO NOT apply in areas where surface water from the treated area can run off to adjacent cropland, streams



## Sprayer Cleaning:

*Heat* can cause injury to sensitive crops at very low concentrations. Sprayers used to apply this product should be flushed out immediately after each day of use.

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Possible Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Heat Complete

Herbicide Group  
14 - saflufenacil  
15 - pyroxasulfone  
(Refer to page 45)

## Company:

BASF Canada

## Formulation:

The *Heat Complete* package contains the following components:

**Heat LQ (PCP#31468):** 342 g/L saflufenacil formulated as a suspension concentrate.

- Container size - 1 x 1.73 L

-plus-

**Zidua SC (PCP#32542):** 500 g/L pyroxasulfone formulated as a suspension concentrate.

- Container size - 1 x 3.89 L

-plus-

**Merge adjuvant (PCP#24702):** Container size - 2 x 8.1 L

## Crops, Rates and Staging:

Prior to the seeding of; or following seeding and prior to the emergence of the following crops:

Crop	Rate (per acre)	
	<i>Heat LQ</i> (mL)	<i>Zidua SC</i> (mL)
Corn, Field peas	22 to 43	49 to 97
Lentils <sup>†</sup>	22	49
Soybeans <sup>*</sup>	22 to 29	49 to 65

<sup>†</sup>DO NOT use rates higher than 22 mL per acre of *Heat LQ* or 49 mL per acre of *Zidua SC* or injury could result.

<sup>\*</sup>Some varieties may be more sensitive to *Heat Complete* and injury may occur.

Note: Crop injury may occur in lentil when *Heat Complete* is used in conjunction with certain soil applied/soil active herbicides. Consult with the manufacturer for more guidance.

Add *Merge* adjuvant at 0.2 to 0.4 L per acre.

## Weeds, Rates and Staging:

Apply up to the 8 leaf stage unless otherwise indicated to control the weeds controlled by glyphosate plus rapid burndown of:

- Canada fleabane
- Cleavers\* (up to 4 whorls)
- Common waterhemp\* (prior to emergence)
- Dandelion (up to 15 cm)\*\*
- Flixweed
- Foxtail (green and yellow)<sup>ΔΔ</sup>
- Kochia<sup>†\*</sup> (up to 15 cm)
- Lamb's-quarters\*
- Narrow-leaved hawk's-beard (up to 8 cm)
- Perennial sow-thistle<sup>\*\*\*Δ</sup>
- Prickly lettuce<sup>\*\*\*Δ</sup>
- Ragweed (common, giant)<sup>\*\*\*</sup>
- Redroot pigweed\*
- Round-leaved mallow
- Shepherd's-purse<sup>\*\*\*</sup>
- Smartweed (lady's-thumb)<sup>\*\*\*</sup>
- Stinkweed\*
- Volunteer canola (all types)\*
- Wild buckwheat\*
- Wild mustard\*
- Wild oats<sup>ΔΔ</sup>

<sup>†</sup> Includes Group 2 and glyphosate-resistant biotypes.

\* Residual suppression (may be rate dependent).

\*\* Top growth burndown control only of perennial plants; control of spring-germinating plants.

\*\*\* Burndown control is rate-dependent.

<sup>Δ</sup>Top growth burndown control only.

<sup>ΔΔ</sup> Prior to emergence; residual suppression by *Zidua* component only.

## Application Information:

- **Water volume:** 20 to 40 L per acre. Higher volumes are required for dense weed stands. Weed control improves with the amount of coverage.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
saflufenacil	POST (foliar) with slight soil activity	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Non-selective Broadleaf	14
pyroxasulfone	PRE (surface) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **Preseed and pre-emergent:** Glyphosate (180 g to 360 g ae per acre)\*  
\* must be mixed with glyphosate.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall shortly after product application can result in slight injury to the crop. Lentils will be more susceptible to injury on coarse textured (sandy or gravelly) and low organic matter soils. Injury will appear usually as burning on the outer edges of the leaves. Lentils will grow out of injury symptoms, and yield will not be impacted at recommended rates.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Grazing Interval:** DO NOT graze or cut labeled crops for feed within 60 days of application.
- **Re-cropping Interval:** All crops 1 year after spring, pre-seed or pre-emergent application.
- **Aerial Application:** DO NOT apply by aircraft.
- **Storage:** Store in a cool, dry place. Avoid freezing. If frozen, bring to room temperature and agitate before use.

• **Buffer Zones:**

Application method	Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground*	Lentils	5	3	3
	Soybeans	5	3	4
	Corn, Field peas	5	3	10

See page 36 for an explanation of the different habitats.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

*Heat Complete* can cause injury to sensitive crops at very low concentrations. Sprayers used to apply this product should be flushed out immediately after each day of use.

Refer to Method B in the general section on sprayer cleaning on page 15-16. Let solution stand for an extended period for better results. Flush sprayer system with water. See the label for product specific cleaning details.

## Hazard Rating:



Caution – Possible Skin Irritant



Warning – Contains the allergen soy

For an explanation of the symbols used here see pages 7 and 8.

# Hotshot

**Herbicide Group**  
**6 - bromoxynil**  
**2 - florasulam**  
*(Refer to page 45)*

## Company:

ADAMA Canada

## Formulation:

The *Hotshot* package contains two components:

**Bromotril II (PCP#30371):** 235 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size – 2 x 9.7 L

**Florasulam 50 SC (PCP#30814):** 50 g/L florasulam formulated as a suspension concentrate.

- Container size – 1.6 L

## Crops and Staging:

**Barley, oats, wheat:** Prior to crop emergence

## Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds.

• **Weeds Controlled up to the 4 leaf stage:**

- |  |                                     |                                |
|--|-------------------------------------|--------------------------------|
| ◦ Annual smartweed (green, pale, Lady's-thumb) | ◦ Cow cockle                        | ◦ American nightshade          |
| ◦ Bluebur                                      | ◦ Kochia (up to 2 inches high)      | ◦ Velvetleaf (up to 8 cm high) |
| ◦ Chickweed                                    | ◦ Ragweed (Common)                  | ◦ Volunteer canola             |
| ◦ Cleavers                                     | ◦ Russian thistle (up to 5 cm high) | ◦ Wild mustard                 |
| ◦ Cocklebur                                    | ◦ Shepherd's-purse                  |                                |
|  | ◦ Stinkweed                         |                                |

- **Weeds Controlled up to the 8 leaf stage:**

- Buckwheat (tartary, volunteer, wild)
- Groundsel, Common
- Lamb's-quarters

- **Weeds Suppressed:**

- Hemp-nettle
- Redroot pigweed
- Sow-thistle (Annual, Perennial)
- Narrow-leaved hawk's-beard

## Rate:

**Bromotril II:** 388 mL per acre

**Florasulam 50 SC:** 32 mL per acre

Maximum ONE APPLICATION of this product or other products containing florasulam WITHIN A TWO YEAR TIME SPAN.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** 20 to 40 L per acre
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium to coarse* droplets by ground. Sprayers without drift reduction nozzles should use between 30 to 40 psi (200 to 275 kPa). Low drift nozzles may require higher pressures for proper performance.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
bromoxynil	POST (foliar)	PSII Inhibitor/Membrane disrupter	Little (Apoplast)	Broadleaf only	6
florasulam	POST	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

Dust on leaves can reduce efficacy.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- Glyphosate

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the *Priority* label; required interval may be up to 8 hours. Contact manufacturer for more information. DO NOT apply excessive irrigation following application as *Priority* has the potential to leach.
- **Re-entry Interval:** DO NOT re-enter treated fields for 24 hours.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Grazing Restrictions:** MUST NOT be grazed or fed to livestock for 30 days after treatment.
- **Re-cropping Interval:** Barley, canola, chickpeas, dry beans, field peas, flax, lentils, mustard (brown, oriental, yellow and oilseed quality *B. juncea*) oat, soybeans, sunflower and wheat, may be grown following applications made the previous season.
- **Aerial Application:** DO NOT apply by aircraft.
- **Storage:** Store in a cool, dry place. Can be stored to -10°C. If frozen, bring to room temperature and agitate before use.

• **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	5	5	30

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. Let solution stand for an extended period for better results. Flush sprayer system with water. See the label for product specific cleaning details.

## Hazard Rating:



Warning – Poison.



Danger – Skin and eye irritant.

Potential skin sensitizer.

# Imazamethabenz

**Herbicide Group**  
**2 - imazamethabenz**  
*(Refer to page 45)*

## Company:

Nufarm Agriculture (*Assert 300SC* - PCP#21032)

Loveland Products Canada (*Avert* - PCP#29618)

## Formulation:

300 g/L imazamethabenz formulated as a suspension concentrate.

- Container size - 2 x 10.8 L

**pH adjuster:** 94.5% sodium bisulfate formulated as a soluble granule.

- Container size - 2 x 2.5 kg bags (1 bag per 10.8 L jug of imazamethabenz)

## Crops, Rates and Staging:

**pH adjuster:** 1 packet per jug of imazamethabenz to be used.

**Imazamethabenz up to 0.67 L per acre (16.1 acres per jug):**

- **Barley, spring wheat (including durum):** 1 to 6 leaf stage.
- **Annual ryegrass (seed production only):** 4 to 6 leaf stage.

**Imazamethabenz at 0.34 L per acre (32 acres per jug):**

- **Sunflower:** 2 to 8 leaf stage. Crop must be less than 15 inches (38 cm) tall except for semi-dwarf varieties, which must be less than 12 inches (30 cm), and dwarf varieties, which must be less than 4 inches (10 cm). Stunting and head deformation can occur from applications made beyond recommended stages.

Maximum ONE APPLICATION EVERY TWO YEARS of *Assert 300SC* or *Avert* or other products containing imazamethabenz.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions. Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 11.

## Weeds, Rates and Staging:

Weeds	Stage	Rate	
		(L per acre)	Acres per 10.8 L jug
Stinkweed, Wild mustard	Up to 6 leaves	0.34	32
Weeds above plus: Buckwheat (wild and tartary) (suppression) Volunteer canola (except Clearfield varieties)	Up to 4 leaves	0.54	20
Wild oat	1 to 3 leaves		
Wild oat	1 to 4 leaves	0.67	16

\* Main stem leaves.

## Application Information:

- **Water volume:** In cereals only, imazamethabenz may be applied in 20 to 40 L of water per acre when applied alone or when tank mixed with dichloroprop/2,4-D, 2,4-D ester, or MCPA ester. For all other applications, apply in 40 L per acre.
- **Nozzles and Pressure:** 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets or larger.
- **Screens:** Use 50 mesh screens for nozzles and in-line filters.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
imazethabenz	POST	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf & Grass	2

## Effects of Growing Conditions:

DO NOT apply imazamethabenz 24 hours before or after a frost. It works best at warm temperatures. Performs relatively consistently under dry conditions. If cold, wet soil conditions persist in the days after application, retillering of wild oats may occur. DO NOT apply to drought stressed sunflowers.

## Tank Mixes:

### Herbicides:

Imazamethabenz may be applied at either 0.53 L or 0.67 L per acre in tank mixes in the brown and dark brown soils, but must be applied at 0.67 L per acre when tank mixing in the black and grey wooded soils for adequate wild oat control.

### In spring wheat (including durum) and barley:

- *Curtail M* (0.80 L per acre)
- *Dichloroprop/2,4-D ester* (0.7 L per acre)\*†
- Fenoxaprop\*\* (0.118 L per acre)
- Fenoxaprop\*\* (0.118 L per acre) + MCPA Ester (0.28 L per acre)
- Fenoxaprop\*\* (0.118 L per acre) + *Refine SG* (12 g per acre)
- *Frontline XL* (0.65 L per acre)
- *Infinity* (0.33 L per acre)
- MCPA Ester\* (up to 0.38 L per acre) (600 g/L formulations)
- *Refine SG* (12 g per acre)
- *Refine SG* (12 g per acre) + MCPA Ester (0.28 L per acre)
- *Spectrum* (20 acres per case)
- *Trophy* (20 acres per case)

† *Dichloroprop-DX* registered with *Assert* only.

\* Apply in 20 to 40 L of water per acre. For all other tank mixes use 40 L per acre.

\*\* Use the 0.54 L per acre rate of imazamethabenz when tank mixing with fenoxaprop (see product labels for specific products).

Fenoxaprop rate provides green foxtail control only.

\*\*\* When tank mixing dry broadleaf products, add products to the tank in the following order: dry broadleaf products, acidifier, imazamethabenz, and other liquid herbicides if required. For repeat tanks, dry broadleaf products need to be mixed with water to form a slurry prior to adding to the remaining spray solution in the tank.

- Refer to imazamethabenz labels for specific mixing order and application details when tank-mixing. Refer to tank mix partner for additional crop staging restrictions.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the imazamethabenz labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 hours will reduce control.
- **Re-entry Interval:** Wait at least 12 hours before entering treated fields.
- **Grazing Restrictions:** DO NOT graze treated fields or cut treated forage for silage or hay. Mature barley and wheat grain or straw from fields treated with imazamethabenz can be fed to livestock. DO NOT feed or graze treated annual ryegrass.
- **Pre-harvest Interval:** DO NOT apply beyond the recommended crop stage.
- **Re-cropping Interval:**
- DO NOT apply imazamethabenz to the same field more than once in two years.

Year After Application	Black and Grey Wooded Soils	Brown and Dark Brown Soils
Year 1	Spring wheat (including durum), barley, canola, field peas, flax, sunflowers	Spring wheat (including durum), CLEARFIELD canola, barley, sunflowers
Year 2	Spring wheat (including durum), barley, canary-seed, canola, field peas, flax, oats, sunflowers	

- Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop not listed in the table. Lentils are known to be particularly sensitive to imazamethabenz residues in the soil. The additive effect of soil residues from the use of imazamethabenz and sequential applications of imazethapyr, metsulfuron, or *Odyssey* herbicides on the same land area has not been determined. Crop rotation guidelines are not known and injury to rotational crops other than wheat (excluding durum) may occur. Plant only wheat (excluding durum) on fields where these herbicides have been used until a field bioassay demonstrates other crops can be grown successfully.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze. Shake well before using.
- **Buffer Zones:**  
Buffers are not required for hand-held and backpack applications.

Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Sunflower	0	0	1
Annual ryegrass, Cereals	1	0	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Imazamox

Herbicide Group

2 - imazamox

(Refer to page 45)

## Company:

BASF Canada (*Solo*, *Solo NXT*)Loveland Products Canada (*Mizuna*)ADAMA Canada (*Davai 80 SL*)

## Formulation:

**Solo ADV (PCP#32066):** 25 g/L imazamox formulated as a water soluble concentrate with built in adjuvant.

- Container size - 2 x 6.5 L jugs

**Mizuna (PCP#32696), Solo (PCP#25496)\*:** 70% imazamox as a water dispersible granule.

- Container size - 4 x 117 g water soluble bags

**Davai 80 SL (PCP#32929):** 80 g/L imazamox formulated as a solution.

- Container size - 2 x 8 L, 96 L

\* **Note:** *Solo* (dry formulation) is no longer manufactured but some may remain in the distribution system. It is likely to be removed from future editions of this guide.

## Crops and Staging:

CLEARFIELD sunflower\*\*\*: 2 to 8 leaf stage.

CLEARFIELD canola\*\*\*: 2 to 6 leaf stage.

CLEARFIELD lentil\*\*\*:

- *Solo ADV*: 2 to 9 leaf stage.
- *Mizuna and Solo*: 2 to 6 leaf stage.

CLEARFIELD oilseed mustard (*Brassica juncea*)\*\*\*: 2 to 6 leaf stage.

Field Pea\*\*: 1 to 6 leaf stage.

Soybean: Cotyledon to 4 leaf (3 expanded trifoliates) stage\*

\* *Solo ADV* and *Davai 80 SL* only.\*\* *Davai 80SL* only.\*\*\* *Solo*, *Solo ADV* and *Mizuna* only.

Temporary crop yellowing may be observed shortly after application in CLEARFIELD canola.

## Weeds, Rates and Staging:

MAXIMUM ONE APPLICATION of these or any other product containing imazamox in a year.

***Solo/Mizuna* at 8.5 g per acre or *Davai 80 SL* at 76 mL per acre plus *Merge* at 0.5 L per 100 L of spray solution will control up to the 4 leaf stage:**

- |                   |                            |                |
|-------------------|----------------------------|----------------|
| ◦ Lamb's-quarters | ◦ Volunteer wheat          | ◦ Wild mustard |
| ◦ Stinkweed       | (not CLEARFIELD varieties) |                |

***Solo ADV* at 325 mL per acre (no adjuvant required) or *Solo/Mizuna* at 11.7 g per acre or *Davai 80 SL* at 100 mL per acre plus *Merge* at 0.5 L per 100 L of spray solution will control:**

*The weeds above plus:*

**Grasses - 1 to 4 main stem leaves, early until tillering:**

- |                               |                        |                  |
|-------------------------------|------------------------|------------------|
| ◦ Barnyard grass              | ◦ Persian darnel       | ◦ Volunteer oat  |
| ◦ Green foxtail               | ◦ Volunteer barley     | ◦ Wild oat       |
| ◦ Japanese brome <sup>†</sup> | ◦ Volunteer canaryseed | ◦ Yellow foxtail |



**Broadleaf Weeds - cotyledon to 4 leaf stage:**

- Cleavers<sup>†</sup>
  - Cow cockle
  - Green smartweed
  - Redroot pigweed
  - Round-leaved mallow<sup>†</sup>
  - Shepherd's-purse
  - Volunteer canola (not CLEARFIELD varieties)
  - Wild buckwheat<sup>†</sup>
- <sup>†</sup> **Suppression only.**

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

**Application Information:**

- **Water Volume:** 40 L per acre.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE (S572.1) medium* or larger droplets.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens (*Solo* and *Mizuna* only).

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
imazamox	POST (foliar) with slight soil activity	ALS Amino Acid inhibitor	Toward growth areas of the plant (Symplast)	Broadleaf & grass	2

**Effects of Growing Conditions:**

DO NOT spray if temperatures of +5°C or lower are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

**Tank Mixes:**

Unless otherwise indicated, imazamox and tank mix partners are applied at all label rates and include adjuvants indicated in "Rates:" above.

**Herbicides:**

- Field Peas:
  - *Davai 80 SL* at 76 mL/acre only
  - Imazethapyr (*Phantom* only at 26.3 mL/acre)
- Soybean:
  - *Davai 80 SL* at 81 mL/acre only
  - Imazethapyr (*Phantom* only at 26.3 mL/acre)

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Restrictions:**

- **Rainfall:** Rainfall within 3 hours of application may reduce product efficacy.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze treated canola or lentil or cut for feed within 20 days of application. DO NOT graze treated sunflower or cut for straw.
- **Pre-harvest Interval:**
  - **Solo, SoloADV or Mizuna only:** DO NOT apply to canola or lentil within 60 days of harvest. DO NOT apply to sunflower within 70 days of harvest.
  - **Davai 80 SL:** DO NOT graze treated crops. Field peas may be fed to livestock 30 days after application.
- **Re-cropping Interval:**
  - **Solo, SoloADV or Mizuna only:** Winter wheat may be seeded 3 months after application.
  - **All products:** Barley, canaryseed, canola, chickpea, field corn, field pea, flax, lentil, oat, sunflower, and spring wheat (including durum) may be seeded the first spring after application and tame mustard (condiment types only) the second season after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above. Contact manufacturer for additional information on recropping intervals. Check any tank mix partners for additional recropping restrictions.

- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze. Store in a cool, dry place above 5° C.
- **Buffer Zones:** Avoid spraying in situations where drift may occur.

Application method	Buffer Zones (metres <sup>1</sup> ) Required for the Protection of:
	Terrestrial and Aquatic Habitat
<i>Solo</i>	11
<i>Mizuna, Davai 80SL and Solo ADV</i>	1

See page 36 for an explanation of the different habitats.

\* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

<sup>†</sup> Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method C' in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:

*Davai 80SL:*



Caution – Poison

*Solo, SoloADV, Mizuna:*



Warning – Eye and Skin Irritant. May cause eye damage.

For an explanation of the symbols used here see pages 7 and 8.

# Imazamox/Imazethapyr

Herbicide Group  
2 - imazamox  
& imazethapyr  
(Refer to page 45)

## Company:

BASF Canada (*Odyssey\**, *Odyssey NXT*)

Loveland Products (*Duet*)

AgraCity (*MPower Ninja*)

## Formulation:

**Duet (PCP#32659), MPower Ninja (PCP#32995):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.

- Container size - 8 x 86.5 g water soluble packs. Adjuvant sold separately.

**Odyssey\* (PCP#25111):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.

- Container size - 8 x 86.5 g water soluble packs per 40 acre case (*Merge* sold separately).

**Odyssey NXT (PCP#32303):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.

- Container size – 2 x 692 g jugs per 80 acre case. One case will also include 2 x 8.1 L jugs of *Merge*.

\* Note: This product is no longer manufactured but some still remains in the distribution system. This product may be removed from future editions when supplies are exhausted.

## Crops and Staging:

Crop	Leaf Stage
Field pea; Faba bean <sup>A</sup>	1 to 6 nodes/true leaf stage
Clearfield canola <sup>A</sup> ; Clearfield oilseed mustard <sup>A</sup> ( <i>Brassica juncea</i> )	2 to 6 leaf

Crop	Leaf Stage
Clearfield lentil <sup>Δ</sup>	1 to 9 above ground nodes
Soybean <sup>Δ</sup>	1 to 3
Fenugreek (seed or forage) <sup>Δ</sup> ; Alfalfa <sup>*†Δ</sup> ; Bird's-foot trefoil <sup>*†Δ</sup>	1 to 4

\* Seed production only

† Seedling and established

<sup>Δ</sup> *Odyssey NXT* and *Duet* only

Temporary crop yellowing may be observed shortly after application in field pea, faba bean, and CLEARFIELD canola.

## Weeds, Rates and Staging:

Merge adjuvant (sold separately for *Duet* and *Mpower Ninja* and *Odyssey*; included in *Odyssey NXT*) must be used at a rate of 0.5 L per 100 L of spray solution.

MSO adjuvant (for use with *Duet* only) must be used at a rate of 1 L per 100 L of spray solution.

At 17.3 g per acre, *Imazamox/Imazethapyr* will control:

- **Grasses - 1 to 4 main stem leaves, until tillers are visible:**
    - Barnyard grass
    - Green foxtail
    - Persian darnel
    - Volunteer cereals (wheat excluding CLEARFIELD varieties, barley, oats)
    - Wild oat
  - **Broadleaf Weeds - cotyledon to 4 leaf stage unless otherwise indicated:**
    - Chickweed
    - Cleavers (up to 4 whorls)
    - Flixweed
    - Green smartweed
    - Hemp-nettle\*
    - Lamb's-quarters\*\*\*
    - Redroot pigweed
    - Russian thistle†
    - Shepherd's-purse
    - Stinkweed
    - Stork's-bill
    - Volunteer canola (not CLEARFIELD varieties)
    - Volunteer tame mustard (not CLEARFIELD oilseed (*B. juncea*) varieties)
    - Wild buckwheat\*
    - Wild mustard
- \* Suppression only in field peas and CLEARFIELD lentils.  
 \*\* Suppression only in field peas and CLEARFIELD canola, not controlled in CLEARFIELD lentils.  
 \*\*\* Suppression only.  
 † Suppression only in CLEARFIELD lentils. Not labelled for control in peas with *Mpower Ninja*.

**Note:** DO NOT apply *Imazamox/Imazethapyr* more than once or follow it with any other product containing imazamox or imazethapyr in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** 40 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets or larger.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
imazamox	POST (foliar) with slight soil activity	ALS Amino Acid inhibitor	Toward Areas of Growth (Symplast)	Broadleaf & grass	2
imazethapyr	POST (foliar) with some soil activity	ALS Amino Acid inhibitor	Toward Areas of Growth (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

## Tank Mixes:

### Herbicides<sup>†</sup>:

- **In CLEARFIELD canola only:**
  - *Lontrel 360* (0.17 to 0.23 L per acre).
- **In field peas, CLEARFIELD canola, CLEARFIELD lentils, and soybeans only:**
  - *Poast Ultra* (190 mL per acre).

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

<sup>†</sup> **Note:** The above mixes are those listed on the *Odyssey* and *Duet* labels only. No tank mixes are listed on the *MPower Ninja* label.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfall within 3 hours of application may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze treated canola or soybean or cut for hay. Field pea may be fed to livestock 30 days after application. DO NOT harvest forage or cut for hay.
- **Pre-harvest Interval:** DO NOT apply within 60 days of harvesting canola, faba bean, oilseed *Brassica juncea*, field pea, and lentil. DO NOT apply within 85 days of harvesting soybean.
- **Re-cropping Interval:** Field pea, lentil, CLEARFIELD canola, canaryseed, oat, barley, field corn\*, chickpea and spring wheat (including durum) may be seeded the first full season after application. Flax, canola and sunflower may be seeded the second full season after application. The manufacturers recommend that a field bio-assay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.
  - **NOTE:** Breakdown of Imazamox/Imazethapyr may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on re-cropping interval.
- \* Field corn is not listed as a registered recrop option on the *MPower Ninja* label.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze. Store in a cool, dry place above 5°C.
- **Buffer Zones:** Avoid spraying in situations where drift may occur.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitats of Depths	Terrestrial habitat
Ground*	11	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method C' in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:



Warning – Eye and Skin Irritant.



Warning – Contains allergen "sulfites"

For an explanation of the symbols used here see pages 7 and 8.

# Imazethapyr

Herbicide Group

2 - imazethapyr

(Refer to page 45)

## Company:

BASF Canada (*Pursuit* 240 - PCP#23844)

AgraCity (*MPower Kamikaze* - PCP#30127)

ADAMA Canada (*Phantom* - PCP#30017)

Univar Canada Ltd (*Gladiator* - PCP#28923)

Loveland Products Canada (*MultiStar* - PCP#29259)

## Formulation:

240 g/L imazethapyr formulated as a solution.

- Container size - 2 x 3.3 L jugs per case

## Crops and Staging:

**All products:** DO NOT use in the brown or dark brown soil zones (except for use in dry bean and alfalfa under irrigated brown soils); rotational crops may be severely injured due to carry over in these soils.

Crop	Stage
Field pea	May be applied up to the sixth above-ground node stage (6 true leaves).

*Pursuit, Gladiator, MultiStar and Phantom only:*

Crop	Stage
Dry bean (pinto, pink and red varieties only)	Up to and including the second trifoliate leaf stage
Soybean (Manitoba only)	Up to and including the third trifoliate leaf stage
Seedling alfalfa (forage or seed production)*	Apply after the first trifoliate leaf stage.
Established alfalfa (seed production only)**	Apply before alfalfa reaches 12 inches (30 cm) in height.
Chickling vetch ( <i>Lathyrus</i> ) grown for seed	Apply at the 5 to 7 leaf stage.

\* Apply only to seedling alfalfa that will remain in production for at least 3 years following application. Apply only once during the life of the alfalfa stand.

\*\* DO NOT apply in the last year of established alfalfa stands.

## Weeds and Staging:

**In field peas. Apply up to the 4 leaf stage, unless otherwise indicated:**

- |                   |                            |  |
|-------------------|----------------------------|--|
| ◦ Chickweed       | ◦ Shepherd's-purse         | ◦ Wild buckwheat <sup>†</sup>                |
| ◦ Cleavers        | ◦ Smartweed                | ◦ Wild mustard                               |
| ◦ Green foxtail   | ◦ Stinkweed                | ◦ Wild oats <sup>†</sup> (2 to 4 leaf stage) |
| ◦ Hemp-nettle     | ◦ Volunteer canola         |  |
| ◦ Redroot pigweed | (not CLEARFIELD varieties) |  |

**In seedling and established alfalfa:**

- |                                  |                                  |                            |
|----------------------------------|----------------------------------|----------------------------|
| ◦ Common groundsel* <sup>†</sup> | ◦ Redroot pigweed                | ◦ Volunteer canola         |
| ◦ Green foxtail <sup>†</sup>     | ◦ Shepherd's-purse* <sup>†</sup> | (not CLEARFIELD varieties) |
| ◦ Green smartweed *              | ◦ Stinkweed                      | ◦ Wild mustard             |

**In dry bean:**

- Hairy nightshade (up to 6 leaf stage)

\* Seedling alfalfa only.

<sup>†</sup> Suppression only.

## Rates:

85 mL per acre (40 acres per jug).

A non-ionic surfactant with at least 80% active ingredient (*Agral 90*, *Agsurf II*, *Surf 92*) should be added at a rate of 0.25 L per 100 L of spray solution. DO NOT over apply imazethapyr, as crop injury may result.

DO NOT apply imazethapyr more than once per season or follow imazethapyr with other products containing imazethapyr in the same year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** 40 to 160 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with **ASABE medium** droplets or larger.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
imazethapyr	POST (foliar)	ALS Amino Acid inhibitor	Toward Areas of Growth (Symplast)	Broadleaf & grass	2

## Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or harvest seedling alfalfa within 14 days of treatment. DO NOT graze or harvest field peas for feed within 30 days. DO NOT graze other treated crops or cut for feed prior to crop maturity.
- **Pre-harvest Interval:** DO NOT apply within 60 days of harvesting field peas or chickling vetch, within 75 days of harvesting dry beans, or within 85 days of harvesting soybeans.
- **Re-cropping Interval:** Rotate to barley, spring wheat (not durum), lentils, alfalfa, field pea or CLEARFIELD canola the year following application. The manufacturer recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crop other than those listed above. However, yield losses within the test strips may not be noticed unless the yield can be compared to an untreated area seeded adjacent to the imazethapyr-treated strip. In case of crop failure, only field peas or CLEARFIELD canola may be replanted in the year of application.
  - *NOTE: Breakdown of imazethapyr may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on re-cropping intervals.*
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze. If the product is exposed to temperatures below 0°C, thaw the product completely and shake the container vigorously prior to use.
- **Buffer Zones:**
  - *Pursuit, MultiStar, Gladiator:*

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground only*	1	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured is metres from the downwind edge of the spray boom to sensitive habitat.

- **Other Products:** DO NOT apply within 15 m of shelterbelts, water bodies, wetlands, and woodlots.

## Sprayer Cleaning:

There are no specific sprayer cleaning directions on the product label. The use of 'Method C' in the general section on sprayer cleaning on pages 12 and 13 is recommended for other products with similar chemistry. Contact the manufacturer for more information.

## Hazard Rating:



Caution – May cause skin irritation



Caution – May cause eye damage

For an explanation of the symbols used here see pages 7 and 8.

# Inferno Duo

Herbicide Group  
2 - flucarbazone, tribenuron  
(Refer to page 45)

## Company:

Arysta LifeScience Canada (PCP#30663)

## Formulation:

45% flucarbazone and 25% tribenuron formulated as a water dispersible granules.

- Container size - 4 x 254.5 gram pouches

## Crops and Staging:

**Spring wheat (NOT including durum):** Apply to the soil surface from one week before seeding until crop emergence.

## Weeds, Rates and Staging:

**Apply 12.75 g per acre of *Inferno Duo* (one 254.5 g pouch treats 20 acres) plus 180 g ae per acre of glyphosate IPA or K+ salts (see glyphosate page) to control:**

- *Weeds controlled by glyphosate at 180 g ae per acre (see glyphosate page) plus:*
  - Cow cockle
  - Dandelion<sup>†</sup>
  - Foxtail barley (up to 10 cm)\*
  - Narrow-leaved hawk's-beard
  - Shepherd's-purse
  - Volunteer canola
  - Wild oats<sup>†</sup>

**Mix with glyphosate at 360 g ae per acre to control:**

- Foxtail barley (greater than 10 cm, heavy infestations or stressed plants)\*

**\* Apply prior to seed head emergence and the loss of older leaves.**

**<sup>†</sup> Suppression only.**

**NOTE:** The entire 254.5 g pouch must be added to the spray tank. DO NOT use part pouches.

DO NOT apply *Inferno Duo* more than once per season or follow the application of *Inferno Duo* with an application of another flucarbazone product.

## Application Information:

- **Water Volume:** 40 L per acre.
- **Nozzles and Pressure:** Use 30 to 50 psi (200 to 345 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
flucarbazone	POST (foliar – emerged weeds) PRE (soil activity)	ALS Amino Acid inhibitor	Toward Areas of Growth (Symplast)	Broadleaf & grass	2
tribenuron	POST (foliar – emerged weeds)	ALS Amino Acid inhibitor	Toward Areas of Growth (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water-logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application.

Adopting practices to increase crop vigor will improve crop tolerance.

## Tank Mixes:

**Herbicides:** Glyphosate IPA or K<sup>+</sup> salts only.

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Inferno Duo* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** DO NOT apply if rainfall is expected within 1 hour of application.
- **Re-entry Interval:** Wait at least 12 hours before re-entering treated fields.
- **Grazing Restrictions:** DO NOT graze treated fields. Mature grain or straw may be fed to livestock.
- **Pre-harvest Interval:** Leave at least 80 days from application to harvest.
- **Re-cropping Interval:** The following crops may be planted 11 months after application.

Soil Zones and Rotational Crops			
Grey-Wooded	Black	Dark Brown	Brown
Spring Wheat Barley Canola (all varieties) Field Pea*	Wheat (Spring & durum) Barley Canola (all varieties) Field Pea* Flax Field Bean	Wheat (Spring & durum) Barley Canola (all varieties) Field Pea* Flax	Spring Wheat

\* NOTE: Field peas may be grown the year following application in fields where precipitation has been equal to or above the 10 year average during the growing season, and where organic matter content is above 4%, and pH is below 7.5. The company suggests a minimum of 100 mm (4 inches) of rain is needed in the 60 days following application for adequate breakdown to take place.

◦ NOTE: Other rotational crops may also be affected if rainfall is less than the 10 year average for the area. Soils in the grey wooded, black and dark brown soil zones with a combination of low organic matter (less than 2%), light textured soils or high pH (greater than 7.5) (i.e. eroded knolls, sandy soils) may result in delayed growth and development in rotational crops. DO NOT plant crops other than those listed above in the year following application.

- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.
- **Buffer Zones:** Leave at least 20 metres from the downwind edge of the spray swath to sensitive upland plants like shelterbelts and woodlots and at least 35 metres to water sources or wetland habitats. Avoid drift onto sensitive crops like canola and tame oat. DO NOT mix or load within 10 metres of water sources or wetland habitats.



## Sprayer Cleaning:

*Inferno Duo* residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product.

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

When mixing with other pesticides, combine the method above with the method required for the tank mix partner if it is different from above.

## Hazard Rating:



Warning: Contains the allergen milk and sulphites.



Caution – Skin irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Infinity

Herbicide Group  
6 - bromoxynil  
27 - pyrasulfotole  
(Refer to page 45)

## Company:

Bayer (PCP#28738)

## Formulation:

37.5 g/L pyrasulfotole and 210 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 2 x 6.7 L jugs per case

## Crops and Staging:

The following crops may be treated when at the 1 leaf stage of growth until the flag leaf is just visible but still rolled:

- |   |   |                                  |
|---|---|----------------------------------|
| ◦ Barley  | ◦ Red fescue and brome grass*             | ◦ Timothy (seed production only) |
| ◦ Perennial ryegrass*<br>(seedling & established, grown for seed or forage) | ◦ (established, grown for seed or forage) | ◦ Triticale                      |
|   |   | ◦ Wheat (spring, durum, winter)  |

**\* NOTE:** Since the uses on forage grasses were registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Those who apply this use do so at their own risk.

## Weeds, Rates and Staging:

At 0.33 L per acre (one case treats 40 acres) the following weeds are controlled at the 1 to 6 leaf stage unless otherwise noted:

- |  |   |  |
|--|---|--|
| ◦ Annual sow-thistle   | ◦ Kochia (up to 10 cm)                                    | ◦ Shepherd's-purse                                 |
| ◦ Chickweed  | ◦ Lamb's-quarters   | ◦ Spreading atriplex (up to 10 leaf) <sup>†*</sup> |
| ◦ Canada fleabane (seedlings up to 10 cm)*                   | ◦ Narrow-leaved hawk's-beard (up to 10 cm before bolting) | ◦ Stinkweed  |
| ◦ Canada thistle <sup>†</sup> (up to 30 cm)                  | ◦ Pale smartweed  | ◦ Stork's-bill (up to 8 leaf) <sup>***</sup>       |
| ◦ Cleavers (1 to 3 whorls)                                   | ◦ Ragweed (common, giant <sup>†*</sup> )                  | ◦ Volunteer canola**                               |
| ◦ Cleavers (4 to 6 whorls)*                                  | ◦ Perennial sow-thistle <sup>†</sup>                      | ◦ Volunteer soybean*                               |
| ◦ Dandelion <sup>†</sup> (up to 25 cm across <sup>††</sup> ) | ◦ Redroot pigweed   | ◦ Wild buckwheat                                   |
| ◦ Flixweed (up to 10 cm)                                     | ◦ Round-leaved mallow <sup>*†</sup>                       | ◦ Wild mustard                                     |
| ◦ Hemp-nettle  | ◦ Russian thistle (up to 10 cm)                           |  |

<sup>†</sup> Suppression only.

<sup>††</sup> Spring seedlings and overwintered rosettes.

<sup>†</sup> Suppression alone or control with the addition of AMS\*

\* Add 200 g of active ammonium sulphate per acre (202 g per acre of 99% dry; 0.5 L per acre of 40% liquid; or 0.4 L per acre of 49% solution).

\*\* All herbicide tolerant varieties.

\*\*\* Only when mixed with 2,4-D + ammonium sulphate.

DO NOT apply *Infinity* or other products containing pyrasulfotole or bromoxynil more than once in the same year.

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 19 L per acre
  - **Aerial:** Minimum 11.4 L per acre

Higher water volumes should be used under dense crop and weed canopies to ensure thorough coverage of the target weeds.
- **Nozzles and Pressure:** Maximum 40 to 45 psi (275 to 310 kPa) with conventional flat fan nozzles. Use nozzles and pressure designed to deliver proper coverage with **ASABE medium** droplets. Angle ground sprayer nozzles forward at a 45° angle to improve coverage of vertical leaf targets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
bromoxynil	POST (foliar)	PSII Inhibitor/ Membrane disruptor	Little (Apoplast)	Broadleaf only	6
pyrasulfotole	POST (foliar)	HPPD Pigment Inhibitor	Some – both foliar and root (Apoplast) Somewhat systemic (has soil residues)	Broadleaf only	27

## Effects of Growing Conditions:

For best results, apply to emerged, young, actively growing weeds according to the weed stages listed. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control. Weeds growing under adverse environmental conditions such as drought will be less susceptible herbicide effects.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **Wheat (spring, winter, and durum), barley and triticale:**
  - *Liquid Achieve*
- **Wheat (spring and durum) and barley only:**
  - *Puma Advance*
  - 2,4-D Ester (113 g ae per acre) + Ammonium sulphate (see Rates:)

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** DO NOT mix with fertilizers other than those indicated above.

**Note:** The above mixes are those listed on the *Infinity* label only.

Bayer also supports the following mixes that are not on the *Infinity* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** 2,4-D Ester (56 to 112 g ae per acre), *Axial+Tilt*, *Horizon NG*, *Lontrel*, MCPA 600 Ester (94.5 to 189 mL per acre), *Puma Advance* + *Tilt*, *Traxos*, *Varro*, *Traxos+Tilt*.
- **Fungicides:** *Tilt*.
- **Insecticides:** *Decis*, *Sevin XLR*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour of application may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated area within 12 hours.
- **Grazing Restrictions:** DO NOT graze treated crops or cut for hay within 25 days of application.
- **Pre-harvest Interval:** Leave at least 50 days for wheat and triticale and 45 days for barley from application to harvest of grain or straw.
- **Re-cropping Interval:** Alfalfa, barley, canaryseed, canola, field corn (Manitoba only), flax, potatoes, soybeans (Manitoba only), sunflowers, tame oat, and wheat (durum, spring) may be seeded the year following application. Field peas may be grown the season following application in black, grey-wooded and dark brown soil zones. DO NOT plant field peas the season following *Infinity* use in the brown soil zone where organic matter content is below 2.5 % and where soil pH is above 7.5. Lentils may be seeded the second season after application.

- **Aerial Application:** May be applied by air.
- **Storage:** Store product in original containers in a secure, dry area, away from other pesticides, food or feed above –20°C. If stored over winter, shake or mix well before using.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	5
Fixed wing airplane	10	1	375
Helicopter	10	1	225

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

The manufacturer recommends a cleanout process similar to "Method A" on pages 12 and 13 using a combination of water and ammonia solution rinses.

For additional information, Refer to pages 12 and 13.

## Hazard Rating:



Warning – Warning Poison



Warning – Eye and Skin Irritant.



Warning – Contains the allergen soy.

For an explanation of the symbols used here see pages 7 and 8.

# Infinity FX

*This product is a prepackaged tank mix of Infinity (see page 269) and FX (fluroxypyr - see Fluroxypyr page 217). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**6 - bromoxynil**  
**27 - pyrasulfotole**  
**4 - fluroxypyr**  
*(Refer to page 45)*

## Company:

Bayer

## Formulation:

**Infinity (PCP #28738):** 37.5 g/L pyrasulfotole and 210 g/L bromoxynil formulated as an emulsifiable concentrate.

- Container size - 13.4 L

**FX (PCP #32006):** 180 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 6.5 L

## Crops and staging:

**Spring Wheat, Durum, Barley:** Apply at the 2 leaf stage of growth until stem elongation.

## Weeds, Rates, Staging:

At the *Infinity* 335 mL per acre and *FX* 160 mL (one case treats 40 acres) the weed species controlled by the *Infinity* label plus the following.

- Cleavers (1 to 9 whorls)\*
- Kochia (up to 15 cm in height)
- Volunteer flax (up to 12 cm)
- Chickweed (up to 8 leaf stage)
- Round-leaved mallow (1 to 6 leaf stage)
- Hemp-nettle (up to 8 leaf stage)

\* Ammonium sulphate at 200 g of active ingredient per acre may be added for improved broad leaf control (202 g per acre of 99% dry; 0.5 L per acre of 40% liquid; or 0.4L per acre of 49% liquid).

## Application Information

- **Water Volume**
  - **Ground:** Minimum of 19 L per acre . Higher water volumes should be used under dense crop and weed canopies to ensure thorough coverage of the target weed.
- **Nozzles and Pressure:** Maximum 40 to 45 psi (275 to 310 kPa) with conventional flat fan nozzles. Use nozzles and pressure to deliver proper coverage with *ASABE medium* droplets. Angle ground sprayer nozzles forward at a 45° angle to improve coverage of vertical leaf targets.

## Tank Mixes

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides :

- **Spring wheat, durum, and barley:**
  - 2,4-D ester + AMS
  - *Liquid Achieve*
  - *Puma Advance*
- **Spring wheat and durum:**
  - *Horizon NG*
  - *Varro*
- **Spring wheat and barley:**
  - *Axial*

**Fertilizers:** DO NOT mix fertilizers other than those indicated above

Bayer also supports the following mixes that are not on the *Infinity FX* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** 2,4 D ester, MCPA ester

Adding ingredients in the correct order is critical for optimum performance. Check label of both products to be mixed for directions. General guidelines can be found on page 11.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Kerb

**Herbicide Group  
15 - propyzamide**  
(Refer to page 45)

## Company:

Corteva Agriscience

## Formulation:

**Kerb 50WP (PCP#25595):** 50% propyzamide formulated as a wettable powder.

- Container size - 1.36 kg (3 x 454 g water soluble pouches)

**Kerb SC (PCP#30264):** 400 g/L propyzamide formulated as a suspension concentrate.

- Container size - 2 x 10 L

## Crops and Staging:

Apply to the following established crops between October 1 and freeze-up or very early spring\*. Temperatures should be above freezing at time of application but should not exceed 12°C after application or a reduction in control may be observed. Applications are more effective if followed by a rain. Contact manufacture for specific staging and application guidelines prior to application.

Established alfalfa, bird's-foot trefoil, and established pastures\*\*.

\* Early spring application for seed alfalfa only.

\*\* **Severe stand thinning** may occur to pastures consisting primarily of crested wheatgrass, meadow fescue and timothy.

- Some thinning (10 to 15%) may occur with tall fescue and creeping red fescue.

## Weeds, Rates and Staging:

Apply in late fall or very early spring (seed alfalfa only) prior to the emergence of weeds.

Established grass or grass/legume pastures for control of foxtail barley:

- **Brown, dark brown or gray wooded soils:**
  - *Kerb SC*: 0.45 L per acre.
- **Black soils:**
  - *Kerb 50WP*: 0.45 kg per acre.
  - *Kerb SC*: 0.56 L per acre.

Established Alfalfa<sup>†</sup> and bird's foot trefoil<sup>†</sup>:

Weed	Rate (kg per acre)	
	<i>Kerb WP</i>	<i>Kerb SC</i>
Annual grasses, volunteer cereals, wild oat	0.71 kg <sup>†</sup>	0.89 L <sup>†</sup>
Quackgrass, orchardgrass, timothy, chickweed	0.91 to 1.32* kg	1.13 to 1.62* L
Dodder (fall application only)	1.3 kg	1.62 L

Note that complete control may not be achieved.

\* Maximum 0.91 kg per acre with spring application. Low temperatures and adequate moisture following application are needed for efficacy.

† Including fall application on spring seeded crops.

**Caution:** DO NOT use on soils with more than 6% organic matter. DO NOT apply to soils prone to flooding. DO NOT apply to pastures that contain high proportions of timothy, crested wheat grass or meadow fescue. Consult the manufacturer for other forage grass species sensitivities to *Kerb*.

## Application Information:

- **Water Volume:** 120 to 200 L per acre.
- **Nozzles and Pressures:** Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
propazomide	PRE (soil active)	Long-chain Fatty Acid Inhibitor/ Membrane & cell wall production	Little (apoplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

Dry soil conditions at time of weed emergence may result in reduced control. Approximately 3 inches of total precipitation is required for adequate activation. Best results when soil temperatures are low but above freezing.

## Tank Mixes:

None Registered

## Restrictions:

- **Rainfall:** Surface applications are most effective if followed by 0.5 to 1 inch (1.25 to 2.5 cm) of rain within 2 days of application. Avoid application when heavy rain is forecast.
- **Re-entry Interval:** DO NOT re-enter treated areas for 24 hours.
- **Grazing Restrictions:** DO NOT graze or harvest for livestock feed within 90 days of the 1.32 kg per acre rate of *Kerb 50WSP* or the 1.62 L per acre rate of *Kerb SC*, and 60 days of application for lower rates.
- **Re-cropping Interval:** May be replanted to leafy vegetable crops after 30 days of treatment and root or tuber vegetables within 90 days of treatment. DO NOT re-plant to any other crops within 1 year of treatment.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. DO NOT freeze.
- **Buffer Zones:** DO NOT contaminate domestic or natural water sources or wetlands.

Crop	Buffer zone* (metres†) for terrestrial habitat
Established grass pastures, established grass /legume pastures, alfalfa or trefoil grown for seed	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:

*Kerb WSP:*



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Ko-Act (this referring text to be removed in the 2022 edition)

See Tribenuron + 2,4-D on page 393.

# Korrex II

Herbicide Group  
2 - florasulam  
4 - dicamba  
(Refer to page 45)

## Company:

Corteva Agriscience

## Formulation:

The *Korrex II* package contains two components:

**Korrex II A (PCP#31405):** 25% florasulam formulated as water dispersible granules.

- Container size - 1 X 0.45 Kg

**Korrex II B (PCP#31205):** 480 g/L dicamba dimethylamine salt formulated as a solution.

- Container size - 1 X 7.76 L

## Crops and Staging:

Barley, Durum, Oats, Spring Wheat, Winter Wheat:

In the fall following harvest of the previous crop or in spring prior to seeding. No later than 48 hours after seeding and prior to crop emergence.

## Weeds, Rates and Staging:

*Korrex II* must be mixed with glyphosate at least 180 g ae per acre or up to 1000 g ae per acre of glyphosate to control the weeds controlled by glyphosate at these rates (see glyphosate page for product rates and weeds controlled).

- **Spring application:**
  - *Korrex II A* at 5.7 g per acre plus *Korrex II B* at 97 mL per acre (one package of *Korrex II* will treat 80 acres)
- **Fall application** (Note: Fall application is generally more effective in control of perennial weeds):
  - *Korrex II A* at 8.1 g per acre plus *Korrex II B* at 139 mL per acre (one package of *Korrex II* treats 56 acres)

**Weeds controlled by glyphosate at the rates above plus enhanced control of the following weeds at the 2 to 4 leaf stage unless otherwise indicated:**

- |  |                                    |                            |
|--|------------------------------------|----------------------------|
| ◦ Annual sow thistle <sup>†</sup>  | ◦ Hemp-nettle                      | ◦ Smartweed                |
| ◦ Cleavers   | ◦ Kochia                           | ◦ (including lady's-thumb) |
| ◦ Chickweed  | ◦ Narrow-leaved hawk's-beard       | ◦ Stinkweed                |
| ◦ Cow cockle   | ◦ (up to 8 cm tall)                | ◦ Volunteer canola*        |
| ◦ Dandelion (seedling, overwintered or mature plants up to 30 cm across) | ◦ Perennial sow-thistle**          | ◦ Wild buckwheat           |
|  | ◦ Scentless chamomile <sup>†</sup> | ◦ Wild mustard             |
|  | ◦ Shepherd's-purse                 |                            |

<sup>†</sup> **Suppression only.**

\* **Including all herbicide-tolerant canola varieties.**

\*\* **Applications at advanced stages will reduce control.**

Refer to the product labels for complete mixing instructions for these products. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Use a minimum of 20 to 40 L per acre
- **Nozzles and Pressure:** Maximum 22 psi (150 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
florasulam	POST (foliar)	ALS Amino Acid inhibitor	Toward Areas of Growth (Symplast)	Broadleaf only	2
dicamba	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

***Korrex II A:*** Warm, moist growing conditions promote active weed growth and enhance activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

***Korrex II B:*** Crop damage (stunting, reduced seed set) can occur if the chemical is applied at any time other than the recommended stage. DO NOT apply to crop under stress from adverse environmental conditions, such as excess moisture, drought and disease. Apply when air temperature is between 10 and 25°C.

## Tank Mixes:

Herbicides:

- **Prior to crop emergence:**
  - *Korrex II* must be mixed with glyphosate\* (180 to 1000 g ae per acre – see glyphosate page for conversion to product rates).
- \* **All salt types.**

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage and a repeat treatment may be required. DO NOT apply if rainfall is forecast for the time of application. Consult manufacturer for more detail on the time period they support.
- **Re-entry Interval:** No specific re-entry period is indicated on the label. Other products with similar component indicated a minimum re-entry period of 12 hours.
- **Pre-harvest Interval:** DO NOT harvest crops for 60 days from application.
- **Grazing Restrictions:** Livestock may graze the treated area 7 days after application.
- **Re-cropping Interval:** Registered crops may be seeded any time after treatment. Preseed fields treated with *Korrex II* in the spring season can be seeded the following year to barley, canola, chickpeas, corn, field beans, flax, *Juncea* canola, lentils, mustard (brown, oriental, yellow), oats, peas, potato (except seed potato), soybeans, sunflower, wheat or fields can be summerfallowed. Fields treated with *Korrex II* for fall application season after August 1<sup>st</sup> can be seeded only to registered crops.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place in original container.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground	15	15	30

See page 36 for an explanation of the different habitats.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

**Korrex II A:** Refer 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

**Korrex II B:** Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

A combination of 'Method A' and 'Method B' is the best option. The use of *All-Clear* or *Clean-Out* sprayer cleaners are also recommended as an alternative to the combination of methods above.

## Hazard Rating:

**Korrex II A:**



Warning – Eye Irritant.

**Korrex II B:**



Caution – Poison



Warning – Eye Irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Liberty 150SN (this referring text to be removed in the 2022 edition)

See Glufosinate 150SN on page 230.



# Liberty 200SN

Herbicide Group  
10 - glufosinate  
(Refer to page 45)

## Company:

BASF Canada (PCP#25337)

## Formulation:

200 g/L of glufosinate ammonium formulated as a solution.

- Container sizes - 10 L

## Crops and Staging:

**Liberty 200 SN tolerant Corn only:** 1 to 8 leaf stage. Refer to product label for appropriate method of determining crop leaf stage.

**Liberty tolerant soybean varieties only:** up to the start of flowering and prior to canopy closure.

## Weeds Rates and Staging:

Weeds controlled with 0.61 L per acre rate

Weed	Weed Stage (from emergence to stage)
Cocklebur	4 leaf
Green foxtail, Proso millet, Ragweed	5 leaf
Redroot pigweed, Shepherd's-purse	6 leaf
Chickweed	8 leaf

Weeds controlled with 0.81 L per acre rate

Weed	Weed Stage (from emergence to stage)
Perennial sow-thistle, wild buckwheat, wild mustard, wild oat, Yellow foxtail	4 leaf
Barnyard grass, eastern black nightshade	5 leaf
Canada thistle*, field bindweed*, lady's-thumb, lamb's-quarters, wormseed mustard	6 leaf
Ragweed	7 leaf
Stinkweed	8 leaf

\* season long suppression.

Weeds controlled with 1.0 L per acre rate

Weed	Weed Stage (from emergence to stage)
Quackgrass**	4 leaf
Jimsonweed	1 to 6 leaf stage

\*\* season long suppression, apply with ammonium sulphate, 2.4 L per acre (49% solution) or 1.2 kg per acre (99%).

## Second Application:

- A second application may be made to fields treated initially with up to 1 L per acre, if weeds and crop are at the correct leaf staging. DO NOT apply more than 2 L per acre *Liberty 200SN* to a crop in a single season.

## Split Application Program:

- For season long control of the weeds above a split application of *Liberty 200SN* may be employed. The first application must be a minimum of 0.81 L per acre made at the correct weed staging. For the second application of a 0.51 L per acre rate may be used. The second application timing must be made as soon as the second flush of weeds occurs and before the maximum leaf stage for the crop.

## Application Information:

- **Water Volume:** A minimum of 45 L per acre.
- **Nozzles and Pressure:** Use 25 to 40 psi (175 to 275 kPa) when using conventional 80° or 110° flat fan nozzles. Angle nozzles forward at 45° to improve coverage of vertical leaf surfaces. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
glufosinate	POST (foliar)	Glutamine Synthase Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Broadleaf & grass	10

## Effects of Growing Conditions:

*Liberty 200SN* activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought and low humidity conditions slow weed growth. Applications made under these stress conditions may result in reduced weed control. Weed control may also be reduced when heavy dew, fog, or mist are present at the time of application.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** Within 4 hours of application may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated areas for 24 hours after application, without protective clothing as for spraying.
- **Grazing Restrictions:** DO NOT graze treated fields within 20 days of application.
- **Pre-harvest Interval:** Leave 86 days between application and corn harvest, and 70 days for soybean.
- **Re-cropping Interval:** No re-cropping restrictions the year after treatment.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**
  - Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method C' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Caution – Skin Irritant



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Linuron

Herbicide Group

7 - linuron

(Refer to page 45)

## Company:

Tessenderlo Kerley Inc. (*Lorox L*)

Loveland Products Canada (*Linuron 400*)

The following recommendations are a blend of recommendations of all linuron products. Consult the individual product labels for specific recommendations.

## Formulations:

**Linuron 400L (PCP#15544):** 400 g/L linuron formulated as a suspension concentrate.

- Container size - 10 L

**Lorox L (PCP#16279):** 480 g/L linuron formulated as a suspension concentrate.

- Container size - 10 L

## Crops, Rates and Stages:

Post-emergent applications only:

Crop	Stage	Linuron 400 L (L per acre)	Lorox L (L per acre)
Spring wheat (including durum), oats and barley*	2 to 4 leaf stage	0.20 to 0.26	0.17 to 0.22
Field corn (post-emergent** directed spray, do not spray over top of corn)	Apply when corn is at least 15 inches (38 cm) high (highest leaf on free standing plant)	1.16 to 2.18	0.97 to 1.82
Caraway, coriander	Apply when in the 2 to 4 leaf stage	—	0.50 to 0.67
Dill†	Apply when dill has at least 2 full leaves developed	—	0.77 to 1.9
Shelterbelts (caragana, green ash, Siberian and American elm, Manitoba maple, poplar, willow, white spruce, Colorado spruce, Scots pine)	Apply as an overall spray to dormant stock or as a directed spray if buds have broken.	2.18	1.82
Short Rotation Intensive Poplar	Apply as a directed spray under plants that have been established for 1 year or more	—	1.82

\* Only when tank mixed with MCPA amine at 0.28 to 0.38 L per acre (600 formulation) or 0.4 to 0.57 L per acre MCPA K (400 formulation).

\*\* Use lower rate when weeds do not exceed 2 inches (5 cm) and higher rate for weeds up to 8 inches (20 cm) in height, preferably before they are 5 inches (13 cm) high. Requires the addition of a mineral oil surfactant blend at 1 to 2 L per 100 L of spray solution or spray oil at 1 to 2 L per 10 L of spray solution. See oil labels for directions. DO NOT apply if linuron has been applied pre-emergent.

† A split pre-emergent/post emergent application of linuron may be made in dill. See below for more information.

Pre-emergent surface (not incorporated) applications for use on loam to clay soils only:

	Linuron 400 (L per acre)		Lorox L (L per acre)	
	Soil Organic Matter		Soil Organic Matter	
	less than 2%	from 2 to 5%	less than 2%	from 2 to 5%
Field corn	1.09*	1.58	0.91*	1.31*
Soybeans	1.09 to 1.58	1.58 to 2.18	0.91 to 1.31	1.31 to 1.82
Sweet white lupins	1.01	1.50	0.85	1.25
Potatoes	1.11 to 1.72	1.72 to 2.22	0.91	1.82
Dill†	—	—	0.53 to 0.77	0.77 to 1.0

\* Must be tank mixed. Refer to specific labels for registered tank mix partners.

† A split pre-emergent/post emergent application of linuron may be made in dill. See below for more information.

If used on sandy soils, severe crop injury may result.

Seed the crop at least 2 inches (5 cm) deep. Make only one application per year to field crops.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Split applications:

- This product may also be applied to dill as a split pre/post-emergent application. A pre-emergent surface application of up to 0.77 L per acre, followed by a second post-emergent application, no sooner than two weeks after the first, of up to 1.0 L per acre. Minimum staging for post-emergent applications given above still applies.

Banded Applications:

- This product may also be applied in a narrow band directly over the row in wide rowed crops if another method is to be used for weed control in between the rows. For band treatment, use proportionately less; for example, for 10 inch band on 30 inch row, use 1/3 of the broadcast rate.

Weeds and Staging:

- **Post-Emergence:**
  - Apply when annual broadleaf weeds are in the 2 to 4 leaf stage and when green foxtail is in the 1 to 3 leaf stage.
  - In shelterbelts, apply when weeds are less than 4 inches (10 cm) tall.
- **When tank mixed with MCPA amine in cereals, the following weeds are controlled:**

◦ Buckwheat (tartary, wild)	◦ Green foxtail	◦ Ragweed (common, giant)
◦ Chickweed	(suppression possible)	◦ Redroot pigweed
◦ Corn spurry	◦ Green smartweed	◦ Shepherd's-purse
◦ Cow cockle	◦ Hemp-nettle	◦ Stinkweed
◦ Flixweed	◦ Lady's-thumb	◦ Stork's-bill
	◦ Lamb's-quarters	
- **Pre-emergent surface treatments and Post-emergent applications in corn and shelterbelts:**
  - Sufficient moisture (1 to 2 inches or 3 to 5 cm) in the form of rainfall or irrigation is necessary within 7 to 10 days of a pre-emergence application or poor weed control will result.

◦ Barnyard grass*	◦ Kochia <sup>†</sup>	◦ Sow-thistle (annual, perennial) <sup>†</sup>
◦ Common chickweed	◦ Lamb's-quarters	seedlings only)
◦ Common groundsel <sup>†</sup>	◦ Pigweed (prostrate <sup>†</sup> , redroot)	◦ Stinkweed <sup>◦</sup>
◦ Corn spurry <sup>†</sup>	◦ Plantain (seedlings only) <sup>†</sup>	◦ Wild buckwheat
◦ Dandelion (seedlings only) <sup>†</sup>	◦ Purslane	◦ Wild radish <sup>†</sup>
◦ Foxtail (green, yellow)*	◦ Ragweed (common)	◦ Witch grass
◦ Goosefoot	◦ Shepherd's-purse	◦ Wormseed mustard
◦ Knotweed	◦ Smartweed (annual)	
- \* Suppression
- <sup>†</sup> Not registered with Lorox L.
- Not registered with Linuron 400.

Application Information:

- **Water Volume:**
  - *Cereals, coriander & caraway:* 40 L per acre.
  - *Field Corn directed spray:* 69 to 138 L per acre.
  - *Dill:* 89 to 178 L per acre
  - *Pre-emergent surface:* 81 to 162 L per acre.
  - *Shelterbelts:* 90 to 180 L per acre.
- **Nozzles and Pressure:** 30 to 40 psi (200 to 275 kPa) when using conventional stainless steel flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.
- **Screens:** Use a 50 mesh or coarser line strainers and screens.

How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
linuron	PPI (soil active) POST (foliar)	PSII Inhibitor/ Membrane disruptor	Little foliar; upward soil applied (Apoplast)	Broadleaf & grass	7

Effects of Growing Conditions:

In post-emergent applications the best weed control occurs when temperatures are moderate, when relative humidity is high and when soil moisture is adequate. Injury to cereals (crop lightening) will occur when the crop is under stress because of drought or disease. This injury is worse when the product is applied at advanced leaf stages. In pre-emergent surface treatments, rainfall or irrigation (1 to 2 inches or 3 to 5 cm) is required to move linuron into the root zone of germinating seeds.

Insufficient moisture will result in poor weed control. Drought conditions after application will result in little to no weed control. If rainfall does not occur within 7 to 10 days of application and prior to crop emergence, a shallow rotary hoeing (0.75 to 1.5 inches/ 2 to 4 cm) should be made to mix the top layer of soil to help activation. Avoid covering treated ground with un-treated soil. If unusually heavy rain follows application, severe crop injury may result from herbicide in the root zone of the crop. DO NOT use on sandy soils or severe crop injury will result.

## Tank Mixes:

### Herbicides:

- **In Cereals:** For post-emergent applications in cereals, linuron must be tank mixed with MCPA amine or MCPA K. DO NOT tank mix with other herbicides.
- **In Corn:**
  - *AAtrex*
  - *Dual II Magnum*
  - *Primextra II Magnum*
- Not all linuron products have the same tank mix options, refer to specific labels.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the linuron labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label for post-emergent applications; required interval may be up to 8 hours. Pre-emergent applications require rainfall for activation. Contact manufacturer for more information.
- **Grazing Restrictions:** DO NOT graze treated crops or cut for feed prior to crop maturity.
- **Pre-harvest Interval:** DO NOT harvest sweet corn within 50 days of treatment and field corn within 60 days of treatment or until tassel emergence..
- DO NOT harvest caraway, coriander and dill within 60 days of treatment.
- **Re-cropping Interval:** If the intended crop fails, fields treated with pre-emergent surface applications of linuron, may be seeded back to corn, soybeans, sweet white lupins, or potatoes. Till the soil thoroughly before reseeding. No restrictions 1 year after treatment.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT store liquid Linuron formulations at temperatures below 5°C. *Lorox L* may be frozen.

## Sprayer Cleaning:

Refer to the general section on sprayer cleaning on pages 12 and 13.

## Lontrel 360 (this referring text to be removed in the 2020 edition)

*See clopyralid on page 151.*

## Luxxur

*This product is a co-pack of components that are the equivalent of Varro (page 413) and the equivalent of Express SG (Tribenuron, page 390). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - thienencarbazone-methyl**  
**& tribenuron**  
(Refer to page 45)

## Company:

Bayer Canada

## Formulation:

The *Luxxur* package contains two components:

**Luxxur Component A (PCP#32458):** 50% tribenuron methyl, formulated as a water soluble granule.

- Container size – 243 g

**Luxxur Component B (PCP#31990):** 10 g/L thiencazone-methyl formulated as a suspension concentrate.

- Container size – 8 L

## Crops and Staging:

**Spring wheat (including durum):**

- 1 to 6 main stem leaf stage to a maximum of three tillers, and before the first node can be felt in the stem. Under drought conditions, DO NOT apply if there is >35 days between seeding and spraying, as drought hastens crop development.

**Winter wheat:**

- Spring or fall application from 1 to 6 main stem leaf stage and before the first node can be felt in the stem. Under drought conditions, DO NOT apply if there is >35 days between seeding and spraying, as drought hastens crop development.

## Weeds and Staging:

**Weeds controlled by Varro (page 421) plus:**

- Canada thistle (15 cm) \*
- Cow cockle (10 cm)
- Dandelion (1 to 6 leaf stage)
- Narrow-leaved hawk's-beard (prior to bolting)
- Perennial sow-thistle (15 cm)\*
- Round leaved mallow\*\*
- Scentless chamomile (10cm)

\* For control the addition of an additive is required, see rates section for more information

\*\* Suppression only

## Rate:

Maximum of one application of this or other products containing thiensulfuron or tribenuron (see the charts beginning on page 14 for a list of products) per year.

**Luxxur Component A:** 6 g per acre

**Luxxur Component B:** 0.2 L per acre

(One case will treat 40 acres)

Add ammonium sulphate **on spring wheat only** for improved weed control. Add 200 g active ammonium sulphate per acre (202 g per acre of 99% dry; 0.5 L per acre of 40% liquid or 0.4 L per acre of 49% solution) to the tank before adding other components.

**DO NOT add ammonium sulphate to applications on durum wheat.**

For improved weed control in durum wheat add either *Agral 90* or *AgSurf* at 0.2L per 100 L.

## Tank Mixes:

None registered.

**Bayer supports the following mixes that are not on the *Luxxur* label. Apply mixes according to the most restrictive use limitations for either product:**

- **Herbicides:** 2,4-D ester, *Buctril M*, *Curtail M*, *Frontline XL*, *Infinity*, *Infinity FX*, MCPA ester, *OcTTain*, *Pixxaro*, *Paradigm*, *Prestige XC*, *Stellar*, *Thumper*, *Trophy*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.**

# Manipulator 620

Plant growth regulator

## Company:

Taminco US Inc. (PCP#31462); Distributed by Engage Agro

## Formulations:

620 g/L chlormequat chloride formulated as a solution.

- Container size – 2 x 10 L

## Crops, Rates and Stages:

Apply *Manipulator 620* when risk of lodging is high.

Crop*	Application	Rate (L per acre)	Stage
Spring wheat (including durum)	Single Application	0.7	1 to 2 node stage
	Split Application	0.3 – First application 0.4 – Second application	2 leaf stage to beginning of stem elongation 1 to 2 node stage
Winter wheat	Single Application	0.7	1 node stage to just before flag leaf emergence
	Split Application	0.4 – First Application 0.3 – Second Application	2 leaf stage 1 node stage to just before flag leaf emergence

\* May be applied to crops under-seeded to clover or grasses. DO NOT apply later than just before flag leaf emergence.

DO NOT exceed 0.7 L of *Manipulator 620* per acre in a single year.

## Application Information:

- **Water Volume:** Minimum 40 L per acre
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Boom height must be 60 cm or less above the crop.

## How it Works:

*Manipulator 620* affects the production of plant hormones responsible for cell elongation resulting in plants with shorter, thicker stems.

## Effects of Growing Conditions:

DO NOT apply *Manipulator 620* to crops under stress from drought, excess moisture or nutrient deficiency. Best results from early morning or evening application.

Applications of *Manipulator 620* may be made under normal seasonal temperatures down to 1° Celsius. DO NOT apply during frost.

## Tank Mixes:

None registered.

DO NOT use in a tank mixture with liquid nitrogen fertilizer.

## Restrictions:

- **Rainfall:** Within 2 hours may reduce effectiveness. Avoid application when heavy rain is forecast.
- **Re-entry Interval:** Leave 12 hours before entering treated fields.
- **Grazing Restrictions:** DO NOT graze treated crops or cut for hay.
- **Pre-harvest Interval:** DO NOT apply later than just before flag leaf emergence.
- **Re-cropping Interval:** No restrictions the year after application.

- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**

Application method	Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:
		Terrestrial habitat
Ground	All crops	1

See page 36 for an explanation of the different habitats.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Danger – Poison

For an explanation of the symbols used here see pages 7 and 8.

# MCPA

## Herbicide Group

### 4 - MCPA

(Refer to page 45)

## Company and Formulation

	PCP# (Product Name)				
	Na 300*	Amine 500*	Amine 600*	Ester 500**	Ester 600**
AgraCity		30461		30462	
Agri Star		27858	31322 (Albaugh)	27860	
Federated Cooperatives Ltd.					29001
IPCO	20306		31327		27802
Nufarm	14718		28384		27803
Loveland	9858	9516			27804 ( <i>CheckMate</i> )

\* Formulated as a solution

\*\* Formulated as an emulsifiable concentrate

## Crops, Rates and Staging:

The maximum safe rates for various crops are given below. Higher rates used for harder to control weeds (see “Weeds, Rates and Staging”) may cause crop injury. Application rates for individual products may vary from those listed. Refer to the label for product specific use rates. Rates greater than those for harder to control weeds may cause crop injury. When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Crop	Stage	Maximum Rate (L per acre)		
		Amine 500	Amine or Ester 600	Na Salt
Wheat (spring and durum), barley	4 leaf to just before flag leaf emergence.	0.45	0.42 (E)	0.81
Oats	3 leaf to just before flag leaf emergence. <sup>††</sup>	0.45	0.36	0.81
Spring rye	4 leaf to just before flag leaf emergence.	0.45	0.42	0.81



Crop	Stage	Maximum Rate (L per acre)		
		Amine 500	Amine or Ester 600	Na Salt
Flax (NOT Solin - low linolenic acid flax)	2 inches (5 cm) in height to prebud stage. Apply at 2 to 4 inches (5 to 10 cm) in height for maximum crop tolerance.	0.4	0.28 (E) or 0.34 (A)	0.71
Winter wheat (WW), fall rye (FR)	In spring, apply from the time growth commences until the early flag leaf stage.	0.45	0.42	0.81
Corn	As a broadcast spray up to 6 to 7 in. (15 to 18 cm) tall or 6 leaf stage. Up to 3 weeks before tasseling as a directed spray using drop nozzles.	0.45	0.37 (Amine only)	0.61
Peas	Vines 4 to 7 inches (10 to 18 cm) long. For short-statured, determinate flowering peas, apply at the early stages within this range.	0.22*	0.17 (Amine only)	0.36*
Cereals underseeded to alfalfa (not Flemish varieties)	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.	0.22	0.19 (Amine only)	0.4
Underseeded alsike, ladino and red clover	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.	0.28	NR	0.4
Red clover <sup>†</sup> Seedling (seed and forage) Established <sup>†</sup> (seed only)	<b>Seedlings:</b> 1 to 3 trifoliate stage. DO NOT feed to livestock in the first year. <b>Established:</b> Apply at the breaking of dormancy in the spring up to 7.5 cm.	0.23	0.19 (Amine only)	NR
Grass pastures	Spring or fall.	1.42	1.13 (E) or 1.42 (A)	0.71
Seedling forage** grasses (not for seed)	Apply from the 3 leaf stage to the shot blade stage.	0.45**	NR	NR
Established forage** grasses (not for seed)	Apply in the spring up to the shot blade stage or in the fall after harvest.	0.45**	NR	NR

(E) or (A) indicates Ester or Amine formulations. NR = Not Registered

\* The rates given are lower than the registered rates for peas. Less than the maximum label rates are recommended because of crop injury concerns.

\*\* MCPA is NOT registered for use on forage grasses grown for forage seed.

<sup>†</sup> Nufarm MCPA Amine only.

<sup>††</sup> Use the lowest rate of MCPA Amine 600 on oats between the 3 and 6 leaf stage.

## Formulation Characteristics:

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low
Salts	Very Low	Slow	Very Low

## Weeds, Rates and Staging:

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet).

NOTE: The following rates are a general range for all products. Rate ranges for individual products may differ slightly. Consult the product label for specific rates for each application.

+ Not controlled by Na salt formulations

**Susceptible weeds:**

- **Amine 500 formulations – 0.28 to 0.45 L per acre**
- **Amine and Ester 600 formulations – 0.24 to 0.36 L per acre**
- **Na formulations – 0.5 to 0.81 L per acre.**
  - Burdock
  - Cocklebur
  - Flixweed (late fall applications or small seedlings)
  - Kochia
  - Lamb's-quarters
  - Mustards (except dog and tansy)
  - Prickly lettuce
  - Ragweed
  - Russian pigweed
  - Shepherd's-purse
  - Stinkweed
  - Wild Radish
  - Wild Sunflower

**Harder to control weeds:**

- **Amine 500 formulations – 0.45 to 0.71 L per acre.**
- **Ester 600 formulations – 0.42 to 0.61 L per acre.**
- **Na formulations – 0.81 to 1.1 L per acre.**
  - Annual sow-thistle
  - Biennial wormwood
  - Bluebur+
  - Common peppergrass
  - Curled dock
  - Flixweed (overwintered rosettes prior to bolting)
  - Goat's-beard+
  - Goosefoot+
  - Hemp-nettle (suppression only)
  - Mustard (including dog, tansy and tumble)
  - Plantain
  - Purslane+
  - Redroot pigweed
  - Smartweed (annual)
- **Top growth control only (rates as for harder to control weeds):**
  - Blue lettuce
  - Bindweed (field, hedge)
  - Canada thistle
  - Corn spurry+
  - Dandelion+
  - Gumweed
  - Field horsetail+
  - Hoary cress
  - Leafy spurge
  - Perennial sow-thistle
  - Russian thistle+

**Application Information:**

- **Water Volumes:**
  - **Cereals, flax, pastures, forage grasses:** 40 to 81 L per acre.
  - **Peas:** Minimum 61 L per acre.
  - **Cereals Underseeded to Forage Legumes:** 61 to 81 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
MCPA	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

**Effects of Growing Conditions:**

Best weed control occurs when temperatures are above 21°C (daytime) or 10°C (night time) and humidity is above 70 percent. DO NOT apply if temperature exceeds 27°C. If applying to flax, injury and a delay in maturity may result from application under hot or humid conditions. Extremely hard water may reduce performance or cause problems in spraying the product.

**Tank Mixes:****Herbicides:**

- **In Wheat and barley:**
  - *Banvel II* (amine only)
  - Linuron and *Sencor* (500 amine only).
- **In Oats:**
  - Linuron (500 amine only)
  - Not all brands are labelled for tank mixing. Check the product label prior to use for registered mixes and rates. Follow all precautions and restrictions on both labels.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** Liquid nitrogen (28-0-0) may be used in place of water as a carrier with certain amine formulations for application in spring to winter wheat or fall rye.

**Note:** The above mixes are those listed on the MCPA labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 hours of MCPA Na salt, 4 hours of MCPA amine, or 2 hours of MCPA ester application will reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze within 7 days of application.
- **Re-cropping Interval:** No restrictions the year after application.
- **Aerial Application:** Some products may be applied by air to specific crops. Check the label for detailed instructions.
- **Storage:** MCPA ester may be frozen. DO NOT freeze MCPA amine or MCPA sodium salt.
- **Buffer Zones:**
  - Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Crop	Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Cereals, Flax	Ground*	1	1	4
	Fixed wing aircraft	1	0	60
	Helicopter	1	0	50
Legume forages	Ground*	1	1	4
	Fixed wing aircraft	1	1	25
	Helicopter	1	1	25
Pastures	Ground*	1	1	4
	Fixed wing aircraft	15	0	60
	Helicopter	15	0	50

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Warning – Poison

For an explanation of the symbols used here see pages 7 and 8.

# MCPB / MCPA

**Herbicide Group**  
**4 - MCPB & MCPA**  
*(Refer to page 45)*

## Company:

IPCO (*Clovitox Plus* - PCP#24336)

Nufarm Agriculture (*Tropotox Plus* - PCP#8211)

Loveland Products Canada (*Topside* - PCP#22003)

## Formulation:

375 g/L MCPB present as a sodium (Na) salt and 25 g/L MCPA present as potassium (K) or sodium (Na) salt and formulated as a solution.

- Container size - 10 L

## Crops, Rates and Staging:

Registered for all products:

- **Apply 1.11 to 1.72 L per acre. Apply only that needed to control the target weeds:**

Crop	Stage
Pea	3 to 6 expanded leaves.
Clover (alsike, ladino, red, white Dutch, wild white)	Monofoliolate to 3 trifoliolate leaf stage (with or without a cover crop).
Oats, wheat, rye or barley (alone or as a companion crop)	2 leaf to flag leaf stage.
Field corn	45 cm high to the start of tasseling – use drop nozzles.
Established pasture	After grazing or cutting when weeds have regrown to a susceptible stage.

## Seedling Forage Grasses:

- **Apply at 1.11 to 1.42 L per acre from the 2 to 4 leaf stage:**

- Bromegrass (smooth, meadow)
- Fescue (altai, red, meadow, tall)
- Green needlegrass
- Reed canarygrass
- Timothy
- Wheatgrass (crested, creeping intermediate, northern, pubescent, slender, stream-bank, tall, western)
- Wild rye (altai, Russian)

Registered for *Tropotox Plus* and *Clovitox Plus* only:

- Seedling alfalfa for seed production\* at the 3 to 6 trifoliolate stage.

NOTE: Seedling alfalfa vigour may be reduced in the year of treatment, however, the crop recovers and yield will not normally be affected.

**\* Since this use is registered under the User Requested Minor Use Label Expansion program, the manufacturers assume no responsibility for herbicide performance. Users of this treatment on seedling alfalfa do so at their own risk.**

Maximum ONE APPLICATION per year of these and other products containing the active ingredients MCPA/MCPB.

## Weeds, Rates and Staging:

Weeds	Stage	Rate (L per acre)
Lamb's-quarters, Mustards (ball, wild, wormseed), Stinkweed	Seedlings	1.11
Annual sow-thistle*, Hemp-nettle*, Redroot pigweed, Ragweed, Shepherd's-purse, Volunteer rapeseed (including canola), Wild radish*	Seedlings	1.72
Curled dock, Perennial sow-thistle**, Plantain	Rosette	1.72
Bull thistle	Rosette to early bud	1.72
Buttercup (creeping, tall), Field bindweed	In spring during rapid growth	1.72
Canada thistle	6 inches (15 cm) to early bud	1.72
Horsetail*	6 inches (15 cm)	1.72

\* Suppression only

\*\* Top growth control only

## Application Information:

- **Water Volume:**
  - *Clovitox Plus*: 71 to 91 L per acre.
  - *Tropotox Plus, Topside*: 61 to 81 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
MCPB & MCPA	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Damage to peas or seedling forage legumes may occur if the crop is sprayed when under drought or disease stress. Under extremely hot or humid conditions, crop injury may be severe. DO NOT apply when temperatures are over 27°C. Best activity on weeds occurs in warm weather.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:**
  - *Field com*: A re-entry interval of 9 days after application is required.
  - *For all other registered crops*: DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze crop treated with *Topside* or cut for hay. DO NOT graze or cut seedling forage grasses in the year of treatment. Cereals treated with *Tropotox* or *Clovitox* may be used for grazing or cut for greenfeed or hay 30 days after application. Forage legumes and peas treated with *Clovitox* may be used for animal feed 30 days after application. Withdraw meat animals from fields treated with *Tropotox* or *Clovitox* at least 3 days before slaughter.
- **Re-cropping Interval:** A minimum rotational crop plant back interval of 12 months must be observed for all crops other than those registered for use with MCPA or MCPB. Phenoxy herbicides can persist in soils for weeks, particularly if dry or cool weather persists. DO NOT seed sensitive crops immediately after spraying.
- **Aerial Application:** *Clovitox* may be applied by air to established pasture and cereal crops (not underseeded to clover).
- **Storage:** DO NOT freeze.
- **Buffer Zones:**
  - Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:

### *Clovitox Plus:*


 Danger – Poison

 Danger - Corrosive to eyes

### *Tropotox Plus & Topside:*

 Caution – Poison

### *Tropotox Plus:*

 Warning – Contains the allergen caseinate (milk)

For an explanation of the symbols used here see pages 7 and 8.

# Mecoprop-p

## Herbicide Group

### 4 - mecoprop-p

(Refer to page 45)

## Company:

Loveland Products Canada (*Mecoprop-P* - PCP#27891)

## Formulation:

150 g/L mecoprop-p present as potassium salt formulated as a liquid.

## Crops and Staging:

Spring wheat (including durum), barley and oats: 3 leaf to flag leaf stage.

## Weeds, Rates and Staging:

Apply *Mecoprop-P* at 2.2 to 2.8 L per acre to weeds from the 2 to 4 leaf stage. Use the high rate for weeds in an advanced stage of growth.

- Black medic
- Canada thistle (top growth control only)
- Chickweed
- Cleavers
- Clover (volunteer)
- Corn spurry
- Lamb's-quarters
- Plantain
- Wild mustard

## Application Information:

- **Water Volume:** 81 to 121 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
mecoprop	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Apply in warm weather under good growing conditions. Avoid spraying in very hot weather or in drought conditions.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Grazing Restrictions:** DO NOT graze or feed treated crop to livestock prior to crop maturity.

- **Re-cropping Interval:** No restrictions the year after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**
  - Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	0	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Metribuzin

**Herbicide Group**  
**5 - metribuzin**  
*(Refer to page 45)*

## Company:

Bayer (*Sencor 75 DF*)

United Phosphorus Inc. (*TriCor 75 DF*)

ADAMA Canada (*Squadron*)

Sharda CropChem Canada (*Buzzin 70 WDG; Mextrix SC*)

## Formulations:

**Sencor 75 DF (PCP#17242); Squadron (PCP#32081); TriCor 75 DF (PCP#30661):** 75% metribuzin formulated as a dispersible granule.

- Container sizes -
  - **Sencor 75 DF** - 4 x 2.5 kg
  - **Squadron** - 4 x 5 kg jugs
  - **TriCor 75 DF** - 2.5 kg

**Buzzin 70 WDG (PCP#32756):** 70% metribuzin formulated as wettable granule.

- Container size – 2.5 kg

**Mextrix SC (PCP#32876):** 480 g/L metribuzin formulated as suspension concentrate.

- Container size – 4 x 5 L

## Crops and Staging:

**Barley and Wheat (Spring and durum only):** Post-emergence (POST) 2 to 5 leaf stage.

**Chickpea\*:** Up to 2.5 inches (6 cm) in height, when vines have 1 to 3 above ground nodes. **Note:** application past recommended growth stage may result in severe crop injury.

**Faba bean, Lentil<sup>†</sup>, Soybean\*\*\*:** Preplant incorporated (PPI) (only in a tank mix with *Treflan EC*).

**Lentil\*:** Single or split post-emergent applications\*\* - up to 6 inches (15 cm) of vine length. For maximum crop tolerance, apply at the 1 to 4 above ground node stage.

**Peas (Field only):** Preplant incorporated (PPI) (when tank mixed with *Rival* or *Treflan EC*).

**Peas (Field and Processing):** Post-emergence (single or split applications\*\*) - up to 6 inches (15 cm) of vine length. For short-statured, determinate flowering peas, apply at the early stages within this range.

**Potato (except Belleisle or Tobique)\*\*\*:** Preplant incorporated (PPI) or Pre-emergence (PRE) in sprinkler irrigation systems (apply only in a tank mix with *Eptam Liquid EC* for both systems).

**Potato (except Atlantic, Belleisle, Eramosa, Tobique and red-skinned or early maturing varieties)\*\*\*:** Early post-emergence (up to 4 inches or 10 cm in height).

† Fall application only.

\* DO NOT use on lentils, peas or chickpeas seeded less than 2 inches (5 cm) deep or in soils with less than 4 percent organic matter.

\*\* Under certain field or weather conditions a split application may provide better weed control and crop tolerance than single applications. The first application should be made at the cotyledon to 2 leaf stage of the weeds. The second application should be made when a second flush of weeds have emerged or if weeds which were more advanced at the time of the first application have started to show regrowth. The split applications are normally 7 to 10 days apart.

\*\*\*Consult manufacturer or seed supplier for varietal tolerances to metribuzin applications in soybean and potato.

## Crops and Rates:

Crop		Rates		
		75 WDG forms (g per acre)	<i>Buzzin</i> (g per acre)	<i>Metrix SC</i> (mL per acre)
Barley		80 to 152	87 to 163	112 to 222
Chickpea		111	119	172
Faba bean - Spring PPI†	Coarse soils	111 to 152	119 to 163	172 to 222
	Medium to Fine soils	152 to 222	163 to 238	222 to 344
Faba bean - Fall PPI†	Coarse soils	152 to 192	163 to 206	222 to 238
	Medium to Fine soils	192 to 222	206 to 238	238 to 344
Lentil	Single POST app	111	119	172
	Split POST app	60 to 80 (each)	61 to 82 (each)	85 to 112 (each)
Pea (field only) - Spring PPI†	Coarse soils	152	163	222
	Medium to Fine soils	152 to 192	163 to 206	222 to 283
Pea (field only), Lentils - Fall PPI†	Coarse soils	192	206	283
	Medium to Fine soils	190 to 222	206 to 238	283 to 344
Pea (field and processing)	Single POST app	111 to 152	119 to 163	172 to 222
	Split POST app	60 to 80 (each)	61 to 82 (each)	85 to 112 (each)
Potato (PPI or PRE)		152 to 222	163 to 238	222 to 344
Potato (POST)		152	163	222
Spring wheat (including durum)		80 to 111	87 to 119	112 to 172
Soybean (Spring PPI only):	Coarse soils	111 to 152	119 to 163	172 to 222
	Medium to Fine soils	152 to 222	163 to 238	222 to 344

† Only in tank mix with liquid trifluralin only.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Post-emergence applications should be made when weeds are small – 2 inches (5 cm) in height or diameter.

Split applications (post-emergence on lentils and peas) – 1<sup>st</sup> application at cotyledon to 2 leaf stage of weeds.

The 2<sup>nd</sup> application (if necessary) 7 to 10 days after the first.

The following rates are based on the 75 WDG formulations. Check the table in Crops and Rates for corresponding rates for other formulations.



- **Post-emergence at 81 g per acre:**
  - *Weeds controlled in spring wheat, barley, field pea and suppressed in lentil and chickpea:*
    - Chickweed
    - Green smartweed
    - Hemp-nettle\*
    - Lamb's-quarters
    - Stinkweed
    - Volunteer canola
    - Wild mustard
  - *Additional weeds controlled in spring wheat and barley only:*
    - Lady's-thumb
    - Redroot pigweed
- **Post-emergence at 111 g per acre:**
  - *Weeds controlled in spring wheat, barley, potato, field pea, and suppressed in lentil and chickpea:*
    - Ball mustard
    - Corn spurry
    - Hemp-nettle
    - Tartary buckwheat
  - *Additional weeds controlled in spring wheat and barley only:*
    - Common groundsel
    - Night-flowering catchfly
    - Wormseed mustard
- **Post-emergence at 152 g per acre in spring wheat and barley only:**
  - Henbit
  - Russian thistle
- **Post-emergence at 152 g per acre in potatoes only:**
  - *Weeds listed for peas above plus:*
    - Lady's-thumb
    - Redroot pigweed
    - Shepherd's-purse
- **Preplant Incorporated in faba beans, lentils, field pea and soybean (see "Crops and Rates:" above). Must be applied in tank mix with Treflan EC or Rival (see trifluralin page for rates):**
  - *Weeds controlled by either Rival or Treflan EC plus:*
    - Chickweed
    - Corn spurry
    - Green smartweed
    - Hemp-nettle
    - Lamb's-quarters
    - Stinkweed
    - Volunteer canola
    - Wild mustard
  - \* Use the high rate for best control.
  - \*\* Suppressed only in lentils and chickpeas.

## Application Information:

- **Water Volume:**
  - *Preplant incorporated:* 40 L per acre.
  - *Post-emergence applications:*
    - *Cereals* - 40 L per acre.
    - *Lentils, peas, chickpeas* - 70 L per acre.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets. If using conventional flat fan nozzles use a maximum of 30 to 40 psi (200 to 275 kPa) with opening no smaller than 8002 or TK2. For lentils, peas and chickpeas use nozzles no smaller than 8003 or TK3. Angle nozzles 45° forward to achieve better coverage of vertical weed targets.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens.
- **Incorporation:** All plant growth and stubble should be thoroughly worked into the soil before treatment. Apply directly to the soil surface. Two incorporations are required at right angles for thorough mixing. The first incorporation must be made within 24 hours of spraying. For fall applications, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve crop residue; however, both incorporations must be done the recommended depth.
- Incorporate with a tandem disc, discer or field cultivator (Vibrashank type). Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metribuzin	PPI (soil active) POST (foliar)	PSII Inhibitor/ Membrane disruptor	Little foliar; upward soil applied (Apoplast)	Broadleaf & grass	5

## Effects of Growing Conditions

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within 3 days of application will also aggravate injury. If frost occurs, allow 4 to 5 days for crop to recover prior to applying metribuzin. Heavy rainfall soon after application to peas, lentils and chickpeas can result in stand reduction on soils with less than 4 percent organic matter.

## Tank Mixes:

### Herbicides:

- **In spring wheat or barley:** Dicamba, *Target*, MCPA amine or 2,4-D amine.
- **In potatoes (post emergent) Sencor 75 DF, Buzzin 70 WDG and TriCor only:** *Prism*\*
- **In potatoes (preplant incorporated):** *Eptam Liquid EC* (Required).
- **In faba beans (preplant incorporated):** *Treflan EC* (Required).
- **In soybeans (preplant incorporated):** *Treflan EC* (Required).
- **In peas:**
  - *Treflan* (PPI)
  - *Rival* (PPI).
  - All products – 75 WDG forms at 77 g per acre\*\* plus 0.19 L per acre MCPA sodium salt (300 g/L).

\* Consult manufacturer or seed supplier for varietal tolerances to metribuzin and *Prism* tank-mix applications in potato. *Prism SG* with *TriCor* only.

\*\* See corresponding rates for other formulations in the chart in "Crops and Rates"

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the metribuzin labels only.

Allow 5 days between application of metribuzin and application of other pesticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 hours may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated areas for 12 hours after application.
- **Grazing Restrictions:** DO NOT graze treated cereal crops within 30 days of application, or peas, chickpeas or lentils within 70 days of application.
- **Pre-harvest Interval:** DO NOT harvest barley, wheat or potatoes within 60 days of application. DO NOT harvest lentils, chickpeas, or field peas within 70 days of application. DO NOT harvest processing peas or chickpeas within 40 days of application.
- **Re-cropping Interval:** Preplant incorporated treatments may leave a residue in the soil that will affect succeeding crops when using higher rates of product. DO NOT seed canola, sunflowers, onions, celery, peppers, cole crops, lettuce, spinach, red beets, turnips, pumpkin, squash, cucumbers or melons the year after treatment. Fall seeded crops may be injured when seeded the same year as preplant or post-emergence applications of these products.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:			
	Aquatic Habitats of Depths			Terrestrial habitat
	Less than 1 m	1 to 3m	Greater than 3 m	
Ground only*	5	2	1	10

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured is metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Use 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Metsulfuron

Herbicide Group

2 - metsulfuron

(Refer to page 45)

## Company:

FMC Corporation (*Ally Toss-N-Go* - PCP#24388)

## Formulation:

60% metsulfuron methyl formulated as a water dispersible granule.

- Container size:
  - 122 g (4 x 30.5 g water soluble bags)

## Crops and Staging:

**Wheat (spring and durum), barley:** 2 leaf up to emergence of the flag leaf.

### Established forage grasses for forage or seed production\*:

- Apply from the 2 leaf to flag leaf stage and before canopy is dense enough to prevent thorough leaf coverage.
  - Crested wheatgrass\*
  - Creeping red fescue\*
  - Timothy\*†
  - Intermediate wheatgrass\*
  - Orchardgrass\*

† Fall application only.

**\* NOTE - Since applications to forage grasses have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Application to forage grasses is at the risk of the user.**

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Apply up to 3 g per acre (one 122 g package treats 40 acres) to control weeds at the 2 to 4 leaf stage unless otherwise indicated.

A rate of 2 to 3 g per acre may be used when mixing with certain other herbicides (See Tank Mixes).

Add a non-ionic surfactant such as *Agral 90*, *Ag-Surf II*, *Companion*, *Super Spreader* or *Citowett Plus* at 0.2 L per 100 L spray volume.

### Weeds Controlled:

- Ball mustard
- Bluebur
- Chickweed
- Common groundsel
- Corn spurry
- Cow cockle
- Flixweed
- Hemp-nettle
- Pigweed (prostrate, redroot)
- Scentless chamomile
- Shepherd's-purse
- Smartweed (green, lady's-thumb)
- Stinkweed
- Stork's-bill
- Tartary buckwheat
- Volunteer canola\*
- Wild mustard

### Weeds Suppressed:

- Canada thistle\*\*
- Lamb's-quarters (up to 3 in (8 cm))
- Russian thistle
- Sow-thistle (annual, perennial)\*\*
- Toadflax
- Wild buckwheat (up to 3 leaf)

\* CLEARFIELD varieties will be controlled only with the addition of 2,4-D or MCPA.

\*\* Apply when thistles are less than 6 inches (15 cm) tall.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Minimum 40 L per acre.
- **Nozzles and Pressure:** No application pressures are recommended by the manufacturer. Typical application pressures for standard flat fan nozzles are from 35 to 40 psi (240 to 275 kPa). Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with **ASABE medium** droplets.
- **Screens:** Use a 50 mesh nozzle screens and in-line filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metsulfuron	PRE	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf	2

## Effects of Growing Conditions:

Metsulfuron may injure crops stressed by heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures, drought, or water-saturated soils, either before or after application. Weed control will be reduced under dry, cold conditions.

## Tank Mixes:

DO NOT mix the soluble bags with liquid fertilizers, substances that contain boron or substances that release free chlorine. Mixing the water soluble bags with any of these compounds will result in an insoluble substance in the tank.

### Herbicides:

- **In wheat:**
    - *Puma Advance*
  - **In wheat and barley:**
    - 2,4-D Amine or Ester (170 to 227 g ae per acre – refer to 2,4-D page), plus surfactant\*.
    - MCPA Amine or Ester (0.23 to 0.38 L per acre – 600 g/L formulation), plus surfactant.
  - **In creeping red fescue:**
    - *Assure II* (0.2 to 0.3 L per acre) plus *Sure-Mix* adjuvant\*.
- \* Use with the 3 g per acre rate only.

Consult tank mix partner labels for additional crop staging and variety restrictions.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizer:** None registered. DO NOT mix the soluble bags with fertilizers.

**Note:** The above mixes are those listed on the *Ally* label only.

FMC Corporation also supports the following mixes that are not on the *Ally* label. Apply mixes according to the most restrictive use limitations for either product:

**Herbicides:** *Clodinafop*, *Everest 2.0*, *Everest 2.0 + 2,4-D*, *Everest 3.0 + 2,4-D*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rain within 4 hours of application of tank mixes with 2,4-D amine, 2 hours of application of tank mixes with 2,4-D ester, will reduce weed control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** No restrictions.
- **Re-cropping Interval:**
  - **Caution:**
    - DO NOT apply more than 3 g per acre per year.
    - DO NOT use on highly variable soils that have large gravelly or sandy areas, eroded knolls, or calcium deposits.
    - Metsulfuron residues can persist for long periods, potentially limiting re-cropping options. Degradation of metsulfuron is dependent on the pH, moisture, and temperature of the soil. Refer to the label for details on rotation and minimum re-cropping intervals.
    - The following re-cropping intervals, based on soil pH, should be considered as guidelines only. Metsulfuron residues may affect crops for a longer period of time than outlined in the following table. Add 12 months to recommendations if less than 5 inches (130 mm) of rainfall in brown and dark brown soils or less than 10 inches (250 mm) rainfall in black or grey wooded soils in any year following application.

### Minimum Re-Cropping Interval (Months)

Soil PH	Barley, Wheat	Oat*	Canola*	Flax*	Lentils	Canary Seed	Yellow Mustard
less than 7.0	10	10	10 (22)	10 (22)	34	48	48
7.0 -7.9	10	10 (22)	22 (34)	34	48	48	48

\* Figures in brackets refer to re-cropping intervals in brown and dark brown soil zones.

- On black and grey wooded soils with pH of 7.5 or less, fescue may be planted 10 months after application and alfalfa, red clover, peas and flax may be planted 22 months after application. DO NOT use on soils with pH greater than 7.9.

- Effects of metsulfuron residues on crops other than those listed in the table have not been fully evaluated. Because of the length of re-cropping restrictions and the lack of information on many rotational crops, land previously treated with metsulfuron cannot be rotated to crops other than those listed until a field biosassay confirms that residues of metsulfuron are not present. Consult the label for additional instruction on how to perform a field bioassay. Failure to follow these instructions could result in injury to subsequent crops.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**
  - Handheld or backpack applications do not require a buffer.

Use	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat**
	Less than 1 m	Greater than 1 m	
Cropland	1	1	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Terrestrial buffers are not required for transport and utility rights of way

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Metsulfuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply metsulfuron should be flushed out immediately after metsulfuron is used. All nozzles, screens and filters should be removed and cleaned after applying this product. Refer to 'Method B' found in the general sprayer cleaning section on pages 12 and 13. DO NOT use ammonia with chlorine bleach.

## Hazard Rating:



Caution – Poison



Caution – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Momentum

Herbicide Group  
4 - clopyralid & fluroxypyr  
(Refer to page 45)

## Company:

Loveland Products Canada (PCP#30456)

## Formulation:

90 g/L clopyralid and 90 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 8.99 L

## Crops and Staging:

Apply at the 3 leaf to just before the flag leaf stage of barley, wheat (spring, durum).

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

The following weeds are controlled at the 1 to 4 leaf/whorl stage unless specified:

- Canada thistle\*\*
- Kochia (2 to 8 leaf)
- Volunteer flax (1 to 12 cm)
- Cleavers
- Stork's-bill (1 to 8 leaf)\*
- Wild buckwheat

\* Suppression only.

\*\* Season long control, some regrowth may occur in the fall. Apply from the 4 inch (10 cm) to pre-bud stage.

## Rates:

0.45 L per acre.

Apply a maximum of ONE APPLICATION of this product or other products containing either clopyralid or fluroxypyr per year.

## Application Information:

- **Water Volume:** 40 L per acre.
- **Nozzles and Pressure:** Use 30 to 40 psi (200 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE coarse** droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
clopyralid, fluroxypyr	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool (less than 8°C) temperatures, weeds are not actively growing and control may be reduced. DO NOT apply to weeds stressed longer than 20 days from lack of moisture as poor control can result.

## Tank Mixes:

### Herbicides:

- MCPA Ester 500 (0.34 to 0.45 L per acre)
- MCPA Ester 600 (0.28 to 0.38 L per acre)

*Momentum* alone or tank mixed with MCPA ester rates above may be mixed with the following:

- **In spring wheat (including durum) and barley:**
    - Tralkoxydim<sup>†</sup> (0.20 L per acre) plus registered adjuvant
    - Imazamethabenz<sup>†</sup> (0.52 to 0.64 L per acre) plus water pH adjuster
    - Fenoxaprop 120 EC<sup>†</sup> (0.16 to 0.31 L per acre).
  - **In spring wheat (including durum):**
    - Clodinafop<sup>†</sup> (label rates)
    - *Simplicity OD* (0.2 L per acre)
    - *Traxos* (label rate)
- <sup>†</sup> **Note: The manufacturer may not support all brand of these products. See the label or contact Loveland Products Canada for more information.**

Check the labels of mix partners for additional crop staging restrictions.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note: The above mixes are those listed on the *Momentum* label only.**

Loveland Products Canada also supports the following mixes that are not on the *Momentum* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Everest 2.0* (flucarbazone), *Puma Advance* (fenoxaprop), *Varro*, *Avert*(imazamethabenz), *Refine SG* (thifensulfuron/tribenuron) and 2,4-D Ester

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval between application and rain without loss of control may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze treated fields or cut for hay within 3 days of application.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Re-cropping Interval:** Wheat, barley, oats, rye, flax, canola, mustard and peas may be planted the year after application or the field may be fallowed. DO NOT under-seed crops to forage legumes the year after treatment. DO NOT sow any other crops until the second year after application. Apply manure bedded with straw from treated crops only to the crops listed above.

◦ *DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Loveland Products Canada representative or retailer for more information before seeding field peas following drought conditions in the previous year.*

- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.
- **Buffer Zones:**
  - Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	15	15	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

◦ Spray when winds are under 16 km/hr, but not dead calm.

## Sprayer Cleaning:

No specific cleaning recommendations are provided on the *Momentum* label. As a petroleum based emulsifiable concentrate, 'Method B' in the general section on sprayer cleaning on pages 12 and 13 may be the most effective. Check with the manufacturer for more information.

## Hazard Rating:



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# MPower Good Harvest

Herbicide Group  
10 - glufosinate  
(Refer to page 45)

## Company:

AgraCity (PCP#30761)

## Formulation:

150 g/L glufosinate ammonium formulated as a solution.

- Container sizes: 10.8 L, 108 L, 1000 L

## Crops, Rates and Staging:

### Harvest Aid Treatment:

**Note:** As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from crops treated with this product prior to harvest may have market access concerns. Please see page 10 for more information AND consult potential grain buyers before using this product.

Crop	Rate (L per acre)	Stage
Alfalfa (seed production only)	0.81 to 1.09**	50 to 75% pod turn (brown)
Lentil*	1.09	40 to 60% pod turn (yellow to brown)
Potato*	1.21	14 to 21 days prior to harvest

\* Not for crops grown for seed.

\*\* Use the higher rate when crop canopies or weed densities are heavy.



## Application Information:

- **Water Volume:**
  - **Ground applications:** Minimum 45 L per acre. When crop canopy and weed densities are heavy, apply in 69 to 89 L per acre of water.
  - **Aerial applications:** 13 to 22 L per acre.
- **Nozzles and Pressure:**
  - **Ground Application:** Use 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles; 45 psi (310 kPa) when using check valves. Angle nozzles forward at 45° to improve coverage of vertical leaf surfaces. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** or larger droplets.
  - **Aerial applications:** DO NOT use raindrop nozzles. Use a combination of nozzles and pressure to provide **ASABE coarse** or larger droplet size distribution.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
glufosinate	Preharvest	Glutamine Synthase Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Non-selective broadleaf & grass except HT crops	10

## Effects of Growing Conditions:

MPower Good Harvest activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought, and low humidity conditions slow weed growth. Applications made under these stressed conditions may result in reduced weed effectiveness.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** Within 4 hours may reduce activity.
- **Re-entry Interval:** DO NOT re-enter treated areas for 24 hours after application, without protective clothing as for spraying.
- **Grazing Restrictions:** DO NOT graze the treated crop or cut for feed.
- **Pre-harvest Interval:** Leave 9 days between application and harvest of lentil and potato.
- **Re-cropping Interval:** No restrictions.
- **Aerial Application:** May be applied by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**
  - **Ground:** DO NOT apply within 15 metres of sensitive plants or water or wetland areas.
  - **Aerial:** DO NOT apply within 30 metres of sensitive plants or water or wetland areas.
  - DO NOT apply when dead calm or when winds exceed 16 km/hr when using unprotected booms or applying by air, or exceeding 25 km/hr when using shrouded booms.

## Sprayer Cleaning:

Refer to 'Method B' in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:



Warning – Poison



Caution – Skin Irritant



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.



# Muster Toss-N-Go

Herbicide Group  
2 - ethametsulfuron  
(Refer to page 45)

## Company:

FMC Corporation (PCP#23569)

## Formulation:

75% ethametsulfuron-methyl formulated as a water dispersible granule.

- Container size - 320 g (4 x 80 g water soluble bags).

## Crops, Rates and Staging:

NOT for use on Yellow mustard (*Brassica alba*).

Crop	Rate (g per acre)	Stage
Canola	8 to 12	Minimum 2 leaf stage (main stem) to the start of bolting.
Mustards: Brown & Oriental condiment as well as oilseed quality ( <i>Brassica juncea</i> )	8	4 leaf stage but prior to bolting.
Ethiopian Mustard ( <i>Brassica carinata</i> )		
Sunflower	8 to 12	2 to 8 leaf stage (15 to 45 cm)

*Muster* applied alone requires the addition of *Agral 90*, *Agsurf II*, or *Citowett* at 0.2 L per 100 L of spray solution. When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Weeds, Rates and Staging:

Apply from the cotyledon to 6 leaf stage. Stinkweed must be sprayed in the 1 to 4 leaf stage

At the 8 g per acre rate (one 320 g package treats 40 acres):

- Flixweed \*
- Green smartweed
- Hemp-nettle
- Stinkweed \*\*
- Wild mustard

The 12 g per acre rate (one 320 g package treats 26.7 acres) controls above weeds plus:

- Redroot pigweed \*\*
- Stinkweed

\* Spring seedlings only.

\*\* Suppression with *Muster* alone but control with *Assure II* plus *Sure-Mix* or a *Poast Ultra* plus *Merge* tank mix where permitted.

## Application Information:

- **Water Volume:** 40 L per acre.
- **Equipment, Nozzles and Pressure:** 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE medium** droplets. Sprayer must be equipped with continuous agitation. Maintain the spray boom at 24 inches or less above the crop canopy.
- **Screens:** Use a 50 mesh or coarser nozzle screen and in-line filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
ethametsulfuron	POST	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf	2

Effects of Growing Conditions:

DO NOT apply to crops that are stressed by severe conditions such as drought, low fertility, saline soils, waterlogged soils (soils at or near field capacity), disease or insect damage as crop injury may result. Less than acceptable control will occur in fields where high weed populations exist and where stressful environmental conditions prevail (drought, cold weather). Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Thin crop stands or application prior to the 2-leaf stage of canola or 4-leaf stage of brown condiment mustard and oriental mustard (condiment and oilseed types), sandy soils or soils with low organic matter may increase the severity of the injury.

Tank Mixes:

DO NOT mix the soluble bags with liquid fertilizers, substances that contain boron or substances that release free chlorine. Mixing the water soluble bags with any of these compounds will result in an insoluble substance in the tank.

Herbicides:

- **Canola, Brown and Oriental Mustards (*Brassica juncea* only):**
  - *Assure II* plus *Sure-Mix* adjuvant.
- **Canola only:**
  - *Poast Ultra* plus *Merge* adjuvant.

Insecticides: None registered.

Fungicides: None registered.

Fertilizers: None registered. DO NOT mix soluble bags with liquid fertilizers.

Note: The above mixes are those listed on the *Muster* label only.

FMC Corportation also supports the following mixes that are not on the *Muster* label. Mixes must be applied according to the most restrictive use limitations for either product:

- **Herbicides:** *Assure II* (sunflowers), *Assure II* plus *Lontrel*, *Lontrel*, *Lontrel 360* plus *Poast Ultra* (canola only).

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

Restrictions:

- **Rainfall:** Within 4 to 6 hours may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze or feed crop to livestock within 60 days of application. DO NOT graze treated sunflowers.
- **Pre-harvest Interval:** Leave 60 days from application to harvest.
- **Re-cropping Interval:** DO NOT sow wheat, barley, oats or flax within 10 months of application. DO NOT seed canola, lentils, peas, faba beans, tame mustard, alfalfa, canaryseed, dry beans, fescues or red clover within 22 months of application. All other crops must not be sown until a successful “field bioassay” is performed at 22 months after application. Growers may experience reduced yields if other crops are grown without following these guidelines.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.
- **Buffer Zones:**

Crop (By ground only*)	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Canola, Sunflower, Ethiopian Mustard	4	2	55
Mustard (Condiment and Oilseed types)	3	2	40

See page 36 for an explanation of the different habitats.  
\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.  
† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Sprayer Cleaning:

Sprayers used to apply *Muster* should be flushed out immediately after *Muster* is used. Refer to ‘Method A’ in the general section on sprayer cleaning on pages 12 and 13.

Hazard Rating:

None indicated.

# Navius

Herbicide Group  
2 - metsulfuron  
4 - aminocyclopyrachlor  
(Refer to page 45)

## Company:

Bayer (PCP#31382)

## Formulation:

39.5% aminocyclopyrachlor and 12.6% metsulfuron formulated as a water dispersible granule.

- Container size – 8 x 1.361 Kg.

## Crops and Staging:

Rangeland or Non-crop areas (i.e. Rights of Way, roadsides, industrial sites, fence lines and other non-crop areas)

**DO NOT** use in residential or recreational areas, where bystanders could be exposed during or after application.

**DO NOT** apply to cropland.

**Note:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

Avoid application of this product in areas where the roots of desirable trees and/or shrubs may extend unless injury or loss can be tolerated. Root zone areas of desirable trees or vegetation are affected by local conditions and can extend well beyond the tree canopy.

## Weeds, and Staging:

For best results, apply to young, actively growing weeds. For woody species, apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

**After the granules have fully dispersed, add surfactant. Either one of the following:**

- non-ionic surfactants (i.e. *Agral 90*, *Agsurf II*, or *Citowett*) at 0.25 L per 100 L (25 mL per 10 L) of spray solution.
- *Merge* or a crop oil concentrate (oil-surfactant blends such as *Assist*, *Score*, etc.) at 1 L per 100 L (100 mL per 10 L).

### Weeds Controlled at 68 g per acre:

- |                               |  |                                 |
|-------------------------------|--|---------------------------------|
| ◦ Bluebur                     | ◦ Hemp-nettle                          | ◦ Stinkweed                     |
| ◦ Buckwheat (tartary, wild*)  | ◦ Kochia (including Group 2 resistant) | ◦ Stork's-bill                  |
| ◦ Canada goldenrod†           | ◦ Lamb's-quarters*                     | ◦ Sweet clover (white, yellow)  |
| ◦ Canada thistle              | ◦ Leafy spurge                         | ◦ Toadflax*                     |
| ◦ Chickweed                   | ◦ Mustard (ball, wild)                 | ◦ Volunteer canola              |
| ◦ Common groundsel            | ◦ Orange hawkweed                      | ◦ (except Clearfield varieties) |
| ◦ Common tansy                | ◦ Ox-eye daisy                         | ◦ White cockle                  |
| ◦ Common yarrow               | ◦ Pigweed (prostrate, redroot)         | ◦ Wild carrot                   |
| ◦ Corn spurry                 | ◦ Rough cinquefoil†                    | ◦ Yellow star-thistle           |
| ◦ Cow cockle                  | ◦ Russian thistle                      |                                 |
| ◦ Dandelion                   | ◦ Scentless chamomile                  | <u>Woody Species:</u>           |
| ◦ Flixweed                    | ◦ Shepherd's-purse                     | ◦ Smooth sumac                  |
| ◦ Knapweed (diffuse, spotted) | ◦ Smartweed (green, lady's-thumb)      | ◦ Western snowberry             |
| ◦ Giant buttercup†            | ◦ Sow-thistle (annual, perennial)      | ◦ Wild rose                     |

### Weeds Controlled at 135 g per acre:

- The weeds listed above plus the following *Woody Species* up to 2,5 metres unless otherwise indicated:
 

◦ Manitoba maple (Box Elder)	◦ Plains cottonwood	◦ Hackberry
◦ Green ash	◦ Poplar (balsam, black)	◦ Balsam fir (up to 2 metres)
◦ Chokecherry (up to 3 metres)	◦ Trembling aspen (up to 3 metres)	◦ Spruce (Black, White – up to 2 metres)
◦ Pin cherry (up to 3 metres)	◦ Willow (sandbar/ditchbank, Pussy)	

### Weeds Controlled at 270 g per acre:

- The species listed above plus the following *Woody Species* to 2 metres tall unless otherwise indicated:

- |                                   |  |
|-----------------------------------|--|
| ◦ Pine (Eastern white, Jack, Red) | ◦ Spruce (Black, White – up to 3 metres) |
| ◦ Balsam fir (up to 3 metres)     |  |

\* **Suppression only.**

† **Season long control only.**

**DO NOT** apply more than a total of 270 g per acre of *Navius* per season or apply *Escort* to the same site in the same year as *Navius*. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information

- **Water Volume:**
  - **Ground:** No specific carrier volumes are indicated for ground application but volumes could be up to 162 L per acre for herbaceous weeds and up to 810 L per acre is recommended for foliar application to woody species. See the label for details.
  - **Aerial:** Apply in 12 to 20 L per acre of water.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metsulfuron-methyl	POST (foliar) also has soil activity	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf only	2
aminocyclopyrachlor	POST (foliar) also has soil activity	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity. Weeds stressed by moisture or temperature extremes (heat or cold) may be less susceptible and incomplete weed kill may result. Residual control of weeds germinating after application occurs when *Navius* is carried into the root zone by rainfall. **DO NOT** apply during periods of intense rainfall or to soil saturated with water. Brush hardened off by cold weather and drought stress may not be controlled.

## Restrictions:

- **Rainfall:** Rain within 4 hours may reduce effectiveness.
- **Re-entry Interval:** **DO NOT** re-enter treated areas until sprays have dried.
- **Re-cropping Interval:** No recropping interval is indicated. Conduct a bioassay when converting pasture to annual crop land to determine tolerance to potential residues in the soil. The following restrictions apply to all plant materials, or manure from animals fed material, from areas treated with *Navius* within the previous 18 months:
  - **DO NOT** apply to land used for growing susceptible crops. Manure may only be applied on rangeland.
  - **DO NOT** use as mulch or compost and do not apply directly on or around desirable plants.
  - Must only be used on-farm.
- **Grazing Restrictions:** No grazing or haying restrictions for non-lactating or lactating animals (including cattle, horses, sheep, and goats) when used as directed. Grazing animals do not have to be moved off the pasture or rangeland before, during or after application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**
  - **Contact the Saskatchewan Ministry of Environment or Manitoba Sustainable Development Department for additional permitting requirements.**
  - Hand-held or backpack sprayers and spot treatments are exempt from buffer zone requirements.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat <sup>**</sup>
	Less than 1 m	Greater than 1 m	
Ground	5	2	45
Fixed wing aircraft	250	100	800
Helicopter	80	45	800

See page 36 for an explanation of the different habitats.

\* For ground vehicle mounted booms, buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Terrestrial buffers are not required for transport and utility rights of way. Aquatic buffers still apply.

<sup>†</sup> Distance is measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

*Navius* can cause severe injury to sensitive plants at very low concentrations. Use 'Method A' on pages 12 and 13 to clean sprayers immediately after using *Navius* or directions on the label.

## Hazard Rating:



Warning - contains the allergens milk and sulfites

For an explanation of the symbols used here see pages 7 and 8.

# OcTTain XL

Herbicide Group  
4 - fluroxypyr & 2,4-D  
(Refer to page 45)

## Company:

Corteva Agriscience (PCP#30077)

## Formulation:

90 g/L fluroxypyr plus 360 g/L 2,4-D LV ester as a co-formulated product.

- Container size – 2 x 9 L, (40 acres), 108 L (240 acres), 576 L (1280 acres). All products above are formulated as emulsifiable concentrates.

## Crops and Staging:

**Spring wheat (including durum), barley:** 4 leaf up to the emergence of the flag leaf.

**Winter wheat:** Apply to winter wheat in the spring from the 3 tiller stage to just before the flag leaf stage.

### Forage Grasses for seed production only\*:

- *Seedling and established grasses at the 4 leaf up to the emergence of the flag leaf.*
  - Bromegrass (meadow, smooth)
  - Timothy
  - Wheatgrass (crested, intermediate)
  - Fescue (creeping red, tall)

**\*Note:** Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. **Those who apply these uses do so at their own risk.**

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, and Staging:

The following weeds are controlled at the 2 to 4 leaf stage, unless otherwise specified:

- OcTTain XL at 0.45 L per acre (2 x 9 L treats 40 acres, 108 L treats 240 acres, 576 L treats 1280 acres) controls:
 

◦ Bluebur	◦ Hoary cress <sup>o</sup>	◦ Sow-thistle (perennial) <sup>†o</sup>
◦ Burdock	◦ Kochia	◦ Stinkweed
◦ Cleavers(1 to 8 whorl)	◦ Lamb's-quarters	◦ Stork's-bill (1 to 8 leaf)
◦ Clover (sweet)	◦ Mustards (except dog or green and grey tansy mustard)	◦ Sunflower (annual)
◦ Cocklebur	◦ Plantain	◦ Vetch
◦ Common chickweed	◦ Prickly lettuce	◦ Volunteer canola
◦ (up to 8 cm or 3 inches) <sup>†</sup>	◦ Ragweed	◦ Volunteer flax (1 to 12 cm)
◦ Field horsetail <sup>o</sup>	◦ Redroot pigweed <sup>†</sup>	◦ Wild radish
◦ Flixweed	◦ Round-leaved mallow (1 to 6 leaf)	◦ Wild mustard
◦ Goat's-beard	◦ Shepherd's-purse	◦ Wild buckwheat (1 to 6 leaf)
◦ Hemp-nettle (2 to 6 leaf)		

- **OcTTain XL at 0.45 L per acre (one 2 x 9 L case treats 40 acres and 576 L treats 1280 acres) plus 2,4-D ester (LV700 at 81 mL per acre or LV600 at 95 mL per acre) controls:**
  - **All weeds listed above plus:**
    - Annual sow-thistle<sup>†</sup>
    - Blue lettuce<sup>◦</sup>
    - Canada thistle<sup>◦†</sup>
    - Cleavers (1-8 whorls)<sup>Δ</sup>
    - Common chickweed (up to 8 cm or 3 inches)
    - Dandelion<sup>◦◦</sup>
    - Docks
    - Dog mustard
    - Field bindweed<sup>◦</sup>
    - Field peppergrass
    - Gumweed
    - Hairy galinsoga
    - Hedge bindweed
    - Leafy spurge<sup>◦</sup>
    - Oak-leaved goosefoot
    - Perennial sow-thistle<sup>◦†</sup>
    - Redroot pigweed
    - Russian thistle
    - Smartweed (including lady's-thumb)
    - Tansy mustard
    - Tartary buckwheat
    - Wild buckwheat (1 to 8 leaf)
- † **Suppression only**
- **Top growth only**
- **Spring rosettes only.**

Make only ONE APPLICATION per year of any of these products or other products containing the same active ingredients. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information

- **Water Volume:**
  - **Ground:** OcTTain XL use 20 to 40 L per acre. All other uses minimum 40 L per acre.
  - **Aerial:** OcTTain XL only use 12 to 20 L per acre.
- **Nozzles and Pressure:** Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE coarse** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
fluroxypyr	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
2,4-D	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

The activity these products are influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

The following mixes may be used with each of the combinations above unless noted otherwise.

- **In spring wheat (including durum) and barley:**
  - Assert (0.53 to 0.65 L per acre)
  - Tralkoxydim\*
- **In spring wheat (including durum) only:**
  - Clodinafop 240EC (93 mL per acre)
  - Fenoxaprop
  - Simplicity OD<sup>†</sup>
  - Simplicity GoDRI

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered. DO NOT mix soluble bags with liquid fertilizers.

\* Temporary crop injury or reduced wild oat control may occur with this tank mix.

† OcTTain XL without additional 2,4-D ester only.

**Note:** The above mixes are those listed on the OcTTain XL labels only.

The manufacturers may also support mixes between their product and other pesticides that are not on their labels. Check with the manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Wet foliage at application will reduce control.
- **Re-entry Interval:** DO NOT re-enter treated area within 12 hours.
- **Re-cropping Interval:** Alfalfa, barley, canola, corn, dry beans, flax, forage grasses, lentils, mustard, oats, peas, potatoes, rye, soybeans, sunflowers and wheat may be grown the year after application. There are no re-cropping restrictions the second year after application.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Grazing Restrictions:** DO NOT permit lactating dairy animals to graze cereal fields within 7 days of application. DO NOT harvest cereal crops for forage or cut hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT feed or cut forage grasses for hay.
- **Aerial Application:** May be applied by air.
- **Storage:** Avoid freezing. If frozen, bring to room temperature and agitate before use. These products are combustible. DO NOT store near heat or open flame.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Field sprayer	1	0	1
Fixed wing aircraft	1	0	55
Helicopter	1	0	45

See page 36 for an explanation of the different habitats.

\* For ground vehicle mounted booms, buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Warning – Eye Irritant



Caution – Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Odyssey/Odyssey NXT (this referring text to be removed in the 2021 edition)

See imazamox/ imazethapyr on page 262.

# Odyssey Ultra/Odyssey Ultra NXT

*This product is a prepackaged tank mix of Odyssey/Odyssey NXT (see Imazamox/Imazethapyr - page 262) and Poast Ultra (page 327). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

Herbicide Group

1- sethoxydim

2- imazamox,

imazethapyr

(Refer to page 45)

## Company:

BASF Canada

## Formulation:

The Odyssey Ultra/Odyssey Ultra NXT packages contain the following components:

**Odyssey Ultra A (PCP#31353) or Odyssey Ultra NXT A (PCP#32305):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.

- Container size –
  - **Odyssey Ultra A:** 8 x 86.5 g water soluble packs or
  - **Odyssey Ultra NXT A:** 1 x 692 g jug.

**Odyssey Ultra B (PCP#31354) or Odyssey Ultra NXT B (PCP#32304):** 450 g/L sethoxydim formulated as an emulsifiable concentrate.

- Container size – 1 x 6.1 L jug.

**Merge adjuvant (PCP#24702):** Container size – 1 x 8.1 L

## Crops and Staging:

Crop	Leaf Stage	Days to Harvest
Field pea	1 to 6*	60
CLEARFIELD canola	2 to 6	60
CLEARFIELD lentil	1 to 9*	60
Soybean	1 to 3	85
Faba bean	1 to 6	80

\* Above-ground nodes

## Weeds, Rates and Staging:

At 17.4 g per acre *Odyssey Ultra A* and 0.15 L per acre *Odyssey Ultra B* (one package treats 40 acres) controls the weeds controlled by *Odyssey* (*Odyssey Ultra A*) plus the grasses controlled by *Poast Ultra* (*Odyssey Ultra B*) plus the weeds below:

- Japanese brome grass (Spring seedlings only)\*
- Quackgrass (Suppression - 2 to 5 leaf)

\* **Suppression of fall emerged Japanese brome with *Odyssey Ultra* alone but control with *Poast Ultra* (0.04 L per acre) tank mix.**

*Odyssey Ultra* requires the addition of *Merge* adjuvant at 0.5 L per 100 L of spray solution (included in *Odyssey Ultra NXT* packaging).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Tank Mixes:

**Herbicides:**

- *Poast Ultra* (0.04 L per acre)

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*



# Olympus

Herbicide Group  
2 - propoxycarbazone-sodium  
(Refer to page 45)

## Company:

Bayer

## Formulation:

**Olympus (PCP#32755):** 70% propoxycarbazone-sodium formulated as a wettable granule.

- Container size - 463 g

## Crops and Staging:

Spring, durum, and winter wheat: Apply pre-seed or prior to crop emergence.

## Weeds and Rates:

Weeds Controlled up to 15 cm in height unless otherwise indicated:

Preplant surface or postplant preemergence	<b>Olympus:</b> 5.8 g per acre <b>Glyphosate*:</b> 180 to 360 g a.e. per acre	<b>Weeds Controlled by glyphosate at the rates given plus:</b> <ul style="list-style-type: none"> <li>• Canada fleabane (up to 8 cm)<sup>Δ</sup></li> <li>• Canola, volunteer<sup>†</sup> (1-leaf stage to 4 leaf stage)</li> <li>• Cleavers<sup>Δ</sup></li> <li>• Common ragweed<sup>Δ</sup></li> <li>• Downy brome<sup>†Δ</sup></li> <li>• Flixweed<sup>Δ</sup></li> <li>• Green foxtail<sup>Δ</sup></li> <li>• Hemp-nettle<sup>Δ</sup></li> <li>• Japanese brome (up to and including the 2 leaf stage)</li> <li>• Kochia<sup>ΔΔ</sup> (except glyphosate tolerant biotypes)</li> <li>• Lady's-thumb<sup>Δ</sup></li> <li>• Lamb's-quarters<sup>Δ</sup></li> <li>• Persian darnel<sup>Δ</sup></li> <li>• Redroot pigweed<sup>Δ</sup></li> <li>• Russian thistle<sup>Δ</sup></li> <li>• Stinkweed<sup>Δ</sup></li> <li>• Volunteer barley<sup>Δ</sup></li> <li>• Volunteer flax<sup>Δ</sup></li> <li>• Volunteer wheat<sup>Δ</sup></li> <li>• Wild buckwheat (up to 8 cm in height and up to 3 leaf stage)<sup>Δ</sup></li> <li>• Wild mustard<sup>Δ</sup></li> <li>• Wild oat<sup>Δ</sup></li> <li>• Foxtail Barley (seedling to heading)<sup>**†</sup></li> </ul>
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\* including all salts

\*\* 360 g ae per acre of glyphosate is required for control of foxtail barley

<sup>†</sup> For more consistent control of subsequent flushes, follow an application of *Olympus* + glyphosate with an in-crop application of *Varro*. Refer to the *Varro* label for additional weeds controlled.

<sup>Δ</sup> Controlled by glyphosate alone at 180 to 275 g ae per acre.

<sup>ΔΔ</sup> Controlled by glyphosate alone at 360 g ae per acre.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 14.

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 20 L per acre
  - **Aerial:** Minimum 10 L/acre (Note: There are restrictions on aerial application – see the note under Restrictions below)
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets or larger. The use of 80° or 110° flat fan nozzles is recommended for optimum spray coverage. DO NOT use flood jet nozzles, controlled droplet application equipment or Sprafol equipment.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
propoxycarbazone-sodium	POST and PRE (has soil activity)	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	2

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **Pre-seed and Pre-Emergent:**
  - Glyphosate

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered. DO NOT mix soluble bags with liquid fertilizers.

## Restrictions:

- **Rainfall:** Within 1 hour of application may reduce control.
- **Re-entry Interval:** DO NOT re-enter treated fields for 12 hours.
- **Grazing Restrictions:** MUST NOT be grazed or fed to livestock for 71 days after treatment.
- **Pre-harvest Interval:** Leave 71 days between application and harvest.
- **Re-cropping Interval:** Barley, canola, dry beans, field peas, flax, lentils, oats, and soybeans may be grown in the season following application.
- **Aerial Application:** Note – while *Olympus* may be applied by aerial application, due to the requirement that it be mixed with glyphosate, this aerial option is only available for certain glyphosate products and then only when the field to be treated is too wet to support ground based sprayers. (See glyphosate page)
- **Storage:** Store in a cool, dry place.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	1	0	1
Fixed wing aircraft	1	0	20
Helicopter	1	0	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on page 15 to 16. Let solution stand for an extended period for better results. Flush sprayer system with water. See the label for product specific cleaning details.

## Hazard Rating:



Warning – Contains the allergen soy

For an explanation of the symbols used here see pages 7 and 8.

# Optica Trio

Herbicide Group  
4 - MCPA, mecoprop & dichlorprop  
(Refer to page 45)

## Company:

Loveland Products Canada (PCP#29662)

## Formulation:

160 g/L MCPA + 130 g/L mecoprop-p + 310 g/L dichlorprop-p formulated as a solution

- Container size - 10 L

## Crops and Staging:

Crop	Stage
Barley, oat, spring wheat (including durum)	2 to 5 leaf
Winter wheat	Spring application only; up to 12 inches (30 cm) high (top leaf extended)

## Weeds, Rates and Staging:

Weeds controlled at the 2 to 3 leaf stage unless otherwise indicated.

### Apply at 0.61 L per acre to control:

- Lamb's-quarters
- Stinkweed
- Volunteer canola
- Wild mustard

### Apply at 1.0 L per acre to control the weeds listed above plus:

- Canada thistle\*
- Chickweed (Common)
- Cleavers (1 to 2 whorls)
- Kochia
- Lady's-thumb (suppression)
- Ragweed (Common)
- Redroot pigweed
- Wild buckwheat

\* Top growth control only.

DO NOT apply *Optica Trio* more than once or follow application with any related product in the same year.

## Application Information:

- **Water Volume:** Minimum 20 L per acre.
- **Nozzles and Pressure:** 30 to 43 psi (200 to 300 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets or larger.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dichlorprop-p	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4
mecoprop-p					
MCPA					

## Effects of Growing Conditions:

Less than satisfactory control may result if weeds are not actively growing such as under conditions that are extremes of hot or cold, dry or wet weather prior to spraying.

## Tank Mixes:

### Herbicides:

- *Spring wheat (including durum):*
  - *Signal* (93 mL per acre) plus supplied adjuvant.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Optica Trio* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT feed treated crops to milking animals or harvest for forage within 7 days of application. Meat animals grazing treated crops must be removed 3 day prior to slaughter.
- **Pre-harvest Interval:** No pre-harvest interval indicated on label when *Optica Trio* is used alone.
- **Re-cropping Interval:** No information provided on label. Contact manufacturer for information.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Keep from freezing.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	2

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Caution – Poison



Danger – Corrosive to eyes

For an explanation of the symbols used here see pages 7 and 8.

# Option 2.25 OD

*For use in Manitoba only.*

**Herbicide Group  
2 - foramsulfuron**

*(Refer to page 45)*

## Company:

Bayer

## Formulations:

**Option 2.25 OD (PCP#27424):** 22.5 g/L foramsulfuron formulated as an oil-dispersion.

- Container size - 6.3 L jug

## Crops and Staging:

Field corn at the 1 to 8 leaf stage or 5 to 6 visible collars

## Weeds and Staging:

### Annual Grasses:

Weed	Leaf Stage
Barnyard grass	1 to 6 (to early tillering)
Foxtail (green and yellow), Proso millet	2 to 5 (to early tillering)
Witchgrass	2 to 4

### Broadleaf Weeds:

Weed	Leaf Stage
Chickweed, common	4 to 6
Lamb's-quarters	4 to 8
Mustard, wild	5 to 7
Mustard, wormseed	5 to 9
Nightshade, eastern black	1 to 5
Pigweed, redroot	1 to 7
Ragweed, common*	2 to 4

\* Suppression only.

## Rates:

**Option 2.25 OD:** 0.63 L per acre (10 acres per jug) plus 28% UAN (liquid 28-0-0) at 1.0 L per acre.

**NOTE:** *Option 2.25 OD* should be tank mixed with *Banvel II* at 121 mL per acre for enhanced control of broadleaf weeds and the management of Group 2 resistant weed biotypes.

Add *Option 2.25 OD* to a half full tank, followed by *Banvel II*, then 28% UAN.

## Application Information:

- **Water Volume:** 60 L per acre
- **Nozzles and Pressure:** Use 25 to 40 psi (175 to 275 kPa) when using conventional 80° or 110° flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* or larger droplets.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
Foramsulfuron	POST (foliar) also has soil activity	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

Under optimum conditions weed growth ceases within 1 to 3 days and yellowing of the growing point occurs in 5 to 10 days. Warm moist conditions provide for the best activity. Activity may be reduced or delayed if applied under cool and/or dry conditions or in the presence of heavy dew, fog, mist or rain or if weeds are dust covered. If the crop or weeds are under stress due to environmental conditions, delay application until the both crop and weeds have resumed active growth.

## Tank Mixes:

**Herbicides:** *Banvel II* (121 mL per acre)\*

**Insecticides:** Avoid application to corn that has been treated with organophosphorous insecticides.

**Fungicides:** None registered.

**Fertilizers:** DO NOT use any fertilizers or additives other than 28% UAN (1 L per acre), recommended\*.

\* *Option 2.25 OD* should be applied to corn in Manitoba as a tank-mixture with *Banvel II*. UAN 28% is required. See 'Rates' section above.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 hours may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields until residues have dried.
- **Grazing Restrictions:** DO NOT graze treated corn crops or cut for forage within 45 days of application.
- **Pre-harvest Interval:** Leave 70 days between application and harvest of grain.
- **Re-cropping Interval:** The following crops may be grown the season following application: alfalfa, barley, bean (dry common), canola, clover (red), corn (field and sweet), oat, pea, potato, soybean, timothy, spring wheat. Winter wheat may be seeded 4 months after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Keep dry.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	3

See page 36 for an explanation of the different habitats.

\* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Option 2.25 OD residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product. Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Eye Irritant



Warning – Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

## Outlook\*

\* Note: This product is no longer manufactured but some still remains in the distribution system. This product may be removed from future editions when supplies are exhausted.

**Herbicide Group**  
**15 - dimethanamid**  
*(Refer to page 45)*

## Company:

BASF Canada (PCP#29194)

## Formulations:

720 g/L dimethanamid-P formulated as an emulsifiable concentrate.

- Container size – 2 x 9 L

## Crops and Staging:

**Potatoes** - After seeding or hilling prior to emergence of the crop. DO NOT apply before seeding or hilling.

## Weeds and Staging:

**Prior to the emergence of:**

- Barnyard grass
- Crabgrass (large, smooth)
- Foxtail (green and yellow)
- Eastern black nightshade\*
- Redroot pigweed

\* Control with highest rate (390 mL per acre) only. Lower rates provide suppression only.

## Rates:

Apply at 306 to 390 mL per acre. Apply at the higher rate on fine-textured or high organic soils and for heavier anticipated weed problems. DO NOT exceed the equivalent of a single application of *Outlook* or *Frontier Max* in a single season.

### Pre-emergence surface treatments:

Soil Type (Texture)	Rate (mL per Acre)		
	Less than 3% Organic Matter	3 to 6% Organic Matter	7 to 10% Organic Matter
Coarse	306	306	348
Medium and Fine	306	348	390

## Application Information:

- **Water Volume:** A minimum of 40 L per acre.
- **Pressure:** 30 to 43 psi (200 to 300 kPa).
- **Nozzles:** Flat fan or flood-jet. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets.
- **Screens:** Use a 16 mesh suction screen, 50 mesh elsewhere on sprayer.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dimethanamid-P	PPI, PRE (surface), early POST (foliar) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

Rainfall is required within 7 to 10 days of application to activate and move *Outlook* into the soil zone. If dry conditions persist, a shallow cultivation or the use of a rotary hoe is necessary to move the herbicide into moist soil and control weed escapes. Shallow tillage is important to minimize dilution of the herbicide. If drought conditions persist after pre-emergence applications, weed control may not be adequate.

## Restrictions:

- **Rainfall:** Avoid heavy rainfall after application. A light to moderate rainfall 7 to 10 days after application is important for good weed control.
- **Re-entry Interval:** DO NOT enter treated fields for 24 hours.
- **Pre-harvest Interval:** Leave 40 days between application and harvest.
- **Grazing Restrictions:** DO NOT graze within 40 days of application.
- **Re-cropping Interval:** In the event of a crop failure, treated fields may be seeded back to corn (field or sweet), soybeans, or dry common beans. DO NOT reseed potatoes after a crop failure. Cereal crops may be planted 100 days after application. The crops above plus green onions, potato and transplanted cabbage may be planted the next season after use. All other crops may be seeded 11 months after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze. Must be stored under heated warehouse conditions.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	3

See page 36 for an explanation of the different habitats.

\* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. When mixing with other pesticides, combine the method above with the method recommended for the tank mix partner if different from above for thorough cleaning.

## Hazard Rating:



Warning – Poison



Caution – Eye Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Overdrive

Herbicide Group

4 - dicamba

19 - diflufenopyr

(Refer to page 45)

## Company:

BASF Canada (PCP#30065).

## Formulation:

20% diflufenopyr and 50% dicamba sodium salts formulated as water dispersible granules.

- Container size - 4 x 3.4 kg

## Crops and Staging:

Established permanent grass pasture, non-cropland sites and rangeland. DO NOT apply *Overdrive* on annual crops or newly seeded grasses.

**Note:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

## Weeds and Staging:

- |                           |  |                                   |
|---------------------------|--|-----------------------------------|
| ◦ Biennial wormwood       | ◦ Leafy spurge**                       | ◦ Velvetleaf                      |
| ◦ Canada thistle*         | ◦ Perennial sow-thistle (2 to 10 leaf) | ◦ Vetch*                          |
| ◦ Dandelion**             | ◦ Ragweed (common)                     | ◦ Volunteer canola (up to 4 leaf) |
| ◦ Kochia (up to 15 cm)*** | ◦ Redroot pigweed                      | ◦ Wild buckwheat                  |
| ◦ Lady's-thumb            | ◦ Sweet clover*                        |                                   |
| ◦ Lamb's-quarters         | ◦ Tall waterhemp                       |                                   |

\* Top growth control

\*\* Top growth suppression

\*\*\* Including Group 2 and 9 resistant biotypes.

## Rates:

115 g per acre.

(One package treats 118 acres)

*Merge Adjuvant* at the rate of 0.25 L per 100 L of spray solution or a non-ionic surfactant at 0.25 L per 100L of spray solution plus ammonium nitrate (UAN 28%) at 1.25L per 100L of spray solution must also be added. Use of an anti-foam agent is suggested.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Minimum 89 L per acre. Use higher water volumes when treating dense or tall vegetation.
- **Nozzles and Pressure:** Maximum 20 psi (150 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of application equipment and pressure that is designed to deliver an even coverage of *ASABE coarse* droplets that are less prone to drift. Non-target broadleaf plants are very sensitive to *Overdrive* drift. Avoid conditions that are conducive to drift. (See page 7 for drift control suggestions).



## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
diflufenzopyr	POST (foliar)	Auxin transport inhibitor	To growth areas of the plant (Symplast)	Broadleaf only	19

## Effects of Growing Conditions:

DO NOT spray if temperatures are expected to exceed 27°C. DO NOT spray in high humidity or fog. DO NOT spray if wind velocity exceeds 8 km/h. Established grasses growing under stress conditions can exhibit various injury symptoms that may be more pronounced if herbicides are applied.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** Heavy rain within 4 hours of application may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT permit lactating dairy animals to graze fields within 7 days after application. DO NOT harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place.
- **Buffer Zones:**
  - Hand-held or backpack sprayer and spot treatment DO NOT require a buffer zone from sensitive habitat, but efforts should be made to minimize exposure to sensitive plants and open water or wetlands.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Freshwater habitat	Terrestrial habitat
Field sprayer*	15	10

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Caution – Eye Irritant, Potential Skin Sensitizer



Warning – Contains the allergen sulfites

For an explanation of the symbols used here see pages 7 and 8.

# Paradigm

Herbicide Group

2 - florasulam

4 - halauxifen

(Refer to page 45)

## Company:

Corteva Agriscience (PCP#31304)

## Formulation:

20% halauxifen present as methyl ester and 20% florasulam formulated as a water dispersible granule.

- Container size - 4 x 0.8 kg jugs per case

## Crops and Staging:

### Pre-seed and Post Harvest Applications:

- Prior to the planting of wheat (winter, spring and durum) and barley (or within 48 hours of seeding)
- Must be used in combination with a mixture of glyphosate at 180 to 1000 g ae per acre.

### In Crop:

- *Spring wheat (including durum) and barley*: 2 leaf stage to just prior to emergence of the flag leaf.
- *Winter wheat*: 3 leaf stage to just prior to emergence of the flag leaf.

## Weeds, Rates and Staging:

Apply to actively growing weeds at the 1 to 8 leaf stage unless otherwise specified.

**In-Crop Treatments:** Add Intake adjuvant at 0.5 to 1.0 L per 100 L of spray solution, Turbocharge or Merge adjuvants at 0.5 L per 100 L, or a 90% active non-ionic surfactant (NIS) at 0.25 L per 100 L of spray solution. Surfactant purchased separately.

**Weeds Controlled alone at 10 g per acre (one 0.8 kg jug treats 80 acres) in-crop or in a fall burndown in a mix with glyphosate in addition to the weeds controlled by glyphosate:**

- |   |  |   |
|---|--|---|
| ◦ American dragonhead (up to bud stage or 15 cm)                                    | ◦ Henbit (up to 8 leaf or 15 cm)   | ◦ Smartweed (green, lady's-thumb)   |
| ◦ Buckwheat, wild   | ◦ Kochia* (suppression up to 15 cm; control in fall burndown)                                      | ◦ Sow-thistle, annual (control up to 4 leaf in-crop; suppression in fall burndown)          |
| ◦ Canada thistle (suppression up to 30 cm)  | ◦ Lamb's-quarters  | ◦ Sow-thistle, perennial <sup>§</sup> (up to 6 leaf)  |
| ◦ Chickweed   | ◦ Mustard (wild) <sup>†</sup>  | ◦ Stinkweed <sup>†</sup>  |
| ◦ Cleavers (1 to 9 whorl stage)   | ◦ Narrow-leaved hawk's-beard (in-crop up to bolting and 30 cm in height; fall burndown up to 8 cm) | ◦ Stork's-bill  |
| ◦ Cow cockle  | ◦ Night-flowering catchfly <sup>§</sup> (up to bolting, 15 cm in height)                           | ◦ Velvet leaf (up to 5-leaf)  |
| ◦ Dandelion (seedlings, overwintered rosettes and mature plants up to 30 cm across) | ◦ Ragweed, common (in-crop up to 6 leaf; fall burndown up to 8 cm)                                 | ◦ Volunteer alfalfa (up to 25 cm)   |
| ◦ Fleabane, Canada (up to 15 cm in-crop & up to 8 cm in fall burndown)              | ◦ Redroot pigweed  | ◦ Volunteer canola (NOT Clearfield varieties alone but all varieties with glyphosate)       |
| ◦ Flixweed (up to 8 leaves or 8 cm high)  | ◦ Round-leaved mallow (up to 6 leaf)   | ◦ Volunteer flax (up to 15 cm)  |
| ◦ Hemp-nettle (suppression alone in crop; control in fall burndown)                 | ◦ Scentless chamomile <sup>§</sup> (up to the bud stage)   | ◦ White cockle <sup>§</sup> (spring seedlings and over-wintered plants up to the bud stage) |
|   | ◦ Shepherd's-purse <sup>†</sup> (up to bolting or 20 cm)   |   |

**Weeds controlled at 7.6 grams per acre (one 0.8 kg jug treats 107 acres) when applied in a spring burndown in a mix with glyphosate in addition to those weeds controlled by glyphosate:**

- |  |  |                            |
|--|--|----------------------------|
| ◦ Buckwheat, wild (1 to 2 leaves)                              | ◦ Fleabane, Canada (up to 15 cm in-crop & up to 8 cm in fall burndown) | ◦ Lamb's-quarters          |
| ◦ Canada thistle (suppression up to 30 cm)                     | ◦ Flixweed (up to 8 leaves or 8 cm high)                               | ◦ Mustard (wild)           |
| ◦ Chickweed  | ◦ Hemp-nettle (suppression alone in crop; control in fall burndown)    | ◦ Shepherd's-purse         |
| ◦ Cleavers (1 to 9 whorl stage)                                |  | ◦ Smartweed (lady's-thumb) |
| ◦ Dandelion (seedlings and spring rosettes up to 15 cm across) |  | ◦ Stinkweed                |

<sup>§</sup> Suppression only.

\* Light to moderate infestation (up to 150 plants/m<sup>2</sup>).

<sup>†</sup> Best results prior to the 4 leaf (seedling) stage when applied alone in-crop.

## Application Information:

- **Water Volume:** Minimum 20 to 40 L per acre for all *Paradigm* use patterns. Use the higher volume when there is a heavy crop canopy or weeds are at an advanced stage.
- **Nozzles and Pressure:** Use 30 to 40 psi (200 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of *ASABE S572.1 coarse* droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
florasulam	POST (foliar)	ALS Amino Acid inhibitor	Toward areas of growth (Symplast)	Broadleaf only	2
halauxifen	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Weeds and crops must be actively growing. Extreme growing conditions such as drought or near freezing temperature prior to, at or following time of application may reduce weed control.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

\* An adjuvant is not required with these tank mixes.

\*\* Use *Agral 90* surfactant at 0.25 L per 100 L of spray solution.

### Herbicides:

- **In-Crop:**
  - MCPA 600 Ester (161 to 230 mL per acre)\*
  - *Curtail M* (0.6 L per acre)\*
  - *Lontrel XC* (50 mL per acre)
  - *Everest 2.0*\*\*
  - *Everest 2.0* + MCPA (rates above)\*\*
  - *Everest 2.0* + *Curtail M* (rates above)\*\*
  - *Simplicity/Simplicity GoDRI*\*\*
  - *Simplicity/Simplicity GoDRI* + MCPA (rates above)\*\*. Consult label use for specific surfactant requirements.
  - *Simplicity/Simplicity GoDRI* + *Curtail M* (rates above)\*\*. Consult label use for specific surfactant requirements.
- **Preseed Burndown (Fall or Spring):**
  - Glyphosate IPA, DMA or K+ formulations up to 1000 g ae per acre (see glyphosate page for details)

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Paradigm* label only. Corteva Agriscience also supports the following mixes that are not on the *Paradigm* label. Apply mixes according to the most restrictive use limitations for either product:

**Herbicides:** *Axial*, *Axial Xtreme*, *Assert*, *Traxos*, *Sierra 2.0* and *Varro*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour of application may reduce the activity of *Paradigm*.
- **Re-Entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze livestock within 7 days of application. DO NOT cut for silage or hay within 21 days of application.
- **Pre-harvest Interval:** DO NOT harvest crops within 60 days of application.
- **Re-cropping Interval:** Barley (spring), canola (including oilseed quality *B. juncea*), dry bean, field pea, flax, mustard (oriental, brown and yellow), oats, soybeans, sunflower, wheat (spring) can be seeded a minimum of 10 months after treatment or fields can be summerfallowed. Lentils may be grown 22 months after application.
- **Aerial Application:** DO NOT apply by air.

- **Storage:** Store in a cool, dry place in original container.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only	1	1	1

See page 36 for an explanation of the different habitats.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. Check the cleanout requirements of pesticides mixed with this product. Additional cleanout measures may need to be integrated into those provided here.

## Hazard Rating:



Caution – Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Permit WG

**Herbicide Group  
2 - halosulfuron**

(Refer to page 45)

## Company:

Gowan Canada (PCP#31210)

## Formulation:

72.6 % halosulfuron methyl ester formulated as water dispersible granules.

Container size: 567 g

## Crops and Staging:

### Pre-emergent surface<sup>†</sup>:

- **Dry beans\***: Apply 14.2 to 19 g per acre after seeding but prior to soil cracking.

### Post-emergent foliar<sup>†</sup>:

- **Dry beans\***: Apply 14.2 to 28.3 g per acre at the 2 to 4 trifoliate leaves, prior to flowering. Maximum of one application per year.
- **Corn (sweet, popcorn)**: Apply 19 to 28.3 g per acre up to the 10 to 12 leaf stage. A second application of 19 g per acre may be applied with drop nozzles if needed, avoiding contact with the whorl. Maximum of two applications per year.
- **Corn (Field)**: Apply 19 to 37.6 g per acre up to the 10 to 12 leaf stage. A second application of up to 37.6 g per acre may be applied with drop nozzles if needed. Maximum of two applications per year.
- **Proso (Crown) millet**: Apply 14 to 19 g per acre from the 2 leaf up to prior to head emergence. Maximum one application per year.

\* **Note: not all varieties have been tested for tolerance. For untested varieties apply to a small area to determine tolerance prior to use on a large scale.**

<sup>†</sup> **Applications to emerged weeds require the addition of a non-ionic surfactant with 80% or greater active ingredient content at the lowest labelled rate for the surfactant regardless of crop stage.**

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Weeds controlled with pre-emergent soil applications of 14 to 19 g per acre unless otherwise indicated:

- Annual sunflower
- Canada fleabane
- Chickweed (common)
- Cocklebur
- Common groundsel
- Corn spurry
- Creeping yellow cress
- Flower-of-an-hour
- Fringed (Northern) willowherb
- Hairy galinsoga
- Jimsonweed
- Lamb's-quarters
- Plantain, broadleaf
- Pigweed (redroot, smooth)
- Prickly lettuce
- Purslane\*
- Ragweed (common)
- Round-leaved mallow
- Shepherd's-purse
- Smartweed (Lady's-thumb, Pennsylvania)
- Spiny amaranth
- Stinking mayweed
- Wild mustard
- Wild radish
- Velvetleaf
- Volunteer canola (except Clearfield varieties)
- Yellow nutsedge\*\*

\* Suppression only

\*\* Requires a rate of 28.3 to 37.6 g per acre rate for suppression based on the maximum rate for each crop.

Weeds controlled from the 3 leaf stage (unless otherwise indicated) to the maximum weed height indicated:

Weed	Maximum Weed Height (cm)	
	14 to 19 g per acre	28.3 to 37.6 g per acre
Annual sunflower	31	38
Bindweed (Hedge)*	5	10
Cocklebur	23	36
Common milkweed*	13	31
Corn spurry	5	10
Creeping yellowcress	5	10
Fleabane (Philadelphia)	8	8
Flower-of-an-hour	8	31
Hairy galinsoga	5	10
Horsetail*	5	10
Pigweed (redroot, smooth)	8	15
Ragweed (common)	23	31
Ragweed (giant)	8	15
Shepherd's-purse	5	10
Smartweed (Lady's-thumb, Pennsylvania)	5	10
Spiny amaranth	8	15
Wild mustard	8	15
Wild radish	8	15
Velvetleaf	23	31
Volunteer canola (except Clearfield varieties)	8	-
Yellow nutsedge	8 to 15	8 to 31

\* Suppression only.

## Application Information:

- **Water Volume:** Minimum 40 to 55 L per acre. Use the higher volume when there is a heavy crop canopy or weeds are at an advanced stage.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE medium** droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
halosulfuron	PRE, POST	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf	2

## Effects of Growing Conditions:

Moisture is necessary to activate the herbicide in soil for effective weed control. Dry weather following applications may reduce effectiveness. Extremes in environmental conditions such as temperature, moisture, soil conditions, and cultural practices may affect activity.

Optimum activity is experienced between 12 to 24° C when weeds are actively growing. Weeds may not be actively growing and as a result reduced activity will occur when temperatures are below 8° C or above 27° C.

## Tank Mixes:

### Herbicides:

- **In dry beans:**
  - *Eptam Liquid EC* (1.72 to 2.12 L per acre) as pre-plant incorporated tank mix – see *Eptam Liquid EC* page for incorporation instructions.
- **In field corn only:**
  - 2,4-D (label rates)
  - *Accent* (label rates)
  - *AAtrex* (label rates)
  - Dicamba (label rates)
  - Glyphosate in glyphosate tolerant corn only (label rates)

**Insecticides:** None registered.

**NOTE:** The application of foliar organophosphate insecticides to treated crops can increase the risk of crop injury.

**Fungicides:** None registered.

**Fertilizers:** UAN or high grade ammonium sulfate (21-0-0) may be used if a tank mix partner requires it as an additive. DO NOT use liquid fertilizer as a spray carrier.

**Note:** The above mixes are those listed on the *Permit WG* label only. Gowan Canada supports the use of the following mixes that are not on the label:

- **Herbicide:** glyphosate (Dry Bean prior to ground crack).

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Activity of foliar applications may be reduced if rainfall or irrigation occurs within 4 hours. Pre-emergent surface applications will benefit from some rainfall but excessive rainfall (greater than 1 inch or 2.5 cm) shortly after application may result in injury, especially when seeding is shallow.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or cut corn for livestock greenfeed within 30 days of the last application. Allow 30 days for sweet corn and 65 days for popcorn or grain corn from the last application to foliage and the harvesting of silage. Proso (crown) millet may be grazed immediately after treatment. DO NOT cut proso (crown) millet for hay within 37 days of application or feed straw within 50 days of application.
- **Pre-harvest Interval:** DO NOT harvest dry beans within 30 days of post-emergent applications. DO NOT harvest proso (crown) millet within 50 days of application. There is no pre-harvest interval indicated for grain corn.
- **Re-cropping Interval:** Delay seeding the following crops for the interval indicated:
  - **Dry common beans** – no delay required
  - **Field corn** - 1 month
  - **Cereals (wheat barley and oats)** - 2 months
  - **Potatoes, peas forage legumes and soybeans** - 1 year
  - **Canola and sunflowers** - 2 years
  - Refer to label for all other crops including vegetable field crops.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place in original container.

• **Buffer Zones:**

Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Proso (Crown) millet	10	4	15
Dry beans	10	5	20
Corn (sweet, pop)	15	5	30
Corn (field)	15	10	40

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

◦ Spray when winds are under 16 km/hr, but not dead calm.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Caution – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Pinnacle SG Toss-N-Go

**Herbicide Group**  
**2- thifensulfuron**  
*(Refer to page 45)*

## Company:

FMC Corporation (PCP#30741)

## Formulation:

50% thifensulfuron methyl as a water soluble granule.

- Container size - 8 x 12 g water soluble pouches

## Crops and Staging:

**Soybean:** First fully expanded trifoliate leaf to before soybeans have initiated flowering.

## Weeds, Rates and Staging:

Apply up to weeds 4 inches (10 cm) tall or wide.

**Pinnacle SG Toss-N-Go at 3.3 g per acre will control:**

- Lady's-thumb
- Redroot pigweed
- Wild Mustard

**Pinnacle SG Toss-N-Go at 4.8 g per acre (one container treats 28.7 to 19.8 acres) will control the weeds above plus:**

- Lamb's-quarters
- Velvetleaf \*

\* The addition of 28-0-0 liquid fertilizer at 4 L per 100 L of spray solution or 2.4 kg of 46-0-0 dry urea fertilizer may improve control of velvetleaf. Refer to the product label for complete mixing instructions.

Pinnacle SG Toss-N-Go requires the addition of a non-ionic surfactant such as Agral 90, Agsurf II, or Citowett at 1 L per 1000 L of spray solution. Oil surfactant blends such as Assist at 0.4 to 0.8 L per acre, or Sure-Mix at 0.5 L per 100 L of spray solution may be used as adjuvants (check label for use rates).

A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Minimum of 45 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
thifensulfuron	POST	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf	2

## Effects of Growing Conditions:

*Pinnacle SG Toss-N-Go* applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days after application may also result in crop injury.

Weeds under stress conditions at the time of application may not be adequately controlled.

Stress conditions are severe weather conditions, frost, low fertility, drought, water-saturated soils, and disease or insect damage.

Injury symptoms can be crop discoloration (yellowing, purpling or reddening of leaf veins), or stunting.

## Tank Mixes:

### Herbicides:

- *Assure II* (0.2 L per acre) plus *Sure-Mix\** adjuvant.
- *Basagran* (0.71 or 0.91 L per acre) plus *Assist* adjuvant\*.
- *Basagran Forté* (0.71 or 0.91 L per acre)\*.
- *Assure II* (0.25 L per acre) plus *Basagran Forté* (0.71 or 0.91 L per acre) plus *Sure-Mix* adjuvant\*.

\* Refer to appropriate labels for *Pinnacle SG Toss-N-Go* and adjuvant rates of application.

**Fungicides:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the *Pinnacle SG Toss-N-Go* label only.

**FMC also supports the use of the following mixes that are not on the label:**

- **Herbicide:** glyphosate (glyphosate tolerant soybean only).

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Up to 25 mm of rain beginning 1 hour or more after spraying will not reduce the effectiveness of *Pinnacle SG Toss-N-Go*.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Pre-harvest Interval:** Leave 60 days from application to harvest.
- **Re-cropping Interval:** DO NOT plant any crop other than soybean, tomatoes, Clearfield canola, wheat or barley for 30 days after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in closed original container in a dry area away from food or feed.
- **Buffer Zones:**
  - Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	0	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.



## Sprayer Cleaning:

*Pinnacle SG Toss-N-Go* can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray *Pinnacle SG Toss-N-Go* should be flushed out immediately after use. Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning: Contains the allergen milk.

For an explanation of the symbols used here see pages 7 and 8.

# Pixxaro

**Herbicide Group**  
**4 - halauxifen,**  
**fluroxypyr & MCPA**  
*(Refer to page 45)*

## Company:

Corteva Agriscience

## Formulation:

The *Pixxaro* package contains 2 components:

***Pixxaro A (PCP#31303)***: 16.2 g/L halauxifen and 250 g/L fluroxypyr present as ester and formulated as an emulsifiable concentrate.

- Container size – Case: 1 x 4.9 L; Pallet: 4 x 9.8 L

***Pixxaro B/Plus M Ester 600 (PCP#29622)***: 600 g/L MCPA ester formulated as an emulsifiable concentrate.

- Container size – Case: 1 x 9.45 L; Pallet: 75.1 L

## Crops and Staging:

**Wheat (spring, durum, winter) and barley**: 3 leaf stage to just prior to emergence of the flag leaf.

## Weeds and Staging:

Apply to actively growing weeds up to 10 cm high or wide unless otherwise specified:

### • Weeds Controlled:

- |   |   |                                       |
|---|---|---------------------------------------|
| ◦ American dragonhead <sup>†</sup>              | ◦ Hemp-nettle <sup>††</sup>             | ◦ Shepherd's-purse (up to 20 cm)      |
| ◦ (up to bud stage)                             | ◦ Henbit <sup>†</sup> (up to bud stage) | ◦ Smartweed (green, lady's-thumb)*    |
| ◦ Burdock (prior to 4 leaf)                     | ◦ Kochia <sup>†</sup>                   | ◦ Sow-thistle, annual* (up to 4 leaf) |
| ◦ Canada thistle (up to 30 cm)*                 | ◦ Lamb's-quarters <sup>††</sup>         | ◦ Stinkweed                           |
| ◦ Chickweed <sup>††</sup>                       | ◦ Marshelder (false ragweed)            | ◦ Stork's-bill <sup>††</sup>          |
| ◦ Cleavers (1 to 9 whorl)                       | ◦ Mustard (ball, wild)                  | ◦ Velvetleaf (up to 5 leaf stage)     |
| ◦ Cocklebur                                     | ◦ Nightshade                            | ◦ Vetch                               |
| ◦ Cow Cockle (up to 8 leaf or 15 cm)            | ◦ (black, hairy and cutleaf)            | ◦ Volunteer alfalfa (up to 25 cm)     |
| ◦ Dandelion (rosettes up to 30 cm in diameter)* | ◦ Plantain, common                      | ◦ Volunteer canola <sup>††</sup>      |
| ◦ Field horsetail*                              | ◦ Prickly lettuce                       | ◦ Volunteer flax <sup>†</sup>         |
| ◦ Fleabane, Canada <sup>†</sup>                 | ◦ Ragweed (common, giant)               | ◦ Wild buckwheat <sup>††</sup>        |
| ◦ Flixweed                                      | ◦ Redroot pigweed <sup>††</sup>         | ◦ Wild radish                         |
|   | ◦ Round-leaved mallow (up to 6 leaf)    | ◦ Wild sunflower (annual)             |

\* **Suppression only.**

<sup>†</sup> **Up to 15 cm in height.**

<sup>††</sup> **1 to 8 leaf stage.**

## Rates:

***Pixxaro A***: 125 mL per acre.

***Pixxaro B***: 236 to 283\* mL per acre. Use the 283 mL per acre\* rates for improved control of heavy infestations or larger redroot pigweed or smartweeds.

(One case treats 40 acres, bulk unit treats 320 acres)

\* **Note: Additional MCPA ester must be purchased separately above what is indicated in "Container Size:" above to achieve this higher rate.**

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 20 to 81 L per acre.
  - **Aerial:** Minimum 12 L per acre.
- **Nozzles and Pressure:** Use 30 to 40 psi (200 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE coarse** droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
halauxifen	Early POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
fluroxypyr	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
MCPA	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Weeds and crops must be actively growing. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **Spring wheat (including durum) and barley:**
  - Fenoxaprop 120 EC (0.31 L per acre)
  - *Liquid Achieve*
  - *Puma Advance* (0.41 L per acre)
- **Spring Wheat and Barley:**
  - *Axial*
- **Spring Wheat (including durum):**
  - *Simplicity OD/Simplicity GoDRI*
  - Clodinafop 240 EC (93 mL per acre plus adjuvant)
  - *Everest 2.0*
  - *Horizon NG* (376 mL per acre)
  - *Traxos*

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Pixxaro* label only. Corteva Agriscience also supports the following mixes that are not on the *Pixxaro* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Assert*, *Varro*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour may reduce control.
- **Re-Entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze livestock within 7 days of application. DO NOT cut for silage or hay within 21 days of application.
- **Pre-harvest Interval:** DO NOT harvest crops within 60 days of application.
- **Re-cropping Interval:** Winter wheat and fall rye may be seeded 3 months after application. Alfalfa, barley, canola, corn, dry bean (*Phaseolus vulgaris* species including pinto, kidney and white types), flax, field peas, mustard (oriental, brown and yellow and oilseed quality (*B. juncea* varieties), oats, soybean, spring wheat, sunflower and timothy may be seeded the first spring following application. Lentils may be grown the second season after application.

- **Aerial Application:** May be applied by air.
- **Storage:** Store over winter in a heated, dry place in original container.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Field sprayer	1	1	2
Aerial (Fixed wing)	5	1	80
Aerial (Helicopter)	5	1	65

See page 36 for an explanation of the different habitats.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. Check the cleanout requirements of pesticides mixed with this product. Additional cleanout measures may need to be integrated into those provided here.

## Hazard Rating:

**Pixxaro A:**



Warning – Skin and Eye Irritant.



Caution – Potential skin sensitizer.

**Pixxaro B:**



Warning – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Poast Ultra

**Herbicide Group**  
**1 - sethoxydim**  
*(Refer to page 45)*

## Company:

BASF Canada (PCP#24835)

## Formulation:

450 g/L sethoxydim formulated as an emulsifiable concentrate.

- Container size - 2 x 7.7 L

## Crops, Rates and Staging:

Crops are tolerant at all growth stages. However, the Preharvest interval outlined in the "Restrictions:" section must be followed to avoid unacceptable residues of sethoxydim in harvested crops.

**To a maximum of 0.13 L per acre:** Borage

**To a maximum rate of 0.19 L per acre:** Chickpea

**To a maximum rate of 0.23 L per acre:** Tame buckwheat

**To a maximum rate of 0.26 L per acre:**

- |                     |             |                                   |
|---------------------|-------------|-----------------------------------|
| ◦ Alsike clover**   | ◦ Coriander | ◦ Sainfoin**                      |
| ◦ Caraway           | ◦ Dill      | ◦ Solin (low linolenic acid flax) |
| ◦ Cicer milkvetch** | ◦ Safflower | ◦ Sweet clover**                  |

**To a maximum rate of 0.45 L per acre:**

- Alfalfa
- Alsike clover\*
- Canola
- Chickling vetch
- Cicer milkvetch\*
- Creeping red fescue (for seed only)
- Dry beans (kidney, pinto, white)
- Dry field peas
- Faba beans
- Fenugreek
- Flax (NOT including low linolenic acid flax)
- Lentil
- Lupin
- Mustard
- Potatoes
- Sainfoin\*
- Shelterbelts
- Soybeans
- Sunflower
- Sweet clover\*

\* Established stands

\*\* Seedling stands

**Weeds, Rates and Staging:**

Optimum yield response occurs when weeds are controlled early.

Weeds and Stages	Staging	Rate (L per acre)	Acres Treated per 7.7 L Container
Green or yellow foxtail, barnyard grass, volunteer corn, Persian dandel, proso millet, witchgrass, large crabgrass	1 to 6 leaf	0.13	60
Wild oats, volunteer wheat, oats and barley	1 to 6 leaf stage except for low rate (See footnote*)	0.13* or 0.19	60 or 40
Quackgrass suppression	1 to 3 leaf stage	0.19	40
Quackgrass (season long control)	1 to 3 leaf stage	0.45	17
Foxtail barley suppression	prior to tillering	0.45	17

\* Use the low rate in canola, flax and peas only under the following conditions:

- when wild oat, volunteer wheat and volunteer barley are from 1 to 4 leaves (best results prior to tillering)
- under ideal growing conditions (adequate moisture, good fertility and moderate temperatures (15 to 28°C). DO NOT apply under stress conditions.
- with water volumes between 20 to 40 L per acre.

**Merge Adjuvant (sold separately):** Must always be used with *Poast Ultra*. When *Poast Ultra* is applied alone use *Merge* at 0.5 L to 1.0 L per 100 L of total spray solution. When applying to quackgrass and/or foxtail barley use *Merge* at 1.0 L per 100 L of spray solution. See the tank mix section for *Merge* rates for tank mixing. *Merge* should be added at rates of 0.10 to 0.20 L per acre when applied by air.

**Application Information:**

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre - 40 L to 81 L per acre if crop or weed growth is dense, and when spraying quackgrass.
  - **Aerial:** 10 to 20 L per acre
- **Nozzles and Pressure:** Use 40 to 45 psi (275 to 300 kPa) with conventional 80° or 110° flat fan nozzles tilted forward at an angle of 45°. Low drift nozzles may require higher pressures for proper performance. Contact the herbicide manufacturer regarding the suitability of low drift nozzles for use with this product. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
sethoxydim	POST (foliar)	ACCCase Lipid Synthesis Inhibitor	Toward areas of growth (Symplast)	Grass only	1

**Effects of Growing Conditions:**

Most effective control is achieved when grasses are actively growing. Weeds stressed by drought, flooding, hot or prolonged cool temperatures (<15°C) and poor fertility are more difficult to control. Use the higher of the recommended rates for grasses stressed for less than 20 days. DO NOT apply to grasses stressed more than 20 days because of lack of moisture. Control may be reduced if temperatures are below 15°C. Subsequent tillering may occur under stress conditions or if fertility is low.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

**Herbicides:** The following tank mixes can be applied with 0.13 to 0.19 L per acre of *Poast Ultra*.

**Merge Adjuvant (sold separately):** Use at 0.75 to 1.0 L of *Merge* per 100 L of mixed spray solution for most mixes except when mixing with *Pursuit* use 1.0 L per 100 L of solution.

- **In Flax:**
  - *Buctril M* (including Solin).
  - *Logic M* (including Solin).
  - *Lontrel 360* (0.23 to 0.34 L per acre).
  - *Lontrel 360* (0.23 to 0.34 L per acre) + MCPA Ester (0.28 to 0.38 L per acre - 600 g/L formulations).
  - MCPA Ester (up to 0.38 L per acre - 600 g/L formulations)
  - The above tank mixes may reduce grass control, especially under adverse weather conditions.
- **In Canola:**
  - *Lontrel 360*
  - *Muster*
  - *Lontrel 360* (0.17 L per acre) + *Muster* (8 g per acre) + *Merge* (0.4 L per acre)
- **In Liberty Link Canola only:**
  - *Poast Ultra* (0.09 L per acre) + *Liberty* (1.08 L per acre)
- **In Field Pea:**
  - ***Poast Ultra* (0.19 L per acre) plus *Merge* (0.4 L per acre) may be tank mixed with:**
    - *Pursuit* (40mL per acre) to control:
      - Chickweed
      - Smartweed
      - Wild buckwheat
      - Cleavers
      - Stinkweed
      - (light infestations only)
      - Hemp-nettle (peas only)
      - Volunteer canola (non-
      - Wild mustard
      - Redroot pigweed
      - CLEARFIELD varieties)
    - The company does not provide guidelines for weed densities under light infestations. When in doubt, use the higher rate below or contact the manufacturer.
  - *Pursuit* (85 mL per acre) for all weeds on the *Pursuit* label.

Check label directions for mixing order and additional timing restrictions for broadleaf partners.

Allow 4 days between application of *Poast Ultra* and application of herbicides other than those registered for tank mixing. Allow 5 days between application of *Sencor* and *Poast Ultra*. Allow 14 days for regrowth when applied in sequence with a grass control herbicide.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Poast Ultra* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour of application may reduce control.
- **Re-entry Interval:** DO NOT enter treated field for 12 hours.
- **Grazing Restrictions:** DO NOT graze the treated crop or cut for feed prior to crop maturity. Forage legumes may be cut after the specified
- **Preharvest interval:**

Preharvest Interval (Days)	Crops
30	Forage legumes (excluding alfalfa)
60	Dry peas, fenugreek, flax
65	Lentil, chickpea
70	Canola, chickling vetch, alfalfa, borage
76	Mustard
80	Potato, dry bean, soybean, faba bean, lupin

Preharvest Interval (Days)	Crops
85	Buckwheat
86	Solin
90	Safflower
105	Sunflower

- **Re-cropping Interval:** DO NOT plant cereals or grass within 14 days of application.
- **Aerial Application:** May be applied by air.
- **Storage:** May be frozen.
- **Buffer Zones:**

Application method	Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground*	All	1	0	2
Fixed wing airplane	Food or feed crops	1	0	70
	Shelter-belts	5	0	150
Helicopter	Food or feed crops	1	0	60
	Shelter-belts	1	0	85

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance from downwind edge of spray boom and non-target area.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13. Empty and clean spray tank using this method if an oil film accumulates.

## Hazard Rating:



Caution – Poison



Caution – Eye and Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Predicade

*This product is a prepackaged tank mix of Predicade Broadleaf (equivalent to Barricade SG page 114), Predicade Grass (equivalent to Varro page 413), Perimeter II (see fluroxypyr page 217), and NuFarm MCPA Ester 600 (page 284). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - thifensulfuron/**  
**tribenuron, thien carbazon**  
**4 - fluroxypyr, MCPA**  
*(Refer to page 45)*

## Company:

FMC Corporation

## Formulation:

The *Predicade* package contains the following components:

**Predicade Broadleaf (PCP#31713):** 25% thifensulfuron methyl and 25% tribenuron methyl formulated as a soluble granule.

- Container size - 486 g

**Predicade Grass (PCP#31735):** 10 g/L thien carbazon-methyl formulated as a suspension concentrate.

- Container size – 8 L

**Perimeter II (PCP#30094):** 333 g ae/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size – 3.4 L

**Nufarm MCPA Ester 600 (PCP#27803):** 600 g ae/L MCPA ester formulated as an emulsifiable concentrate.

- Container size – 7.6 L

## Crops and Staging:

### Spring wheat (including durum):

Apply from the fully emerged 3 leaf to 6 leaf stage, with a maximum of three tillers, and before the first node can be felt in the stem. DO NOT apply beyond 35 days of emergence.

### Winter wheat:

Spring application from the 3 tiller stage and before the first node can be felt in the stem. DO NOT apply after the presence of the first node as crop injury may occur.

## Rates

**Predicade Broadleaf:** 12 g per acre

**Predicade Grass:** 200 mL per acre

**Perimeter II:** 85 mL per acre

**MCPA Ester 600:** 190 mL per acre

(One case treats 40 acres)

## Weeds and Staging:

Weeds controlled by *Barricade II* and *Varro* plus:

- Dandelion (spring and fall rosettes, up to 15 cm in diameter)
- Volunteer canola (all varieties) – 2 to 4 leaf
- White cockle
- Scentless chamomile

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

## Prestige Brands (this referring text to be removed in the 2021 edition)

*See Clopyralid/MCPA + fluroxypyr on page 156.*

## Primextra II Magnum

Herbicide Group  
15 - metolachlor

5 - atrazine  
(Refer to page 45)

### Company:

Syngenta Canada (PCP#25730)

### Formulation:

400 g/L of s-metolachlor and 320 g/L of atrazine formulated as a liquid.

- Container size – 2 x 10 L

## Crops and Staging:

Pre-plant incorporated or pre-emergent in corn. Pre-emergent applications of *Primextra II Magnum* require at least 0.5 inches of water (1.25 cm) within 10 days of application for proper activity.

## Weeds and Staging:

Apply prior to the emergence of weeds. Weeds that have emerged prior to application will not be controlled.

- Barnyard grass
- Buckwheat
- Foxtail (green, yellow)
- Lamb's-quarters
- Nightshade (American, Eastern black)
- Pigweed (prostrate, redroot)
- Purslane
- Ragweed
- Smartweed (lady's-thumb)
- Wild mustard
- Witch grass
- Yellow nutsedge\*

\* Herbicide must be incorporated for best control.

## Rates:

Weed Populations	Rate (L per acre)	Acres Treated per 14 L Container
Light infestations	1.2	11.7
Medium infestations	1.4	10
Heavy infestations	1.6	8.8

DO NOT apply *Primextra II Magnum* to:

- soils with less than 1% organic matter content
- soils with more than 10% organic matter content.

It is recommended that any products containing atrazine not be used in areas treated with this product during the previous season.

## Application Information:

- **Water Volume:** 61 L per acre
- **Pressure:** 30 to 45 psi (200 to 300 kPa).
- **Nozzles:** Flat fan
- **Screens:** Use 50-mesh nozzle and main plumbing screens.
- **Incorporation:**
  - Incorporate using S-tine or C-tine cultivators or tandem disk. DO NOT incorporate deeper than 4 inches (10 cm).
  - To ensure that the product remains in the top 2 inches (5 cm) of soil, apply to a firm seedbed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 6 km/hr (4 mph). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 10 km/hr (6 mph).

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
atrazine	PPI, PRE (surface) with residual soil activity	PSII Inhibitor/ Membrane disruptor	Little foliar; upward soil applied (Apoplast)	Primarily broadleaf	5
metolachlor	PPI, PRE (surface) with residual soil activity	Long-chain Fatty Acid Inhibitor	Little movement (Symplast)	Broadleaf & grass	15

## Effects of Growing Conditions:

Extended periods of dry soil conditions may result in reduced weed control. Moderate rainfall (0.5 inch) after application will enhance activity. Heavy rainfall following application of *Primextra II Magnum* may dilute the metolachlor deeper than 2 inches (5 cm) and result in reduced weed control, particularly on light textured soils.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** May be tank mixed with liquid fertilizer for pre-plant incorporated applications. Conduct a compatibility test by performing a jar test prior to mixing the products in the tank. May be impregnated onto dry bulk fertilizers (except nitrate or superphosphate fertilizers or limestone).

**Note:** The above mixes are those listed on the *Primextra* label only.



Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Moderate rainfall shortly after application will enhance activity. Heavy rainfall reduces weed control by leaching the chemical out of the top few centimeters of soil. Inadequate rainfall after application (within 10 days) will cause reduced weed control.
- **Re-entry Interval:** DO NOT re-enter treatment area within 12 hours of application.
- **Grazing Restrictions:** DO NOT graze or cut corn for feed before ear emergence.
- **Re-cropping Interval:** This product contains atrazine. All crops except corn and triazine-tolerant canola may be affected the year following the use of atrazine. Other more sensitive crops may be affected two or more growing seasons after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a dry place.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic habitat	Terrestrial habitat
Ground only*	29	10

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

◦ DO NOT mix or load this product within 30 metres of any sensitive aquatic habitats

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Ratings



Caution Poison



Caution – Eye Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Prism SG

Herbicide Group  
2 - rimsulfuron  
(Refer to page 45)

## Company:

Corteva Agriscience (PCP#30057)

## Formulation:

25% rimsulfuron formulated as a water soluble granule.

- Container size - 480 g

## Crops and Staging:

Irrigated potato\* prior to flower initiation.

Potato tolerance differs by variety. Limit first use to a small area of each variety prior to widespread adoption in the field. Delay cultivation for 7 to 10 days after application.

**\* NOTE - Since applications to irrigated potato in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Application to irrigated potato in western Canada is at the risk of the user.**

## Weeds, Rates and Staging:

**Note:** Maximum of 6 g per acre of the active ingredient rimsulfuron per acre (24 g Prism SG per acre) PER YEAR.

24 g per acre (one package treats 20 acres) controls the following weeds at the stage indicated:

Weeds	Weed Stage
Barnyard grass, Foxtail (green, yellow), Witch grass	1 to 6 leaf, maximum 2 tillers
Quackgrass	3 to 6 leaf (less than 10 inches or 25cm leaf extended)
Lamb's-quarters*, Redroot pigweed	4 to 6 leaf (less than 4 inches or 10 cm tall or across)

### \* Suppression

Add a recommended non-ionic surfactant such as *Citowett Plus*, *Agsurf II*, or *Agral 90* at 0.2 L per 100 L spray solution.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Minimum 40 L per acre.
- **Nozzles and Pressure:** 25 to 40 psi (175 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
rimsulfuron	POST (foliar)	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	2

## Effects of Growing Conditions:

Apply when the temperature 24 hours before and after application is between 5°C and 28°C. Temperatures beyond this range increase the potential for crop injury. Rapid fluctuations in temperature will stress the crop (greater than a 20°C difference within 24 to 36 hours). Allow 48 to 72 hours for the crop to acclimatize before spraying if severe temperature fluctuations occur.

Crop injury may result if applications are made when potatoes are stressed by abnormally hot, humid, or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If potatoes have been injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying.

Warm, moist conditions after application promote good weed control while cool and/or dry conditions may reduce or delay activity. Weeds hardened off by cold weather or drought stress may not be controlled.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** Within 2 to 4 hours may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Pre-harvest Interval:** Leave 30 days from application to harvest.
- **Grazing Restrictions:** DO NOT graze the treated crop or cut for hay.
- **Re-cropping Interval:** Field corn may be planted any time after application. Winter wheat may be planted 4 months after application. Barley, canola, chickpeas, clover (red), corn (sweet and seed), dry bean, faba bean, field pea, flax, lentil, oat, potato, soybean, sorghum, spring wheat (including durum) and sunflowers may be planted the year after application. For all other crops, a field bioassay is recommended before planting.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.

• **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- DO NOT apply in areas where surface water from the treated area can run off to adjacent cropland, streams, irrigation water or wells.

## Sprayer Cleaning:

Refer to 'Method A' found in the general sprayer cleaning section on pages 12 and 13. Check the label or contact the manufacturer for more specific sprayer cleaning information.

## Hazard Rating:



Warning – Eye Irritant



Warning – Contains the allergen sodium sulfite.

For an explanation of the symbols used here see pages 7 and 8.

# Pulsar

**Herbicide Group**  
**4 - dicamba & fluroxypyr**  
*(Refer to page 45)*

## Company:

Syngenta Canada (PCP#29450)

## Formulation:

86.9 g/L dicamba and 113.3 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 2 x 9.82 L, 78.6 L

## Crops and Staging:

**Barley and spring wheat (including durum):** 2 to 5 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Unless otherwise indicated apply when weeds are at the 2 to 3 leaf stage and rosettes are less than 2 inches (5 cm) across.

**At 246 mL per acre (80 acre per case) Pulsar controls:**

- Cleavers
- Wild buckwheat\*
- Kochia (up to 9-leaf)

**At 371 mL per acre (53 acre per case) Pulsar controls the weeds above plus:**

- Lamb's-quarters\*
- Stork's-bill\*
- Redroot pigweed\*
- Volunteer flax
- Russian thistle
- Wild buckwheat (up to 9-leaf)

**\* Suppression only**

ONE APPLICATION per year is permitted.

## Application Information:

- **Water Volume:** Minimum 44.5 L per acre.
- **Nozzles and Pressure:** Use a maximum pressure between 40 and 45 PSI (275 to 310 kPa) for conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
dicamba, fluroxypyr	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

DO NOT apply to crops that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

## Tank Mixes:

### Herbicides:

- **Barley, Spring wheat, and durum only:**
  - MCPA LV600 ester (0.23 L/acre)
- **Spring wheat, and durum:**
  - Horizon NG (376 mL per acre)
  - Horizon NG (376 mL per acre) + MCPA LV600 ester (0.23 L per acre)
  - Traxos (label rate)
  - Traxos (label rate) + MCPA Ester (rates above)

**Fertilizers:** None registered

**Note:** The above mixes are those listed on the *Pulsar* label only.

Syngenta also supports the following mixes that are not on the *Pulsar* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** 2,4-D Ester, 2,4-D Ester + *Sierra 2.0*, *Express SG*, *Refine SG*, *Sierra 2.0*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Pre-harvest Interval:** Leave 60 days between treatment and harvest.
- **Grazing Restrictions:** Treated crops may be grazed, or cut for hay or silage after 7 days when used alone, or a minimum of 12 days when mixed or longer if the intervals are longer for the tank mix partner.
- **Re-cropping Interval:** Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the following season. There are no re-cropping restrictions the second year after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen. If frozen, bring to room temperature and agitate before use. This product is combustible. DO NOT store near heat or open flame.
- **Buffer Zones:**
  - Handheld or backpack applications do not require a buffer.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic habitat	Terrestrial habitat
Ground only*	15	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- Legumes are particularly sensitive to *Pulsar*.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Danger – Poison



Warning – Eye Irritant



Caution – Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Quinclorac

Herbicide Group  
4 - quinclorac (broadleaves)  
26 - quinclorac (grasses)  
(Refer to page 45)

## Company:

BASF Canada (*Facet L*)

Manufactured by Productierra for sale by Great Northern Growers (*Clever*)

Manufactured by Productierra for sale by UAP (*Ingenious*)

Univar Canada Ltd (*MasterLine Quinclorac*)

## Formulation:

***Clever* (PCP#31365); *Ingenious* (PCP#32213); *MasterLine Quinclorac* (PCP#31753):** 75% percent quinclorac formulated as a water dispersible granule (WDG).

- Container size - 1 kg bags

***Facet L* (PCP#31539):** 180 g/L quinclorac formulated as a solution.

- Container size - 2 x 9.07 L

## Crops Rates and Staging:

*Merge* adjuvant (purchased separately) must be used at 1 L per 100 L of spray solution to control for all products and rates.

### Pre-emergent surface:

*Facet L* at 227 to 280 mL per acre may be mixed with<sup>Δ</sup> or without glyphosate and applied prior to the seeding of canola.

<sup>Δ</sup> *Merge* not required when mixing with glyphosate.

### Post-emergent:

**Quinclorac 75% WDG at 55 g per acre (18 acres per case) or *Facet L* at 227 mL per acre may be applied post-emergence to:**

- Barley - 1 to 4 leaf (prior to tillering)\* (*Facet L* only may be used on barley for human consumption)
- Canola (all varieties) - 2 to 6 leaf

**Quinclorac 75% WDG only at 55 g per acre (18 acres per case) acre may be applied post-emergence to:**

- Mustard (brown, oriental and oil quality *Brassica juncea*) - 2 to 6 leaf

**Quinclorac at 55 to 67 g per acre (18 to 15 acres per case) or *Facet L* at 227 to 280 mL per acre may be applied post-emergence to:**

- Canaryseed - 3 to 5 leaf\*†
- Spring wheat (including durum) - 1 to 5 leaf.

\* Not for use on crops for human consumption.

† Not for use on crops for livestock consumption.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

**Note:** As of July 3, 2018 Codex Alimentarius adopted an international MRL for quinclorac reducing concerns that canola treated with quinclorac will have market access concerns. However, during this transition year, it may still be prudent to *consult with potential grain buyers to ensure that they will accept canola treated with quinclorac before applying.*

## Weeds, Rates and Staging:

### Pre-emergent surface:

*Facet L* applied at 227 mL per acre will control emerged weeds listed below, plus suppression of secondary flushes of cleavers emerging from seed.

*Facet L* applied at 280 mL/acre will control emerged weeds listed below, plus plus control of secondary flushes of cleavers and green foxtail emerging from seed.

### Post-emergent:

Apply *Quinclorac* at 55 to 67\* g per acre (18 to 15 acres per case) or *Facet L* at 227 to 280\* mL per acre plus *Merge* adjuvant (purchased separately) at 1 L per 100 L of spray solution to control:

#### Grasses:

- Barnyard grass (1 to 5 leaves)
- Green foxtail\* (1 to 5 leaves, up to 2 tillers)

#### Broadleaves:

- Cleavers (1 to 3 whorls)
- Volunteer flax (1 to 8 cm)
- Sow-thistle (annual and perennial – 2 to 6 leaf)\*\*

\* Use the high rate for heavy infestations of green foxtail only. For clarification of what constitutes a heavy infestation contact the manufacturer.

\*\* Suppression only.

**DO NOT apply products that contain quinclorac more than once every two years.**

Early treatment of weeds is important to maximize crop yield potential by eliminating early weed competition. Refer to broadleaf tank mix partner for additional timing restrictions.

## Application Information:

- **Water Volume:** Minimum 45 L per acre.
- **Nozzles & Pressure:** 40 to 60 psi (275 to 425 kPa) when using standard flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage *ASABE fine* droplets or larger. Flat fan nozzles may be tilted forward 45 degrees to improve coverage on vertical surfaces (i.e. grasses).
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
Quinclorac	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
		Cellulose Synthesis Inhibitor	Throughout the plant (Symplast)	Grass only	26

## Effects of Growing Conditions:

DO NOT apply to crop that is under stress from conditions such as frost, hail, flooding, drought or extremes in temperature. Cool weather may delay weed control and if prolonged may result in poor weed control.

## Tank Mixes:

**Herbicides:** When mixing with broadleaf partners a slight reduction in green foxtail control may result. If spraying for green foxtail, use the high rate of Quinclorac. Add *Merge* adjuvant at 1 L per 100 L spray solution for all tank mixes.

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### In spring wheat (including durum) only:

- 2,4-D amine or ester (160 to 212 g ae per acre)
- *Buctril M*
- MCPA amine or ester (0.34 to 0.45 L per acre - 500 g/L formulations)
  - Refer to individual product labels for application details such as staging and varietal restrictions.

**In canola only:**

- Pre-emergent surface – *Facet L* at 227 to 280 mL per acre may be mixed with glyphosate at 180 to 325 g ae per acre (see glyphosate page for product rates).
- Post-emergent - Quinclorac 75%WDG at 25 g per acre or *Facet L* at 170 to 227 mL per acre may be mixed with:
  - Glyphosate at rates registered in glyphosate tolerant canola varieties only
  - *Ares* in Clearfield canola varieties only (*Facet L* only).
- Post-emergent in *Liberty Link* canola Quinclorac 75%WDG at 25 g per acre or *Facet L* at 113 to 227 mL per acre may be mixed with:
  - *Liberty 150SN* - up to 1.35 L per acre
  - *Liberty 150SN* - up to 1.35 L per acre, plus clethodim (*Centurion* only) at 50 to 75 mL per acre (*Facet L* only).

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

*Note: Allow 4 days between the application of Quinclorac and any other chemical not listed as a tank mix.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**Restrictions:**

- **Rainfall:** Within 6 hours may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours after application.
- **Grazing Restrictions:** DO NOT graze or cut for feed within 77 days of application. DO NOT graze canaryseed or use for consumption by livestock. DO NOT graze or cut treated canola crops for feed. Canola meal may be fed.
- **Pre-harvest Interval:** DO NOT harvest wheat or canaryseed within 77 days of application. DO NOT harvest canola or mustard within 60 days of application. DO NOT harvest spring barley within 80 days of application.
- **Re-cropping Interval:** In case of crop failure, only barley, canola or spring wheat (including durum) may be reseeded the same year. Barley, canola, field peas, oats, sunflowers and wheat may be grown the year after application. Flax and lentils may be grown the second year after application. On low organic matter soils or under dry conditions, flax and lentils should not be grown until the third year after application. DO NOT use Quinclorac on land where potatoes or vegetables are grown.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen. Should product freeze, warm to room temperature before using.
- **Buffer Zones:**

Application method	Application Rate		Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	75WDG (g/acre)	<i>Facet L</i> (mL/acre)	Aquatic habitat	Terrestrial habitat
Wheat, canaryseed	67	270	10	4
Canola, mustard**, barley, wheat, canaryseed	55	227	10	3

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* 75% WDG formulations only.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

**Sprayer Cleaning:**

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

**Hazard Rating:**

Caution – Poison



Caution – Eye and Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Quizalofop

Herbicide Group

1 - quizalofop

(Refer to page 45)

## Company:

Corteva Agriscience (*Assure II* - PCP#25462)

Gowan Canada (*Yuma GL Liquid EC* - PCP#30100)

Interprovincial Cooperative Ltd. (*Contender* – PCP#32091)

## Formulation:

96 g/L quizalofop-P-ethyl formulated as an emulsifiable concentrate.

- Container size:
  - *Assure II* + *Sure-Mix* Adjuvant – 8 L + 8 L, 96 L + 96 L, or 500 L + 500 L
  - *Yuma GL Liquid EC* – 2 x 8 L (*adjuvant purchased separately*)
  - *Contender* + *Contender MSO* Adjuvant – 8 + 8 L

## Crops and Staging:

**Annual Crops:** No leaf stage restrictions, but do not apply beyond Preharvest intervals listed in the table:

Crop	Preharvest Interval (Days)	Max Leaf Stage
Camelina*	64	
Canola	64	
Chickpea	85	
Dry Bean*†	30	
Ethiopian Mustard ( <i>Brassica carinata</i> )*	64	
Faba Bean*	30	
Flax, or Solin (low linolenic acid flax)	82	
Hemp (for fibre, seed, or oil)*††	73	6 leaf (up to 25 cm)
Lentil	65	
Oriental mustard (condiment types and oilseed quality <i>Brassica juncea</i> )	64	
Pea (field and processing)	65	
Soybean	80	
Sunflower*††	60	
Yellow and Brown Mustard††	64	

† NOTE: While Quizalofop has been registered for use on all dry field bean types not all types have been tested for tolerance. When using Quizalofop on a new dry bean type or variety for the first time evaluate tolerance on a small area first before applying large acreages and check with seed supplier for variety sensitivity.

†† *Assure II* and *Yuma GL Liquid EC* only.

### Forage Crops (seed production only):

- **Seedling or Established:** Alfalfa, alsike clover\*, red clover\*, creeping red fescue.
- **Seedling only:** Bird's-foot trefoil\*, white clover\*, sweet clover\*, and sainfoin\*.

\* NOTE - Since applications to these crops have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Application to these crops is at the risk of the user.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

Apply Quizalofop according to weed stage below to the maximum rates of 0.3 L per acre for all crops except Ethiopian mustard (*B. carinata*) where the maximum rate is 0.2 L per acre.



### Add one of the following registered adjuvants to the spray tank when applying:

- **Assure II only:** *Liberate* or *Sure-Mix* (0.5 L per 100 L of spray solution), *LI700* (0.25 to 0.5 L per 100 L of spray solution), or *Merge* (0.5 to 1.0 L per 100 L of spray solution)
- **Contender:** *Contender MSO* adjuvant (0.5 L per 100 L of spray solution) or *XA Oil Concentrate* (0.5 to 1.0 L per 100 L of spray solution)
- **Yuma GL Liquid EC:** *Merge* or *XA Oil Concentrate* (0.5 to 1.0 L per 100 L of spray solution), or *MSO adjuvant* or *Sure-Mix* (0.5 L per 100 L of spray solution)

Use the higher rate of *XA Oil Concentrate* when wild oats or quackgrass are present in the field or when growing conditions are poor.

Weed	Stage	Rate	
		L per acre	Acres per 8 L
Green foxtail	2 leaf to early tillering	0.15	54
Volunteer wheat, barley & oat*	2 leaf to early tillering	0.15	54
Volunteer corn	2 to 6 leaf stage	0.15	54
Wild oat*	up to 2 tillers	0.20	40
Barnyard grass, yellow foxtail, proso millet, old witchgrass	2 leaf to early tillering	0.20	40
Quack grass suppression	2 to 6 leaf stage		
Foxtail barley	3 to 4 leaf max 3 tillers		
Downy and Japanese brome	2 to 5 leaf stage		
Quack grass season long control	2 to 6 leaf stage	0.30	26

\* Best results are likely to occur if applications are made before tillering begins. Apply at the 2 to 3 leaf stage for optimum control.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

### Application Information:

- **Water Volume:**
  - **Ground:** Minimum 40 L per acre. Up to 162 L per acre of water may be used under heavy populations to improve coverage.
  - **Aerial:** Minimum 10 L per acre to a maximum of 20 L per acre.
- **Nozzles and Pressure:** 30 to 40 psi (210 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

### How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
Quizalofop-p-ethyl	POST (foliar)	ACCCase Lipid Synthesis Inhibitor	Toward areas of growth (Symplast)	Grass only	1

### Effects of Growing Conditions:

Crop injury may occur if crops are stressed because of drought or flooding. Less than acceptable weed control may be expected if weeds are under stress because of drought, flooding or cool weather.

### Tank Mixes:

#### Herbicides:

- **In Canola:**
  - *Muster* (8 to 12 g per acre) plus adjuvant.
- **Glufosinate tolerant canola (Liberty Link) only:**
  - *Liberty 150 SN\** (0.54 to 1.6 L/ac) plus *Sure-Mix*, *LI 700* or *Liberate* adjuvant\*.
- **In Dry Bean (Pinto, Pink, Great Northern, Small Red):**
  - *Basagran* (label rates with Quizalofop at 0.25 L per acre plus *Sure-Mix* adjuvant).
- **In Oriental Mustard (*B. juncea* condiment and oilseed):**
  - *Muster* (8 g per acre plus Quizalofop at 0.15 to 2.0 L per acre plus adjuvant). DO NOT use on yellow mustard as injury will result.
- **In Soybean:**
  - *Pinnacle* (2.2 to 3.3 g per acre).
  - *Pinnacle* (2.2 to 3.3 g per acre) plus *Basagran Forté* (label rates) plus Quizalofop (0.25 L per acre) plus *Sure-Mix*.

- **In Tribenuron Tolerant Sunflowers:**
  - *Express SG* (6 g per acre) plus *Sure-Mix* or *Merge*\*.
- **In Established creeping red fescue for seed:**
  - *Ally* (label rates) plus Quizalofop (0.2 to 0.3 L per acre) plus adjuvant.
- Allow 24 hours after application before applying a broadleaf herbicide. If the broadleaf herbicide is applied first, wait 7 days before application of Quizalofop.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the Quizalofop labels only.

Quizalofop manufacturers may also support mixes with pesticides that are not on the quizalofop labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

- **Herbicides:** *Ares*, *Eclipse*\*, Glyphosate (glyphosate tolerant canola and soybean only), *Lontrel*\*, *Lontrel+Muster*\*, *Odyssey NXT*, *Pursuit*, *Solo*, *Viper ADV*.
- \* *Assure II* only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour of application may reduce control.
- **Re-entry Interval:** 4 days for camelina and 12 hours for all other crops.
- **Grazing Restrictions:** DO NOT graze treated crops or cut for feed in the year of treatment.
- **Pre-harvest Interval:** See 'Crops and Staging' chart above.
- **Re-cropping Interval:** No restrictions the year after treatment.
- **Aerial Application:** May be applied by air when used alone.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**

Rates (L per acre)	Application method	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
All rates	Ground *	1	0	3
Up to 0.15	Winged aircraft	0	0	70
	Helicopter	0	0	55
Up to 0.20	Winged aircraft	0	0	85
	Helicopter	0	0	70
Up to 0.30	Winged aircraft	1	0	125
	Helicopter	1	0	100

See page 36 for an explanation of the different habitats.

\* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Cleanout is recommended but no specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Danger – Corrosive to eyes



Skin irritant, Potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Reclaim II

Herbicide Group  
2 - metsulfuron  
4 - aminopyralid  
& 2,4-D

(Refer to page 45)

## Company:

Corteva Agriscience

## Formulation:

*Reclaim II* has two components:

**Reclaim II A (PCP#30062):** 52.5% aminopyralid + 9.45% metsulfuron methyl formulated as a water dispersible granule.

- Container size - 1.84 kg

**Reclaim II B (PCP#30063):** 660 g/L 2,4-D ester formulated as an emulsifiable concentrate.

- Container size: 2 X 6.48 L

NOTE: Limited availability through selected retail outlets.

## Crops and Staging:

**Rangeland and pastures** - Apply in spring or early summer.

*Note: The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. Avoid use in these situations.*

## Weeds, Rates and Staging:

Application timing is critical for weed control. For optimum weed control apply when weeds are emerged, young and actively growing in the vegetative stage for proper translocation and systemic weed activity.

Maximum of 49 g ae(active ingredient) per acre of *Reclaim II* (equivalent of 93 g product/acre) or other product containing aminopyralid (*Restore II*, *Milestone*, *Clearview*, *Sightline*) per season. Treated areas should not receive more than 49 g ae per acre a product containing aminopyralid the year after initial treatment.

**Reclaim II A at 55 g per acre plus Reclaim II B at 0.69 L per acre provides season long control of the following weeds unless indicated otherwise:**

- |                                    |                                |                                    |
|------------------------------------|--------------------------------|------------------------------------|
| ◦ Absinthe                         | ◦ Field scabious               | ◦ Russian thistle                  |
| ◦ Annual sunflower                 | ◦ Flixweed                     | ◦ Scentless chamomile <sup>†</sup> |
| ◦ Annual sow-thistle               | ◦ Goat's-beard                 | ◦ Shepherd's-purse                 |
| ◦ Mustard (ball, dog, wild)        | ◦ Gumweed                      | ◦ Smartweed (green, lady's-thumb)  |
| ◦ Biennial wormwood                | ◦ Hairy galinsoga              | ◦ Stinkweed                        |
| ◦ Bluebur                          | ◦ Hawkweed                     | ◦ Stork's bill                     |
| ◦ Burdock                          | ◦ Hedge bindweed               | ◦ Sweet clover                     |
| ◦ Canada fleabane                  | ◦ Hoary cress                  | ◦ Tall buttercup                   |
| ◦ Canada goldenrod                 | ◦ Hemp-nettle                  | ◦ Buckwheat (tartary, wild)        |
| ◦ Canada thistle <sup>††</sup>     | ◦ Horse-nettle                 | ◦ Tumbleweed                       |
| ◦ Chickweed                        | ◦ Knapweed (Russian, spotted)  | ◦ Vetch                            |
| ◦ Clover                           | ◦ Lamb's-quarters              | ◦ Volunteer canola                 |
| ◦ Common groundsel                 | ◦ Musk or nodding thistle      | ◦ Wild radish                      |
| ◦ Common ragweed                   | ◦ Narrow-leaved hawksbeard     | ◦ Wild strawberry <sup>††</sup>    |
| ◦ Common tansy                     | ◦ Oak leaf goosefoot           | ◦ Yellow star-thistle              |
| ◦ Corn spurry                      | ◦ Oxeye daisy (pre-bud)        |                                    |
| ◦ Cow cockle                       | ◦ Pasture sage                 | <b>Shrubs</b>                      |
| ◦ Cocklebur                        | ◦ Plantain                     | ◦ Silverberry (wolf willow)        |
| ◦ Dandelion <sup>††</sup>          | ◦ Perennial sow-thistle        | ◦ Western snowberry (buckbrush)    |
| ◦ Field bindweed (top growth only) | ◦ Prickly lettuce              |                                    |
| ◦ Field peppergrass                | ◦ Pigweed (prostrate, redroot) |                                    |

**Reclaim II A at 69 g per acre plus Reclaim II B at 0.69 L per acre provides season long control of the following weeds unless indicated otherwise:**

◦ *Weeds listed above plus:*

- Canada thistle (24 mo. suppression\*\*)
- Cudweed
- Curled dock
- Fireweed
- Hoary alyssum
- Perennial pepperweed

- Perennial ragweed
- Pasture sage<sup>††</sup>
- Prairie sage<sup>†</sup>
- Pussy toes
- Volunteer alfalfa
- Wild carrot

Shrubs

- Prairie wild rose (or suppressed for 24 mo.)
- Shrubby cinquefoil<sup>†</sup>
- Western snowberry (buckbrush)<sup>†</sup>

**Reclaim II A at 81 g per acre plus Reclaim II B at 0.69 L per acre provides season long control of the following weeds unless indicated otherwise:**

◦ *Weeds listed above plus:*

- Baby's-breath
- Black henbane
- Canada thistle<sup>††</sup>
- Wild caraway
- Wild parsnip

Shrubs

- Prairie wild rose<sup>††</sup>
- Silverberry (wolf willow)<sup>††</sup>
- Western snowberry (buckbrush)<sup>††</sup>

**Weeds Controlled by Reclaim II A at 93 g per acre plus Reclaim II B at 0.69 L per acre:**

◦ *Weeds listed above plus:*

- Knapweed (Brown, diffuse\*\*)
- Hawkweed (orange, yellow)\*\*\*

- Prairie sage<sup>††</sup>
- Purple loosestrife

Shrubs

- Shrubby cinquefoil<sup>††</sup>

<sup>†</sup> Controlled up to 12 months from application.

<sup>††</sup> Controlled up to 24 months after application. DO NOT retreat again in year after treatment.

\* Removal of competing vegetation may result in new Canada thistle shoots emerging.

\*\* Apply *Reclaim II* when plants are actively growing with the optimum time of application occurring from rosette to the bolting stages of development or in the fall. Use of the highest application rate improves or extends the duration of control.

\*\*\* Apply *Reclaim II* to plants in the bolting stage of development

## Application Information:

- **Water Volume:**
  - **Ground:** 45 L per acre minimum. For better coverage apply at 80 L per acre.
  - **Aerial:** 20 L per acre minimum
- **Nozzles and Pressure:** Use a combination of application equipment and pressures that will apply *ASABE coarse* droplets in a uniform pattern. Drift of even small amounts of *Reclaim II* into sensitive plants or areas where sensitive crops may be grown can cause injury. DO NOT apply under conditions prone to drift (i.e. high winds, dead calm, or temperature inversions).

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metsulfuron-methyl	POST (foliar) also has soil activity	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf only	2
aminopyralid	POST (foliar) also has soil activity	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
2,4-D	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Application should be avoided when pasture and targeted weeds are under stress of drought, excess moisture, extreme heat or cold or other environmental stresses. Target weeds must be actively growing. Avoid applications when temperatures exceed 28°C.

## Tank Mixes:

**Herbicides:** *Grazon XC* (1.0 L per acre)

**Note:** The above mixes are those listed on the *Reclaim II* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT re-enter treated areas for 12 hours.
- **Grazing Restrictions:** DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated areas and feed untreated feed for at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application.
- **Re-cropping Interval:** DO NOT apply to pastures where legumes are an essential component. DO NOT break up treated pasture and plant to sensitive broadleaf crops for at least 3 years after application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store product in original, labeled containers in a secure, dry, cool area. DO NOT freeze.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic habitat	Terrestrial habitat
Ground*	10	15
Fixed wing airplane	80 to 175**	250 to 750**
Helicopter	70 to 150**	175 to 650**

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Distance varies depending on spray droplet size. Consult the *Reclaim* label to determine buffer zone size when applying by air.

† Distance is measured from the downwind edge of the boom to sensitive areas.

- DO NOT apply this product directly to any water body or mix or load near water or wells. DO NOT apply when heavy rains are forecast or on moderate to steep slopes toward sensitive areas or to light soils with shallow water table. Contact the provincial environment department for additional permits to apply near water.

## Sprayer Cleaning:

Refer to 'Method A' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product such as *All Clear* or *Clean Out* spray cleaner. The inclusion of detergent in 'Method B' may provide improved cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Warning – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Reflex\*

\* For use only in the Red River Valley of Manitoba.

## Herbicide Group

### 14 - fomesafen

(Refer to page 45)

## Company:

Syngenta Canada (PCP#24779)

## Formulation:

240 g/L fomesafen formulated as a solution.

- Container size - 10 L

## Crops and Staging:

Apply *Reflex* at 235 mL per acre at the 1 to 2 trifoliolate leaf stage of the following crops:

- **Soybeans:** Apply only as a tank mix with *Basagran* at 0.71 L per acre plus *Agral 90* at 1 L per 1000 L of spray solution or as a mix with glyphosate at registered rates in glyphosate tolerant soybean.
- **Dry beans\*:** Apply only as a tank mix with *Basagran* at 0.71 L per acre plus *Agral 90* at 1 L per 1000 L of spray solution.

**\* NOTE - Since applications to dry beans in the Red River Valley has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Application to dry beans is at the risk of the user.**

DO NOT use before the 1<sup>st</sup> trifoliolate leaf stage or increased risk of crop injury may result.

Maximum ONE APPLICATION EVERY TWO CONSECUTIVE YEARS of *Reflex* or other products containing the active ingredient fomesafen.

## Weeds, Rates and Staging:

Broadleaf weeds controlled by *Basagran* at the 0.71 L per acre rate or glyphosate at registered rates in glyphosate tolerant soybeans plus improved control of the following weeds up to the 4-leaf stage:

- Cocklebur
- Eastern black nightshade
- Lady's-thumb
- Lamb's-quarters\*
- Ragweed (common)
- Redroot pigweed
- Volunteer canola
- Wild mustard
- Velvetleaf (3 leaf)

\* Suppression only

## Application Information:

- **Water Volume:** Minimum 81 L per acre. Increase water volume to 142 L per acre for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.
- **Pressure:** 275 kPa (40 psi). Increase pressure to 420 kPa (60 psi) for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.
- **Nozzles:** Use nozzles capable of delivering appropriate pressures and volumes.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
fomesafen	POST (foliar) with slight soil activity	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Broadleaf only	14

## Effects of Growing Conditions:

Weed control and crop tolerance may be reduced under certain stress conditions such as cold temperatures, excess moisture, drought and injury from hail or previous herbicide applications.

## Tank Mixes:

**Herbicides:**

- **Dry Beans:**
  - *Basagran* (0.71 L per acre)
- **Soybeans:**
  - *Basagran* (0.71 L per acre)
- **Glyphosate tolerant soybeans only:**
  - *Glyphosate* (360 to 720 g ae per acre)

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the *Reflex* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 4 hours may reduce control.
- **Grazing Restrictions:** DO NOT graze treated crop or cut for hay. There is insufficient data to support such use.
- **Pre-harvest Interval:** Leave at least 84 days from application to harvest.
- **Re-cropping Interval:** Winter wheat may be sown 4 months after application. Spring wheat, dry beans, soybeans and field corn may be grown the year following an application.
  - These re-cropping restrictions refer only to the Red River Valley of Manitoba. Use outside this region is not registered as re-cropping options have not been determined.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool place away from food or feed.
- **Buffer Zones:** Leave a buffer zone of at least 15 metres between the last spray swath and the edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands as well as aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs. DO NOT apply when winds are greater than 15 km/hr.

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Danger – Corrosive to Eyes

For an explanation of the symbols used here see pages 7 and 8.

# Restore II

Herbicide Group  
4 - aminopyralid & 2,4-D  
(Refer to page 45)

## Company:

Corteva Agriscience (PCP#30632)

## Formulation:

40 g/L aminopyralid and 400 g/L 2,4-D both present as amine salts formulated as a solution.

- Container size - 2 x 10 L

*Note: Limited availability through selected retail outlets.*

Maximum of 49 g ae (active ingredient) per acre of *Restore II* (97 L product per acre) or other products containing aminopyralid (*Reclaim II*, *Milestone*, *Clearview*, *Sightline*) PER SEASON.

## Crops and Staging:

**Rangeland and pastures:** Apply in spring or early summer.

*Note: The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. Avoid use in these situations.*

## Weeds, Rates and Staging:

Apply when weeds are young and actively growing in the vegetative stage for control unless indicated otherwise.

*Note: the use of the highest rate structure improves level and duration of weed control and is recommended when weed populations are dense.*

**Restore II at 0.57 L per acre will control:**

- Annual sow-thistle
- Bull thistle
- Burdock (<4 leaf)
- Buttercup (hairy, tall)
- Canada fleabane
- Canada thistle<sup>††</sup>
- Common broomweed
  - As well as other annual "Susceptible Weeds" controlled by 2,4-D on the 2,4-D page.
- Common plantain
- Daisy fleabane
- Goat's-beard
- Horse-nettle
- Nodding thistle
- Ox-eye daisy
- Perennial sow-thistle
- Prickly lettuce
- Spotted knapweed
- Stinging nettle
- Sweet clover
- Yellow star-thistle

**Restore II at 0.86 L per acre will control:**

- *Weeds listed above plus:*
  - Canada goldenrod<sup>††</sup>
  - Cudweed
  - Curled dock (<4 leaf)
  - Dog mustard
  - Groundsel
    - As well as other annual "Hard to Control Weeds" controlled by 2,4-D on the 2,4-D page.
  - Hawkweed
  - Hairy fleabane
  - Heal-all
  - Narrow-leaved hawk's-beard
  - Scentless chamomile
  - Sheep sorrel
  - Sulphur cinquefoil<sup>††</sup>
  - Tansy ragwort
  - Western ragweed

**Restore II at 0.97 L per acre will control:**

- *Weeds listed above plus:*
  - Absinthe
  - Biennial wormwood<sup>††</sup>
  - Bindweed (Field and Hedge)<sup>††</sup>
  - Blue Lettuce<sup>††</sup>
  - Burdock<sup>††</sup>
  - Canada goldenrod<sup>††</sup>
  - Common tansy<sup>†††</sup>
  - Dandelion<sup>††</sup>
  - Diffuse knapweed<sup>†††</sup>
  - Fuller's teasel
  - Gumweed<sup>††</sup>
  - Hoary cress<sup>††</sup>
  - Ironweed (tall)
  - Leafy spurge<sup>††</sup>
  - Mouse-eared chickweed<sup>††</sup>
  - Russian knapweed<sup>†††</sup>
  - Yarrow (common)<sup>†††</sup>
  - Yellow rocket<sup>††</sup>

<sup>†</sup> Top growth control only<sup>††</sup> Season long control<sup>†††</sup> Suppression only**Application Information:**

- **Water volume:**
  - **Ground application:** 40 L per acre minimum.
  - **Aerial Application:** 20 L per acre minimum
- **Nozzles and Pressure:** Use a combination of application equipment and pressures that will apply **ASABE coarse** droplets in a uniform pattern.
  - Drift of even small amounts of *Restore II* into sensitive plants or areas where sensitive crops may be grown can cause injury. DO NOT apply under conditions prone to drift (i.e. high winds, dead calm, or temperature inversions).
  - Avoid applications closer than the drip line or outer edge of the canopies of trees or injury may occur to the tree.

*NOTE: Use closed handling systems when using bulk containers and/or if handling more than 663 L of product per day. Handheld applications are limited to 20 L of product per day. Respirators must be worn if applying more than 12.5 L per day using handheld equipment.*

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
aminopyralid	POST (foliar) also has soil activity	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
2,4-D	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

**Effects of Growing Conditions:**

Application should be avoided under conditions of drought or other environmental stress.

**Tank Mixes:**

None registered.



## Restrictions:

- **Rainfall:** No rainfall period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT re-enter treated areas for 12 hours.
- **Grazing Restrictions:** DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application. Allow 3 days of grazing on an untreated pasture (or feed untreated hay) before transferring livestock to areas where sensitive broadleaf crops may be grown.
- **Re-cropping Interval:** DO NOT use if legumes are essential in a pasture. DO NOT break up treated pasture and plant to sensitive broadleaf crops for at least 3 years after application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store product in original, labelled containers in a secure, dry, cool area. DO NOT freeze.
- **Buffer Zones:**
  - Handheld equipment is exempt from the buffer zones indicated below when implementing Early Detection and Rapid Response (EDRR) measures on isolated plants or patches. DO NOT apply to water.

Application method	Buffer Zones (metres <sup>1</sup> ) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground *	10	10
Fixed wing airplane	80 to 175**	80 to 175**
Helicopter	70 to 150**	70 to 150**

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

\*\* Distance varies depending on spray droplet size. Consult the *Restore II* label to determine buffer zone size when applying by air.

<sup>†</sup> Distance is measured from the downwind edge of the boom to sensitive areas.

- DO NOT apply this product directly to any water body or mix or load near water or wells. DO NOT apply when heavy rains are forecast or on moderate to steep slopes toward sensitive areas or to light soils with shallow water table. Contact the provincial environment department for permits to apply near water.

## Sprayer Cleaning:

'Method A' found in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:



Danger – Eye and Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Retain SG

*This product is a prepackaged tank mix of the equivalent of thifensulfuron/tribenuron (page 373) and fluroxypyr + 2,4-D (page 220). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - thifensulfuron**  
**& tribenuron**  
**4 - fluroxypyr & 2,4-D**  
*(Refer to page 45)*

## Company:

Loveland Products Canada

## Formulation

The *Retain SG* package has 3 components:

**Retain A (PCP#30129):** 33.35% thifensulfuron + 16.65% tribenuron formulated as a water soluble granule.

- Container size - 486 g

**Loveland Products Canada 2,4-D Ester 700 (PCP#29006):** 660 g/L 2,4-D ester formulated as an emulsifiable concentrate.

- Container size - 6.8 L

-plus either -

**Retain B<sup>†</sup> (PCP#29557):** 180 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 4.8 L

- or -

**Retain 333 B (PCP#32845):** 333 g/L fluroxypyr formulated as an emulsifiable concentrate.

- Container size - 2.6 L

<sup>†</sup> **Note:** This formulation is no longer manufactured but some may remain in the distribution system. This product will be removed from future editions when supplies are exhausted.

## Crops and Staging:

Spring wheat (including durum), barley: 4 leaf to flag leaf stage.

## Weeds and Staging:

Apply from the seedling to 4 leaf or whorl stage of the following weeds:

- Weeds controlled by thifensulfuron/tribenuron plus cleavers\*

\* Not Group 2 resistant biotypes

## Rates

**Retain A:** 12 g per acre

**Retain B:** 120 mL per acre

-or-

**Retain 333 B:** 70 mL per acre

**Loveland Products Canada 2,4-D:** 0.2 L per acre

Add Agral 90, Agsurf II, or Citowett Plus at 0.2 L per 100 L of spray solution.

*Retain SG* may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

## Tank Mixes:

Loveland Products Canada supports the following mixes that are not on the *Retain SG* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** Axial, Everest 2.0, Traxos, Simplicity, Varro, WildCat, Puma Advance.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

*See component products for more information on restrictions application details and handling. Use the most limiting restrictions across all components for the mix.*

# Reward

## Herbicide Group

### 22 - diquat

(Refer to page 45)

#### Company:

Syngenta Canada, distributed by Univar Environmental (PCP#26271)

#### Formulation:

240 g/L diquat formulated as a solution.

- Container size: 4 x 3.78 L

#### Use:

For use in farm dugouts and other clear, slow moving water bodies to control water weeds, such as:

- Canada water weed
- Duckweed
- Pond weeds
- Coontail
- Flowering rush
- Water milfoil

Offers temporary control of certain species of algae.

High levels of suspended organic matter or clay particles in water will reduce control.

NOTE: A permit must be obtained from Saskatchewan Water Security Agency or Manitoba Sustainable Development for application of pesticides directly to or within a set distance of water bodies that are not wholly contained within a private parcel of land.

#### Timing:

Mid-May through late June when water weeds or algae are actively growing. Apply before weeds have developed a heavy mat of growth for effective control.

#### Rates:

**Dugouts less than 5 feet (1.5 m) deep:** Apply *Reward* at 7.4 L per acre.

- At this rate, 2.2 L of *Reward* will treat a dugout that is 160 feet by 80 feet (49 m x 24.4 m).

**Dugouts more than 5 feet (1.5 m) deep:** Apply *Reward* at 10.1 to 11.8 L per acre.

- At these rates, a dugout that is 160 feet by 80 feet (49 m x 24.4 m) will require 3.0 to 3.5 L of *Reward*. Milfoil can be controlled in early stages by 3.7 L per acre in early stages of growth.

#### Application:

- Dilute 1 part *Reward* with 4 parts clean water.
- Spray over the water surface, inject below the water surface or pour directly onto the water surface from a moving boat or for small water bodies, apply from the banks. See label for detailed instructions. Note: *Reward* is bound rapidly to soil, so material must enter the water directly to be effective.

#### How it Works:

*Reward* is a non-volatile fast acting herbicide for the control of water weeds. Control of susceptible weeds generally occurs within 1 to 2 weeks. *Reward* is inactivated upon contact with soil, mud or lake bottoms. Therefore, it has no residual herbicidal effect.

#### Restrictions:

- **Grazing Restrictions:** DO NOT use water for animal consumption for 24 hours after application.
- **Irrigation:** DO NOT use water for irrigation for 5 days after application.
- **Domestic Use:** DO NOT use water for human consumption for 5 days after application. DO NOT swim in water for 24 hours after treatment.
- **Storage:** DO NOT freeze.
- **Environment:** If weed growth is dense, protect fish by not treating more than one-fourth of dugout at a time.

#### Equipment Clean Out:

Refer to page 'Method C' in the general section on sprayer cleaning on pages 12 and 13.

**Hazard Rating:**

Warning – Poison



Caution – Skin Irritant, Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Rexade

**Herbicide Group**  
**2 - pyroxsulam**  
**4 - halauxifen & 2,4-D**  
*(Refer to page 45)*

**Company:**

Corteva Agriscience

**Formulation:****Rexade A (PCP #32520):** 5% halauxifen and 15% pyroxsulam formulated as water dispersible granules.

- Container size – 1 x 1.62 kg jug

**Rexade B (PCP #32294):** 660 g/L 2,4-D ester formulated as an emulsifiable concentrate.

- Container size – 1 x 8.58 L jug

**Crops and Staging:****Wheat (including Durum):** From the fully expanded 3 leaf stage up to the emergence of the flag leaf.**Winter wheat:** Apply at 2 to 7 leaf stage (4 tiller stage)**Weeds, Rates and Staging:**Use *Rexade A* 40 g per acre and *Rexade B* 215 mL per acre (one case treats 40 acres) for control or suppression of following weed species.**Weeds controlled:**

- **Grasses: 1 to 5 leaf stage unless otherwise indicated.**

- |                                       |  |                                       |
|---------------------------------------|--|---------------------------------------|
| ◦ Barnyard grass                      | ◦ Brome, Downy (2 to 6 leaf, 4 tillers) <sup>§</sup> | ◦ Foxtail (yellow)                    |
| ◦ Brome, Japanese (1 to 6 leaf stage) | ◦ Foxtail (green) <sup>§</sup>                       | ◦ Wild oats, (up to 4 leaf, 2 tiller) |

- **Broadleaves:**

- |  |  |  |
|--|--|--|
| ◦ Annual sunflower                     | overwintered rosettes, up to                   | (up to 6 leaf stage, < 10 cm height)   |
| ◦ Bluebur                              | 20 cm)*  | ◦ Russian thistle                      |
| ◦ Buckwheat, wild                      | ◦ Flixweed (up to 10 cm)                       | ◦ Smartweed (1 to 5 leaf stage)        |
| ◦ Burdock                              | ◦ Hemp-nettle <sup>†</sup>                     | ◦ Shepherd's purse (up to 30 cm tall)  |
| ◦ Canada fleabane                      | ◦ Kochia <sup>**†§</sup>                       | ◦ Stinkweed (up to 30 cm tall)         |
| (up to 15 cm height)                   | ◦ Lamb's-quarters <sup>†</sup>                 | ◦ Stork's-bill (up to 8 leaf stage)    |
| ◦ Canada thistle (up to 30 cm tall,    | ◦ Mustard                                      | ◦ Sweet clover                         |
| pre bud stage) <sup>§</sup>            | (except dog and green tansy)                   | ◦ Velvetleaf (up to 5 leaf stage)      |
| ◦ Chickweed, common (up to 10 cm)      | ◦ Night flowering catchfly <sup>§</sup> (up to | ◦ Volunteer alfalfa                    |
| ◦ Cleavers <sup>†</sup> (1 to 9 whorl) | bolting stage, up to 15 cm height)             | (up to 24 cm height)                   |
| ◦ Cocklebur                            | ◦ Pigweed (red-root) <sup>†</sup>              | ◦ Volunteer canola (1 to 6 leaf stage) |
| ◦ Corn spurry (up to 2 whorl stage,    | ◦ Plantain                                     | ◦ Volunteer flax (up to 15 cm height)  |
| <10 cm in height)                      | ◦ Prickly lettuce                              | ◦ White cockle (up to bud stage, less  |
| ◦ Cow cockle                           | ◦ Ragweed (Common)                             | than 15 cm height)                     |
| ◦ Dandelion (seedlings and             | ◦ Round-leaved mallow                          | ◦ Wild raddish                         |

<sup>§</sup> Suppression only.<sup>\*\*</sup> Light to moderate infestations (up to 150 plants per m<sup>2</sup>, up to 15 cm in height)<sup>†</sup> Including group 2 resistant biotypes

## Application Information:

- **Water volume:**
  - **Ground:** 20 to 40 L per acre
  - **Aerial:** 12 L per acre
- **Nozzles and Pressure:** Use boom pressure of 235 kPa or less. Use nozzles and pressure designed to produce **ASABE coarse** droplets. To reduce drift caused by turbulent wingtip vortices, the nozzle distribution along the spray boom length must not exceed 65% of the wing or rotor span.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
pyroxsulam	POST (foliar)	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	2
haulaxifen	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4
2,4-D	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

DO NOT apply to registered crops that are stressed by severe weather conditions (frost, drought or saturated soil) as crop injury may result. Reduced activity will occur when temperatures are below 8° C or above 27° C. Frost 3 days before or after application may reduce weed control and crop tolerance. Under certain conditions (heavy rainfall, prolonged cooled weather, frost conditions, wide fluctuation in day/ night temperatures), lightening in crop colour and reduction in crop height may occur.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- 2,4-D ester up to an additional 70 g ae per acre (see 2,4-D page).

**Insecticides:** None registered

**Fungicide:** None registered

**Fertilizers:** None registered

Adding ingredients in the correct order is critical for optimum performance. Check label of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Avoid application if rainfall is forecast within 4 hours.
- **Re-entry Interval:** DO NOT re-enter treated field until 12 hours post-application.
- **Grazing Restrictions:** DO NOT graze treated crops or cut for hay within 7 days of application.
- **Pre-harvest Interval:** DO NOT harvest treated crops for 60 days after application.
- **Re-cropping Interval:** Fields can be re-seeded 11 months with spring barley, spring wheat, oats, canola, flax, brown and yellow mustard, canola quality *Brassica juncea*, field peas and soybeans or fields can be fallowed. Sunflowers can be planted 10 months and lentils 22 months after application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store in original containers in dry well ventilated storage. Store in heated storage. If the product is frozen, bring to room temperature and agitate before use.

• **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Field sprayer	15	15
Aerial (fixed)	1	90
Aerial (rotary)	1	75

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. Let solution stand for an extended period for better results. Flush sprayer system with water before reuse. See the label for product specific cleaning details.

## Hazard Rating:



Warning – Poison



Caution – Eye irritant, Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Rezuvant

*This product is the equivalent of a prepackaged tank mix of Pixxaro A (page 325) and Axial (see page 109). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**4 - halauxifen,**  
**fluroxypyr & MCPA**  
*(Refer to page 45)*

## Company:

Corteva Agriscience

## Formulation:

The *Rezuvant* package contains 2 components:

**Rezuvant A (PCP#33262):** 16.2 g/L halauxifen and 250 g/L fluroxypyr present as ester and formulated as an emulsifiable concentrate.

- Container size – 4.9 L; 2 x 9.8 L

**Rezuvant B (PCP#33277):** 50 g/L pinoxaden formulated as an emulsifiable concentrate.

- Container size – 2 x 9.8 L; 80 L

## Crops and Staging:

**Wheat (spring only) and barley:** 1 leaf stage to just prior to emergence of the flag leaf.

## Weeds and Staging:

Apply to actively growing weeds up to 10 cm high or wide unless otherwise specified:

- **Grass weeds controlled by Axial plus the following broadleaf weeds from 1 to 8 leaf stage, unless otherwise indicated:**

- |                                  |   |                                     |
|----------------------------------|---|-------------------------------------|
| ◦ Chickweed                      | ◦ Nightshade (black, hairy and cutleaf) <sup>††</sup> | ◦ Sow-thistle, annual* (to 5 leaf)  |
| ◦ Cleavers (1 to 9 whorl)        | ◦ Ragweed (common <sup>††</sup> , giant)              | ◦ Stork's-bill                      |
| ◦ Fleabane, Canada <sup>†</sup>  | ◦ Redroot pigweed                                     | ◦ Velvetleaf (5 leaf stage)         |
| ◦ Flixweed (up to 8 leaf & 8 cm) | ◦ Round-leaved mallow <sup>††</sup>                   | ◦ Volunteer alfalfa (to 25 cm)      |
| ◦ Hemp-nettle                    | ◦ Shepherd's-purse                                    | ◦ Volunteer flax <sup>†</sup>       |
| ◦ Kochia <sup>†</sup>            | (to bolting or 10 cm)                                 | ◦ Wild buckwheat                    |
| ◦ Lamb's-quarters                |   | ◦ Wild Mustard (to 4 leaf or 10 cm) |

\* Suppression only.

<sup>†</sup> Up to 15 cm in height.

<sup>††</sup> 1 to 6 leaf stage.

## Rates:

Note: Maximum of ONE APPLICATION of this or other products containing pinoxaden per year.

**Rezuvant A:** 125 mL per acre

**Rezuvant B:** 500 mL per acre

(One case treats 40 acres or bulk co-pallet treats 160 acres)

Addition of surfactant is NOT required. Use the spray suspension as soon as it is prepared. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 14.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **Spring wheat (including durum) and barley:**
  - MCPA ester (0.31 L per acre)

**Note:** The above mixes are those listed on the *Rezuvant* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

*See component products for more information on additional restrictions, application details and handling. Unless indicated differently above, use the most limiting restrictions across all components for the mix.*

# Roundup Xtend

**Herbicide Group**  
**9 - glyphosate**  
**4 - dicamba**  
*(Refer to page 45)*

## Company:

Bayer

## Formulation:

**Roundup Xtend (PCP#32274):** 240 g ae/L glyphosate present as the monoethanolamine salt and 120 g/L dicamba present as the diglycolamine salt. *Roundup Xtend* also contains ingredients within the formulation to reduce volatility (i.e. *VaporGrip Technology*).

- Container size – 2 x 10 L

## Crops and Staging:

**Glyphosate+dicamba tolerant (RR2 Xtend) Soybean:**

- **Pre-plant or pre-emergence:** Apply any time prior to the emergence of the crop.
- **Post-emergence:** Apply once or twice, at least two weeks apart, up to the early flower stage (R1).

**Corn hybrids with Roundup Ready 2 Technology:**

- **Pre-emergence:** Apply prior to the emergence of the crop.
- **Post-emergence:** Spike to 5-leaf stage

*Note: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sand, loamy sand and sandy loam soils) and/or the depth to the water table is shallow. Avoid use in these situations.*

**Weeds, Staging and Rates:**

Apply to small actively growing weeds that are less than 4 inches (10 cm) in height or width. Early applications when the weeds are small reduce early season weed competition and provide maximum yield potential.

**Note: DO NOT add acidifying buffering agents, acidic pH adjusting agents or adjuvants other than agriculturally approved NIS to the spray solution. DO NOT add ammonium sulfate (AMS), AMS-containing adjuvants, water conditioners, or sprayable fluid fertilizers.**

Rate (L per acre):	Weeds controlled:
1.0	<div> <b>Annual broadleaf weeds:</b>            Buckwheat (tartary, wild)            Chickweed            Cleavers            Corn spurry            Cow cockle            Flixweed            Hemp-nettle            Narrow-leaved hawk's-beard            Night-flowering catchfly            Kochia            Lamb's-quarters         </div> <div>           Mustard, wild            Pigweed, redroot            Shepherd's-purse            Smartweed                (green, lady's-thumb)            Stinkweed            Stork's-bill            Russian thistle            Volunteer canola                (non glyphosate-tolerant)            Wild tomato         </div> <div> <b>Annual grass weeds:</b>            Barnyard grass            Green foxtail            Volunteer barley            Volunteer wheat            Wild oats    <b>Perennial weeds:</b>            Canada thistle*            Dandelion (suppression only)            Foxtail barley*            Quackgrass            Sow-thistle (perennial)*         </div>
1.5	<div> <i>All weeds listed above plus:</i>  <b>Annual broadleaf weeds:</b>            Biennial wormwood                (2 to 8 leaf stage)            Bur cucumber                (up to 18 leaf stage)*            Cocklebur            Canada fleabane                (post-emergent up to 8 cm)            Eastern black nightshade            Narrow-leaved vetch            Pigweed (smooth)         </div> <div>           Prickly lettuce            Ragweed (common)            Round-leaved mallow*            Smartweed (Pennsylvania)            Sow-thistle (annual)            Stork's-bill            Velvetleaf            Volunteer flax         </div> <div> <b>Annual grass weeds:</b>            Annual blue grass            Downy brome            Persian darnel            Yellow foxtail            Proso millet    <b>Perennial weeds:</b>            Common milkweed*            Dandelion                (pre-emergent to crop)            Dandelion **            Field bindweed*            Foxtail barley            Yellow nutsedge*         </div>
2.0	<div> <i>All weeds listed above plus:</i>            Mustard (hare's ear, Indian, tumble, wormseed)            Russian pigweed            Ragweed (false, giant)    <b>Short term residual activity on annual broadleaf weeds:</b>            Lamb's-quarters            Redroot pigweed            Ragweed (common)            Velvetleaf (suppression only)            Wild buckwheat         </div>

\* Single application provides suppression. Sequential applications provide control. For sequential applications, ensure the crop has not advanced beyond the recommended growth stage. The sequential application should be applied at least two weeks after the first application.

\*\* Control with a single application prior to seeding in the spring. The addition of 360 g ae per acre of addition glyphosate (see tank mixes) will improve control of heavy infestation and plants over 15 cm (6 inches) across.

**NOTE: The 2 L per acre rate is to be used only once in a growing season. DO NOT exceed the maximum season total of 4 L per acre.**



## Application Information:

DO NOT allow herbicide solution to mist, drip, drift or splash onto desirable vegetation because severe injury or destruction to desirable broadleaf plants could result. Apply when air temperature is between 10 and 25°C. DO NOT spray when the temperature is expected to exceed 30°C.

When applying *Roundup Xtend* adjacent to sensitive crops, apply as a pre-plant, pre-emergent or early post-emergent treatment to avoid potential drift onto the sensitive crops.

- **Water Volume:** Minimum 40 L per acre.
- **Nozzles and Pressure:** Use only spray nozzles that produce *ASABE S-572.1 Extremely Coarse (XC) to Ultra Coarse (UC)* spray qualities and minimal amounts of fine spray droplets. **DO NOT use conventional flat fan nozzles that produce Medium or Fine spray qualities.** Adjust pressure for selected nozzles to maintain XC to UC spray qualities. Use at least 30 psi (200 kPa) to ensure proper pattern overlap and check this visually.

DO NOT apply during a temperature inversion because off-target movement potential is high. Temperature inversions increase drift potential because fine droplets may remain suspended after application and move in unpredictable directions with light and variable wind. (See 'Avoiding Spray Drift' on page 7 for more information on how to avoid drift.)

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
glyphosate	POST (foliar)	EPSP Amino Acid Synthesis Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	9
dicamba	POST (foliar) also has soil activity	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Reduced control may result if treatments are made during poor growing conditions such as drought stress, disease or insect damage, or if weeds have been mowed, grazed or cut. Heavy dust on foliage or a crop or weed canopy covering smaller weeds may also reduce control. Extremely cool or cloudy weather following treatment or prolonged drought conditions may slow activity of this product and delay the visual effects of control.

## Tank Mixes:

### Herbicides:

- Glyphosate (*Roundup brands*) – top up of total glyphosate to a maximum of 720 g ae per acre.

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

**DO NOT add acidifying buffering agents, acidic pH adjusting agents or adjuvants other than agriculturally approved NIS to the spray solution. DO NOT add ammonium sulfate (AMS), AMS-containing adjuvants, water conditioners, or sprayable fluid fertilizers.**

Bayer also supports the following mixes that are not on the *Roundup Xtend* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:**
  - Prior to emergence of Dicamba Tolerant Soybean:
  - Heat LQ, Authority, Valtera

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 4 hours of application may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours following application.
- **Pre-harvest Interval:** 7 to 10 days for soybean forage and 13 to 15 days for soybean hay.
- **Grazing Restrictions:** DO NOT permit lactating dairy animals to graze fields within 7 days after application. DO NOT harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.

- **Re-cropping Interval:** A plant back interval of 120 days is required for those crops not on the label.
- **Aerial Application:** DO NOT apply by aircraft.
- **Storage:** Store above -10°C to keep product in solution. If the product freezes and crystals form, place in a warm room (20°C), allow the product to reach room temperature and roll or shake periodically until crystals have re-dissolved.
- **Buffer Zones:**

Method of application	Buffer Zones (metres <sup>†</sup> ) required for the protection of:	
	Aquatic Habitat	Terrestrial Habitat
Field sprayer	15	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A or B' in the general section on sprayer cleaning on pages 12 and 13. Let solution stand for an extended period for better results. Flush sprayer system with water. See the label for product specific cleaning details.

## Hazard Rating:

No specific hazards indicated. Wear chemical resistant clothing, gloves and footwear to load mix and cleanup. Avoid direct inhalation of spray mist.

# Salute

*This product is the equivalent of a prepackaged tank mix of Ares (page 99) and Lontrel Dry (Note: Lontrel Dry is only available with Salute and Tensile – See clopyralid on page 151). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - imazamox, imazapyr**  
**4 - clopyralid**  
*(Refer to page 45)*

## Company:

Corteva Agriscience

## Formulation

The *Salute* package contains the following components:

**Salute A (PCP#31353):** 72% clopyralid formulated as a water soluble granule.

- Container size – 2.25 kg

**Salute B (PCP#31354):** 35 g/L imazamox and 15 g/L imazapyr formulated as solution.

- Container size – 1 x 9.8 L jug

**Merge adjuvant (PCP#24702):** Container size - 8.1 L

## Crops and Staging:

CLEARFIELD canola from the 2 to 6 leaf stage.

## Weeds and Staging:

**Weeds controlled by Ares (see page number above) plus:**

- Annual sow-thistle
- Perennial sow-thistle
- Canada thistle

## Rates

**Salute A:** 56 g per acre.

**Salute B:** 245 mL per acre.

**Merge adjuvant (purchased separately):** 0.5 L per 100 L of spray solution.

Maximum ONE APPLICATION of Salute or other products that contain imazamox (Ares, Solo, Odyssey) per year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Tank Mixes:

None registered.

## Restrictions:

**Re-cropping Interval:** The year following *Salute* application fields can be seeded to canary seed, field peas\*, field corn, CLEARFIELD canola/oilseed *B. juncea*, spring wheat, spring barley, tame oats. Two years following *Salute* application fields can be seeded to canola (all types), flax, sunflower, durum wheat, lentils, chickpea.

\* DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (22 months following application), contact your local Corteva Agriscience representative or retailer for more information before seeding field peas following drought conditions in the previous year.

See component products for more information on additional restrictions, application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.

# Shieldex 400SC

Herbicide Group  
27 - tolpyralate  
(Refer to page 45)

## Company:

ISK Biosciences Corporation, distributed in Canada by Engage Agro Corp (PCP#32943)

## Formulation:

400 g/L tolpyralate formulated as a suspension concentrate.

- Container size – 4 x 600 mL

## Crops and Staging:

**Corn:** up to 50 cm tall or up to and including 6 leaf collars (V6), whichever is more restrictive.

## Weeds, Rates and Staging:

Apply to actively growing weeds less than 10 cm tall:

Broadleaf Weeds	30.4 mL/ac	40.5 mL/ac
Green pigweed	S	S
Cocklebur	S	C
Lamb's-quarters	S	C
Redroot pigweed	S	C
Smooth pigweed	C	C
Purslane	S	S
Ragweed (common, giant)	S	S
Shepherd's-purse	S	S
Smartweed (Pennsylvania)	S	S
Waterhemp (common)	S	S
Waterhemp (tall)	C	C

C = Control

S = Suppression

Apply to grasses less than 10 cm tall or before tillering:

Grasses	30.4 mL/ac	40.5 mL/ac
Barnyard grass	S	S
Crabgrass, large	C	C
Foxtail (yellow)	S	S
Green foxtail	S	C

**MSO Concentrate (sold separately):** Apply 1% v/v or 10 L MSO Concentrate per 1000L of spray mixture.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

## Application Information:

- **Water volume:** 57 to 190 L per acre.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ASAE medium or larger droplets.
- **Screens:** Use 50-mesh (or coarser) filter screen.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
tolpyralate	POST (foliar)	HPPD Pigment Inhibitor	Some – both foliar and root (Apoplast) Somewhat systemic (has soil residues)	Broadleaf only	27

## Effects of Growing Conditions:

Poor weed control or crop injury may result from applications made to plants under stress from abnormally hot or cold weather; environmental conditions such as drought, water-saturated soils, hail damage or frost; disease, insect or nematode injury; or prior herbicide or carryover from a previous year's herbicide application.

## Tank Mixes:

### Herbicides:

- Atrazine (227g ai per acre) – DO NOT apply atrazine if corn is greater than 30 cm tall.

**Fertilizers:** Use 12.5 to 25 L/1000L spray solution of a high-quality urea ammonium nitrate (UAN) such as 28% N or 32% N or 8.4 to 20.4 kg/1000L of a spray grade ammonium sulphate (AMS), recommended.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rainfast in 1 hour.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or feed treated corn forage or silage for 21 days after application.
- **Pre-harvest Interval:** DO NOT apply to field corn within 85 days of harvest.
- **Re-cropping Interval:** The following crops may be grown 9 months after application: alfalfa, barley, bean (dry), canola, grass (grown for seed or forage), oat, pea, potato, sorghum, soybean, sunflower, spring wheat. Winter wheat or rye (annual and fall) may be seeded 3 months after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** To prevent contamination, store this product away from food or feed.
- **Buffer Zones:** Avoid spraying in situations where drift may occur. DO NOT apply during periods of dead calm.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	1	1	2

See page 36 for an explanation of the different habitats.

\* Buffer zones may be reduced when using drift reduction measures. See the Buffer Zone Calculator on the Pest Management Regulatory Agency web site.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Tank Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on page 12 and 13.

## Hazard Rating:

None listed.

# Signal FSU

Herbicide Group

1 - clodinafop

2 - thifensulfuron/tribenuron

4 - fluroxypyr

(Refer to page 45)

## Company:

Nufarm Agriculture

## Formulation:

The *Signal FSU* package contains three components:

**Signal F (PCP#31434):** 112 g/L clodinafop propargyl and 217 g/L fluroxypyr ester formulated as an emulsifiable concentrate.

- Container size – 8 L

**Boost (PCP#30377):** 50% thifensulfuron methyl and 25% tribenuron methyl formulated as a water dispersible granule.

- Container size – 320 g

**NuFarm Enhance Adjuvant (PCP#29952):** Container size – 4 L

## Crops and Staging:

**Wheat (spring, durum) only:** 2 leaf up to the emergence of the 4<sup>th</sup> tiller.

## Weeds and Staging:

### Grass weeds:

Weed	Stage
Barnyard grass	1 to 5 leaf prior to tillering
Green and yellow foxtail	1 to 5 leaf stage, prior to emergence of 3rd tiller
Volunteer canaryseed, wild oats	1 to 6 leaf, maximum 3 tillers
Volunteer oats	3 to 6 leaf, maximum 3 tillers

### Broadleaf weeds:

- Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.
  - Annual smartweed (green, lady's-thumb)
  - Ball mustard
  - Chickweed (1 to 6 leaf)
  - Cleavers (1 to 4 whorls)
  - Common groundsel
  - Corn spurry
  - Cow cockle
  - Flixweed
  - Hemp-nettle
  - Kochia (2 to 8 leaf)
  - Lamb's-quarters
  - Narrow-leaved hawk's-beard
  - Redroot pigweed
  - Russian thistle
  - Shepherd's-purse
  - Stinkweed
  - Tartary buckwheat
  - Volunteer canola (not CLEARFIELD varieties)
  - Volunteer flax (up to 12 cm)
  - Volunteer sunflower
  - Wild buckwheat (1 to 3 leaf)
  - Wild mustard

### Weeds Suppressed:

- Canada thistle, sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
- Scentless chamomile
- Stork's-bill (2 to 6 leaf)

## Rate:

**Signal F:** 0.2 L per acre

**Boost:** 8 g per acre

**Enhance Adjuvant:** 0.25 L per 100 L of total spray solution.

(One package treats 40 acres)

Maximum ONE APPLICATION per year of *Signal FSU* or other products containing clodinafop, thifensulfuron, tribenuron, or fluroxypyr.

Thifensulfuron/tribenuron may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing. Refer to the product label for complete mixing instructions.

## Application Information:

- **Water Volume:** Minimum 40 L per acre.
- **Nozzles and Pressure:** Use 29 to 40 psi (200 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE coarse** droplets while maintaining good coverage of foliage. Keep booms lower than 60 cm from crop canopy.
- **Screens:** Use of 50 mesh screens or coarser are required.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
clodinafop	POST (foliar)	ACCase Lipid synthesis inhibitor	Toward growth areas (Symplast)	Grasses only	1
thifensulfuron/ tribenuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf only	2
fluroxypyr	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Application to crops stressed by extreme weather conditions such as frost, hail, saturated soils or drought as well as low fertility, insect damage or disease pressure may result in crop injury and/or reduce weed control.

Crop and weeds that are growing rapidly produce optimum activity. The optimum temperature range for the best activity is between 12 to 24°C. Activity will be reduced below 8°C and above 27°C.

## Tank Mixes:

### Herbicides:

- **In wheat (*spring and durum*) only:**
  - 2,4-D Ester (up to 226 g ae per acre)
  - MCPA Ester (up to 452 mL of a 500 g/L form or 377 mL of a 600 g/L form per acre)

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the *Signal F* and *Boost* labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 4 hours will reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Grazing Restrictions:** DO NOT graze or feed treated crop to livestock within 3 days of application.
- **Re-cropping Interval:** Barley, canola, field peas, flax, forage grasses, lentils, mustard, oats, rye and registered crops may be seeded the season after application.
- **Aerial Application:** DO NOT apply by aircraft.
- **Storage:** Store in a cool, dry place in original container. Shake well before using. If frozen, warm liquid component gradually to 10°C and shake well to reconstitute component before use.
- **Buffer Zones:**

Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground only	15	15

See the key to product pages on page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Tank Cleaning:

Thifensulfuron/tribenuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Thifensulfuron/tribenuron should be drained and flushed out immediately after use.

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. The addition of detergent will enhance cleanout.

## Hazard Rating:

**Signal F:**



Danger – Skin irritant

Caution Eye irritant

**Boost:**



Warning – Skin and Eye Irritant

**Nufarm Enhance Adjuvant:**



Caution – Skin irritant



Warning, contains the allergen soy

For an explanation of the symbols used here see pages 7 and 8.

# Simazine

Herbicide Group

**5 - simazine**

(Refer to page 45)

## Company:

Syngenta Canada distributed by Univar Environmental (*Princep Nine-T*)

Loveland Products Canada (*Simazine 480*)

## Formulations:

*Princep Nine-T* (PCP#16370): 90% simazine formulated as a water dispersible granular.

- Container size - 5 kg

*Simazine 480* (PCP#23181): 480 g/L simazine formulated as a solution.

- Container size - 2 x 10 L

## Crops and Staging:

**Established alfalfa or bird's-foot trefoil (*Princep Nine-T* only):**

DO NOT use in year of seeding. Apply after final cut in fall until freeze-up. DO NOT apply to the same field more than three consecutive years. Residues may build up with yearly applications.

**Corn (field, sweet):** Apply one week prior to seeding and incorporate to a depth of 1 inch (2.5 cm), or apply no later than 4 days after seeding corn. Rainfall is required to activate herbicide.

**Established shelterbelts (elm (American, Siberian), caragana, green ash, Manitoba (boxelder) maple):** Apply in fall or early spring before weeds begin growth. Injury may occur to shelter belts growing under saline conditions.

DO NOT apply to frozen ground

## Weeds and Staging:

*Simazine* is applied prior to the emergence of the weeds and kills them when they are exposed to the treated layer of soil.

- |  |                                      |                  |
|--|--------------------------------------|------------------|
| ◦ Barnyard grass                       | ◦ Ragweed                            | ◦ Wild oats      |
| ◦ Lamb's-quarters                      | ◦ Smartweed (including lady's-thumb) | ◦ Yellow foxtail |
| ◦ Perennial species starting from seed | ◦ Volunteer clovers                  |                  |
| ◦ Purslane                             | ◦ Wild buckwheat                     |                  |

## Rates:

- **Forage crops:**
  - *Princep Nine-T*: 0.45 kg per acre.
- **Corn:\***
  - *Princep Nine-T*: 0.61 to 0.81 kg per acre.
  - *Simazine 480*: 1.4 to 3.4 L per acre.
- **Shelterbelts:**
  - *Princep Nine-T*: 1.8 kg per acre.
  - *Simazine 480*: 3.8 to 5.7 L per acre.

\* Rate of application to corn is dependent on soil texture. Refer to specific labels for correct application rates on corn.

## Application Information:

- **Water Volume:** Minimum 121 L per acre. In shelterbelts, use a minimum of 202 L per acre.
- **Nozzles and Pressure:** For conventional flat fan nozzles use a maximum pressure of 30 to 45 psi (200 to 300 kPa). Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.
- **Screens:** Use 50 mesh or coarser nozzle screens and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
simazine	PPI (soil active)	PSII Inhibitor/ Membrane disruptor	Upward soil applied (Apoplast)	Broadleaf & grass	5

## Effects of Growing Conditions:

When applying to forage stands, dry soil conditions at the time of weed emergence may result in reduced weed control.

## Tank Mixes:

None registered.

**Note:** The above mixes are those listed on the simazine labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Moderate rainfall after application enhances activity.
- **Re-entry Interval:** DO NOT enter treated areas for 12 hours following application.
- **Grazing Restrictions:** In forage stands, allow 30 days between application and grazing, 60 days between application and cutting for feed. DO NOT graze or cut corn for feed prior to ear emergence.
- **Re-cropping Interval:** Simazine is persistent and residues may persist for several years depending on soil pH, available soil moisture, number of yearly applications, and the sensitivity of the following crop. Simazine will break down in soil more slowly under conditions of high pH and/or low rainfall. Corn will tolerate soil residues of simazine and may be planted the year of application. Navy beans, onions, peas may be injured 12 month after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze *Simazine 480*. *Princep Nine-T* may be frozen. Store in a cool, dry place.



• **Buffer Zones:**

Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Alfalfa	1	1	4
Bird's-foot trefoil, sweet corn	1	1	5
Field corn	1	1	10
Shelter-belts	2	1	20

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Caution – Poison. (*Simazine 480*)

For an explanation of the symbols used here see pages 7 and 8.

# Simplicity

**Herbicide Group**  
**2 - pyroxsulam**  
(Refer to page 45)

## Company:

Corteva Agriscience

## Formulation:

**Simplicity 30 OD (PCP#28887):** 30 g/L pyroxsulam formulated as an oil-dispersion.

- Container size - 2 x 8 L

**Simplicity GoDRI (PCP#31916):** 21.5% pyroxsulam formulated as a water dispersible granule.

- Container size - 4 x 2.24 kg

## Crops and Staging:

**Wheat (Spring, and durum):** 3 leaf stage until prior to the emergence of the flag leaf (up to 6 leaf plus 2 tillers).

**Winter wheat:** 1 to 3 leaf stage in fall or 2 to 7 leaf plus 4 tillers in spring.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

When applied alone, add a 90% active non-ionic surfactant such as *Agral 90* at 0.25 L per 100 L of spray solution.

- Adjuvants purchased separately.

See the *Simplicity* or *Simplicity GoDRI* labels for additional adjuvant requirements.

Shake *Simplicity 30 OD* jug well before adding to spray tank.

**Wild oats (less than 75 plants per sqm):**

- *Simplicity 30 OD* at 0.15 L per acre (one case treats 106 acres) or *Simplicity GoDRI* at 21 g per acre (one 2.24 kg jug treats 106 acres).

**All weeds listed below:**

- *Simplicity 30 OD* at 0.20 L per acre (one case treats 80 acres) or *Simplicity GoDRI* at 28 g per acre (one 2.24 kg jug treats 80 acres).
- **Grasses:**

Weed	Stage
Wild oat	up to the 4 leaf, 2 tillers
Barnyard grass, Yellow foxtail Green foxtail*	1 to 5 leaf
Japanese brome	1 to 6 leaf
Downy brome†	

- **Broadleaves:**

- Canada thistle\* (up to 30 cm, before budding)
- Cleavers (up to 6 whorl)
- Cow cockle (up to 8 leaf)
- Common chickweed (up to 10 cm)
- Corn spurry (up to 2 whorl or 10 cm tall)
- Dandelion\* (spring rosettes <20 cm diameter)\*
- Flixweed (up to 10 cm)
- Hemp-nettle (1 to 8 leaf)
- Redroot pigweed (1 to 8 leaf)
- Round-leaved mallow (up to 6 leaf or 10 cm)
- Russian thistle\* (up to 10 cm)
- Shepherd's-purse (up to 30 cm)
- Smartweed (1 to 5 leaf)
- Stinkweed (up to 30 cm)
- Volunteer canola (1 to 6 leaf)\*\*
- Wild buckwheat (1 to 4 leaf)\*

\* **Suppression only.**

\*\* **Not Clearfield varieties**

† **Control with fall application in winter wheat; suppression only in spring applications on both winter and spring wheat.**

**Winter wheat (*Simplicity* alone) for downy brome suppression use the following adjuvant:**

- *Merge* at 0.5 L per 100 L of spray (spring application only). See the *Simplicity* or *Simplicity GoDRI* labels for additional adjuvant requirements.

**Application Information:**

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre
  - **Aerial:** 12 L per acre
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE coarse** droplets. See the label for detailed instructions on aerial application.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
pyroxsulam	POST (foliar)	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	2

**Effects of Growing Conditions:**

DO NOT apply to crops that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury may result and/or weed control may be reduced.

**Tank Mixes:****Herbicides:**

- The addition of an adjuvant to *Simplicity OD* is not required in tank mixes unless the adjuvant is required by the tank mix partner. Consult the *Simplicity GoDRI* label for added requirements.

Tank-Mix Partner	Product Rates
2,4-D Ester	280 g ae per acre
<i>Buctril M</i> (bromoxynil + MCPA)	0.4 L per acre
<i>Curtail M</i>	0.6 L per acre
<i>Frontline 2,4-D</i> (florasulam + 2,4-D)	60 acres per case
<i>Frontline XL</i> (florasulam + MCPA)	0.5 L per acre
MCPA ester (600 formulation)	0.23 to 0.38 L per acre
<i>OcTTain XL</i>	0.45 L per acre

Tank-Mix Partner	Product Rates
<i>Paradigm</i> **	10 grams per acre
<i>Pixxaro</i> **	40 acres per case
<i>Prestige XC</i>	27 acres per case
<i>Spectrum</i> (florasulam + Curtail M)	20 acre per case
<i>Stellar/ Stellar XL</i>	40 acres per case
<i>Thumper</i> (bromoxynil + 2,4-D)	0.4 L per acre

**Fungicides:**

- *Tilt*\* (label rates)
- *Stratego*\*(label rates)
- MCPA + *Tilt* \*
- MCPA + *Stratego*\*

**Fertilizers:** None registered

\* High rate of *Simplicity GoDRI* only

\*\* *Simplicity GoDRI* only.

**Note:** The above mixes are those listed on the *Simplicity OD* or *Simplicity GoDRI* labels only.

Corteva Agriscience also supports the following mixes that are not on the *Simplicity* labels. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** 2,4-D ester (up to 420 g ae per acre), *Attain XC* (low use rate), *Attain XC* + either *Tilt* or *Stratego*, *Barricade II*, Bromoxynil, *Paradigm*, *Pixxaro*, *Retain*, Thifensulfuron/tribenuron.
- **Fungicides:** *Tilt* and *Stratego* are supported mixes with *Simplicity OD* at the high rate only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**Restrictions:**

- **Rainfall:** Within 2 hours may reduce control.
- **Pre-harvest Interval:** Leave 60 days between treatment and harvest.
- **Grazing Restrictions:** Must NOT be grazed or fed to livestock for 7 days after treating crop.
- **Re-cropping Interval:** Barley, condiment and oilseed quality brown mustard (*B. juncea* types), canola, chickpea, dry bean, flax, lentil, oat, field pea, potato, spring wheat, soybean, sunflower and yellow mustard may be seeded 11 months following treatment.
- **Aerial Application:** May be applied by air.
- **Storage:** Avoid freezing, store above -9°C. Allow product to warm above 7°C before using and thoroughly mix the product prior to use.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	1	1	2
Helicopter	1	1	60
Fixed wing aircraft	1	1	70

See page 36 for an explanation of the different habitats.

\* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

**Sprayer Cleaning:**

Equipment used to apply *Simplicity* should not be used to apply other pesticides to sensitive crops without thorough cleaning. To avoid subsequent injury to crops other than cereals, all spraying equipment must be thoroughly cleaned both inside and out, as follows:

1. Immediately after spraying drain the sprayer tank. Any contamination on the outside of the spraying equipment should be removed by washing with clean water.
2. Rinse inside of tank with clean water and flush through booms and hoses using at least one tenth of the spray tank volume. Drain tank completely.

3. Add *All Clear* tank cleaner at 0.5 L per 100 L of water while filling the tank ½ full with clean water. Agitate for at least 15 minutes ensuring the cleaning solution comes in contact with interior surfaces. Flush the boom and hoses with the cleaning solution and be sure to remove caps at the end of booms to allow cleaning solution to reach all areas of the boom. Leave the spray solution in the sprayer for an extended period if possible (eg. overnight). Thoroughly drain the sprayer.
4. Remove nozzles and screens and clean separately with *All Clear* cleaning solution (50 mL in 10 L water).
5. Rinse the tank with clean water and flush through the booms and hoses using at least one tenth of the spray tank volume. Drain tank completely.

Refer to pages 12 and 13 for additional information on sprayer cleaning.

### Hazard Rating:



Warning – Poison



Warning – Contains the allergen soy



Caution – Eye and Skin Irritant, Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

## Solo Ultra

*This product is a prepackaged tank mix of Solo (see Imazamox page 260) and Poast Ultra (page 327). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the effect of growing conditions, and restrictions for the component products see the product pages listed above.*

### Herbicide Group

1 - sethoxydim

2 - imazamox

(Refer to page 45)

### Company:

BASF Canada

### Formulation:

The *Solo Ultra* package contains the following components:

***Solo ADV (PCP#32066):*** 25 g/L imazamox formulated as a water soluble concentrate with built in adjuvant.

- Container size – 2 x 6.5 L jugs

***Poast Ultra B (PCP#31354):*** 450 g/L sethoxydim formulated as an emulsifiable concentrate.

- Container size – 1 x 6.2 L jug

### Crops and Staging:

**CLEARFIELD sunflower:** 2 to 8 leaf stage.

**CLEARFIELD canola:** 2 to 6 leaf stage.

**CLEARFIELD lentil:** 2 to 9 leaf stage.

**CLEARFIELD oilseed mustard (*Brassica juncea*):** 2 to 6 leaf stage

**Soybean:** Cotyledon to 4 leaf stage

Temporary crop yellowing may be observed shortly after application in CLEARFIELD canola.

### Weeds Staging:

Weeds controlled by *Solo ADV* plus the grasses controlled by *Poast Ultra* at the stages indicated on the component product pages plus:

- Quackgrass (Suppression - 2 to 5 leaf)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

### Rates:

***Solo ADV:*** 325 mL per acre

***Poast Ultra:*** 154 mL per acre

(One package treats 40 acres)

## Tank Mixes:

### Herbicides:

- *Poast Ultra* (40 mL per acre)

**Insecticides:** None registered.

**Fungicides:** None registered.

**Fertilizers:** None registered.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Sortan IS

**Herbicide Group**  
**2 - rimsulfuron**  
(Refer to page 45)

## Company:

Corteva Agriscience (PCP#32627)

## Formulation:

20% rimsulfuron formulated as a water dispersible granule.

- Container size: 1.2 Kg

## Crops and Staging:

### Field corn:

- Pre-emergent;
- Post-emergent up to 5 leaf (3 visible collars).

## Weeds and Staging:

Maximum 30.4 g per acre of *Sortan IS* or 6.1 g per acre of the active ingredient rimsulfuron PER YEAR.

**Pre-emergent surface:** 30.4 g per acre (one jug treats 40 acres) controls the following weeds emerging from seed:

- Barnyard grass
- Foxtail (green, yellow\*)
- Lady's-thumb\*
- Proso millet
- Shepherd's-purse
- Sow-thistle (annual)\*
- Volunteer canola (not including Clearfield varieties)

\* **Suppression only**

**Post-emergent:** *Sortan IS* applied alone requires the addition of a non-ionic surfactant such as *Agral 90*, *Agsurf II* or *Cittowet Plus* at 0.2 L per 100 L of spray solution.

- *The weeds listed above plus the following:*

Weed	Maximum leaf stage	Rate	
		15.2 g per acre	30.4 g per acre
Barnyard grass	1 to 4 leaf		✓
Foxtail (green, yellow*)	1 to 4 leaf		✓
Lamb's-quarters*	2 to 4 leaf		✓
Redroot pigweed	2 to 4 leaf	✓	✓
Shepherd's-purse	Cotyledon – 4 leaf		✓
Volunteer canola (not including Clearfield varieties)	Cotyledon – 5 leaf	✓	✓
Wild buckwheat	up to 4 leaf	(If mixed with glyphosate)	✓
Witchgrass	1 to 4 leaf		✓
Quackgrass	3 to 6 leaf		✓

\* **Suppression only**

## Application Information:

- **Water Volume:** Minimum 40 to 77 L per acre. Higher water volumes may provide better performance.
- **Nozzles and Pressure:** Use 25 to 40 psi (175 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE medium** droplets while maintaining good coverage of foliage.
- **Screens:** Use 50 mesh filter screens or larger.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
rimsulfuron	POST (foliar)	ALS Amino Acid Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	2

## Effects of Growing Conditions:

Crop injury and reduce weed control may result if application is made to plants that have been stressed by extreme environmental conditions, low fertility, compacted soil, disease or insect damage.

## Tank Mixes:

**Herbicides:** Glyphosate (360 g ae per acre) – pre-emergent; post-emergent (glyphosate tolerant corn only).

**Insecticides:** None Registered.

*Sortan IS* should not be applied to corn that has been treated with organophosphate insecticides. Leave 7 days between the application of *Sortan IS* and that of a foliar organophosphate insecticide.

**Note:** The above mixes are those listed on the *Sortan IS* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 2 to 4 hours may reduce the efficacy of post emergent treatments. A modest rainfall after pre-emergent applications will improve control of emerging seedlings.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT feed (silage, grazing, greenfeed, grain) treated crop to livestock within 30 days of application.
- **Pre-harvest Interval:** DO NOT apply within 30 days of harvest for feed or grain.
- **Re-cropping Interval:** Corn may be seeded any time after application. Barley, canola, chickpea, corn (seed or sweet), dry beans, faba beans, field pea, flax, lentil, oat, potatoes, soybean, sunflower and wheat (spring, durum) may be grown the year after application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in original containers in away from other fertilizers, food or feed. Freezing will not impair effectiveness.
- **Buffer Zones:**

Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground application	1	1	5

See the key to product pages on page 36 for an explanation of the different habitats.


\* Buffer zones may be reduced when using drift reduction measures. See the Buffer Zone Calculator on the Pest Management Regulatory Agency web site.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:

 Warning – Contains the allergens milk and sulfites

 Warning – Contains phenol

For an explanation of the symbols used here see pages 7 and 8.

# Tandem

*This product is the equivalent of a prepackaged tank mix of Tandem A (see Simplicity page 365) and Tandem B (See Fluroxypyr on page 217). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - pyrosulam**  
**4 - fluroxypyr**  
*(Refer to page 45)*

## Company:

Corteva Agriscience

## Formulation:

The *Tandem* package has 2 components:

**Tandem A (PCP#29985):** 30 g/L pyroxsulam formulated as an oil-dispersion.

- Container size - 8 L jug

**Tandem B (PCP#29965):** 333 g ae/L fluroxypyr formulated as an emulsifiable concentrate.

## Crops and Staging:

**Spring wheat (including durum):** 3 leaf stage until the first node can be felt in the stem (up to 6 leaf plus 2 tillers).

**Winter wheat:** Apply in the spring from the 3 tiller stage to just before the flag leaf stage.

When tank-mixing always check the tank mix partner recommendations for additional staging restrictions.

## Weeds, Rates and Staging:

**Tandem A at 0.15 L per acre plus Tandem B at 85 mL per acre (53 acres per case):**

- Wild oats (less than 75 plants per sqm)

**Tandem A at 0.20 L per acre plus Tandem B at 127 mL per acre (40 acres per case):**

- **The grass weeds controlled by Simplicity (see page 365) plus the following broadleaf weeds:**

Weed	Maximum Application Stage
Wild buckwheat*	4 leaves
Smartweed	5 leaves
Round-leaved mallow, Volunteer canola**	6 leaves
Cleavers, Cow cockle, Hemp-nettle <sup>†</sup> , Kochia, Redroot pigweed, Stork's-bill*	8 leaves or whorls
Common chickweed, Flixweed, Russian thistle*	10 cm
Volunteer flax	12 cm
Dandelion*	up to 20 cm, diameter
Canada thistle*	up to 30 cm, prebud

\* **Suppression only.**

\*\* **Not Clearfield varieties**

<sup>†</sup> **NOTE** Group 2 resistant biotypes only controlled to the 6 leaf stage.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **In spring wheat (including durum):**
  - 2,4-D Ester 700 (0.24 to 0.32 L per acre)
  - *Curtail M*
  - MCPA Ester (0.24 to 0.38 L per acre) (600 g ae/L forms)

**Fungicides:**

- *In spring wheat (including durum):*
  - *Tilt*
  - *Stratego*

**Note:** The above mixes are those listed on the *Tandem* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**Restrictions (different from the components):**

- **Aerial Application:** May be applied by air.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	2
Helicopter	1	1	55
Fixed wing aircraft	1	1	65

See page 36 for an explanation of the different habitats.

\* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

*See component products for more information on additional restrictions, application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

## Tensile\*

*This product is a prepackaged tank mix of Solo (page 260) and Lontrel Dry (Lontrel Dry is only available with Salute and Tensile) (page 151). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the effect of growing conditions, and restrictions for the component products see the product pages listed above.*

## Herbicide Group

**2 - imazamox**

**4 - clopyralid**

(Refer to page 45)

**Company:**

BASF Canada

**Formulation:**

The *Tensile*\* package contains 2 components:

**Solo (PCP#28741):** 70% imazamox formulated as a dispersible granule.

- Container size - 4 x 117 g water soluble bags

**Lontrel Dry (PCP#27306):** 75% clopyralid formulated as a dispersible granule.

- Container size - 2 x 810 g

\* **Note:** *Tensile* is no longer manufactured but supplies may still remain in the distribution system. This product may be removed in future editions.

**Crops and Staging:**

**CLEARFIELD canola varieties:** 2 to 6 leaf stage.

Apply only to CLEARFIELD canola varieties; application to any other variety of canola or any other crop will result in crop death.



## Weeds and Staging:

- Weeds controlled by *Solo* plus:
  - Canada thistle (rosette to pre-bud stage)\*
  - Sow-thistle, annual
  - Sow-thistle, perennial\*
  - Wild buckwheat
- \* Top growth control for 6 to 8 weeks

## Rates:

**Solo:** 11.7 g per acre.

**Lontrel Dry:** 40 g per acre.

(One case treats 40 acres)

**Merge:** 0.5 L per 100 L of spray solution (sold separately). At a spray volume of 40 L per acre one 8.1 L jug of *Merge* will treat 40 acres. *Tensile* MUST be applied with *Merge* adjuvant.

DO NOT apply *Tensile* more than once or follow *Tensile* with any other products containing clopyralid or imazamox in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 11.

## Restrictions and Application Information:

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

Particular attention should be paid to the recropping restrictions for both *Solo* and *Lontrel*.

# Thifensulfuron/tribenuron

Herbicide Group  
2 - thifensulfuron  
& tribenuron  
(Refer to page 45)

## Company:

FMC Corporation (*Refine SG*)

Arysta LifeScience Canada (*Deploy WDG*)\*

FMC Corporation (*Nimble*)\*

AgraCity (*MPower R*)

Nufarm Agriculture (*Boost*)

Rotam North America (*Draft*)

\* This product is no longer manufactured but supply may still remain in distribution. This product may be removed from future editions of this guide.

## Formulation:

**Refine SG (PCP#28285):** 33.35% thifensulfuron methyl plus 16.65% tribenuron methyl formulated as a water soluble granule.

- Container size - 486 g

**Boost (PCP#30377); Deploy WDG (PCP#30846); Draft (PCP#31904), MPower R (PCP#30945), Nimble (PCP#29467)\* = 75% WDG formulations:** 50% thifensulfuron methyl plus 25% tribenuron methyl formulated as a water dispersible granule.

- Container size - 320 g

## Crops and Staging:

Apply from 2 leaf to the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

- Cereals:
  - Barley
  - Oat
  - Wheat (including durum spring and winter)

- **Sulfonylurea (SU) tolerant canola – 2 to 5 leaf and prior to bolting (*Draft only*).**
- **Seedling or established forage grasses for forage or seed production:\***
  - Bromegrass (meadow, smooth)
  - Fescue (creeping red, tall)
  - Kentucky bluegrass\*\*
  - Orchardgrass
  - Wheatgrass (crested, intermediate, northern, pubescent, slender, streambank, tall, western)

**\* NOTE: Since the use of this product on forage grasses is registered under the User Requested Minor Use registration system, the manufacturer assumes no responsibility for herbicide performance. Users of this product on forage grass do so at their own risk.**

**\*\* Established stands only.**

## Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

- **Weeds Controlled:**
  - Annual smartweed (green, lady's-thumb)
  - Ball mustard
  - Chickweed (1 to 6 leaf)
  - Common groundsel
  - Corn spurry
  - Cow cockle
  - Flixweed
  - Hemp-nettle
  - Lamb's-quarters
  - Narrow-leaved hawk's-beard
  - Redroot pigweed
  - Russian thistle
  - Shepherd's-purse
  - Stinkweed
  - Tartary buckwheat
  - Volunteer canola (CLEARFIELD varieties controlled with 2,4-D or MCPA mixes in cereals or grass crops only)
  - Volunteer sunflower
  - Wild buckwheat\*
  - Wild mustard
- **Weeds Suppressed:**
  - Canada thistle (less than 6 inches or 15 cm tall or across)\*\*
  - Cleavers (1 to 3 whorls)
  - Round-leaved mallow (2 to 6 leaf)
  - Scentless chamomile
  - Sow-thistle (less than 6 inches or 15 cm tall or across)\*\*
  - Stork's-bill (2 to 6 leaves)
  - Toadflax (less than 6 inches or 15 cm tall)

**\* Refine SG: up to 5 leaf stage; 75% WDG formulations: up to 3 leaf stage only.**

**\*\* Prior to budding**

## Rate:

**Refine SG:** 12 g per acre (one 486 g container treats 40 acres).

**75% WDG formulations:** 8 g per acre (one 320 g container treats 40 acres).

Add *Agral 90*, *AgSurf II\**, *Citowett Plus*, *HiActivate\**, *Liberate*, *Nufarm Enhance*, or *Super Spreader\** surfactants at 0.2 L per 100 L of spray solution.

**\* Refine SG only.**

Maximum of ONE APPLICATION per year of thifensulfuron/tribenuron or other products with the same active ingredients.

Thifensulfuron/tribenuron may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing. Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 22 L per acre.
  - **Aerial (Refine SG only):** Minimum 10 L to maximum 20 L per acre.
- **Nozzles and Pressure:** Use 30 to 40 psi (210 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
thifensulfuron/ tribenuron	POST (foliar)	ALS Amino Acid Synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

DO NOT apply to wheat, barley or oats that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result.

Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

## Tank Mixes:

### Herbicides:

- Tank mix partners applied at all label rates. Recommended adjuvants are used unless otherwise noted.

Tank Mix Partner	Crops				
	Spring wheat	Winter wheat	Durum	Barley	Oats
2,4-D amine or ester (160 to 212 g ae per acre)* <sup>†</sup>	✓	✓	✓	✓	
Clodinafop 240EC (95 to 115 mL per acre) plus <i>Score</i> adjuvant	✓		✓		
Clodinafop 240EC (95 mL per acre) + Dicamba ( <i>Banvel II</i> rates below) plus <i>Score</i> adjuvant	✓		✓ <sup>Δ</sup>		
Clodinafop 240EC (95 mL per acre) + MCPA ester (0.23 <sup>G</sup> or 0.34 to 0.45 L per acre)* plus <i>Score</i> adjuvant	✓		✓		
<i>Curtail M</i> (0.61 L per acre) <sup>†</sup>	✓			✓	
Dicamba ( <i>Banvel II</i> only at 44.5 mL per acre to 58.7 mL per acre**) <sup>†</sup>	✓		✓ <sup>Δ</sup>	✓	
Fenoxaprop 120EC (0.16 to 0.31 L per acre)	✓		✓	✓	
Fenoxaprop 120EC (0.16 to 0.31 L per acre) + MCPA ester (0.23 <sup>♦</sup> or 0.34 L per acre)*	✓		✓	✓	
Fluroxypyr ( <i>Perimeter II</i> at 63 mL per acre only) <sup>†</sup>	✓		✓	✓	
Fluroxypyr + 2,4-D ( <i>Flurox 2,4</i> only) <sup>†</sup>	✓ <sup>ΔΔ</sup>		✓ <sup>ΔΔ</sup>	✓ <sup>ΔΔ</sup>	
Imazamethabenz ( <i>Assert</i> only)	✓		✓	✓	
Imazamethabenz ( <i>Assert</i> only) + MCPA ester (0.28 to 0.45 L per acre)*	✓		✓	✓	
<i>Lontrel 360</i> (85 mL per acre) <sup>†</sup>	✓			✓	
<i>Lontrel 360</i> (85 mL per acre) + 2,4-D ester* or MCPA ester* (0.34 L per acre) <sup>†</sup>	✓			✓	
MCPA amine or ester (0.23 <sup>♦</sup> or 0.28 to 0.45 L per acre)* <sup>†</sup>	✓	✓	✓	✓	✓
<i>Simplicity 30 OD</i> (0.15 to 0.20 L per acre) <sup>†</sup>	✓ <sup>Δ</sup>		✓ <sup>Δ</sup>		

<sup>†</sup> Marked tank mixes require the addition of a non-ionic surfactant. Unmarked mixes do not require additional adjuvant beyond what is provided for by the tank mix partner.

<sup>Δ</sup> *Refine SG* only.

<sup>ΔΔ</sup> *Boost, Deploy, MPower R* and *Nimble* only.

\* 500 g ai/L formulation.

\*\* High rate of *Banvel II* with *Refine SG* only.

<sup>♦</sup> Tank mix with 0.23 L per acre to control Clearfield canola at the 2 to 4 leaf stage.

◦ Check the above tank mix partner(s) respective labels for additional staging and varietal restrictions.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the Thifensulfuron/tribenuron labels only.

FMC also supports the following mixes that are not on the *Refine SG* label. Mixes must be applied according to the most restrictive use limitations for either product:

- Herbicides:** *Axial*, *Axial Xtreme*, *Everest 3.0*, *Everest 3.0 + 2,4-D*, *Flucarbazone 2.0*, *Flucarbazone 2.0 + 2,4-D*, *Lontrel XC*, *Puma Advance*, *Simplicity GoDRI*, *Traxos*, *Varro*, *Varro + 2,4-D ester*, *Varro + MCPA ester*
- Fungicides:** *Acapela*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

Restrictions:

- **Rainfall:** Rainfall of 1 inch (25 mm) or more beginning within 1 hour of application of *Refine SG* or 4 hours for 75% WDG formulations may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours following application.
- **Grazing Restrictions:** Must NOT be grazed or fed to livestock for 7 days after treatment.
- **Re-cropping Interval:** No restrictions the year after treatment. Canola, flax, lentil and alfalfa may be planted 2 months after application.
- **Aerial Application:** *Refine SG* may be applied by air. DO NOT apply 75% WDG formulations by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**
  - *Refine SG:*

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	15
Fixed wing airplane	1	0	125
Helicopter	1	0	100

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- **75% WDG formulations (Ground equipment only):**
  - Leave a 15 metre buffer zone between last spray swath and sensitive upland or aquatic habitats such as shelterbelts, wetlands, sloughs, and woodlots.


Sprayer Cleaning:

Thifensulfuron/tribenuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray thifensulfuron/tribenuron should be drained and flushed out immediately after use.


Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. If mixing with another pesticide with different cleaning measures, those measures should be integrated into 'Method A' (e.g. addition of detergent).

Hazard Rating:

75% WDG formulations:

 Warning – Eye and Skin Irritant

*Refine SG:*

 Warning – Contains the allergen milk.

For an explanation of the symbols used here see pages 7 and 8.

# Thifensulfuron/tribenuron + MCPA ester

Herbicide Group  
2 - thifensulfuron  
& tribenuron  
4 - MCPA  
(Refer to page 45)

These products are prepackaged tank mix of Refine SG (page 349) and MCPA ester (page 269).  
Information listed is restricted to Crop, Weeds and Rates and Tank mixes. For other detailed information on the component products see the product pages listed above.

## Company:

FMC Corporation (*Refine M*)

Loveland Products Canada (*BroadSide*)

## Formulation:

**Refine SG (PCP#28285):** 33.35% thifensulfuron methyl + 16.65% tribenuron methyl; formulated as a water soluble granule.

- Container size - 486 g

**MCPA ester (PCP#27803):** 600g/L MCPA formulated as an emulsifiable concentrate.

- Container size - 1 x 7.6 L of MCPA ester

## Crops and Staging:

**Barley, wheat (including durum and winter) and oat:** fully expanded 3<sup>rd</sup> leaf to the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

## Weeds and Staging:

Weeds controlled or suppressed by *Refine SG* plus 'Susceptible Weeds' controlled by MCPA ester, plus:

- Dandelion (rosettes, less than 15 cm in diameter)
- Volunteer canola (2 to 4 leaf) (including CLEARFIELD varieties)

## Rate:

**Refine SG:** 12 g per acre

**MCPA 600 Ester:** 0.19 L per acre

(One case treats 40 acres)

Refer to the product labels for complete mixing instructions.

A general guide to mixing can be found on page 11.

## Tank Mixes:

### Herbicides:

- **In spring wheat (including durum) and barley:**
  - *Assert* (0.54 to 0.67 L per acre)
- **In spring wheat (NOT durum) and barley:**
  - *Lontrel 360* (85 mL per acre)

Check the above tank mix partners respective labels for additional staging and varietal restrictions.

**Note:** The above mixes are those listed on the *Refine SG* label only.

FMC also supports the following mixes that are not on the *Refine M* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Axial*, *Axial Xtreme*, *Clodinafop*, *Everest 2.0*, *Everest 3.0*, *Lontrel XC*, *Puma Advance*, *Simplicity OD/GoDRI*, *Traxos*, *Varro*
- **Fungicides:** *Acapela*

See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.

# Topramezone

Herbicide Group  
**27 - topramezone**  
*(Refer to page 45)*

## Company:

AmVac Corporation, distributed in Canada by UAP (*Impact* - PCP#28141)

BASF Canada (*Armezon* - PCP#30131)

## Formulation:

336 g/L topramezone formulated as a suspension.

- Container size:
  - *Armezon*: 0.6 L
  - *Impact*: 8 L

## Crops and Staging:

Corn (field<sup>†</sup>, seed, sweet<sup>††</sup>): From the 1 to 7 leaf stage

<sup>†</sup> Including both conventional and herbicide tolerant varieties.

<sup>††</sup> NOTE: Tolerance of sweet corn varieties to topramezone and its mix partners may be variable. When tolerance is unknown, check with the supplier of seed and/or apply to a small area first to assess tolerance.

## Weeds and Staging:

The following weeds are controlled with topramezone unless otherwise indicated:

*Topramezone* MUST BE applied in tank mix with one of the herbicide options indicated in "Tank Mixes:"

- **Grass weeds below from the 1 to 4 leaf stage:**
  - Barnyard grass\*
  - Foxtail (green and yellow)\*
- **Broadleaf weeds below from the 1 to 8 leaf stage:**
  - Chickweed (common)\*
  - Kochia (up to 10 cm)\*\*
  - Lamb's-quarters\*
  - Lady's-thumb\*
  - Nightshade (eastern black)
  - Pigweed (redroot, green)
  - Ragweed (common)
  - Velvetleaf\*
  - Volunteer canola (up to 8 leaf) including glyphosate-tolerant varieties\*\*
  - Wild mustard

\* **Suppression only.**

\*\* *Armezon* only. All types including glyphosate-resistant varieties.

## Rates:

15 mL per acre

Must be applied with either:

- *Merge* adjuvant at 0.5 L per 100 L of spray solution

-or-

- *Assist* (or *XA Oil concentrate*\*) at 1.25 L per 100 L plus UAN (liquid 28-0-0) at 1.25 L per 100 L of spray solution.

Maximum ONE APPLICATION of topramezone per season.

## Application Information:

- **Water Volume:** Minimum 81 L per acre.
- **Nozzles and Pressure:** Use 20 to 40 psi (140-276 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of *ASABE medium* droplets while maintaining good coverage of foliage.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
topramezone	POST (foliar)	HPPD Pigment Inhibitor	Little (Apoplast) some uptake by roots	Broadleaf & grass	27

## Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool temperatures, weeds are not actively growing, control may be reduced.

## Tank Mixes:

### Herbicides:

Topramezone must be mixed with one of the following:

- **Field and Sweet Corn:**
  - AAtrex (0.42 L per acre) (DO NOT use Merge with this mix in sweet corn)
- **Field corn only:**
  - Frontier Max (0.3 L per acre) + AAtrex (rates above)
- **Glyphosate tolerant corn only:**
  - Glyphosate (360 g ae per acre, no adjuvant required) (see glyphosate page for details)
  - Glyphosate + AAtrex (rates above)
  - Glyphosate + AAtrex (rates above) + Frontier Max (rates above)

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the topramezone label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** DO NOT apply if heavy rain is forecast. Contact manufacturer for more information.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze treated fields or cut for feed within 45 days of application.
- **Pre-harvest Interval:** Leave 45 days between application and harvest.
- **Re-cropping Interval:** Field corn only may be seeded to treated areas after a crop failure. Winter wheat may be seeded a minimum four months after application. Spring wheat, canola, field corn, navy (white) bean, soybean, lentils, pea and alfalfa may be seeded the following crop year. Check tank mix options for additional reseeding restrictions. Conduct a field bioassay (a test strip grown to maturity) the year before growing any other crop.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

- Spray when winds are under 16 km/hr, but not dead calm.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning – Contains the allergen soy.

For an explanation of the symbols used here see pages 7 and 8.

# Tordon 22K

Herbicide Group

**4 - picloram**

(Refer to page 45)

## Company:

Corteva Agriscience (PCP#9005)

## Formulation:

240 g/L picloram acid present as a potassium salt, formulated as a solution.

- Container size - 10 L, 3.6 L

*Note: Available only through selected retail outlets.*

## Crop and Staging:

Apply at any stage of permanent grass pastures, rangeland and non-cropland.

*NOTE: It is strongly recommended that this product be applied by a licensed applicator.*

## Weeds, Rates and Staging:

For the control of biennial and deep-rooted perennial weeds listed below:

Weed	Rate L per acre	Backpack (mL of Tordon 22K per 100 M <sup>2</sup> )*
Scentless chamomile	0.445	11
Knapweed (diffuse, spotted)	0.91	22
Canada thistle, pasture sage, poverty weed, Russian knapweed, perennial sow-thistle or <i>Low plant densities of:</i> Leafy spurge, field bindweed, toadflax	1.8	45
Leafy spurge, field bindweed, toadflax	3.6 <sup>†</sup>	90 <sup>†</sup>

<sup>†</sup> NOTE: This rate is only registered for spot application treating a maximum of one acre out of every two acre area at this rate.

\* Mix with 18 litres of water and the spray solution over 100 square metres.

For best results, applications should be made when perennial weeds have fully developed, green leaves. Application in late summer (or periods of dry weather) when plants are not actively growing may result in unsatisfactory control.

## Application Information:

- **Water Volume:** 160 to 325 L per acre without spray running off foliage.
- **Nozzles and Pressure:** Maximum 150 to 350 kPa (20 to 50 psi) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of application equipment and pressure that is designed to deliver an even coverage of coarse droplets that are not prone to drift. Non-target broadleaf plants are very sensitive to Tordon 22K drift.
- Avoid conditions that are conducive to drift. (See page 7 for drift control suggestions)



## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
picloram	POST (foliar) also has soil activity	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

**IMPORTANT:** *Tordon 22K* is a very persistent and water-soluble herbicide. Treated soil should NOT be moved from the treated area. DO NOT apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. DO NOT apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. If shallow aquifers are present, DO NOT apply *Tordon 22K*. This product is moderately toxic to fish. DO NOT apply to any water bodies or in areas where the runoff from treated areas will reach fish-bearing waters.

*Tordon 22K* must not be applied on range and pasture acres that are irrigated. DO NOT compost or mulch clippings from grass treated with *Tordon 22K*.

## Effects of Growing Conditions:

Avoid application when pasture and target weeds are under stress from drought, flooding, extreme heat or cold, as injury to grass or unacceptable control may result. Avoid spraying if temperatures exceed 28°C.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** Rain within 6 hours of application may cause poor results. Heavy rainfall may dissolve and carry *Tordon 22K* away from the target area, or it may leach dissolved *Tordon 22K* out of the root zone or to undesirable locations.
- **Grazing Restrictions:** DO NOT graze lactating dairy animals within 6 weeks after treatment. There are no grazing restrictions for other livestock. DO NOT use manure from animals grazing treated forage to fertilize susceptible plants or crops.
- **Re-cropping Interval:** *Tordon 22K* may persist in the soil for up to 5 years. For this reason *Tordon 22K* may only be applied on permanent grass pastures and rangeland unless applied by an authorized pesticide applicator. Avoid the root zone of desirable trees or shrubs.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:**
  - Hand-held or backpack sprayer and spot treatment DO NOT require a buffer zone from sensitive habitat, but efforts should be made to minimize exposure to sensitive plants and open water or wetlands.

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only	4	2	120

See page 36 for an explanation of the different habitats.

\* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

*Tordon 22K* can cause severe injury to sensitive crops (especially pulses and other broadleaf crops) at very low concentrations. Spray equipment should be flushed out immediately after spraying *Tordon 22K*. Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Caution – Poison.



Danger – Eye Irritant.



May Cause Skin Irritation.

For an explanation of the symbols used here see pages 7 and 8.

# Tralkoxydim

Herbicide Group

1 - tralkoxydim

(Refer to page 45)

## Company:

Corteva Agriscience (*Liquid Achieve* - PCP#28555; *Intake* adjuvant - PCP#31243)

ADAMA Canada (*Bison* - PCP#29256; *Addit* adjuvant - PCP#29263)

Loveland Products Canada (*Marengo* - PCP#29289; *Turbocharge B* adjuvant - PCP#29288)

Nufarm Agriculture (*Nufarm Tralkoxydim Liquid* - PCP#32078; *Adjuvant for Nufarm Tralkoxydim* - PCP#30828)

## Formulation:

400 g/L tralkoxydim formulated as a suspension concentrate.

- Container sizes:
  - *Marengo*: 8 L of tralkoxydim plus 4L *Turbocharge*.
  - *Bison*: 8 L of tralkoxydim plus 8 L *Addit* adjuvant
  - *Liquid Achieve*: 2 x 8 L or 96 L of tralkoxydim (*Intake* adjuvant sold separately).
  - *Nufarm Tralkoxydim Liquid*: 8 L or 64 L of tralkoxydim plus 8 or 64 L *Adjuvant for Nufarm Tralkoxydim*

## Crops and Staging:

No staging restrictions unless otherwise indicated.

### Cereals:

- Barley
- Rye (spring & fall)
- Triticale
- Wheat (spring, durum, & winter)

**Forage legumes:** May be used on wheat and barley crops undersown to the following (if not tank mixed with a broadleaf herbicide).

- Alfalfa
- Bird's-foot trefoil
- Clovers
- Sanfoin

### Forage Grasses (seed production only)\*:

- ***Under-seeded with a cereal or grown alone (seedling or established)\*:***
    - Brome grass (meadow, smooth)
    - Creeping red fescue
    - Wheatgrass (crested, intermediate)
  - ***Under-seeded with a cereal or grown alone (seedling only)\*:***
    - Wheatgrass (northern, slender, western)
- \* *Liquid Achieve, Nufarm Tralkoxydim Liquid and Bison only.*

**NOTE - Since applications to these crops have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. An application to these crops is at the risk of the user.**

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

## Weeds and Staging:

**Wild oats** - 1 to 6 leaf stage (total leaves including tillers), with a maximum of 2 tillers.

**Volunteer tame oats** - 1 to 6 leaf stage.

**Green and yellow foxtail** - 1 to 5 leaf stage (total leaves including tillers), with a maximum of 1 tiller.

**Barnyard grass, Persian darnel** - 1 to 4 leaf stage (total leaves including tillers).

For forage grasses and perennial cereal rye, apply prior to tillering of the above weeds.

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

## Rates:

0.2 L per acre.

(One 8 L jug of tralkoxydim treats 40 acres)

Add *Turbocharge*, *Intake*, *Adjuvant for Nufarm Tralkoxydim*, or *Addit* adjuvant at a rate of 0.5 L per 100 L spray solution. Under adverse conditions or heavy weed infestations, add *Intake* adjuvant to *Liquid Achieve* at 1 L per 100 L of spray solution.

Maximum ONE APPLICATION of these products or other products containing tralkoxydim per season.

*Note: If water analysis shows bicarbonate levels are 400 ppm or greater, add 0.9 to 1.8 kg of active ammonium sulphate per 100 L of spray water prior to mixing.*

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre. Application in less than 20 L per acre water volume may result in mixing problems or unacceptable crop injury.
  - **Aerial:** 12 to 18 L per acre.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets. See the label for detailed instructions on aerial application.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
tralkoxydim	POST (foliar)	ACCCase Lipid Synthesis Inhibitor	Toward areas of growth (Symplast)	Grass only	1

## Effects of Growing Conditions:

Cereal crops that have set tillers may incur injury (yellowing and/or stunting) if applications are made within 48 hours of freezing temperatures. Cereal crops that have not set tillers may be injured if exposed to temperatures of 4°C or less up to 48 hours before or after application. Tank mixing with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from application. Temporary crop injury may occur when tralkoxydim tank mixes (particularly dichlorprop/2,4-D ester products, and bromoxynil/MCPA ester products + additional MCPA Ester) are applied under extreme environmental conditions (dry or wet, cool or hot weather) resulting in crop stress. Control of grasses could be reduced when they are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperatures.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

DO NOT tank mix tralkoxydim products with a broadleaf herbicide when applying to underseeded forage grasses or legumes.

Tank Mix Partner	Crops						
	Spring wheat	Durum	Winter wheat	Barley	Spring rye	Fall rye	Triticale
2,4-D ester (205 g ae per acre) <sup>†</sup>	•	•	•	•	•	•	
Bromoxynil <sup>†</sup>	•	•	•***	•		•***	•***
Bromoxynil + 2,4-D (0.40 L per acre) <sup>†*</sup>	•	•		•			
Bromoxynil/MCPA Ester <sup>†*</sup>	•	•	•	•		•	
<i>Curtail M</i> (0.81 L per acre)	•	•		•			
Dichlorprop/2,4-D <sup>*</sup>	•	•	•	•			
Fluroxypyr + 2,4-D <sup>†††</sup> ( <i>Attain XC</i> only), <i>OcTTain XL</i> <sup>††</sup>	•	•	•	•			
Fluroxypyr + MCPA ( <i>Trophy</i> only)	•	•		•			
<i>Infinity</i> <sup>††</sup>	•	•	•	•			
<i>Lontrel</i> (0.11 L per acre) + MCPA ester (0.38 L per acre - 600 g/L forms)	•	•		•			
MCPA ester <sup>†</sup> (0.38 L per acre - 600 g/L forms)	•	•	•	•	•	•	

Tank Mix Partner	Crops						
	Spring wheat	Durum	Winter wheat	Barley	Spring rye	Fall rye	Triticale
<i>Prestige XC</i> <sup>††</sup>	.	.	. <sup>††</sup>	.			

<sup>†</sup> Manufacturers may support different brands of generic products with their product. Check the tralkoxydim product label for specific brands registered.

<sup>††</sup> *Liquid Achieve* only.

<sup>†††</sup> *Liquid Achieve* and *Marengo* only.

\* Tank mixes may result in some temporary initial injury under adverse environmental conditions.

\*\* Temporary crop injury can occur if applied prior to the 4 leaf stage. A reduction in wild oat control may occur with this mix.

\*\*\* *Buctril M* mixed with either *Liquid Achieve* or *Marengo* only in winter wheat, fall rye and triticale.

DO NOT tank mix tralkoxydim products with herbicides or formulations of herbicides not listed above as loss of grass control may result.

When applying broadleaf herbicides not listed above, in the same field, always apply tralkoxydim first. Apply the broadleaf product no sooner than seven days after application of tralkoxydim.

#### Insecticides:

- *Matador* (49 mL per acre)
- *Matador* tank mixes with *Bison* may also be combined with bromoxynil or bromoxynil/MCPA ester products.

**Fungicides:** None registered.

**Fertilizers:** None registered.

Note: The above mixes are those listed on the tralkoxydim labels only.

Various manufacturers may also support additional mixes that are not on the tralkoxydim labels. Check with manufacturers for more details.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

#### Restrictions:

- **Rainfall:** Within 1 hour will reduce control.
- **Re-entry Interval:** DO NOT enter treated field for 12 hours.
- **Grazing Restrictions:** Straw from treated grain crops may be fed to livestock. Immature cereal crops may be grazed or cut for hay 16 days after treatment. DO NOT feed or graze forage crops in year of treatment
- **Pre-harvest Interval:** Leave 60 days from application to harvest.
- **Re-cropping Interval:** DO NOT replant treated areas to tame oat or corn for at least 4 weeks after application.
- **Aerial Application:** May be applied by air to cereal crops only. DO NOT apply within 50 m of fish bearing waters and wildlife habitat.
- **Storage:** Store in a dry place. DO NOT freeze.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>1</sup> ) Required for the Protection of:
	Terrestrial habitat
Ground*	3
Helicopter	80
Fixed wing aircraft	100

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

#### Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

#### Hazard Rating:



Caution – Skin and Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Travallas

Herbicide Group  
2 - metsulfuron, thifensulfuron  
4 - fluroxypyr  
(Refer to page 45)

## Company:

FMC Corporation (PCP#31685)

## Formulation:

3 g ai/L metsulfuron methyl; 30 g ai/L thifensulfuron methyl; and 150 g ae/L fluroxypyr ester formulated as suspension concentrate liquid.

- Container size - 2 x 8 L

## Crops, Rates and Staging:

**Barley, Wheat (spring, durum):** 2 leaf to flag leaf stage (prior to head emergence).

**Winter Wheat:** In the spring up to the flag leaf stage (prior to head emergence).

## Weeds and Staging:

- 0.2 L per acre to control or suppress weeds up to 10 cm tall or wide unless otherwise indicated:
  - Canada thistle (maximum 15 cm and prior to bud)\*
  - Cleavers (1 to 6 whorl)
  - Common chickweed (1 to 6 leaf)
  - Corn spurry
  - Cow cockle
  - Dandelion (fall or spring germinating rosettes up to 25 cm)
  - Flixweed
  - Hemp-nettle
  - Kochia
  - Lamb's-quarters
  - Narrow-leaved hawk's-beard
  - Night-flowering catchfly
  - Redroot pigweed
  - Russian thistle
  - Shepherd's-purse (up to 20 cm)
  - Smartweed (lady's-thumb, green)
  - Stinkweed
  - Stork's-bill
  - Volunteer canola (except Clearfield varieties)
  - Volunteer flax
  - Wild buckwheat (1 to 8 leaf)
  - Wild mustard
  - White cockle

\* **Suppression only**

Maximum ONE APPLICATION per year of *Travallas* or other products containing metsulfuron, thifensulfuron or fluroxypyr.

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 22 L per acre.
  - **Aerial:** Apply between 10 and 20 L per acre of water
- **Nozzles and Pressure:** Use 30 to 40 psi (210 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of **ASABE coarse** droplets while maintaining good coverage of foliage. Keep booms lower than 60 cm from crop canopy.
- **Screens:** Use of 50 mesh screens or coarser are required.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metsulfuron, tribenuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf only	2
fluroxypyr	POST (foliar)	Synthetic Auxin	Moves throughout the plant (Symplast)	Broadleaf only	4

## Effects of Growing Conditions:

Application to crops stressed by extreme weather conditions such as frost, hail, saturated soils or drought as well as low fertility, insect damage or disease pressure may result in crop injury and/or reduce weed control. The conditions above as well as wide fluctuations in day/night temperatures or prolonged cool weather may shorten the crop slightly.

Crop and weeds that are growing rapidly produce optimum activity. The optimum temperature range for the best activity is between 12 to 24°C. Activity will be reduced below 8°C and above 27°C.

## Tank Mixes:

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

Tank Mix Partner	Crop			
	Spring Wheat	Durum	Winter Wheat	Barley
<i>Axial</i>	•		•	•
<i>Axial</i> + MCPA (rates as below)	•		•	•
<i>Everest 2.0</i>	•		•	
<i>Everest 2.0</i> plus MCPA ester	•		•	
MCPA ester (up to 113 g ae per acre)	•	•	•	•
<i>Puma Advance</i>	•	•		•
<i>Puma Advance</i> + MCPA	•	•		•
<i>Simplicity OD</i>	•	•	•	
<i>Simplicity OD</i> + MCPA ester (rates as above)	•	•	•	
<i>Traxos</i>	•	•		
<i>Traxos</i> plus MCPA ester (rates as above)	•	•		
<i>Varro</i>	•	•	•	
<i>Varro</i> plus MCPA ester (rates as above)	•	•	•	

**Insecticides:** None registered.

### Fungicides:

- *In Barley and spring wheat (including durum) only:*
  - *Acapela*

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Travallas* label only.

FMC also supports the following mixes that are not on the *Travallas* label. Apply mixes according to the most restrictive use limitations for either label.

- **Herbicides:**
  - *Spring wheat only:* *Everest 3.0*
  - *Spring wheat (including durum):* Clodinafop
  - *Wheat (spring, durum, winter):* *Simplicity GoDRI*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 2 hours will reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:** DO NOT graze or feed treated crop to livestock within 7 days of application.
- **Pre-harvest Interval:** Leave 60 days between application and harvest.
- **Re-cropping Interval:** Canola, fababeans, field corn, flax, oats, field peas, soybeans, and registered crops may be seeded 10 months after application. Lentils may be seeded 22 months after application.
- **Aerial Application:** May be applied by aircraft.
- **Storage:** Store in a cool, dry place in original container. Shake well before using. If frozen, warm gradually to 10°C and shake well to reconstitute component before use.

• **Buffer Zones:**

Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground application	1	1	5
Aerial (fixed wing)	1	1	200
Aerial (helicopter)	1	1	175

See the key to product pages on page 36 for an explanation of the different habitats.

\* Buffer zones may be reduced when using drift reduction measures. See the Buffer Zone Calculator on the Pest Management Regulatory Agency website.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

° Spray when winds are under 16 km/hr, but not dead calm.

## Tank Cleaning:

Thifensulfuron/tribenuron and/or metsulfuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Thifensulfuron/tribenuron and/or metsulfuron should be drained and flushed out immediately after use.

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. When mixing with another pesticide with different cleaning measures, those measures should be integrated into 'Method A' (e.g. addition of detergent).

## Hazard Rating:



Caution – Skin Irritant

Potential skin sensitizer. Contains the allergen soy.

For an explanation of the symbols used here see pages 7 and 8.

# Traxos

**Herbicide Group**  
**1 - pinoxaden & clodinafop**  
*(Refer to page 45)*

## Company:

Syngenta Canada (PCP#29855)

## Formulation:

25 g/L pinoxaden and 25 g/L clodinafop propargyl formulated as an emulsifiable concentrate.

- Container size - 2 X 10 L, 80 L, 400 L

## Crops and Staging:

**Spring wheat (including durum) and winter wheat:** prior to the emergence of the 4<sup>th</sup> tiller.

When tank mixing, check broadleaf product description for additional restrictions.

## Weeds, Rates and Staging:

0.5 L per acre, no additional adjuvant required (packages treat 40, 160 and 800 acres)

### For control of:

Weed	Stage
Barnyard grass, Persian darnel	1 to 5 leaves prior to tillering
Foxtail (green, yellow)	1 to 5 leaves, maximum 2 tillers
Volunteer canaryseed, Volunteer oat, wild oat, proso millet	1 to 6 leaves, maximum 3 tillers

Optimum yield response occurs when weeds are controlled in early stages.

Maximum of ONE APPLICATION per year of *Traxos* or other products containing pinoxaden.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:**
  - **Ground:** Minimum 20 L up to 40 L per acre.
  - **Aerial:** Minimum 12 L per acre.
- **Nozzles and Pressure:** 40 to 45 psi (275 to 310 kPa) when using conventional 80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE coarse** droplets.
- **Screens:** Use 50 mesh nozzle screens.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
pinoxaden, clodinafop	POST (foliar)	ACCCase Lipid synthesis inhibitor	Toward growth areas (Symplast)	Grasses only	1

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity. Weeds hardened off by environmental stress such as cold weather, drought or excessive heat may not be adequately controlled.

## Tank Mixes:

### Herbicides:

- *Buctril M\** (label rates)
- *Curtail M* (0.6 to 0.81 L per acre)
- *Infinity* (0.33 L per acre)
- MCPA 600 ester (0.28 to 0.37 L per acre)
- *Mextrol 450M* (0.5 L per acre)
- *Pulsar* (80 acres per case)
- *Pulsar* (80 acres per case) + MCPA 600 ester (0.23 L per acre)
- *Trophy* (20 acres per case)
  - Refer to the broadleaf herbicide label for crop staging and other information.

### Insecticides:

- *Matador* (25 to 33 mL per acre).

### Fungicides:

- *Tilt* (0.1 L\* to 0.2 L per acre).

**Fertilizers:** None registered.

\* Aerial application approved.

**Note:** The above mixes are those listed on the *Traxos* label only.

Syngenta also supports the following mixes that are not on the *Traxos* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Attain XC* (low label rate), *Barricade II*, *Broadside*, *Enforcer D*, *Enforcer M*, *Infinity FX*, *Momentum*+MCPA ester, *OcTTain XL*, *Paradigm\**, *Paradigm* + MCPA Ester 600\* (189 mL per acre), *Pixxaro*, *Prestige XC*, thifensulfuron/tribenuron + MCPA, *Retain*, *Stellar*, *Stellar XL*, *Travallas* (no MCPA Ester), *Thumper*
  - **Fungicides:** *Propel*, *Quilt*, *Trivapro*
- \* Wild oat control only

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze or harvest treated crops for forage within 7 days of application.
- **Pre-harvest Interval:** Leave at least 60 days from application to harvest.
- **Re-cropping Interval:** No restrictions in the year following treatment.
- **Storage:** Store in a cool, dry, ventilated area away from food or feed. Avoid ignition sources. If frozen, thaw and shake well before using.



- **Aerial Application:** May be applied by air.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground	1	0	1
Aerial by airplane or helicopter	1	0	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

## Hazard Rating:



Warning – Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.

# TraxosTwo

*This product is a prepackaged tank mix of TraxosTwo Grass (equivalent to Traxos – see page 387) and TraxosTwo Broadleaf (equivalent to OcTTain - see page 305). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and general information on the component products see the product pages listed above.*

## Herbicide Group

**1 - pinoxaden, clodinafop**

**4 - fluroxypyr, 2,4-D**

(Refer to page 45)

## Company:

Syngenta Canada

## Formulation:

The *TraxosTwo* package contains the following components:

**TraxosTwo Grass Component (PCP#31674):** 25 g/L pinoxaden and 25 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

- Container size - 10 L, 80 L

**TraxosTwo Broadleaf Component (PCP#31673):** 90 g/L fluroxypyr plus 360 g/L 2,4-D LV ester formulated as an emulsifiable concentrate.

- Container size - 9 L, 72 L

## Crops and Staging:

Spring wheat (including durum): 4 leaf stage up to the emergence of the fourth tiller.

## Rates:

**TraxosTwo Grass:** 0.5 L per acre

**TraxosTwo Broadleaf:** 0.45 L per acre

(One case treats 20 acres and one bulk package treats 160 acres)

## Weeds and Staging:

Weeds controlled by *Traxos* plus the weeds controlled by *OcTTain XL*.

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Tribenuron

Herbicide Group

2 - tribenuron

(Refer to page 45)

## Company:

FMC Corporation (*Express SG*)Nufarm Agriculture (*Spike*)AgraCity (*MPower Extra*)Arysta LifeScience Canada (*Inferno WDG*)

## Formulation:

**Express SG (PCP#28262):** 50% tribenuron methyl, formulated as a water soluble granule (WSG).

- Container size - 486 g\*

**75% WDG formulations (MPower Extra - PCP#33143; Inferno WDG - PCP#30838; Spike - PCP#30376):** 75% tribenuron methyl, formulated as a water dispersible granule (WDG).

- Container sizes -
  - *Inferno WDG\** and *MPower Extra\**: 320 g
  - *Spike*: 160 g, 3.6 kg

\* All products are purchased alone but must be used accordingly in combination with a registered tank mix herbicide.

## Crops and Staging:

### Tribenuron + glyphosate:

- ***In the fall (post-harvest) or spring prior to the seeding of:***

#### Field Crops:

- Barley
- Canary seed<sup>†</sup>
- Dry bean<sup>†Δ</sup>
- Faba bean<sup>†Δ</sup>
- Lupin<sup>†Δ</sup>
- Oat<sup>†</sup>
- Pea<sup>†Δ</sup>

- Soybean<sup>†Δ</sup>
- Wheat (spring, durum, winter<sup>†</sup>)

#### Forage Crops\*†:

- Alfalfa
- Alsike clover
- Bromegrass (meadow, smooth)
- Creeping red fescue
- Red clover (forage and seed production)
- Timothy<sup>†</sup>

\*Allow at least one day (24 hours) between application and seeding.

- ***In the fall prior to the seeding of:***

- *The crops listed above plus:*

- Canola<sup>†</sup>
- Lentil<sup>†Δ</sup>
- Field Corn<sup>†</sup>
- Flax<sup>†</sup>

- ***Fallow:***

- Allow 10 days between application and tillage (fallow).

<sup>Δ</sup> NOTE: Injury to pulse crops, forage grasses and forage legumes may occur on coarse-textured soils, low in organic matter (less than 3%), or in fields with variable soils, gravelly areas, sandy areas or eroded knolls. Avoid planting pulse crops in soils containing more than 50% sand.

\* NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. Those who apply these uses do so at their own risk.

### Tribenuron + 2,4-D ester:

- ***Fallow***
- ***Wheat (spring and durum), barley<sup>††</sup>***: 3 leaf up to emergence of the flag leaf.

### Express SG<sup>†</sup> plus non-ionic surfactant:

- ***Post-emergent in rangeland and pasture:*** stage according to weeds.

### Express SG + Hasten NT adjuvant:

- ***Tribenuron tolerant sunflower<sup>†</sup> (eg. ExpressSun SU7 variety):*** 2 to 8 leaves.

<sup>†</sup> Express SG only.<sup>††</sup> Inferno WDG, MPower Extra and Spike only.

## Weeds, Rates and Staging,

### Pre-seeding application and fallow mixed with glyphosate<sup>†</sup>:

- Express SG at 6 g per acre or 75% WDG tribenuron formulations at 4 g per acre plus glyphosate (any brand) at 180 g ae per acre (see glyphosate pages for equivalent product rates.)
  - Weeds controlled by glyphosate products at the rates above plus:
    - Canada thistle (rosettes)\*\*
    - Narrow-leaved hawk's-beard
    - Volunteer canola (including glyphosate tolerant varieties)\*\*\*
    - Cow cockle \*
    - Scentless chamomile<sup>†\*\*</sup>
    - Dandelion (up to 6 inches)
    - White cockle (rosettes)<sup>†\*\*</sup>

<sup>†</sup> Express SG only.

### Fallow<sup>†</sup>:

- Express SG at 6 g per acre or 75% WDG tribenuron formulations at 4 g per acre plus 2,4-D ester 170 g (6 oz.) ae per acre (e.g. 0.24 L per acre LV 700 formulation):
  - Weeds controlled by 2,4-D ester 170 g (6 oz.) ae per acre plus:
    - Flixweed<sup>♦♦</sup>
    - Stinkweed<sup>♦♦</sup>

### Post-emergent in barley and spring wheat (including durum):

- Inferno WDG, MPower Extra and Spike only at 4 g per acre plus 2,4-D ester 170 g (6 oz.) ae per acre (e.g. 0.24 L per acre LV 700 formulation);
  - Weeds controlled by 2,4-D plus the following weeds up to 4 inches (10 cm) unless otherwise indicated:
    - Annual sunflower
    - Redroot pigweed
    - Canada thistle (top growth)
    - Wild buckwheat (1 to 3 leaf)\*\*
    - Cow cockle

### Post-emergent for control of the emerged weeds below in Rangeland and Pasture only:

- Express SG only at 6 g per acre<sup>♦♦♦</sup> at the early bud – pre-bloom stage:
  - Tall buttercup
  - Narrow-leaved hawk's-beard
- Express SG only at 12 g per acre<sup>♦♦♦</sup>
  - The weeds listed above plus:
    - Dandelion
    - Common tansy
    - White cockle

### Post-emergent in Tribenuron Tolerant Sunflowers:

- Express SG only at 6 g per acre (one package of Express SG treats 80 acres) plus Hasten NT adjuvant at 0.5L per 100L of spray solution will control:
  - Lamb's-quarters (up to 9 leaf)
  - Wild buckwheat\*\* (up to 6 leaf)
- \* Up to the 3 leaf stage
- \*\* Suppression only
- \*\*\* Up to 6 inches
- ♦ Allow 10 days between treatment and tillage.
- ♦♦ Fall rosettes and spring seedlings.
- ♦♦♦ Addition of a non-ionic surfactant at 0.2 L per 100 L of spray solution is required.

Tribenuron may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- Water Volume:** 22 to 40 L per acre.
- Nozzles and Pressure:** Use appropriate pressure for nozzle. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of **ASABE medium** droplets or larger.
- Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
tribenuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance the activity of tribenuron. Weeds hardened off by environmental stress such as cold weather, drought or excessive heat may not be adequately controlled.

## Tank Mixes:

### Herbicides:

- **Prior to seeding registered crops (all products):**
  - Must be mixed with glyphosate.
- **Fallow:** All products
  - Must be mixed with either glyphosate or 2,4-D ester.
- **In spring wheat (including durum) and barley (Inferno WDG, MPower Extra and Spike only):**
  - Assert (0.53 to 0.65 L per acre);
  - Fenoxaprop (Cordon only - 155 mL per acre).
- **In spring wheat (NOT durum) and barley (Inferno WDG, MPower Extra and Spike only):**
  - Banvel II (44.5 mL per acre)
- **Tribenuron Tolerant Sunflowers (Express SG only):**
  - Assure II (label rates) plus Merge or Suremix adjuvants.

**Note:** The above mixes are those listed on the tribenuron labels only.

FMC supports the following mixes that are not on the *Express SG* label. Mixes must be applied according to the most restrictive use limitations for either product:

- **Tribenuron Tolerant Sunflowers:** Select, Centurion, Shadow RTM, Poast Ultra

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 hours may reduce control. Check with product manufacturers for specific recommendations.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Grazing Restrictions:**
  - **75% WDG formulations:** DO NOT graze treated crops within 30 days of application.
  - **Express SG:** Forage may be grazed immediately following application.
- **Pre-harvest Interval:**
  - **75% WDG formulations:** Leave 60 days between spraying and harvest of cereals.
  - **Express SG:** Leave 70 days between spraying and harvest of sunflower.
- **Re-cropping Interval:** There are no restrictions one year after treatment.
  - **75% WDG formulations:** Canola, flax, lentil and alfalfa may be planted 2 months after application.
  - **Express SG:** Canola, flax, and lentil may be planted 2 months after application or in the spring following a fall application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**
  - Handheld or backpack sprayers do not require a buffer zone.

Application method	Buffer Zones (metres <sup>1</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Fallow, preseed, range and pasture	1	0	4
Tribenuron tolerant sunflowers	0	0	3

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Tribenuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Tribenuron should be flushed out immediately after use. Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13.

This ammonia rinse process should be done twice for the WDG formulations. See the labels of the various products for specific instructions. The addition of detergent may improve cleanout, especially when mixing with other products.

## Hazard Rating:

**Express SG and Spike:**



Warning – Eye Irritant

Potential Skin Sensitizer

**Nuance, MPower Extra and Inferno WDG:**



Caution – Eye and skin irritant

**All products:**



Warning – Contains the allergens milk and sulfites

For an explanation of the symbols used here see pages 7 and 8.

# Tribenuron + 2,4-D

*These products are prepackaged tank mixes of Tribenuron (page 390) and 2,4-D (page 81). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.*

**Herbicide Group**  
**2 - tribenuron**  
**4 - 2,4-D**  
*(Refer to page 45)*

## Company:

Nufarm Agriculture (Ko-Act)

AgraCity (MPower X-KO)

## Formulation:

The Tribenuron + 2,4-D packages contain the following components:

**Spike (PCP#30376), or MPower Extra (PCP#33143):** 75% tribenuron methyl, formulated as water dispersible granule.

- Container size - 2 x 160 g

**2,4-D 700 Ester (Nufarm PCP#27820; AgraCity PCP#30460):** 2,4-D 660 g/L as emulsifiable concentrate.

- Container size - 2 x 8.69 L

## Crops and Staging:

Pre-seed burn-off prior to seeding the following crops:

- Barley
- Wheat

May also be applied to chemfallow.

## Weeds, Rates and Staging:

Tribenuron at 4 g per acre plus 2,4-D 700 ester at 212 mL per acre (one case treats 80 acres).

- Weeds controlled up to 10 cm or 3 leaf rosette or less, unless specified, include:

- |             |               |                              |
|-------------|---------------|------------------------------|
| ◦ Chickweed | ◦ Hemp-nettle | ◦ Narrow-leaved hawk's-beard |
| ◦ Dandelion | ◦ Kochia*     | ◦ Shepherd's-purse           |
| ◦ Flixweed  | ◦ Mustard     | ◦ Volunteer canola*          |

\* All biotypes

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Tank Mixes:

**Herbicides:**

- Glyphosate (360 g ae per acre\*)

\* see glyphosate page for rate conversion

*See component products for more information on restrictions application details and handling. Unless indicated differently above use the most limiting restrictions across all components for the mix.*

# Tribenuron/Metsulfuron

Herbicide Group  
2 - tribenuron  
& metsulfuron  
(Refer to page 45)

## Company:

FMC Corporation (*Express Pro*)

AgraCity (*MPower X-Pro*)

## Formulation:

**Express Pro (PCP#29212):** 42.9% tribenuron methyl and 8.6 % metsulfuron methyl formulated as a water soluble granule.

- Container size – 560 g container

The *MPower X-Pro* package has 2 components:

**MPower Extra (PCP#33143):** 75% tribenuron methyl, formulated as a water dispersible granule (WDG).

- Container size: Mini-box – 320 g, Case – 8 x 320 g

**MPower Pro (PCP#31118):** 60% metsulfuron methyl, formulated as a water dispersible granule (WDG).

- Container size: Mini-box – 80 g, Case – 8 x 80 g

Tribenuron/metsulfuron is purchased alone but must be mixed with glyphosate before use.

## Crops and Staging:

For application to fallow, post-harvest\* and prior to seeding of the following crops:

- Spring wheat
- Winter wheat
- Durum wheat
- Barley

Allow at least one day (24 hours) between application and seeding.

### Fallow and Post-harvest\* application:

Allow 10 days between fallow or post-harvest\* treatment and tillage.

DO NOT use Tribenuron/Metsulfuron on highly variable soils that have large gravelly or sandy areas, eroded knolls or calcium deposits.

\* *Express Pro* only.

## Weeds, Rates and Staging:

**Express Pro** at 7 g per acre (one container treats 80 acres) or **MPower X-Pro** at 4 g of **MPower Extra** and 1 g **MPower Pro** per acre (one Mini box treats 80 acres and one case treats 640 acres) plus glyphosate at a rate equivalent to 180 g ae per acre (see glyphosate page):

- Weeds controlled by glyphosate products at these rates plus the weeds below up to 3 inches (8 cm) unless otherwise indicated:
  - Canada thistle (rosettes)\*\*
  - Narrow-leaved hawk's-beard†
  - Volunteer canola (including glyphosate tolerant varieties)\*\*\*†
  - Cleavers†
  - Night-flowering catchfly\*\*
  - Cow cockle\*
  - Scentless chamomile
  - Dandelion \*\*\*†
  - White cockle (rosettes)
- † Residual control
- \* Up to the 3 leaf stage
- \*\* Suppression only
- \*\*\* Up to 6 inches

Tribenuron/Metsulfuron may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

If using other herbicides containing the active ingredient metsulfuron methyl, restrict total use of metsulfuron methyl to 0.61 grams active ingredient per acre per year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** 22 to 45 L per acre.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Low drift nozzles may require higher pressures for proper performance.
- **Screens:** Use 50 mesh or larger screens in both nozzles and in-line filters.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
metsulfuron, tribenuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf only	2

## Effects of Growing Conditions:

Registered crops seeded following Tribenuron/Metsulfuron application become stressed by drought, low fertility, saline soils, waterlogged soils (soils at or near field capacity), disease or insect damage may be injured. This injury may be worse on light or low organic matter soils. Weeds hardened off by environmental stress such as those above may not be adequately controlled.

## Tank Mixes:

### Herbicides:

- Must be mixed with glyphosate.

**Fungicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the Tribenuron/Metsulfuron labels only.

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturers for more information.
- **Re-entry Interval:** Wait 12 hours before re-entering treated fields.
- **Re-cropping Interval:** Barley and wheat (spring, winter and durum) may be seeded a minimum of 24 hours after application. Oats may be seeded the season following application. Canola, faba beans, field corn, flax, peas and soybeans may be planted 10 months following application. Lentils may be seeded 22 months following application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat*
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Tribenuron/Metsulfuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray this product should be flushed out immediately after use.

Refer to 'Method A' found in the general sprayer cleaning section on pages 12 and 13. Check the label or contact the manufacturer for more specific sprayer cleaning information.

## Hazard Rating:

*Express Pro only:*



Caution – Poison



Warning – Eye Irritant



Potential Skin Sensitizer.

**Both Products:**



Contains the allergens sulphites and milk.

For an explanation of the symbols used here see pages 7 and 8.

# Trifluralin

Herbicide Group

**3 - trifluralin**

(Refer to page 45)

## Company:

Gowan Canada (*Treflan Liquid EC, Treflan MicroActiv*)

Nufarm Agriculture (*Rival*)

Loveland Products Canada (*Bonanza*)

## Formulation:

**Bonanza 480 EC (PCP#28289):** 480 g/L trifluralin formulated as an emulsifiable concentrate.

- Container size - 9.45 L, 205 L

**Bonanza 10G (PCP#22744):** 10% trifluralin formulated as a granular.

- Container size - 22.7 kg, 500 kg bags

**Rival EC (PCP#18612):** 500 g/L trifluralin formulated as an emulsifiable concentrate.

- Container size - 9 L, 900 L

**Rival 10G (PCP#18926):** 10% trifluralin formulated as a granular.

- Container size - 22.7 kg, 454 kg bags

**Treflan Liquid EC (PCP#23933):** 480 g/L trifluralin formulated as an emulsifiable concentrate.

- Container size - 9.45 L, 115 L

**Treflan MicroActiv (PCP#21742):** 10% trifluralin formulated as a granular.

- Container size - 454 Kg bags

## Crops and Staging:

Certain formulations are not registered for all the crops listed here. Refer to the specific product label for details. All products are for pre-plant incorporated use only.

**Fallow use in the brown soil zone of Saskatchewan, or fall application in all soil zones. (Granular products only):** Spring wheat (including durum).

Apply to fallow fields in May, June, or July for weed control during both years of a fallow-wheat rotation, or in the fall (September or October) or spring prior to seeding.

DO NOT apply following harvest when the previous crop was treated with another trifluralin product (*Treflan, Rival* or *Bonanza* products). This includes application the previous summer or fall.

DO NOT apply trifluralin following harvest or to fallow when the previous year's crop was an oilseed, barley or pulse crop treated with a deep incorporated, spring or fall applied trifluralin product.



**Green and Yellow Foxtail Control in Cereals:**

- Liquids applied in spring only (after seeding but prior to crop emergence) - spring wheat (including durum), barley. Granulars applied in fall only (after September 1 but before freeze-up) - spring wheat (including semi-dwarf and durum).

**Broadleaf and Grassy Weed Control in other crops:**

- **Spring applied liquid or granular formulations:**
  - Canola, pea, sunflower, safflower (liquid formulations), dry bean, mustard, faba bean, alfalfa, sainfoin, sweet clover, soybean, forage legumes (cicer milk-vetch, seedling alsike clover, red clover, bird's-foot trefoil).
- **Fall applied granular formulations:** Canola, pea, sunflower, dry bean, mustard, faba bean, soybean, barley, lentil and flax.
- **Trifluralin liquids only:** prior to planting shelterbelt transplants (elm, caragana, green ash, Scots pine).

**Weeds:****Fallow use in the brown soil zone of Saskatchewan or fall application in all soil zones (Granular products only):**

- **Fallow Year:**
    - Barnyard grass
    - Cow cockle
    - Green foxtail
    - Lamb's-quarters
    - Persian darnel
    - Redroot pigweed
    - Russian thistle\*
    - Wild buckwheat
    - Wild oat
  - **Crop Year:**
    - Green foxtail
    - Lamb's-quarters
    - Wild buckwheat \*
    - Wild oat \*
- \* **Suppression only**

**Green and Yellow Foxtail Control in Cereals:**

- Foxtail (green, yellow)

**Broadleaf and Grassy Weed Control in other crops:**

- Barnyard grass
- Brome (downy, Japanese)
- Chickweed
- Cow cockle
- Foxtail (green, yellow)
- Knotweed
- Lamb's-quarters
- Persian darnel
- Pigweed
- Purslane
- Wild buckwheat\*
- Wild oats<sup>†</sup>\*

\* **Some plants may escape herbicide treatment but are not competitive with the crop.**

<sup>†</sup> **Suppression only with Treflan Liquid EC and Bonanza 480 EC.**

**Rates and Staging:****Fallow use in the brown soil zone of Saskatchewan (Granular products only):**

- DO NOT apply to sandy soils with less than 1% organic matter. Application to severely eroded knolls is not recommended. DO NOT apply to wet soils, soils in poor working condition, soils which contain more than 8 percent organic matter, or soils subject to prolonged periods of flooding.
- Granules may be applied to fallow fields or following harvest, provided crop residues or green growth do not interfere with cultivation (prevent soil mixing).
- Over-application caused by overlapping, improper calibration or non-uniform application may result in reduced crop stand, delayed development or reduced yields.

Soil Organic Matter (%)	Rate (Kg per acre)		
	1 to 3	4 to 8	2 to 8%
May	3.85	4.5	
June	3.25	3.85	
July	2.65	3.25	
September to October			2.23*

\* **Control of green foxtail only, on soils between 2 to 8% organic matter.**

- During the fallow year, susceptible weeds may not be fully controlled until after the second fallow operation has established a uniform layer of treated soil. Control of wild oats in the crop year may be variable depending on wild oat population as well as soil and climatic conditions. Some wild buckwheat may escape but its growth will be slowed and result in limited competition to the wheat crop.

## Pre-emergent control of green and yellow foxtail:

• **Liquids:**

Product	Rates (L per acre)	
	Light and Medium Soil Texture	Heavy Soil Texture
<i>Rival EC</i>	0.49 to 0.57 L	0.65 L
<i>Treflan Liquid EC, Bonanza 480 EC</i>	0.49 L	0.69 L

• **Granular products (wheat only):**

- 2.23 kg per acre in all soil textures with 2 to 8 % organic matter.

**Broadleaf and Grassy Weed Control in other crops:**

- For use in canola, pea, sunflower, dry bean, mustard, faba bean, seedling alfalfa (spring only), seedling sweet clover (spring only), soybean.

Product	Soil Type			
	Light soils with less than 6% organic matter		Medium to heavy soils with 6 to 15% organic matter	
	Spring	Fall	Spring	Fall
<i>Rival EC</i>	0.65 L per acre	0.89 L per acre*	0.89 to 1.13 L per acre	1.13 to 1.37 L per acre*
<i>Rival 10G</i>	3.43 kg per acre**	4.45 kg per acre	4.45 to 5.67 kg per acre**	5.67 to 6.88 kg per acre
<i>Treflan Liquid EC</i>	0.69 L per acre	0.93 L per acre*	0.93 to 1.21 L per acre	1.21 to 1.37 L per acre*
<i>Bonanza 10G, Treflan Microactiv</i>	Not registered	4.45 kg per acre	Not registered	5.67 to 6.88 kg per acre
<i>Bonanza 480 EC</i>	0.69 L per acre	0.93 L per acre*	0.93 L per acre	1.17 per acre*

\* Although liquid formulations are registered for fall application, this use is not recommended as tillage requirements before and after application will predispose fields to erosion.

\*\* Spring applications of granular formulations are recommended for Manitoba only.

**For use in barley (fall only), apply:**

Product	Soil Type					
	2 to 4% organic matter		4 to 6% organic matter		6 to 10% organic matter	
	Light Soil Texture*	Medium to Heavy Soil Texture**	Light Soil Texture*	Medium to Heavy Soil Texture**	Light Soil Texture*	Medium to Heavy Soil Texture**
<i>Rival 10G, Bonanza 10G, Treflan Microactiv</i>	3.44 kg per acre	3.44 kg per acre	4.45 kg per acre	4.45 kg per acre	4.45 kg per acre	5.67 kg per acre

\* Light textured soils can be defined as sandy to sandy-loam.

\*\* Medium to Heavy textured soils can be defined as loam to clay.

**For use in flax or lentils (fall only), apply:**

Product	Soil Type			
	Soils with 2 to 6% organic matter		Soils with 6 to 15% organic matter	
	Light Soil Texture*	Medium-Heavy Soil Texture**	Light Soil Texture*	Medium-Heavy Soil Texture**
<i>Rival 10G, Bonanza 10G, Treflan Microactiv</i>	4.45 kg per acre	4.45 to 5.6 kg per acre***	5.67 kg per acre	5.67 to 6.88 kg per acre
<i>Bonanza 480 EC</i>	0.93 L per acre	0.93 L per acre	1.17 L per acre	1.17 L per acre
<i>Treflan Liquid EC</i>	0.93 L per acre	1.21 L per acre	1.21 L per acre	1.21 to 1.38 L per acre
<i>Rival EC</i>	0.89 L per acre	1.13 L per acre	1.89 L per acre	1.13 to 1.38 L per acre

\* Light textured soils can be defined as Sandy to Sandy-loam.

\*\* Medium to Heavy textured soils can be defined as loam to clay.

\*\*\* Rates vary among products. Refer to product label for specific information.

## Application:

### Liquid Formulations:

- **Water Volume:** Minimum 40 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets or larger.

**Dry Granular Formulations:** Use equipment capable of metering granular herbicides and applying in an even layer over the surface of the soil. Close applicator lid after filling to avoid prolonged exposure to direct sunlight.

## Incorporation:

### Fallow use in the brown soil zone of Saskatchewan:

- Apply granules to the soil surface and incorporate immediately, in the same operation if possible. DO NOT delay incorporation more than 24 hours after application. Use a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep, and operating at 8 to 10 km/hr. Granules should not be incorporated when soil is crusted, lumpy or too wet for good mixing action.
- **May - July:** A second incorporation at the same depth and at an angle to the first should be done when weed growth requires it. Wait at least one week before making the second incorporation. After completing two fallow incorporations, additional operations with a rod weeder, shallow tillage or fall herbicide application may be required to control remaining weed growth.
- **September - October:** A second incorporation may be done in the fall a minimum of 3 days later. Alternatively, to conserve crop residues cover through the winter, the second incorporation can be completed in the spring at the same depth and at an angle to the first incorporation. When both incorporations take place in the fall, shallow spring tillage should be completed in the spring. If a discer or air seeder is used for seeding, separate spring tillage may not be necessary.
  - *NOTE: Fall application is not recommended on soils where a lack of crop residue cover combined with the required incorporation would leave the soil vulnerable to erosion.*
- **Spring (In the year of seeding):** Apply granules and incorporate immediately, in the same operation if possible. DO NOT delay the first incorporation longer than 24 hours after application. The second incorporation must be delayed a minimum of 3 days following the first incorporation. When applied to cold soils, wait 14 days before making second incorporation. The second incorporation should be done at an angle to the first incorporation, and at the same depth. If a discer or air seeder is used for seeding, the seeding operation can be used as the second incorporation.

### Green and Yellow Foxtail control in Cereals:

- **Liquid formulations:** Apply and incorporate in spring just after seeding. Incorporate to a depth of 1 to 1.5 inches (2 to 4 cm) into a bare soil free of crop residues (80 percent black when viewed from above) using diamond or tine type harrows operated at a speed of 6 mph (9 km/h). Incorporate twice, with the second incorporation at right angles to the first. The first incorporation should be performed immediately in the same direction of application. Both incorporations should be done within 24 hours of application. When tank mixing liquid formulations with *Avadex BW*, follow the same incorporation procedure.
- **Granular formulations:** May be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Incorporate with cultivators or disc implements only. Perform the first tillage operation within 24 hours of application. Incorporate at a working speed of 5 to 8 mph (8 to 13 km/hr) and to a depth of 2 to 3 inches (5 to 8 cm). Wait a minimum of 5 days, then incorporate a second time at right angles to the first. This second incorporation may be delayed until the following spring. Subsequent working should be no deeper than 2 to 3 inches (5 to 8 cm).

### Broadleaf and Grassy Weed Control in other crops:

- Granular formulations are recommended for use in fall or spring as a pre-plant incorporated treatment on broadleaf crops listed on the product label. The liquid formulations should be used only on soils free of lumps and relatively free of crop residues (75% black) and are recommended only for spring use. Granular formulations may be applied to standing or pre-worked stubble. Very heavy crop residues should be worked prior to application to allow product penetration to the soil surface. DO NOT use liquid formulations of trifluralin as a pre-plant incorporated treatment in barley, as severe injury will result. Only the fall applications of granular formulations are registered for use as pre-plant incorporated treatments in barley. For fall application of granular formulations, work the chemical into the soil between September 1 and freeze-up. Use a discer or field cultivator (vibrating shank-type). Disc implements are preferred on stubble. Set equipment to cut at 3 to 4 inches (8 to 10 cm) depth. The initial incorporation should be done within 24 hours of application. The second incorporation should be done at right angles to the first. The second incorporation may be delayed until spring, except when planting barley, flax or lentils; for these crops both incorporations must be done in fall. Delay the second incorporation 5 days for better weed control. This will allow greater release of the chemical onto soil particles and assure more even distribution. Fall application of granular trifluralin on flax, lentils or barley is not recommended on soils prone to erosion, as the 2 fall incorporations necessary in these crops may leave soils vulnerable to wind or water erosion.
- For spring application of liquid and granular formulations, work the chemical into the soil prior to seeding by setting the implement at 3 to 4 inches (8 to 10 cm) cutting depth. The first incorporation must be done within 24 hours of application. The second incorporation must be done at right angles to the first. If incorporating granular trifluralin, delay the second incorporation for 3 days after the first to achieve better weed control.

## Seeding:

### Fallow use in the brown soil zone of Saskatchewan:

- Allow soil to warm before seeding to reduce risk of injury to crop. Place seed 1.25 to 2.5 inches (3 to 6 cm) deep. If spring seedbed preparation is required, set cultivator 2 inches (5 cm) deep. To reduce the risk of wheat injury, use good quality seed and agronomic practices that will promote good growing conditions. Avoid deep seeding, loose seedbeds and seeding into cold soils. If extended dry periods were present after a fallow application, a 10 percent increase in seeding rate is recommended.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
trifluralin	PPI (Soil active)	Mitosis Inhibitor/ cell division	Little movement in plant (Apoplast)	Broadleaf & grass	3

## Effects of Growing Conditions:

Prolonged drought conditions after a May-July application to fallow may result in higher levels of trifluralin in the soil at the time of seeding.

Injury to flax, barley, wheat or lentil may occur if soil and weather conditions are not conducive to rapid crop emergence (cold or dry soils at the time of seeding and crop emergence).

To minimize crop injury, seed into a firm, moist seed bed using a seeder with good depth control and on row packing. Plant barley no deeper than 2 inches (5 cm). Plant cereals, lentil and flax no deeper than 1.5 inches (4 cm).

Less than acceptable weed control will result if dry conditions prevail at the time of weed emergence.

Rainfall has no direct effect on products' activity. Flooding (3 to 5 days) will cause rapid breakdown of the product resulting in reduced weed control. Flooding for 3 weeks or more will result in total breakdown of the product resulting in loss of weed control.

## Tank Mixes:

### Herbicides:

- **Soybeans:**
  - *Sencor (Treflan Liquid EC only).*

**Fertilizers:** Liquid product may be applied with liquid fertilizer as a carrier. Before the herbicide is added to the tank, compatibility of the herbicide to liquid fertilizer should be tested following instructions on the herbicide container. Trifluralin liquids may be blended with dry bulk fertilizers (DO NOT mix with nitrate fertilizers). Check label for blending instructions.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the trifluralin labels only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** No restriction. Flooding may reduce weed control.
- **Re-entry Interval:** Wait at least 12 hours before entering treated fields.
- **Grazing Restrictions:** DO NOT graze the treated crops or cut for feed prior to crop maturity.
- **Re-cropping Interval:** Oat, canaryseed, and small-seeded grasses may be affected the year after treatment. Corn is sensitive at higher rates of application. Damage to wheat can occur if the crop is seeded into land that has been treated during the previous 21 months with trifluralin products and has received abnormally low amounts of precipitation. Damage is worse if conditions are not conducive to rapid emergence of the wheat (for example, if the crop is seeded deep or if soil conditions remain cool during emergence). Damage tends to be greater on fields treated with granular formulations.
- **Aerial Application:** DO NOT apply by air.
- **Storage:**
  - Granular formulations must be stored in a cool, dry location, out of sunlight.
  - *Rival EC:* DO NOT store below 5°C.
  - *Treflan Liquid EC and Bonanza 480:* DO NOT freeze. Crystallization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

- **Buffer Zones:** (liquid formulations only)

Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of*:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Field crops	80	10	1
Shelterbelts, woody crops	120	20	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13 for liquid formulations only.

## Hazard Rating:

**Bonanza 480 EC:**



Warning – Poison



Warning – Eye and Skin Irritant

**All products:**

Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Triton C

**Herbicide Group**  
**2 - thifensulfuron & tribenuron**  
**4 - quinclorac**  
*(Refer to page 45)*

## Company:

FMC Corporation (PCP#28622)

## Formulation:

51.55 % quinclorac; 10.30 % thifensulfuron methyl; 5.15 % tribenuron methyl formulated as a water dispersible granule.

- Container size - 1.566 kg

## Crops and Staging:

**Barley, Spring wheat (including durum):** 2 to 5 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

## Weeds, Rates and Staging:

39.25 g per acre (one container treats 40 acres) plus *Merge* adjuvant at 1.0 L per 100 L of spray solution. Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

**Weeds Controlled:**

- Annual smartweed (green, lady's-thumb)
- Mustard (ball, wild)
- Chickweed (1 to 6 leaf)
- Cleavers (1 to 4 whorls)
- Common groundsel
- Corn spurry
- Cow cockle
- Flixweed
- Hemp-nettle
- Lamb's-quarters
- Narrow-leaved hawk's-beard
- Redroot pigweed
- Round-leaf mallow (2 to 6 leaf)
- Russian thistle
- Shepherd's-purse
- Sow-thistle, annual
- Stinkweed
- Stork's-bill (2 to 6 leaves)
- Tartary buckwheat
- Volunteer canola (not CLEARFIELD varieties)
- Volunteer sunflowers
- Wild buckwheat (1 to 5 leaf)

**Weeds Suppressed:**

- Canada thistle
- Perennial sow-thistle (less than 6 inches or 15 cm tall or across and prior to budding)
- Scentless chamomile
- Toadflax (less than 6 inches or 15 cm tall)
- Volunteer flax

Quinclorac is persistent and will carryover. It is recommended that any products containing quinclorac not be used in areas treated with this product during the previous season.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

**Application Information:**

- **Water Volume:** Minimum 22 L per acre.
- **Nozzles and Pressure:** 30 to 40 psi (210 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

**How it Works:**

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
thifensulfuron, tribenuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf	2
quinclorac	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf only	4

**Effects of Growing Conditions:**

DO NOT apply to wheat, or barley that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result. Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

DO NOT use on highly variable soils that have large gravelly or sandy areas, eroded knolls, or calcium deposits.

**Tank Mixes:**

None registered.

**FMC supports the following mixes that are not on the Triton C label. Mixes must be applied according to the most restrictive use limitations for either product:**

**Herbicides:** *Axial*, *Axial* + MCPA ester, Clodinafop, Flucarbazone 2.0, Flucarbazone 2.0 + 2,4-D, *Puma Advance*.

- **Spring wheat only:** *Everest 3.0* + 2,4-D

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

**Restrictions:**

- **Rainfall:** Within 6 hours may reduce control in general.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** Must not be grazed or fed to livestock for 77 days after treatment.
- **Pre-harvest Interval:** Leave 77 days between treatment and harvest for wheat and durum and 80 days for barley.

- **Re-cropping Interval:** Spring wheat (including durum) and spring barley may be reseeded immediately following application. Wheat, barley, oat, canola, field pea, flax, lentil and sunflower may be grown the year after application. On low organic matter soils or under dry conditions, flax and lentils should NOT be grown until the second year after application. DO NOT use *Triton C* on land where potato or vegetables are grown. A field bioassay (a test strip grown to maturity) must be conducted the year before growing any crops other than those listed above.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	0	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

*Triton C* can cause severe injury to sensitive crops at very low concentrations. Sprayers should be flushed out immediately if application is to be stopped for an extended period. The manufacturer recommends a cleanout procedure similar to 'Method A' in the general sprayer cleaning section on pages 12 and 13. DO NOT use ammonia with chlorine bleach. See label for specific process.

## Hazard Rating:



Caution – Poison



Warning – Eye and Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Triton K

Herbicide Group  
2 - tribenuron  
4 - dicamba, 2,4-D  
(Refer to page 45)

## Company:

FMC Corporation

## Formulation:

The *Triton K* package contains the following components:

***Triton Broadleaf* (PCP#29989):** 58.45% dicamba sodium salt, and 8.25% tribenuron methyl formulated as a water dispersible granule.

- Container size - 1.47 kg

***Nufarm 2,4-D Ester 700* (PCP#27820):** 660 g/L 2,4-D ester formulated as an emulsifiable concentrate.

## Crops and Staging:

**Spring wheat (including durum), winter wheat and barley:** 3 leaves fully expanded to 6 leaves plus 3 tillers. Application outside of this stage range can result in injury to the crop.

**Fallow:** Stage according to weeds.



## Weeds and Staging:

Weeds controlled up to 10 cm tall or across:

- Annual sunflower
- Canada thistle (top growth control)
- Cow cockle
- Dandelion \*\*\*
- Flixweed\*\*
- Kochia (2 to 10 leaf)
- Lamb's-quarters
- Mustard (ball, hare's-ear, Indian, tumble, wild, wormseed)
- Narrow-leaved hawk's-beard\*\*
- Prickly lettuce
- Redroot pigweed
- Russian pigweed
- Russian thistle
- Shepherd's-purse\*\*
- Stinkweed\*\*
- Sweet clover
- Thyme-leaved spurge
- Wild buckwheat\*
- Wild radish

\* 1 to 4 leaf stage

\*\* Fall rosettes and spring seedlings only.

\*\*\* Spring or fall rosettes up to 15 cm in diameter.

## Rate:

**Triton Broadleaf:** 36.8 g per acre

**2,4-D Ester 700:** 243 mL per acre

(One package treats 40 acres)

DO NOT apply more than 36.8 grams per acre of *Triton Broadleaf* per year.

*Triton K* may degrade if left in the sprayer for an extended period of time. Apply within 24 hours of first mixing.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Minimum 22 L per acre.
- **Nozzles and Pressure:** Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE coarse* droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
tribenuron	POST (foliar)	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf	2
dicamba, 2,4-D	POST (foliar)	Synthetic Auxin	Throughout the plant (Symplast)	Broadleaf	4

## Effects of Growing Conditions:

DO NOT apply if temperatures are greater than 30°C, if humidity is high, or wind is blowing toward non-target plants as injury from drift may result.

DO NOT apply to wheat, or barley that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result. Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

## Tank Mixes:

None registered.

**FMC supports the following mixes that are not on the *Triton K* label. Apply mixes according to the most restrictive use limitations for either product:**

- **Herbicides:** Flucarbazone 2.0/3.0, *Puma Advance* (206 mL per acre).

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.



## Restrictions:

- **Rainfall:** Within 4 to 6 hours may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** Lactating dairy animals MUST NOT graze fields with 7 days of treatment.
- **Re-cropping Interval:** No restrictions the year following application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**
  - Handheld or backpack sprayers do not require a buffer zone.

Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Cereals	1	0	4
Fallow	1	1	15

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

*Triton K* can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray this product should be flushed out immediately after use. The manufacturer recommends a process similar to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. DO NOT use ammonia with chlorine bleach. See label for specific instructions.

## Hazard Rating:



Caution – Poison



Warning – Eye and Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Tundra

## Company:

Bayer (PCP#29367)

## Herbicide Group

1 - fenoxaprop

6 - bromoxynil

27 - pyrasulfotole

(Refer to page 45)

## Formulation:

46 g/L of fenoxaprop-p-ethyl, 87.5 g/L of bromoxynil and 15.5 g/L of pyrasulfotole formulated as an emulsifiable concentrate.

- Container size - 8.1 L, 129.6 L, 405 L

## Crops and Staging:

Application beyond the maximum rates provided below may result in crop injury.

Crop	Stage
Barley, Spring wheat (including durum)	1 to 6 leaves on the main stem plus 3 tillers

## Weeds, Rates and Staging:

Apply at the 3 to 4 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before the crop tillers.

Apply 0.81 L per acre (one 8.1 L container treats 10 acres) to control:

### Grass weeds from the 1 to 6 leaf stage up to emergence of 3<sup>rd</sup> tiller:

- Barnyard grass
- Foxtail (green and yellow)
- Wild oat

### Broadleaf weeds from the 1 to 6 leaf stage unless otherwise indicated:

- Canada fleabane (up to 10 cm)\*
- Canada thistle<sup>†</sup> (up to 30 cm)
- Chickweed
- Cleavers (1 to 3 whorls)
- Cleavers (4 to 6 whorls)\*
- Dandelion<sup>†</sup> (up to 25 cm across<sup>††</sup>)
- Flixweed (up to 10 cm)
- Hemp-nettle
- Kochia (up to 10 cm)
- Narrow-leaved hawk's-beard (up to 10 cm and before bolting)
- Pale smartweed
- Ragweed (common)
- Redroot pigweed
- Round-leaved mallow<sup>†</sup>
- Russian thistle (up to 10 cm)
- Shepherd's-purse
- Sow-thistle (annual, perennial<sup>†</sup>)
- Stinkweed
- Stork's-bill (up to 8 leaf)\*\*\*
- Volunteer canola\*\*
- Wild buckwheat
- Wild mustard

<sup>†</sup> Suppression only

<sup>††</sup> Spring seedlings and over-wintered rosettes.

\* Add 200 g of active ammonium sulfate per acre (202 g per acre of 99% dry; 0.5 L per acre of 40% liquid; or 0.4 L per acre of 49% solution).

\*\* Including all herbicide tolerant varieties.

\*\*\* Only when mixed with 2,4-D ester and ammonium sulphate.

DO NOT apply *Tundra* or other products containing fenoxaprop, pyrasulfotole or bromoxynil more than once in the same year.

## Application Information:

- **Water Volume:**
  - **Ground:** 18.9 L per acre. Use higher water volumes for dense crop/weed canopies.
  - **Aerial:** 11.4 L per acre.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** classification droplets. Low drift nozzles may require higher pressures for proper performance.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
fenoxaprop	POST (foliar)	ACCase Lipid Synthesis Inhibitor	Toward areas of growth (Symplast)	Grass only	1
bromoxynil	POST (foliar)	PSII Inhibitor/ Membrane disruptor	Little (apoplast)	Broadleaf only	6
pyrasulfotole	POST (foliar)	HPPD Pigment Inhibitor	Some – both foliar & root (Apoplast) – Somewhat systemic (has soil residues)	Broadleaf only	27

## Effects of Growing Conditions:

Crop injury may result if applied to a crop that is stressed by severe weather conditions, frost, low fertility, drought, water-saturated soil, disease or insect damage. Weeds growing under adverse environmental conditions such as drought will be less susceptible to *Tundra*. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control.

## Tank Mixes:

### Herbicides:

- 2,4-D ester (113 g ae per acre) + ammonium sulphate (see "Weeds, Rates and Staging:" above)

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** DO NOT mix with fertilizers other than those indicated above.

Bayer also supports the following mixes that are not on the *Tundra* label. Apply mixes according to the most restrictive use limitations for either product:

**Herbicides:** *Lontrel*, MCPA Ester + ammonium sulphate.

**Fungicides:** *Tilt*

**Insecticides:** *Decis*, *Sevin XLR*.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour may reduce control.
- **Re-entry Interval:** DO NOT enter treated areas for 24 hours.
- **Grazing Restrictions:** DO NOT graze or cut cereal crops for hay, within 25 days of application.
- **Pre-harvest Interval:** Leave 65 days from application to harvest.
- **Re-cropping Interval:** Alfalfa, barley, canaryseed, canola, corn (Manitoba only), flax, oat, potato, soybean (Manitoba only), sunflower, tomato (Manitoba only), and wheat (spring, and durum) may be planted the season following application. Field pea may be grown the following year in all black, grey-wooded and dark brown soil zones. DO NOT plant field pea the season following *Tundra* use in the brown soil zone where organic matter content is below 2.5% and where soil pH is above 7.5. Lentil may be seeded the second season following application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store in a dry controlled temperature facility. DO NOT freeze. Shake before using if stored for longer than one year.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	3	1	10
Fixed wing aircraft	20	5	375
Helicopter	20	3	225

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on tank mixing on pages 12 and 13.

## Hazard Rating:



Caution – Poison



Danger – Corrosive to eyes and skin.



Warning – Eye Irritant.

Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

# Ultim 75DF/Grande\*

\* For use only in the Red River Valley of Manitoba

Herbicide Group  
2 - rimsulfuron &  
nicosulfuron  
(Refer to page 45)

## Company:

Corteva Agriscience (Ultim 75DF - PCP#24736; Ultim Grande - PCP#32709)

## Formulation:

37.5% rimsulfuron and 37.5% nicosulfuron formulated as a water dispersible granule.

- Container size -
  - Ultim 75DF - 134.8 g (4 x 33.7 g water soluble bags)
  - Ultim Grande - 270 g

## Crops and Staging\*:

Field corn: 1 to 4 leaf stage:

Note: Corn hybrids with ratings of less than 2500 corn heat units may be sensitive to *Ultim*. Check with seed supplier prior to applying to ensure the hybrid has known tolerance to Group 2 herbicides.

**\* NOTE - Since applications to corn in Manitoba has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance. Application to corn is at the risk of the user.**

## Weeds, Rates and Staging:

13.5 g per acre (one *Ultim 75DF* container will treat 40 acres; one *Ultim Grande* container will treat 20 acres) plus a non-ionic surfactant (*AgSurf II*, *Agral 90*, *Citowett Plus*) at 0.2 L per 100 L of spray solution. The following weeds will be control or suppressed at the stage indicated:

Weed	Stage
Wild oats	3 to 6 leaf
Foxtail (green and yellow*), barnyard grass, volunteer cereals	1 to 6 leaf (up to 2 tillers)
Quackgrass	3 to 6 leaf stage (with extended leaf 4 to 8 inches long)
Redroot pigweed	2 to 6 leaf
Volunteer canola**	Emergence to 5 leaf stage

Contact the manufacturer for additional weeds not listed on the label.

\* **Suppression only.**

\*\* **Not Clearfield varieties.**

Maximum ONE APPLICATION PER YEAR of *Ultim* or other products containing nicosulfuron or rimsulfuron.

Apply *Ultim* within 24 hours of mixing, as product degradation may occur resulting in reduced weed control. Refer to the product label for complete mixing instructions.

## Application Information:

- **Water Volume:** Minimum 40 L per acre; for best results apply 56 to 77 L per acre.
- **Nozzles and Pressure:** No pressures listed on label when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets.
- **Screens:** Use a 50 mesh or coarser screen and filter system.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
rimsulfuron, nicosulfuron	POST	ALS Amino Acid synthesis Inhibitor	Toward growth areas (Symplast)	Broadleaf & grasses	2

## Effects of Growing Conditions:

Apply ONLY when the temperature in the 24 hours before AND after application is between 5°C and 28°C. Rapid fluctuations in temperature (greater than 20°C difference within 24 to 36 hours) will stress the corn crop. For maximum crop safety, allow 48 to 72 hours for the corn to acclimatize before applying *Ultim*. Separate applications of *Ultim* herbicide followed by a broadleaf herbicide (minimum 12 hours later) will reduce the potential for injury.

Crop injury may result if application is made to corn that has been stressed by abnormally hot, humid or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If corn has been injured by frost, wait 48 to 72 hours before applying *Ultim*.

## Tank Mixes:

**Herbicides:** None registered.

**Insecticides:** None registered. *Ultim* should NOT be applied to corn that has been treated with *Chlorpyrifos*. Leave 7 days between the application of *Ultim* and that of a foliar organophosphate insecticide.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the *Ultim* label only. E.I. duPont also supports the following mixes that are not on the *Ultim* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** Glyphosate at registered rates in glyphosate tolerant corn.

## Restrictions:

- **Rainfall:** Within 2 to 4 hours may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze or feed treated corn forage, silage, fodder or grain for at least 30 days.
- **Pre-harvest Interval:** Leave 30 days from application to harvest.
- **Re-cropping Interval:** Field corn, winter wheat and spring barley may be planted the year following application. Perform a field bioassay before planting any other crops, or where *Ultim* is more persistent (sandy soils, with low organic matter and pH greater than 7).
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store product in original containers in a secure, dry area, away from other pesticides, food, or feed.
- **Buffer Zones:**

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

The manufacturer recommends a cleanout process similar to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. See the label for specific instructions.

## Hazard Rating:



Warning – Eye Irritant.



Caution – Skin Irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Ultra Blazer

Herbicide Group  
14 - acifluorfen  
(Refer to page 45)

## Company:

United Phosphorus Inc. (PCP#32330)

## Formulation:

240 g/L acifluorfen present as a sodium salt and formulated as a solution.

- Container size - 10 L jug

## Crops and Staging:

**Soybean:** from the 1 to 3 trifoliolate leaf stage. DO NOT apply before the first trifoliolate leaf stage of the soybean. DO NOT apply to soybeans grown on sand or loamy sand soils.

## Weeds and Staging:

*Ultra Blazer* applied at 0.5 L per acre (one jug treats 20 acres) plus *Assist* adjuvant at 0.5 L per 100 L of spray solution will control:

Weed	Maximum Leaf Stage
Common ragweed	8
Redroot pigweed	4

*Ultra Blazer* applied at 1.0 L per acre\*\* (one jug treats 10 acres) will control the weeds above plus the following weeds at the maximum leaf stages listed:

Weed	Maximum Stage
Canada thistle*	Pre-bud
Cocklebur	4 leaf
Common milkweed*	-
Field bindweed*	-
Hedge bindweed*	-
Lamb's-quarters	2 leaf
Nightshade (eastern black)	6 leaf
Redroot pigweed	6 leaf
Smartweed (including lady's- thumb)	8 leaf
Wild Mustard	2 leaf

\* Top growth control only. The plant will grow back from underground roots

\*\* DO NOT add *Assist* adjuvant with the 1.0 L per acre rate as crop injury will result.

Refer to the product label for complete mixing instructions for this product and its mixes. A general mixing guide can be found on page 11.

## Application Information:

- **Water Volume:** No specific water volume is provided on the label but a minimum of 81 L per acre is implied by the adjuvant rates on the label. Good coverage of weed foliage is required for proper control.
- **Nozzles and Pressure:** Use nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
acifluorfen	POST (foliar)	PPO Inhibitor/ Membrane disruptor	Little movement due to rapid cell leakage (Symplast)	Broadleaf only	14

## Effects of Growing Conditions:

Soybeans may exhibit speckling, bronzing and/or leaf burn. The trifoliolate leaf emerging at the time of application may be distorted. Soybeans usually outgrow these conditions and continue to grow at a normal rate with no adverse effect on vigour, maturity, or crop yield. It is important to have good spray coverage on the weeds as *Ultra Blazer* works mainly by contact action. Failure to follow the suggested application rate and timing may result in unsatisfactory control.

## Tank Mixes:

### Herbicides:

- *Ultra Blazer* (0.5 L per acre) plus *Basagran Forté* (0.5 L per acre)
- *Ultra Blazer* (0.255 L per acre) plus *Basagran\** or *Basagran Forté* (0.71 L per acre) depending on predominant weed species present.

◦ See label for details.

\* Add *Assist* adjuvant at 0.5 L per 100 L of spray solution for *Basagran* tank mix only.

**Fertilizers:** None registered. DO NOT add fertilizers to the spray mixture.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Note:** The above mixes are those listed on the *Ultra Blazer* label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 6 hours may reduce weed control.
- **Re-entry Interval:** DO NOT enter treated fields for 12 hours.
- **Pre-harvest Interval:** No specific preharvest interval is indicated on the label.
- **Grazing Restrictions:** DO NOT graze the treated crop or cut for hay.
- **Re-cropping Interval:** The label has no restriction on crops that may be planted the following season.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** DO NOT freeze.
- **Buffer Zones:** Leave a buffer of 15 metres from the last spray pass and sensitive upland areas such as other crops, pastures, rangeland, woodlots or shelterbelts.

## Sprayer Cleaning:

Refer to 'Method B' in the general section on sprayer cleaning on pages 12 and 13. Sprayers may require cleaning after several tank loads to remove any excessive oil buildup on the inside of the sprayer.

## Hazard Rating:



Caution – Poison



Danger – Corrosive to eyes.



Warning - Causes skin irritation. Avoid contact with skin. Harmful if inhaled.

For an explanation of the symbols used here see pages 7 and 8.

# Valtera/Chateau

**Herbicide Group**  
**14 - flumioxazin**  
(Refer to page 45)

## Company:

Valent Canada, Inc. Distributed by Nufarm Agriculture

## Formulation:

51.1% flumioxazin formulated as a water dispersible granule.

- Container size -
  - *Valtera* (PCP#29230): 4.54 kg
  - *Chateau* (PCP#29231): 1.13 kg

## Crops, Rates, and Staging:

Maximum ONE APPLICATION per year of *Valtera* or *Chateau* or other products containing flumioxazin.

Pre-seed or pre-emergent:

**Spring Application:**

Crop	Product	Rate (g per acre)		Acres Treated per Container	
		Soil Type		Soil Type	
		Coarse	Medium	Coarse	Medium
Potato***	<i>Chateau</i>	42.5	42.5	26.5	26.5
Soybean*	<i>Valtera</i>	56.7	85.0*	80	53
Chickpea, Field pea, Spring wheat (NOT including durum)**	<i>Valtera</i>	56.7	56.7	80	80
Non-crop use – bare ground application	<i>Valtera, Chateau</i>	113.0	170.0	40 ( <i>Valtera</i> ) 10 ( <i>Chateau</i> )	26 ( <i>Valtera</i> ) 6.5 ( <i>Chateau</i> )

\* May cause crop injury.

**Fall Application:**

Crop	Product	Rate (g per acre)		Acres Treated per Container	
		Soil Type		Soil type	
		Coarse	Medium	Coarse	Medium
Soybean	<i>Valtera</i>	56.7	85.0	80	53
Chickpea, Field pea, Lentil (red, green), Spring wheat (NOT including durum)**	<i>Valtera</i>	56.7	85.0	80	53

\* Seed soybean at least 1.5 inches (4 cm) deep

\*\* Seed wheat at least 1 inch (2.5 cm) deep; apply *Valtera* a minimum of 7 days prior to seeding spring wheat.

\*\*\* **Potatoes (*Chateau* only):** Apply after hilling. A minimum of 2 inches (5 cm) of soil must cover the vegetative portion of the potato or crop injury may result.

If applied without glyphosate, add methylated seed oil (MSO) at 1 L per acre or a non-ion surfactant such as *Nufarm Enhance* at 0.125 to 0.25 L per 100 L of spray solution.

If weeds are emerged, apply *Valtera* in a mix with a foliar herbicide (see tank mix section).

**Harvest Aid (*Valtera* only):** Apply 42.5 g per acre when crops are physiologically mature to dry green weed material. Add metholated seed oil (MSO) at 1 L per acre or a non-ion surfactant such as *Nufarm Enhance* at 0.125 to 0.25 L per 100 L of spray solution.

- Chickpea, Dry Bean, Field pea – a minimum of 80% of the pods are yellow to tan in colour and 20% are yellow in colour
- Wheat – 30% or less grain moisture.

**Note:** As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from crops treated with this product prior to harvest may have market access concerns. Please see page 10 for more information AND consult potential grain buyers before using this product.

## Weeds and Rates:

Apply prior to crop and weed emergence.

***Chateau* applied at 42.5 g per acre\*\* provides suppression of the following weeds:**

- Canada fleabane
- Kochia
- Lamb's-quarters
- Nightshade (Eastern black, hairy)
- Pigweed (green, redroot)
- Ragweed, common

***Valtera* applied at 56.7 to 85.0 g per acre provides control of the weeds above plus:**

- Common chickweed
- Dandelion
- Green foxtail\*
- Volunteer canola
- Waterhemp (including Group 2, 5 & 9 resistant biotypes)

\* Suppression

\*\* Rate for *Chateau* in potato only.

DO NOT apply on soils with > 5% organic matter, or fine soils. Soils such as clay, clay loam, silty clay or silty clay loam are considered fine textured soils. DO NOT apply to soils composed of more than 90% sand and gravel.

The duration of residual control may be reduced at lower rates. Spray within 6 hours of mixing.



## Application Information:

- **Water Volume:** Minimum application volume is not indicated on the label. Use appropriate water volumes to ensure good spray coverage.
- **Nozzles and Pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.
- **Screens:** The use of 50 mesh screens is recommended.
- **DO NOT** perform any tillage operations after application otherwise weed control will be reduced. When applied prior to seeding crops must be direct seeded with minimum disturbance systems.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
flumioxazin	PRE (surface) with residual soil activity, Pre-harvest	PPO Inhibitor/ Membrane disruptor	<i>PRE:</i> Upward in plant (Apoplast) <i>Preharvest:</i> Little movement due to rapid cell leakage (Symplast)	Broadleaf only	14

## Effects of Growing Conditions:

Rainfall is required to activate flumioxazin in the soil. Crop injury may occur when soils are wet and cool following application or soils are poorly drained. Severe injury may occur with flooded soils. Newly emerging foliage can be temporarily injured by heavy rain splashing treated soil on leaves. Heavy crop residues may reduce weed control.

**Irrigation:** If rainfall is not received after application, 5 to 10 mm of irrigation may be applied to improve weed control activity. **DO NOT** apply irrigation to wheat after emergence until the main head is fully emerged.

## Tank Mixes:

The following mixes are for *Valtera* only.

### Herbicides:

- **Soybean, Wheat or Bare Ground:**
  - Glyphosate (IPA or K salts) 180 to 486 g ae per acre. (spring or fall)

Note: **DO NOT** mix when applying prior to soybean with *Dual II Magnum* or *Frontier/Outlook* herbicides or injury could occur.
- **Field pea and chickpea (spring or fall) and lentil (fall only):**
  - Glyphosate (IPA or K salts) 180 to 360 g ae per acre.
- **Dry Bean Desiccation only:**
  - Glyphosate (IPA or K salts) at preharvest rates.

**Fertilizers:** None registered.

**Fungicides:** None registered.

**Insecticides:** None registered.

**Note:** The above mixes are those listed on the *Valtera* label only.

Nufarm Agriculture also supports the following mixes that are not on the *Valtera* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:**
  - Soybean, Spring wheat: *BlackHawk*
  - Field pea, Spring wheat: *GoldWing*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Rain or irrigation shortly after application is required for activation. If rainfall does not occur, irrigation with at least 5 mm of water is recommended before ground crack occurs.
- **Re-entry Interval:** **DO NOT** re-enter treated fields for 12 hours.
- **Grazing Restrictions:** **DO NOT** graze or cut crops for livestock feed from treated fields.
- **Pre-harvest Interval:**
  - **Desiccation:** Leave 5 days between application and harvest. Leave 7 days to harvest if mixing with glyphosate.

- **Re-cropping Interval:** Soybeans, chickpea, and field pea, may be seeded immediately after treatment or in the spring following a fall application. Lentils may be seeded in the spring following a fall application. Spring wheat may be seeded into minimum and no-till fields 7 days after a spring *Valtera* application or anytime in the spring after a fall application. Winter wheat may be seeded 7 days after dry bean desiccation or in the fall following spring application. Alfalfa, barley, canola, field corn, sorghum, dry edible beans\*\*, and sunflower may be seeded the season after spring application. All other crops require a minimum of 12 months and a successful bioassay prior to indicate safe seeding.

\*\* **Note:** Not all varieties of dry beans have been tested for recrop tolerance. Test new varieties of dry beans on a small area before attempting large acreages.

- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store in a cool, dry place. May be frozen.
- **Buffer Zones:**

Crops	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Potato, Dry bean desiccation	2	1	5
Chickpea, field pea, soybean, Spring wheat	3	1	10
Bare Ground uses	5	2	25

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance is measured from the downwind edge of the boom to sensitive areas.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. See product label for further information.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Varro

**Herbicide Group**  
**2 - thien carbazone**  
*(Refer to page 45)*

## Company:

Bayer (PCP#29070)

## Formulation:

10 g/L thien carbazone-methyl formulated as a suspension concentrate.

- Container size - 2 x 8 L

## Crops and Staging:

### Spring wheat (including durum):

- 1 to 6 main stem leaf stage to a maximum of 3 tillers, and before the first node can be felt in the stem. Under drought conditions, do not apply if there is >35 days between seeding and spraying, as drought hastens crop development.

### Winter wheat:

- Spring or fall application from 1 to 6 main stem leaf stage and before the first node can be felt in the stem. DO NOT apply after the presence of the first node as crop injury may occur.

## Weeds and Staging:

Grass weeds controlled from 1 to 6 main stem leaves and prior to the emergence of the 3<sup>rd</sup> tiller unless otherwise indicated:

- Barnyard grass
- Japanese brome<sup>†</sup> \*\*
- Volunteer canaryseed \*
- Foxtail (green and yellow<sup>†</sup>)
- Persian darnel<sup>†</sup>
- Wild oats

**Broadleaf weeds controlled at the 1 to 6 leaf stage unless otherwise indicated:**

- Cleavers (1 to 6 whorls)
- Round-leaved mallow<sup>†</sup>
- Volunteer canola (except Clearfield varieties)
- Hemp-nettle
- Russian thistle (up to 10 cm)<sup>†</sup>
- Wild buckwheat
- Lamb's-quarters<sup>†</sup>
- Shepherd's-purse
- Wild mustard
- Pale smartweed
- Stinkweed
- Pigweed, redroot

\* Up to the emergence of the 2<sup>nd</sup> tiller.

\*\* Prior to tillering.

† Suppression only.

## Rates:

0.2 L per acre

(One 8 L container will treat 40 acres)

Add ammonium sulphate on spring wheat only for improved weed control. Add 200 g active ammonium sulphate per acre (202 g per acre of 99% dry; 0.5 L per acre of 40% liquid or 0.4 L per acre of 49% solution) to the tank before adding other components.

DO NOT add ammonium sulphate to applications on durum wheat.

For improved weed control in durum wheat add either *Agral 90* or *AgSurf* at 0.25 L per 100 L.

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre. Use higher water volumes for dense canopies.
  - **Aerial:** Minimum 11.3 L per acre.
- **Nozzles and Pressure:**
  - **Ground:** For conventional flat fan nozzles use a pressure of 30 to 50 PSI (207 to 345 kPa). Angle nozzles forward 45 degrees for better coverage. Low drift nozzles may require higher pressures for proper performance.
  - **Aerial:** Minimum 43 PSI (300 kPa).

For either ground or aerial, use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
thiencarbazone	POST (foliar)	ALS Amino Acid Synthesis Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	2

## Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result. Under drought conditions DO NOT apply to spring or durum wheat if the time from seeding to spraying exceeds 35 days or if temperatures will be 3°C or lower within 3 days of application (before or after).

## Tank Mixes:

Add ammonium sulphate to the tank first then *Varro* then the tank mix partner.

Tank mix partners applied at all label rates and include recommended adjuvants unless otherwise noted.

### Herbicides:

- **Wheat (including spring, durum, winter):**
  - *Infinity*
  - *Thumper*

- **Spring Wheat (including durum):**
  - 2,4-D ester (129 g ae per acre)
  - *Buctril M*
  - *Infinty FX*
  - MCPA ester (0.23 L per acre – 600 g/L form)
- **Spring Wheat (NOT including durum):**
  - *Curtail M* (0.61 L per acre)\*
  - *Frontline XL*
  - *Refine SG*
  - *Refine SG* + 2,4-D ester (rates above)
  - *Refine SG* + MCPA ester (rates above)

**Fungicides:** None registered.

**Insecticides:** None registered.

**Fertilizers:** None registered.

**Note:** The above mixes are those listed on the *Varro* label only.

Bayer also supports the following mixes on spring wheat and durum that are not on the *Varro* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Attain XC, Barricade II, Momentum, OcTTain, Paradigm, Pixxaro, Prestige XC\*, Refine M/Broadside, Retain SG, Stellar, Travallas*
- \* When tank-mixing *Varro* with *Prestige XC* or *Curtail M* in spring wheat (NOT durum) always add ammonium sulphate.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 11.

## Restrictions:

- **Rainfall:** Within 1 hour may reduce control.
- **Re-entry Interval:** DO NOT enter treated field for 12 hours.
- **Grazing Restrictions:** Must not be grazed within 7 days or cut for livestock feed within 30 days of treatment.
- **Pre-harvest Interval:** DO NOT harvest grain or straw within 60 days of application for spring and durum wheat or within 72 days of application to winter wheat.
- **Re-cropping Interval:** Alfalfa, barley, canaryseed, canola, chickpea, dry bean, field corn, flax, lentil, mustard, oat, pea, soybean, sunflower, timothy, and wheat (durum, spring) may be seeded the year following application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store in a cool, dry place. Keep from freezing. Shake well before using.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	1
Fixed wing aircraft	1	0	30
Helicopter	1	0	30

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general section on sprayer cleaning on pages 12 and 13. If mixing with other pesticides, combine this method with the method indicated for the tank mix partner.

## Hazard Rating:



Warning – Eye and Skin Irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Velocity m3

Herbicide Group  
2 - thien carbazone  
6 - bromoxynil  
27 - pyrasulfotole  
(Refer to page 45)

## Company:

Bayer (PCP#29584)

## Formulation:

5 g/L thien carbazone-methyl, 31.3 g/L pyrasulfotole and 175 g/L bromoxynil formulated as a suspension concentrate

- Container size - 8.1 L and 129.6 L

## Crops and Staging:

### Spring wheat (including durum):

- 1 to 6 main stem leaf stage to a maximum of 3 tillers, and before the first node can be felt in the stem. Under drought conditions, do not apply if there is >35 days between seeding and spraying, as drought hastens crop development.

### Winter wheat:

- Spring or fall from 1 to 6 leaf stage and before the first node can be felt in the stem. DO NOT apply after the first node is detectable in the stem as crop injury may occur.

## Weeds and Staging:

### Grass weeds controlled from 1 to 6 main stem leaves and prior to the emergence of the 3<sup>rd</sup> tiller:

- |  |                               |                               |
|--|-------------------------------|-------------------------------|
| ◦ Barnyard grass                           | ◦ Canaryseed                  | ◦ Wild oat                    |
| ◦ Foxtail (green and yellow <sup>†</sup> ) | ◦ Persian darnel <sup>†</sup> | ◦ Japanese brome <sup>†</sup> |

### Broadleaf weeds controlled at the 1 to 6 leaf stage unless otherwise indicated:

- |   |  |   |
|---|--|---|
| ◦ Canada fleabane<br>(seedlings 1 to 10 cm)*    | ◦ Kochia (up to 10 cm)   | ◦ Shepherd's-purse                                |
| ◦ Canada thistle (up to 30 cm) <sup>†</sup>     | ◦ Lamb's-quarters  | ◦ Sow-thistle (annual, perennial <sup>†</sup> )   |
| ◦ Common chickweed                              | ◦ Narrow-leaved hawk's-beard<br>(up to 10 cm and prior to bolting) | ◦ Spreading atriplex (1 to 10 leaf) <sup>†*</sup> |
| ◦ Cleavers (1 to 3 whorls)                      | ◦ Pale smartweed   | ◦ Stinkweed                                       |
| ◦ Cleavers (4 to 6 whorls)*                     | ◦ Pigweed, redroot   | ◦ Stork's-bill (1 to 8 leaf)**                    |
| ◦ Dandelion (up to 25 cm diameter) <sup>†</sup> | ◦ Ragweed (common, giant <sup>†*</sup> )                           | ◦ Volunteer canola (all varieties)                |
| ◦ Flixweed (up to 10 cm)                        | ◦ Round-leaved mallow  | ◦ Wild buckwheat                                  |
| ◦ Hemp-nettle                                   | ◦ Russian thistle (up to 10 cm)                                    | ◦ Wild mustard                                    |

<sup>†</sup> Suppression only.

\* Add ammonium sulphate as per the "Rates:" section below.

\*\* Only when mixed with 2,4-D ester + ammonium sulphate (see Tank Mixes).

## Rates:

0.405 L per acre

(One 8.1 L container treats 20 acres, 129.6 L drum will treat 320 acres)

Add ammonium sulphate on spring wheat only for improved weed control or when tank mixing with 2,4-D or MCPA. Add 200 g active ammonium sulphate (202 g per acre of 99% dry; 0.5 L per acre of 40% liquid or 0.4 L per acre of 49% liquid).

If using an ammonium sulphate product with a different concentration, adjust the rate accordingly.

DO NOT add ammonium sulphate to applications on durum wheat.

DO NOT apply *Velocity m3* or other products containing thien carbazone, pyrasulfotole or bromoxynil more than once in the same year.

## Application Information:

- **Water Volume:**
  - **Ground:** 20 to 40 L per acre. Use higher water volumes for dense canopies.
  - **Aerial:** Minimum 11.4 L per acre.

- **Nozzles and Pressure:**

- **Ground:** For conventional flat fan nozzles use a pressure of 30 to 50 PSI (207 to 345 kPa). Angle nozzles forward 45 degrees for better coverage. Low drift nozzles may require higher pressures for proper performance.
- **Aerial:** Minimum 43 PSI (300 kPa).

For either ground or aerial, use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium** droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
thiencarbazone	POST (foliar)	ALS Amino Acid Synthesis Inhibitor	Toward areas of growth (Symplast)	Broadleaf & grass	2
bromoxynil	POST (foliar)	PSII Inhibitor/ Membrane disruptor	Little (apoplast)	Broadleaf only	6
pyrasulfotole	POST (foliar)	HPPD Pigment Inhibitor	Some – both foliar & root (Apoplast) – Somewhat systemic (has soil residues)	Broadleaf only	27

## Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

DO NOT apply to spring or durum wheat under conditions where the time from seeding to spraying exceeds 35 days or if temperatures will be 3°C or lower within 3 days of application (before or after).

## Tank Mixes:

### Herbicides:

- 2,4-D ester (113 g ae per acre) + ammonium sulphate\* (see Rates).
- \* add ammonium sulphate on spring wheat (NOT durum) only.

Bayer supports the following mixes that are not on the *Velocity m3* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Lontrel*, MCPA Ester\* (94.5 to 189 mL - 600 g/L forms).
- \* When adding MCPA Ester to *Velocity m3* tank-mix, ammonium sulphate must be added for application to spring wheat only (see "Rates:" section above).

Fungicides: *Tilt*

Insecticides: *Decis*, *Sevin XLR*.

## Restrictions:

- **Rainfall:** Within 1 hour may reduce control.
- **Re-entry Interval:** DO NOT enter treated field for 24 hours.
- **Pre-harvest Interval:** DO NOT harvest grain or straw within 60 days of application to spring and durum wheat or within 72 days of application to winter wheat.
- **Grazing Restrictions:** Must not be cut for livestock feed within 30 days or grazed by livestock within 25 days of treating the crop.
- **Re-cropping Interval:** Alfalfa, barley, canaryseed, canola, field corn (Manitoba only), flax, soybean (Manitoba only), tame oat, and wheat (durum, spring) may be seeded the year following application. Field pea may be grown the following year in all black, grey-wooded and dark brown soil zones. DO NOT plant field pea the season following *Velocity m3* use in the brown soil zone where organic matter content is below 2.5% and where soil pH is above 7.5. Lentil may be seeded the second season after application.
- **Aerial Application:** May be applied by air.
- **Storage:** Store in a cool, dry place. Keep from freezing. This product is combustible. DO NOT store near heat or open flame.

• **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	5
Fixed wing airplane	10	1	375
Helicopter	10	1	225

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

Refer to 'Method A' in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:



Warning – Poison



Danger – Corrosive to eyes.

Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Velpar DF CU

Herbicide Group

5 - hexazinone

(Refer to page 45)

## Company:

Tessenderlo Kerley Inc. (PCP#25225)

## Formulation:

75% hexazinone formulated as a water dispersible granule.

- Container size - 2 kg

## Crops and Staging:

Established alfalfa for forage and seed (established 18 months or longer). Apply in late fall prior to freeze-up when alfalfa is dormant or in early spring before alfalfa growth resumes. If burning or irrigation is to be carried out, do not apply until these operations have been completed.

Crop injury may occur in fields where alfalfa root growth has been restricted by hard pans or other physical barriers to root growth.

## Weeds, Rates and Staging:

Application stage is dictated by the crop dormancy listed above.

**Apply a minimum of 0.272 kg per acre to control:**

- Dandelion
- Sow-thistle
- Quackgrass

**Apply 0.544 kg per acre to control:**

- The weeds above plus:
  - Narrow-leaved hawk's-beard
  - Scentless chamomile

Use the lower rate on medium-textured soils with low organic matter.

DO NOT apply *Velpar DF CU* to:

- soil that is frozen
- Soil with less than 1% organic matter content
- Soil that is gravelly/rocky, sandy or has exposed subsoil

## Application Information:

- **Water Volume:** 81 L per acre.
- **Nozzles and Pressure:** 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
hexazinone	PRE (surface) soil active	PSII Inhibitor/ Membrane disruptor	Upward soil applied (Apoplast)	Broadleaf & grass	5

## Effects of Growing Conditions:

Adequate soil moisture is required for activation of the product.

## Tank Mixes:

None registered.

## Restrictions:

- **Rainfall:** Rainfall is beneficial for activation of the product.
- **Re-entry Interval:** DO NOT re-enter treated fields for 48 hours.
- **Grazing Restrictions:** Leave 30 days between application and grazing harvesting for feed (hay or greenfeed).
- **Re-cropping Interval:** Leave 2 years of between treating alfalfa and the seeding of a crop. A field bioassay is required after 2 years to determine which crops are safe to grow.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** May be frozen.
- **Buffer Zones:**

Buffers are not required for hand-held and backpack applications.

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	5

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Sprayer Cleaning:

No specific cleaning procedures are indicated on the label. Based on products with similar chemistry, 'Method B' found in the general sprayer cleaning section on pages 12 and 13 or a commercial spray sprayer cleaning product, may provide adequate cleaning. Contact the manufacturer for more information.

## Hazard Rating:



Danger – Corrosive to eyes



Caution – Poison



Caution – Skin Irritant



Warning – Contains the allergen milk

For an explanation of the symbols used here see pages 7 and 8.



# Viper ADV

Herbicide Group  
2 - imazamox  
6 - bentazon  
(Refer to page 45)

## Company:

BASF Canada (PCP#30626)

## Formulation:

20 g/L imazamox and 429 g/L bentazon formulated as a solution.

- Container size - 2 x 8.1 L, 129 L

## Requires the addition of:

BASF 28% UAN (28-0-0) is required, but sold separately.

- Container size - 2 x (2 x 8 Liters); 128 L drums

## Crops and Staging:

**Field pea:** 3 to 6 above-ground nodes (3 to 6 true leaves).

**Dry bean (black, cranberry, great northern, navy, pinto, pink, red Mexican):** *Viper ADV* plus additional *Basagran Forte* (see tank mix section) from the fully expanded first trifoliate leaf to the second trifoliate fully expanded.

Even though *Viper ADV* is registered for all the dry bean types above, tolerance may vary between varieties (esp. navy).  
Test new varieties on a small area for tolerance before widespread use.

**Soybean:** Emergence to 3 expanded trifoliate leaves.

**Established clover (alsike, red) for seed production only:** Apply prior to flowering but before the crop canopy closes.

Note: Applications under hot, humid conditions may result in temporary leaf yellowing, leaf flecking, bronzing or burning. The crop usually outgrows this condition within 10 days and new tissues will not be affected.

## Weeds and Staging:

**Grasses - 1 to 4 main stem leaves or until early tillering.**

- |                   |                        |   |
|-------------------|------------------------|---|
| ◦ Barnyard grass  | ◦ Volunteer barley     | ◦ Volunteer wheat (including durum, not CLEARFIELD varieties) |
| ◦ Green foxtail   | ◦ Volunteer canaryseed | ◦ Wild oat  |
| ◦ Japanese brome* | ◦ Tame oat             | ◦ Yellow foxtail  |
| ◦ Persian darnel  |                        |   |

**Broadleaf Weeds - cotyledon to 4 leaf stage.**

- |                                   |   |  |
|-----------------------------------|---|--|
| ◦ Cleavers*†                      | ◦ Russian thistle                                   | ◦ Volunteer lentils (including CLEARFIELD lentils) |
| ◦ Cow cockle                      | ◦ Shepherd's-purse                                  | ◦ Wild buckwheat*                                  |
| ◦ Green smartweed                 | ◦ Stinkweed   | ◦ Wild mustard†                                    |
| ◦ Kochia*†                        | ◦ Sow-thistle (spiny annual)**                      |  |
| ◦ Lamb's-quarters                 | ◦ Stork's-bill**                                    |  |
| ◦ Pigweed (prostrate**†, redroot) | ◦ Volunteer canola (including CLEARFIELD varieties) |  |
| ◦ Round-leaved mallow*            |   |  |

\* **Suppression only.**

† **Including Group 2 resistant biotypes.**

\*\* ***Viper ADV* + *Basagran Forte* in dry beans only.**

## Rates:

400 mL per acre

(One case of *Viper ADV* treats 40 acres)

Add 28 % BASF UAN (sold separately) at 0.81 L per acre.

Failure to include UAN will result in significantly reduced product performance. DO NOT use any other adjuvants as injury may result.

DO NOT apply *Viper ADV* more than once or follow *Viper ADV* with any related products (*Basagran*, *Odyssey*, *Solo*) in the same year.

DO NOT apply to any crop other than those registered as severe injury will result. Refer to the product label for complete mixing instructions for this product.

A general guide to mixing can be found on page 11.

## Application Information:

- **Water Volume:** Apply in 40 L per acre. High water volumes are required for adequate coverage, particularly when weed densities are high or weed staging is large.
- **Nozzles and Pressure:** Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage a of **ASABE medium** droplets.
- **Screens:** Use 50 mesh or coarser on both nozzle and primary plumbing screens

## How it Works:

Refer to How Do Herbicides Work on page 49 for an explanation of the concepts used in the table below.

Active ingredient	Timing	Target	Movement	Spectrum	WSSA Group
imazamox	POST (foliar)	ALS Amino Acid inhibitor	Symplast	Broadleaf & grass	2
bentazon	POST (foliar)	PSII Inhibitor/Membrane disrupter	Little (Apoplast)	Broadleaf only	6

## Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C or less are forecast within 3 days of application. Under cool or dry conditions, control of some weeds may be severely reduced. DO NOT apply to crops stressed from hail damage, flooding, drought, hot, humid weather, widely fluctuating temperatures, prolonged cold or injury from previous herbicides, as crop injury may result.

## Tank Mixes:

**Dry bean (types above):**

- *Basagran Forte* (145 mL per acre) plus UAN as above.

## Restrictions:

- **Rainfall:** Rain within 6 hours may reduce control.
- **Re-entry Interval:** DO NOT enter treated fields for at least 12 hours.
- **Grazing Restrictions:** DO NOT graze or cut for feed.
- **Pre-harvest Interval:** DO NOT apply within 60 days of harvest.
- **Re-cropping Interval:** Winter wheat may be seeded 3 months after application. Barley, canaryseed, canola, chickpea, field corn, field pea, flax, lentil, oat, sunflower, and spring wheat (including durum) may be seeded the first season after application and tame mustard (condiment types only) the second season after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above. Contact manufacturer for additional information on recropping intervals.
- **Storage:** DO NOT freeze. Store in a cool, dry place above 5°C.
- **Buffer Zones:** Avoid spraying in situations where drift may occur. Leave at least 11 metres between the outside edge of the sprayed area and sensitive non-target areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs. Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

## Sprayer Cleaning:

Refer to 'Method B' in the general sprayer cleaning section on pages 12 and 13.

## Hazard Rating:



Warning – Poison



Warning – Contains the allergen soy.



Warning – Eye and Skin Irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Plant Disease Control

## Integrated Plant Disease Management

### Cereal Leaf Diseases

Cereal leaf diseases affect both the yield and quality of cereals. The following management practices are recommended for effective control of leaf diseases in all cereal crops.

- **Scouting:** Scout fields prior to, during, and following flag leaf emergence to check for disease levels. Flag and upper leaves are responsible for 50 per cent or more of grain-fill.
- **Crop Rotation:** Rotate crop types [e.g. cereal (wheat)/oilseed/cereal(barley)/pulse] to reduce the build-up of disease inoculum in crop residue. If at all possible, do not seed the same crop in back to back years. When a short rotation is absolutely necessary, seed in the second year a variety that is more resistant to an anticipated disease problem.
- **Resistant Varieties:** Provincial crop/seed guides provide a comprehensive listing of the performance of adapted varieties, including their resistance status to specific diseases.
- **Foliar Fungicides:** Foliar fungicides, applied at the proper time in accordance to manufacturers' Pesticide Product labels, can control cereal leaf diseases and help to attain target yields. The greatest benefit occurs when disease pressure is high or with varieties that have poor resistance.
- **Spraying Practices:** Foliar fungicides should be applied preventively, before disease is well-established in a crop and already causing crop loss. Good spray coverage with minimal drift is essential. Ideally, the best time to spray is when the wind is light, humidity is above 60 per cent and air temperature is between 10 and 25°C.

### Ergot of Cereals

Ergot is a fungal disease that affects most cereals and grasses in Canada. Ergot bodies contain toxic alkaloids; they should never be consumed by humans or fed to animals. Ergot is a particularly damaging disease of rye, and has also been observed sporadically over the years on cereals and grasses in the prairie provinces. After an ergot outbreak, crop residue and soil become contaminated with a higher load of ergot bodies, placing nearby grasses and cereal crops at greater risk of infection in the following seasons. This risk increases further when cool, moist weather conditions promote ergot spore production and/or when cereals experience an extended period of flowering or an induction of floret sterility due to any of a variety of agronomic or environmental factors. Once ergot is present, little can be done to control the disease in the field, so prevention is important. Planting seed contaminated with ergot bodies can potentially spread disease to previously clean fields and there are no seed treatments registered; therefore only clean, healthy seed should be used. During the field season, nearby grasses may be mowed to remove additional hosts. Prior to harvest, fields should be scouted to determine where ergot has developed, such as headlands, and those areas should be harvested separately. Viability of ergot bodies decreases after one to two years.

### Fusarium Head Blight of Cereals

Fusarium head blight (FHB) causes a reduction in yield as a result of floret sterility and the loss of light weight cereal kernels during combining. More important is the effect on grain quality and food safety due to production of myco- toxins, including deoxynivalenol (DON) and vomitoxins. In Manitoba, FHB occurs throughout all crop regions and will damage wheat crops whenever environmental conditions favour the disease. In Saskatchewan, FHB has been established in eastern regions for several years, but occurs across the province, particularly in wet years.

- **Field Management of FHB:** Weather is by far the greatest factor in development of FHB. The disease is most likely to develop when the plants are flowering, temperatures range from 15 to 30°C and high moisture is continuous for 48 to 60 hours. If conditions remain warm and moist, the pathogen can continue to sporulate and spread to other kernels or heads. Under these optimum conditions, crop management has little impact on FHB outbreaks. Production practices, which lead to reduced tillering and shortened flowering duration, could reduce the risk period of FHB infection.
- **Crop Rotation and Crop Selection:** A break of at least one year – preferably two years – is advised between cereal, grass and corn production. In fields of wheat on wheat stubble, the incidence of FHB was about one and a half times higher than in fields of wheat planted into pulse crop residue. Regardless of the rotation, producers should consider planting cereals that are less susceptible to FHB. Results from previous years show that durum and soft white wheat varieties are more susceptible than hard red spring wheat varieties. Barley is more resistant than wheat, and oat is more resistant than either wheat or barley. Refer to provincial seed guides for FHB disease ratings for each variety. Planting two or more varieties of wheat with differing flowering times or varying planting dates will help reduce the risk of infection. Susceptible crops should not be planted on infected corn stubble. Corn trash is slower to decompose than cereal trash, and acts as a source of inoculum for a much longer time period.

### Late Blight of Potatoes

One of the major threats to Manitoba and Saskatchewan's potato industry is the fungal disease late blight. At present, there is no fungicide registered for use on potatoes that is capable of eradicating the fungus from infected plants. As a result, producers are forced to adopt preventive management to control this disease. One of the main components of this strategy is the application of fungicides at specified spray intervals. This interval varies with the type of fungicide used. Shortening or lengthening of this interval should be based on current weather conditions and the status of the disease in the crop.

In Manitoba, potato producers can make use of a weather-based late blight risk forecasting program. The purpose of this program is to predict when environmental conditions are most conducive to disease development and issue warnings based on those parameters.

Accurate weather monitoring and scouting techniques are very important for achieving the most effective use of fungicides. Combining precise weather forecasting with spray interval scheduling may lower input costs for the farmer and lead to a more productive, higher quality crop. These weather monitoring systems monitor key environmental variables, such as relative humidity, temperature, leaf wetness and precipitation.

The following practices are recommended for effective disease management:

- **Scouting:** To effectively schedule preventative fungicide applications and eliminate unnecessary fungicide use, local weather forecasts should be used to identify conditions conducive to disease development. Scout fields regularly to identify diseases and pests that may be developing. Low areas in rolling or hilly fields and in wind-protected area near trees lines should be specially checked.
- **Crop Varieties:** (*There are no known commercial resistant varieties currently available in Canada*). Where practical, the use of short season varieties may help reduce the period of use for fungicides.
- **Healthy Seed:** Obtain seed from sources with effective disease management practices. The use of certified seed is legislated in Manitoba and Saskatchewan. Grade seed carefully while cutting and discard suspicious looking tubers and seed pieces.
- **Cull Clean-up:** Avoid leaving tubers, including debris or slivers from seed cutting, in cull piles for any length of time. Follow a program of sanitation for storage facilities and equipment to eliminate sources of the disease. Dispose of cull piles in an approved manner so they do not serve as a source of disease inoculum for future infections. Dispose by burying, using a cover, spreading out on the field over winter, or feeding to livestock.
- **Sanitation:** Follow a program of sanitation for storage facilities and equipment to eliminate sources of disease. Sanitation consists of cleaning and disinfecting all equipment, storage, and tools that contact potatoes from seeding through harvest and storage. Since most disinfectants are inactivated by soil and plant debris, it is essential that equipment and storage is thoroughly cleaned with a pressure washer or steam cleaner with detergent before disinfectant is applied. Treated surfaces should remain wet for at least 20 minutes for the disinfectant to destroy disease organisms.
- **Cultural Practices and Rotation:** Use proper cultural practices including a one in four year potato crop rotation; proper hilling to reduce disease and greening in tubers; manage irrigation to avoid an excess or deficit of soil moisture; schedule irrigation throughout the day so it is not extending the natural dew period and prolonging leaf wetness; if late blight is discovered destroy hot spots of infected fields; control weed hosts (especially nightshades) and remove and destroy volunteer potatoes. Use appropriate weed control practices in rotational crops to control those weeds that may be hosts of diseases in potatoes.
- **Foliar Fungicides:** Preventative fungicide applications are most effective in controlling late blight. Follow product label guidelines for most efficient and safe use of products. Labels of newly registered products also provide information on resistance management. In this context – medium to high

risk of resistance fungicides (e.g. Group 7 - boscalid and Group 11 – strobilurins) should be rotated or mixed with low risk fungicides (e.g. mancozeb (M3) and chlorothalonil (M5)).

- **Farm Visits:** The following recommendations are provided to prevent the spread of potato diseases from field to field or between farms. All people serving the potato industry should use these sanitary practices.
  1. Contact the grower for permission to enter fields and other facilities on the farm.
  2. Keep your vehicle clean and whenever possible, avoid driving your vehicle into fields or potato handling areas.
  3. Carry a boot brush and a supply of disinfectant in your vehicle at all times. Quaternary ammonia (General Storage Disinfectant) is recommended as it is also registered for bacterial ring rot disinfection.
  4. Wear coveralls or other protective outerwear that can be discarded or disinfected regularly.
  5. Clean, washable, footwear is recommended and rubber boots are preferred.
  6. Clean, wash, and disinfect your boots thoroughly on arrival at each field/farm/storage shed and before leaving.
  7. Remove dirty outerwear, including boots before entering your vehicle.
  8. Any tools to be used during the farm call (potato forks, shovels, soil probes, knives, etc) should be cleaned and disinfected before and after use.
  9. Maintain a detailed logbook of field/farm/storage shed visits.

## Canola Diseases

**Sclerotinia stem rot** has been one of the most prominent diseases affecting canola in Manitoba and Saskatchewan for the past 25 years. An important factor for disease development is environmental conditions. The disease is much more widespread and severe during wet years. Fungicide applications are an important element in controlling the development and spread of sclerotinia stem rot. Fungicide spray decisions are based on soil moisture, weather conditions, crop stage and density, and disease history. The Sclerotinia resting bodies (sclerotia) require moist soil conditions for up to 10 days for germination to occur and the spore-bearing structures (apothecia) to form. Usually these conditions do not occur until the crop canopy closes. The spores released from the apothecia utilize the canola petals as a food source and fall into the canola canopy where they infect plants. Lesions form up and down the stem, wilting leaves and eventually killing the plant. Fungicide should be applied between the 20 to 50 per cent flower stages to protect the petals from being colonized by the spores.

**Blackleg** caused by *Leptosphaeria maculans* affects canola and most crucifer field and vegetable crops. After many years of low incidences, due to resistant canola varieties grown in the prairie provinces, the disease is gaining importance again. High frequency of canola in crop rotations, accompanied by changes in the pathogen populations, has led to higher incidences and severities in some fields. For an effective control, a 4 year crop rotation is highly recommended.

**Clubroot** is a soil-borne disease caused by a microbe, *Plasmodiophora brassicae*. Clubroot affects the roots of cruciferous field crops such as canola, mustard, and camelina, as well as

cruciferous vegetables and weeds. Clubroot has become a significant problem for canola growers in some areas of Alberta and the pathogen has been detected in Saskatchewan and Manitoba. Clubroot is a regulated pest in Saskatchewan under *The Pest Control Act*. Currently there is no provincial legislation that regulates clubroot in Manitoba.

Invasion of the interior of the host roots alters hormone balance and leads to increased cell division and growth, resulting in clubroot galls. These deformed roots have a reduced ability to absorb water and nutrients leading to stunting, wilting, yellowing, premature ripening and shrivelling of seeds. The cause of these above-ground symptoms can be confirmed by digging up suspect plants to check roots for gall formation. Clubroot affects canola yield and quality to a similar degree as other diseases affecting water and nutrient uptake, and its impact depends on soil conditions and the growth stage of the crop when infection occurs. Spore germination, infection and disease development are favoured by warm soils, high soil moisture and low soil pH; however, the disease can still occur under conditions outside of the optimum parameters. Infected roots will eventually disintegrate, releasing resting spores into the soil, which may then be transported by wind, water erosion, animals/manure, shoes/clothing, vehicles/tires or earth tag on agricultural or industrial field equipment. Resting spore numbers will decline over time when non-host crops are grown, but a small proportion can survive in soil for up to 20 years. Clubroot is primarily a soil-borne disease; it does not infect seed but it may be found in soil attached to seed or other plant parts. There are currently no seed treatments or foliar fungicides registered for control of clubroot on canola. The following best practices are recommended for prevention and management of clubroot:

1. Plant susceptible crops, including resistant varieties, no more than once every four years. Although crop rotation will not prevent the introduction of clubroot to fields that are free of the pathogen, it will restrict clubroot development by limiting the increase of clubroot resting spores and preventing the increase of clubroot inoculum, as well as help alleviate the impact of other plant pathogens.
2. Scout crops regularly and carefully.
  - Identify suspicious above-ground symptoms including wilting, stunting, yellowing and premature ripening of canola or other susceptible crops.
  - Field entrances and approaches are likely to be contaminated with clubroot spores first. Therefore, symptoms will often appear there first.
  - Confirm cause of above ground symptoms by checking the roots for galls.
  - Send sample of symptomatic plants into a commercial lab for confirmation of diagnosis.
3. Practice good sanitation by restricting movement of potentially contaminated soil to non-contaminated regions.
  - For Saskatchewan and Manitoba producers, this means restricting entry into their fields of vehicles, field machinery or oil rig equipment with earth tag from infested regions unless it has been properly sanitized. Ask questions about where the equipment is from and what sanitation measures have been used before the equipment left the infested area, dealer or auction site.
  - Cleaning steps may include: removal of crop debris and soil, washing of equipment with a power washer using

hot water or steam and misting with disinfectant (1 to 2 per cent bleach solution), followed by an additional rinse with water.

- Other agricultural products, which could carry soil, should be carefully checked for excess soil and if possible be from clubroot free areas.

For more information on clubroot, visit [www.clubroot.ca](http://www.clubroot.ca), [www.saskatchewan.ca](http://www.saskatchewan.ca), or [www.gov.mb.ca/agriculture](http://www.gov.mb.ca/agriculture).

## Pulse Crop Diseases

There are a variety of pulse crops produced in Manitoba and Saskatchewan including field pea, field bean, lentil, chickpea and soybean. Pulse crops are adapted to different regions and will require unique agronomic and disease management practices. Some diseases will attack all pulse crops, e.g. sclerotinia (white mould) and seedling/root rots caused by *Aphanomyces euteiches*, *Pythium*, *Rhizoctonia*, *Fusarium* and *Botrytis* species. Some diseases may occur on more than one type of pulse crop, but the pathogen species infecting each is often specific to that crop. This is the case for the ascochyta blights, powdery mildews and anthracnose. It is important to source information on pulse disease control from grower organizations such as the Saskatchewan Pulse Growers ([www.saskpulse.com](http://www.saskpulse.com)), Manitoba Pulse Growers ([www.manitobapulse.ca](http://www.manitobapulse.ca)), provincial specialists, and field diagnostic guides. Most foliar diseases are favoured by warm, moist conditions and lush crop canopies, but root rots and powdery mildew can be present in dry years as well. In general, pulse disease management will need to include the following practices:

- **Use of clean seed and seed treatments:** Plant certified seed or seed that has been tested at an accredited lab and known to have high germination and zero or acceptable levels of seed-borne disease. Seed treatments will help protect seed and seedlings from low levels of seedborne and soilborne pathogens. However, there are no seed treatments registered for control of *Aphanomyces euteiches*.
- **Crop Rotation:** It is important to keep at least three years between the same type of pulse crop to allow for the breakdown of crop residue on which disease pathogens survive. Longer rotations may be required for *Aphanomyces euteiches*, due to long-lived resting spores in the soil. Since there are diseases that affect more than one type of pulse crop, it is still important to maintain at least two years between different pulse crops.
- **Crop Varieties with Disease Resistance:** Refer to provincial seed guides for varieties adapted to your region. When available, choose varieties with disease resistance.
- **Scouting and Foliar Fungicide Application:** Begin crop scouting at the vegetative stages for aggressive diseases such as ascochyta blight in chickpea. Scout for other foliar diseases at early bloom, e.g. ascochyta blight and anthracnose in lentil. It is too late to apply fungicide to control sclerotinia (white mould) once symptoms are observed, and/or the canopy has closed, so forecasting to determine risk is necessary.
  - Use foliar fungicides only when disease risk and potential loss are significant. Rotate fungicides or use tank mixes from different fungicide groups to prevent development of resistant pathogen populations.



## Effects of Weather

Do not apply foliar fungicides during periods of dead calm or when winds are gusty. Avoid application immediately after a rainfall and delay spraying if rainfall is imminent. Contact fungicides are always more sensitive to wash-off by rainfall than systemic fungicides, because their mode of action relies on drying on the leaf surface. Failure of a contact fungicide to dry on the leaf surface may result in a loss in efficacy. Systemic fungicides are less sensitive than contact fungicides, but still need sufficient drying time and fully absorbed by plants prior to rainfall. Consult the label or product manufacturers for rainfall period for individual products.

## Pathogen Resistance (Insensitivity) Management

Any fungal pathogen population may contain strains naturally insensitive to a fungicide and other fungicides within the same Group. A gradual or total loss of disease control may occur over time if these fungicides are used repeatedly in the same fields. Other resistance mechanisms that are not linked to site of action but specific for individual chemicals, such as enhanced metabolism, may also exist.

### To delay fungicide resistance/insensitivity:

- Where possible, rotate the use of a fungicide, (and others within the same Group) with different Groups that control the same pathogens.
- Where possible, tank mix fungicides with a high risk of developing insensitivity with other fungicides from a different Group.
- DO NOT apply more than the maximum number of applications listed on the label. Avoid consecutive sprays of a fungicide, or other fungicides in the same Group, in a season.
- Fungicide use should be based on an integrated pest management (IPM) program that includes scouting and accurate recording related to pesticide use and crop rotation. An IPM program also considers cultural, biological and other chemical control practices.
- Monitor treated fungal populations for signs of fungicide insensitivity. If disease continues to progress after treatment with a product, DO NOT increase the use rate. Discontinue use of the product and switch to another fungicide with a different target site of action.
- Contact your local regional crops specialist or certified crop advisor for any additional pesticide management and/or IPM recommendations for specific crops and disease problems in your area.

## Fungicide Modes of Action

### Why are fungicides needed?

- Control of disease during crop establishment.
- Increase productivity of crop (photosynthesis) and/or reduce blemishes.
  - Maintain yield and/or market value.
- Improve storage life and quality of harvested plants / grain / produce.
  - Prevent spoilage and/or production of mycotoxins.

### How do fungicides work?

There are several ways to define 'mode of action':

- **Timing:**
  - Preventative: fungicide must be present on plant surface before the pathogen and repeated applications are required to protect new growth.
  - Curative: pathogen may already be present (post-infection, pre-symptom kick-back activity).
  - Eradicant: (post-symptomatic activity).
  - Inhibitive: prevents spore germination or sporulation.
- **Placement:**
  - Contact (AKA protectant): immobile – must come in direct contact with the pathogen.
  - Systemic (AKA penetrant): mobile – can move within plant.
- **Movement:**
  - Intra-plant Movement: within crop via vapour phase or redistribution by rain.
  - Passive Absorption – by diffusion.
  - Apoplastic Movement: xylem-mobile; move within free space and cell walls, upward through the transpiration stream (with water).
  - Symplastic Movement: phloem-mobile (common characteristic of herbicides and insecticides but very few fungicides).
- **Spectrum:**
  - General, Non-specific, or Broad Spectrum: fungicide affects pathogen in multiple ways.
  - Specific or Narrow Spectrum: fungicide targets a specific metabolic site in pathogen or against critical enzyme or protein. Genetic changes or naturally insensitive fungi have a greater chance to overcome the fungicidal effect (resistance/insensitivity).
- **Composition:**
  - Inorganic Fungicides: sulfur or metal ions such as copper.
  - Organic Fungicides: contain carbon atoms.
  - Biopesticides: suppressing pest populations using naturally occurring organisms or natural products derived from plants.
- **Biochemistry:**
  - Primary basis to classify fungicides, developed by Fungicide Resistance Action Committee (FRAC) using their general Mode of Action on fungi and their chemistry.
    - All fungicides within a group share a common mode of action and resistance mechanism.
    - Fungicides within a group may have different chemical structures.
    - Resistance management strategies required wherever resistance is known or there is a risk of resistance development
    - See Table 1.

**Table 1. Fungicide Groups Based on Biochemical Mode of Action (FRAC)**

Mode of Action Target	Chemical Group & Chemical Name	Resistance Risk	Foliar Fungicide Products Registered in Saskatchewan/Manitoba	Seed Treatment Products Registered in Saskatchewan/Manitoba
A. Nucleic Acid Synthesis	4. Phenyl Amides	High	<i>Ridomil Gold/Bravo*</i> , <i>Ridomil Gold SL/Bravo*</i> , <i>Ridomil Gold 480EC</i> , <i>Ridomil Gold 480SL</i>	<i>Allegiance FL</i> , <i>Apron Advance*</i> , <i>Apron Maxx RTA*</i> , <i>Belmont 2.7FS</i> , <i>Cruiser Maxx Beans*</i> , <i>Cruiser Maxx Corn*</i> , <i>Cruiser Maxx Vibrance Beans*</i> , <i>Cruiser Maxx Vibrance Pulses*</i> , <i>Cruiser Vibrance Quattro*</i> , <i>EverGol Energy*</i> , <i>Helix Vibrance*</i> , <i>Insure Cereal*</i> , <i>Insure Cereal FX4*</i> , <i>Insure Pulse*</i> , <i>Maxim Quattro*</i> , <i>Metlock CT*</i> , <i>NipsIt SUITE Cereals OF Seed Protectant*</i> , <i>Prosper Evergol*</i> , <i>Rancona Pinnacle*</i> , <i>Rancona Trio*</i> , <i>Raxil MD*</i> , <i>Raxil PRO*</i> , <i>Raxil PRO Shield*</i> , <i>Trilex Component B</i> , <i>Trilex EverGol*</i> , <i>Trilex EverGol Shield*</i> , <i>Vibrance Maxx RFC/RTA*</i> , <i>Vibrance Maxx RFC with Intego Seed Treatment</i> , <i>Vibrance Quattro*</i> , <i>Visivio*</i>
B. Cytoskeleton and motor proteins	1. Methyl Benzimidazole Carbamates	High	None	<i>Apron Advance*</i> , <i>Cruiser Maxx Corn*</i> , <i>Maxim Quattro*</i> , <i>Mertect SC</i> , <i>Senator PSPT</i>
	22. Benzamide	Low to Medium	<i>Gavel 75DF*</i>	<i>Intego Solo Fungicide</i> , <i>Vibrance Maxx RFC with Intego Seed Treatment</i>
C. Respiration	7. Carboxamides	Medium	<i>Aprovia Top*</i> , <i>Cantus WDG Fungicide</i> , <i>Cotegra*</i> , <i>Dyax*</i> , <i>Elatus*</i> , <i>Fontelis</i> , <i>Kenja 400SC</i> , <i>Lance AG*</i> , <i>Lance WDG Fungicide</i> , <i>Luna Tranquility*</i> , <i>Nexicor</i> , <i>Priaxor*</i> , <i>Propulse*</i> , <i>Sercadis</i> , <i>Trivapro*</i> <i>Vertisan</i>	<i>Cruiser Maxx Vibrance Beans*</i> , <i>Cruiser Maxx Vibrance Pulses*</i> , <i>Cruiser Vibrance Quattro*</i> , <i>Emesto Silver*</i> , <i>EverGol Energy*</i> , <i>Gaucho CS FL*</i> , <i>Helix Vibrance*</i> , <i>Insure Cereal FX4*</i> , <i>Insure Pulse*</i> , <i>IProsper Evergol*</i> , <i>Rancona V RS</i> , <i>Rancona Trio*</i> , <i>Titan Emesto*</i> , <i>Trilex Component A</i> , <i>Trilex EverGol*</i> , <i>Trilex EverGol Shield*</i> , <i>Vibrance 500FS</i> , <i>Vibrance Maxx RFC/RTA*</i> , <i>Vibrance Maxx RFC with Intego Seed Treatment</i> , <i>Vibrance Quattro*</i> , <i>Vibrance Ultra Potato*</i> , <i>Visivio*</i> , <i>Vitaflo 280*</i> , <i>Vitaflo Fungicide*</i> , <i>Vitaflo SP Fungicide*</i>
	11 Strobilurins	High	<i>Acapela</i> , <i>Azoshy 250 SC</i> , <i>Cabrio Plus*</i> , <i>Delaro 325 SC*</i> , <i>Dyax*</i> , <i>Elatus*</i> , <i>Evito 480</i> , <i>Headline EC</i> , <i>MPOWER Spade</i> , <i>Lance AG*</i> , <i>Nexicor*</i> , <i>Priaxor*</i> , <i>Quadris</i> , <i>Quadris Top*</i> , <i>Quilt*</i> , <i>Reason 500SC</i> , <i>Tanos 50 DF*</i> , <i>TopNotch*</i> , <i>Trivapro*</i> <i>Twinline*</i>	<i>Cruiser Maxx Corn*</i> , <i>Insure Cereal*</i> , <i>Insure Cereal FX4*</i> , <i>Insure Pulse*</i> , <i>Maxim Quattro*</i> , <i>Prosper Evergol*</i> , <i>Stadium*</i> , <i>Trilex Component A</i> , <i>Trilex EverGol*</i> , <i>Trilex EverGol Shield*</i>
	21. Cyano-imidazole	Medium to High	<i>Ranman 400SC</i>	None
	29. 2,6-Dinitroanilines	Low	<i>Allegro 500F</i>	None
	45. Triazolopyrimidyl-amine	Medium to High	<i>Zampro*</i>	None
D. Amino Acid & Protein Synthesis	9. Anilino-pyrimidine	Medium	<i>Luna Tranquility*</i> , <i>Scala SC</i>	None
E. Signal Transduction	2. Dicarboximides	Medium to High	<i>Overall 240 SC</i> , <i>Prodex SC</i> , <i>Rovral Flo</i>	None

**Table 1. Fungicide Groups Based on Biochemical Mode of Action (FRAC) continued**

Mode of Action Target	Chemical Group & Chemical Name	Resistance Risk	Foliar Fungicide Products Registered in Saskatchewan/ Manitoba	Seed Treatment Products Registered in Saskatchewan/Manitoba
E. Signal Transduction <i>continued</i>	12. Phenylpyrroles	Low to Medium	-	<i>Apron Advance*</i> , <i>Apron Maxx RTA*</i> , <i>Cruiser Maxx Beans*</i> , <i>Cruiser Maxx Corn*</i> , <i>Cruiser Maxx Potato Extreme*</i> , <i>Cruiser Maxx Vibrance Beans*</i> , <i>Cruiser Maxx Vibrance Pulses*</i> , <i>Cruiser Vibrance Quattro*</i> , <i>Helix Vibrance*</i> , <i>Maxim D*</i> , <i>Maxim MZ PSP*</i> , <i>Maxim PSP</i> , <i>Maxim Quattro*</i> , <i>Stadium*</i> , <i>Vibrance Maxx RFC/RTA*</i> , <i>Vibrance Maxx RFC with Intego Seed Treatment</i> , <i>Vibrance Quattro*</i> , <i>Visivio*</i>
F. Lipid / Membrane Synthesis & Cell Wall Degradation	44. <i>Bacillus</i> strain QST 713	Low	<i>Serenade OPTI</i> , <i>Serenade Soil</i> , <i>Double Nickel LC</i> , <i>Double Nickel 55</i>	None
	49. Oxysterol binding protein homologue inhibitors (OSBPI)	Medium to High		<i>Lumisena</i>
G. Sterol Biosynthesis	3. Demethylation Inhibitors	Medium	<i>Aprovia Top*</i> , <i>Bumper 432 EC</i> , <i>Caramba</i> , <i>Co-Op Pivot</i> , <i>Cotegra*</i> , <i>Delaro 325 SC*</i> , <i>Fitness</i> , <i>Folicur 250EW</i> , <i>Fullback 125SC</i> , <i>Hornet 432 F</i> , <i>Nexicor*</i> , <i>Palliser</i> , <i>Pivot 418EC</i> , <i>Proline 480SC</i> , <i>Propel</i> , <i>Nufarm Propiconazole Fungicide</i> , <i>Propi Super 25 EC</i> , <i>Propulse*</i> , <i>Prosaro 250EC</i> , <i>Prosaro XTR</i> , <i>Quadris Top*</i> , <i>Quash</i> , <i>Quilt*</i> , <i>Tilt 250E</i> , <i>TopNotch*</i> , <i>Trivapro*</i> , <i>Twinline*</i>	<i>Cruiser Maxx Potato Extreme*</i> , <i>Cruiser Vibrance Quattro*</i> , <i>Emesto Silver*</i> , <i>EverGol Energy*</i> , <i>Helix Vibrance*</i> , <i>Insure Cereal*</i> , <i>Insure Cereal FX4*</i> , <i>Maxim D*</i> , <i>Metlock CT*</i> , <i>NipsIt SUITE Cereals OF Seed Protectant*</i> , <i>Rancona Pinnacle*</i> , <i>Rancona V RS</i> , <i>Rancona Trio*</i> , <i>Raxil MD*</i> , <i>Raxil PRO*</i> , <i>Raxil PRO Shield*</i> , <i>Stadium*</i> , <i>Titan Emesto*</i> , <i>Vibrance Quattro*</i> , <i>Vibrance Ultra Potato*</i> , <i>Visivio*</i>
H. Cell Wall Biosynthesis	40. Carboxylic Acid Amides (CAA)	Low to Medium	<i>Forum</i> , <i>Revus</i> , <i>Zampro*</i>	<i>Vibrance Ultra Potato*</i>
P. host plant defence induction	P 06 microbial	Not known	<i>LifeGard WG</i>	None
U. Unknown	27. Cyanoacetamide-oximes	Low to Medium	<i>Curzate 60 DF</i> , <i>Tanos 50 DF*</i>	None
	33. Phosphonates	Low	<i>Confine Extra</i> , <i>Phostrol</i> , <i>Rampart</i>	<i>Confine Extra</i> , <i>Rampart</i>
	NC. (Not classified) and diverse	Not known	<i>Contans WG</i> , <i>Regalia Maxx</i>	<i>Heads Up Plant Protectant</i> , <i>StorOx</i>
M. Multi-Site Contact Activity	M1. Inorganic copper	Low	<i>Copper products</i> , <i>Cueva</i> , <i>Parasol WG</i>	None
	M2. Inorganic sulphur		<i>Cosavet DF Edge</i>	None
	M3. Dithiocarbamates		<i>Cabrio Plus*</i> , <i>Dithane Rainshield</i> , <i>Elixir*</i> , <i>Gavel 75DF*</i> , <i>Manzate Pro-Stick</i> , <i>Penncozeb 75DF</i> , <i>Polyram DF</i>	<i>Gaucho CS FL*</i> , <i>Maxim MZ PSP*</i> , <i>Potato ST16</i> , <i>Solan MZ</i> , <i>Tuberseal</i> , <i>Vitaflo 280*</i> , <i>Vitaflo Fungicide*</i> , <i>Vitaflo SP Fungicide*</i>
	M4. Phthalimides		None	<i>Agrox FL</i>
	M5. Chloronitriles		<i>Bravo 500</i> , <i>Bravo Zn</i> , <i>Echo 720</i> , <i>Echo 90DF</i> , <i>Elixir*</i> , <i>Ridomil Gold/Bravo*</i> , <i>Ridomil Gold SL/Bravo*</i>	None

\*Products contain more than one active ingredient and appear in more than one group.



# Foliar Fungicide Tables

Table 2. Foliar Fungicides for Disease Control in Potatoes

FUNGICIDES	Page	Black Dot	Botrytis Grey Mould / Botrytis Vine Rot	Brown Leaf Spot	Early Blight	Late Blight	Late Blight Tuber Rot / Tuber Blight	Pythium Leak	Pink Rot	Rhizoctonia Canker, Black Scurf, Stolon Canker, and Stem Rot	Silver Scurf	Sclerotinia stem rot
<i>Allegro 500F</i>	439					•						•
<i>Aprovia Top</i>	440			3	•							
<i>Azoshy 250 SC</i>	441	•			•	•				2	2	
<i>Bravo 500</i>	447		•		•	•						
<i>Bravo Zn</i>	447		•		•	•						
<i>Cabrio Plus</i>	443				•	•						
<i>Cantus WDG Fungicide</i>	444				•							
<i>Copper (Copper 53W, Copper Spray)</i>	451				•	•						
<i>Cueva</i>	451				•	•						
<i>Curzate 60 DF</i>	454					1						
<i>Dithane Rainshield</i>	477				•	•						
<i>Double Nickel LC/ Double Nickel 55</i>	457				•					•		•
<i>Echo 90DF / Echo 720</i>	447		•		•	•						
<i>Elatus</i>	460									•	•	
<i>Elixir</i>	462				•	•						
<i>Evito 480</i>	463					3				•		
<i>Forum</i>	466					•	•					
<i>Gavel 75 DF</i>	468				•	•						
<i>Headline EC</i>	471				•	•						
<i>Kingpin 75 WDG</i>	-				•	•						
<i>LifeGard WG</i>	474				3	3						3
<i>Luna Tranquility</i>	475	4		•	•							•
<i>Manzate Pro-Stick</i>	477				•	•						
<i>Mpower Spade</i>	495				•	•						
<i>Orondis Ultra</i>	479					•						
<i>Parasol WG</i>	451				•	•	•					
<i>Penncozeb 75 DF</i>	477				•	•						
<i>Phosphorous acid (Confine Extra, Rampart)</i>	481					•			•			
<i>Phostrol</i>	481					•	•		2,3			
<i>Polyram DF</i>	483				•	•						
<i>Quadris</i>	441	•			•	•				2	2	
<i>Quadris Top</i>	498	4		4	•							4
<i>Quash</i>	499				•							4
<i>Ranman 400SC</i>	504					•	•					
<i>Reason 500SC</i>	505				1	1						
<i>Revus</i>	507					•						
<i>Ridomil Gold/Bravo, Ridomil Gold SL/Bravo</i>	508		•		•	•	•	3	3			
<i>Ridomil Gold 480EC, Ridomil Gold 480SL</i>	508								2			
<i>Scala SC</i>	509				1							
<i>Sercadis</i>	510				•					•		•
<i>Serenade OPTI</i>	511				3							3
<i>Serenade Soil</i>	513							2	2	2		
<i>Tanos 50 DF</i>	514				•	•						
<i>Vertisan</i>	521		•		3					2		
<i>Zampro</i>	523					•	•					

Note: Before using any pesticide on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

• Fungicide registered against the disease

1. Must not be used alone, only as a tank mix (consult individual labels)

2. In-furrow treatments (suppression only)

3. Suppression only (foliar application)

4. Suppression only

Table 3. Foliar Fungicides for Disease Control in Cereals and Grasses

Fungicides	Page	WHEAT								BARLEY								
		Suppression of Fusarium Head Blight	Powdery Mildew ( <i>Blumeria graminis</i> )	Leaf Rust ( <i>Puccinia recondita</i> f. sp. <i>tritici</i> )	Stem Rust ( <i>Puccinia graminis</i> f. sp. <i>tritici</i> )	Stripe Rust ( <i>Puccinia striiformis</i> )	Septoria Leaf Blotch Complex	Spot Blotch	Tan Spot ( <i>Pyrenophora tritici-repentis</i> )	Suppression of Fusarium Head Blight	Net Blotch ( <i>Pyrenophora teres</i> )	Powdery Mildew ( <i>Blumeria graminis</i> )	Leaf Rust ( <i>Puccinia hordei</i> )	Stem Rust ( <i>Puccinia graminis</i> f. sp. <i>tritici</i> / <i>secalis</i> )	Stripe Rust ( <i>Puccinia striiformis</i> )	Scald ( <i>Rhynchosporium secalis</i> )	Septoria Leaf Blotch Complex	Spot Blotch ( <i>Cochliobolus sativus</i> )
<i>Acapela</i>	436		*	*		*	*		*		*	*		*	*	*	*	
<i>Bravo 500</i>	447	*					1*		*									
<i>Bumper 432 EC</i>	489		*	*	*	*	1*		*		*	*	*	*		*	*	*
<i>Caramba</i>	445	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
<i>Co-Op Pivot</i>	489		*	*	*	*	1*		*		*	*	*	*		*	*	*
<i>Dithane Rainshield</i>	477			*			*		*									
<i>Echo 720</i>	447	*					1*		*									
<i>Evito 480</i>	463		*	*	*	*	*		*	*	*	*	*	*				
<i>Fitness</i>	489		*	*	*	*	1*		*	*	*	*	*	*	*	*	*	*
<i>Folicur 250EW</i>	515	*	*	*	*	*	1*		*		*	*	*	*	*	*	*	*
<i>Headline EC</i>	471		*	*		*	*	*	*	*			*	*	*	*	*	*
<i>Hornet 432 F</i>	515	*	*	*	*	*	1*		*	*	*	*	*	*	*	*	*	*
<i>Kingpin 75 WDG</i>	-			*			*		*									
<i>Manzate Pro-Stick</i>	477			*			*		*					*	*	*	*	*
<i>Mpower Spade</i>	495		*	*		*	*	*	*	*				*	*		*	*
<i>Nexicor</i>	478			*		*	*		*	*				*				
<i>Palliser</i>	515	*	*	*	*	*	1*		*	*	*	*	*	*	*	*	*	*
<i>Penncozeb 75DF</i>	477			*			*		*									
<i>Pivot 418EC</i>	489		*	*	*	*	1*		*	*	*	*	*		*	*	*	*
<i>Priaxor</i>	484		*	*		*	*	*	*	*				*	*	*	*	*
<i>Proline 480SC</i>	486	*		*			1*		*	*	*				*		*	*
<i>Propel</i>	489		*	*	*	*	1*		*	*	*	*	*		*	*	*	*
<i>Nufarm Propiconazole Fungicide</i>	489		*	*	*	*	1*		*	*	*	*	*		*	*	*	*
<i>Propi Super 25 EC</i>	489		*	*	*	*	1*		*	*	*	*	*		*	*	*	*
<i>Prosaro 250EC/Prosaro XTR</i>	493	*	*	*	*	*	1*		*	*	*	*	*	*	*	*	*	*
<i>Quilt</i>	501			*		*	*	*	*		*		*	*	*	*	*	
<i>Regalia Maxx</i>	506						*		*									
<i>Tilt 250E</i>	489		*	*	*	*	1*		*	*	*	*	*		*	*	*	*
<i>TopNotch</i>	517			*		*	*	*	*	*	*	*		*	*	*	*	
<i>Trivapro</i>	518			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Twinline</i>	520	*	*	*		*	*	*	*	*	*			*	*	*	*	*
<i>Vertisan</i>	521			*	*		*		*			*	*			*	*	*

Refer to product pages and labels for application information as well as expectations for control vs suppression.

<sup>1</sup> Septoria/Stagonospora leaf blotch complex: \*some products include glume blotch in wheat.

Table 4. Foliar Fungicides for Disease Control in Oat, Rye and Triticale

Fungicides	Page	OAT					RYE				TRITICALE					
		Suppression of Fusarium Head Blight	Powdery Mildew ( <i>Blumeria graminis</i> )	Crown Rust ( <i>Puccinia coronata</i> )	Stem Rust ( <i>Puccinia graminis</i> f. sp. <i>avenae</i> )	Septoria Leaf Blotch Complex	Suppression of Fusarium Head Blight	Powdery Mildew ( <i>Blumeria graminis</i> )	Leaf Rust ( <i>Puccinia recondita</i> f. sp. <i>tritici</i> )	Septoria Leaf Blotch Complex	Suppression of Fusarium Head Blight	Powdery Mildew ( <i>Blumeria graminis</i> )	Leaf Rust ( <i>Puccinia recondita</i> f. sp. <i>tritici</i> )	Stem Rust ( <i>Puccinia graminis</i> f. sp. <i>secalis</i> )	Stripe rust ( <i>Puccinia striiformis</i> )	Septoria Leaf Blotch Complex
<i>Acapela</i>	436		*	*				*	*	*		*	*			*
<i>Bravo 500</i>	447															
<i>Bumper 432 EC</i>	489			*		*										
<i>Caramba</i>	445	*		*		*	*	*	*		*	*	*	*	*	*
<i>Co-Op Pivot</i>	489			*		*										
<i>Dithane Rainshield</i>	477															
<i>Echo 720</i>	447															
<i>Evito 480</i>	463															
<i>Fitness</i>	489			*		*										
<i>Folicur 250EW</i>	515			*	*											
<i>Headline EC</i>	471			*			*	*								
<i>Hornet 432 F</i>	515			*	*											
<i>Kingpin 75 WDG</i>	-															
<i>Manzate Pro-Stick</i>	477															
<i>Mpower Spade</i>	495															
<i>Nexicor</i>	478			*				*				*		*	*	*
<i>Palliser</i>	515			*	*										*	
<i>Penncozeb 75DF</i>	477															
<i>Pivot 418EC</i>	489			*		*										
<i>Priaxor</i>	484			*			*	*			*	*	*	*	*	*
<i>Proline 480SC</i>	486			*			*				*					
<i>Propel</i>	489			*		*										
<i>Nufarm Propiconazole Fungicide</i>	489			*		*										
<i>Propi Super 25 EC</i>	489			*		*										
<i>Prosaro 250EC/Prosaro XTR</i>	493			*	*	*										
<i>Quilt</i>	501			*		*				*						*
<i>Regalia Maxx</i>	506															
<i>Tilt 250E</i>	489			*		*										
<i>TopNotch</i>	517			*		*				*						*
<i>Trivapro</i>	518			*	*	*				*				*		*
<i>Twinline</i>	520			*			*	*	*		*	*	*			*
<i>Vertisan</i>	521			*				*				*	*	*		*

Refer to product pages and labels for application information as well as expectations for control vs suppression.

Table 5. Foliar fungicides for disease control in millet, corn and canaryseed

FUNGICIDES	Page	MILLET	CORN					CANARYSEED
		Suppression of fusarium head blight	Ear rot ( <i>Fusarium/Giberella</i> spp.)	Northern leaf blight ( <i>Setosphaeria turcica</i> )	Common rust ( <i>Puccinia sorghi</i> )	Eye spot ( <i>Aureobasidium zeae</i> )	Grey leaf spot ( <i>Cercospora zeae-maydis</i> )	Suppression of septoria leaf mottle ( <i>Septoria triseti</i> )
<i>Acapela</i>	436			•				
<i>Azoshy 250 SC</i>	441				•			
<i>Bumper 432 EC</i>	489			•	•			•
<i>Caramba</i>	445		•					
<i>Co-Op Pivot</i>	489			•	•			•
<i>Delaro 352 SC</i>	455			•	•	•	•	
<i>Evito 480</i>	463			•	•			
<i>Fitness</i>	489			•	•			•
<i>Headline EC</i>	471				•			
<i>Mpower Spade</i>	495				•			
<i>Nufarm Propiconazole Fungicide</i>	489			•	•			•
<i>Pivot 418 EC</i>	489			•	•			•
<i>Priaxor</i>	484			•	•			
<i>Proline 480 SC</i>	486	•	•	•	•			
<i>Propel</i>	487			•	•			•
<i>Propi Super 25 EC</i>	489			•	•			•
<i>Quadris</i>	441				•			
<i>Quilt</i>	501			•	•			
<i>Tilt 250E</i>	489			•	•			•
<i>Trivapro</i>	518			•	•			
<i>Vertisan</i>	521				•			

Refer to product pages and labels for application information as well as expectations for control vs suppression.

Table 6. Foliar Fungicides for Disease Control in Pulse Crops

FUNGICIDES	Page	CHICKPEA				FIELD PEA					LENTIL					FABA BEAN				DRY BEAN					
		Ascochyta Blight ( <i>Ascochyta rabiei</i> )	Grey Mould ( <i>Botrytis cinerea</i> )	Powdery Mildew ( <i>Erysiphe</i> spp.)	White Mould ( <i>Sclerotinia sclerotiorum</i> )	Ascochyta Complex (1)	Downy Mildew ( <i>Peronospora viciae</i> )	Grey Mould ( <i>Botrytis cinerea</i> )	Powdery Mildew ( <i>Erysiphe pisi</i> )	White Mould ( <i>Sclerotinia sclerotiorum</i> )	Early season root rot ( <i>Aphanomyces euteiches</i> , <i>Pythium ultimum</i> )	Anthrachnose ( <i>Colletotrichum truncatum</i> )	Ascochyta Blight ( <i>Ascochyta lentis</i> )	Grey Mould ( <i>Botrytis cinerea</i> )	Powdery Mildew ( <i>Microsphaera</i> spp.)	White Mould ( <i>Sclerotinia sclerotiorum</i> )	Ascochyta Blight ( <i>Ascochyta fabae</i> )	Botrytis Grey Mould ( <i>Botrytis</i> spp.) / Chocolate Spot	Powdery Mildew ( <i>Microsphaera</i> spp.)	White Mould ( <i>Sclerotinia sclerotiorum</i> )	Anthrachnose ( <i>Colletotrichum lindemuthianum</i> )	Botrytis Grey Mould ( <i>Botrytis cinerea</i> )	Powdery Mildew ( <i>Microsphaera</i> spp.)	Rust ( <i>Uromyces appendiculatus</i> )	White Mould ( <i>Sclerotinia sclerotiorum</i> )
<i>Acapela</i>	436				•	•			•		•	•			•					•	•				•
<i>Allegro 500F</i>	439																								•
<i>Azoshy 250 SC</i>	441	•				•			•		•	•			•	•					•				
<i>Bravo 500</i>	447	•				•					•	•													
<i>Bumper 432 EC</i>	489																							•	
<i>Contans</i>	449																								•
<i>Co-Op Pivot</i>	489																							•	
<i>Copper 53W</i>	451																				•				
<i>Cosavet DF Edge</i>	452								•																
<i>Cotegra</i>	453				•				•						•					•					•
<i>Cueva</i>	451			•		•			•						•								•	•	
<i>Delaro 325 SC</i>	455	•	•		•	•		•		•	•	•	•		•										
<i>Dithane Rainshield</i>	477								•		•	•													
<i>Dyax</i>	459	•			•	•			•	•	•	•			•	•	•		•	•	•		•	•	
<i>Echo 720</i>	447	•				•					•	•													
<i>Elatus</i>	460	•			•	•			•	•	•	•			•	•			•	•	•				•
<i>Fitness</i>	489																							•	
<i>Headline EC</i>	471	•				•	•		•		•	•				•		•		•	•		•	•	
<i>Kenja 400SC</i>	470				•					•					•				•						•
<i>Lance AG</i> (co-pack of <i>Lance WDG</i> and <i>Headline EC</i> )	471	•	•		•	•	•	•	•		•	•	•		•										
<i>Lance WDG Fungicide</i>	473	•	•		•	•		•				•	•		•				•						•
<i>Manzate Pro-Stick</i>	477										•	•													
<i>Mpower Spade</i>	495	•				•	•		•		•	•				•		•		•	•		•	•	
<i>Nufarm Propiconazole Fungicide</i>	489																							•	
<i>Parasol WG</i>	451																			•					
<i>Penncozeb 75DF</i>	477										•	•													
<i>Phostrol</i>	481									•															
<i>Pivot 418EC</i>	489																							•	
<i>Priaxor</i>	484	•	•		•	•	•		•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	
<i>Proline 480 SC</i>	486	•										•			•										
<i>Propel</i>	489			•					•						•				•				•	•	
<i>Propi Super 25 EC</i>	489			•					•						•				•				•	•	
<i>Propulse</i>	492															•			•		•			•	
<i>Quadris</i>	441	•				•			•		•	•			•	•					•				
<i>Quash</i>	499	•			•				•	•		•			•										•
<i>Quilt</i>	501			•		•			•		•			•				•					•		
<i>Serenade OPTI</i>	511		•		•			•		•			•		•						•				•
<i>Tilt 250E</i>	489			•					•					•				•					•	•	
<i>Vertisan</i>	521	•	•			•		•				•	•			•	•				•				

Refer to product pages and labels for application information as well as expectations for control vs suppression.

<sup>1</sup> Ascochyta Complex in field pea may include *Mycosphaerella pinodes*, *Ascochyta pisi*, and *Phoma medicaginis* var. *pinodella*. Refer to product page and label for more information.

Table 7. Foliar Fungicides for Disease Control in Oilseed Crops

FUNGICIDES	Page	CANOLA			MUSTARD			FLAX		SUNFLOWER		SOYBEAN						
		Alternaria Black Spot ( <i>Alternaria</i> spp.)	Blackleg ( <i>Leptosphaeria maculans</i> )	Sclerotinia Stem Rot ( <i>Sclerotinia sclerotiorum</i> )	Alternaria Black Spot ( <i>Alternaria</i> spp.)	Blackleg ( <i>Leptosphaeria maculans</i> )	Sclerotinia Stem Rot ( <i>Sclerotinia sclerotiorum</i> )	Pasmo ( <i>Septoria linicola</i> )	Sclerotinia Stem Rot ( <i>Sclerotinia sclerotiorum</i> )	Rust ( <i>Puccinia helianthi</i> )	Sclerotinia Stem/Head Rot ( <i>Sclerotinia sclerotiorum</i> )	Phomopsis stem blight ( <i>Phomopsis/Diaportha</i> spp.)	Anthrachnose ( <i>Colletotrichum truncatum</i> )	Brown Spot ( <i>Septoria glycines</i> )	Cercospora Leaf Spot ( <i>Cercospora kikuchii</i> )	Powdery Mildew ( <i>Microsphaera diffusa</i> )	White mould ( <i>Sclerotinia sclerotiorum</i> )	Frogeye leaf spot ( <i>Cercospora sojae</i> )
<i>Acapela</i>	436			•				•						•			•	•
<i>Allegro 500F</i>	439																•	
<i>Azoshy250 SC</i>	441	•	•	•											•	•		
<i>Bumper 432 EC</i>	489		•															•
<i>Contans</i>	449			•							•						•	
<i>Co-Op Pivot</i>	489		•															•
<i>Cotegra</i>	453			•			•							•			•	•
<i>Cueva</i>	451															•		
<i>Delaro 325 SC</i>	455							•	•			•		•			•	
<i>Double Nickel LC/ Double Nickel 55</i>	457																•	
<i>Dyax</i>	459													•			•	•
<i>Elatus</i>	460											•		•	•	•		
<i>Evito 480</i>	463																	•
<i>Fitness</i>	489		•															•
<i>Folicur 250EW</i>	515															•		•
<i>Fullback 125SC</i>	467													•	•			•
<i>Headline EC</i>	471	•	•		•	•		•		•								•
<i>Lance AG (co-pack of Lance WDG and Headline EC)</i>	471	•		•	•		•											
<i>Lance WDG Fungicide</i>	473	•		•	•		•				•							
<i>Mpower Spade</i>	495																	•
<i>Nexicor</i>	478		•															
<i>Nufarm Propiconazole Fungicide</i>	489		•															•
<i>Overall 240SC</i>	469	•		•														
<i>Pivot 418 EC</i>	489		•															•
<i>Priaxor</i>	484	•	•	•	•	•	•	•	•	•				•			•	•
<i>Prodex</i>	469	•		•														
<i>Proline 480 SC</i>	486			•					•		•							
<i>Propel</i>	489		•				1*								•	•		•
<i>Propi Super 25 EC</i>	489		•												•	•		•
<i>Quadris</i>	441	•	•	•											•	•		
<i>Quash</i>	499			•						•	•							
<i>Quilt</i>	501		•										•			•		
<i>Rovral Flo</i>	469	•		•														
<i>Serenade OPTI</i>	511			•										•			•	•
<i>Tilt 250E</i>	489		•												•	•		•
<i>Trivapro</i>	518												•			•		
<i>Vertisan</i>	521			•						•	•			•				

Refer to product pages and labels for application information as well as expectations for control vs suppression.

1\* Registered for use on only specific mustard types. Refer to label for details.

Table 8. Foliar Fungicides for Disease Control in Special Crops and Forages

Fungicides	Page	ALFALFA FOR SEED					NON-GRASS ANIMAL FEED		SEED GRASSES		TIMOTHY	CORIANDER	CARAWAY
		Blossom Blight ( <i>Botrytis cinerea</i> / <i>Sclerotinia sclerotiorum</i> )	Common Leaf Spot ( <i>Pseudopeziza medicaginis</i> )	Leaf Spot ( <i>Leptosphaerulina trifolii/briosiani</i> )	Spring Black Stem ( <i>Phoma medicaginis</i> )	Sclerotinia Stem Rot ( <i>Sclerotinia trifoliorum/sclerotiorum</i> )	Common Leaf Spot ( <i>Pseudopeziza medicaginis</i> )	Blossom Blight ( <i>Sclerotinia sclerotiorum</i> )	Leaf and Stem Rusts ( <i>Puccinia</i> spp.)	Powdery Mildew ( <i>Erysiphe graminis</i> )	Purple Eye Spot ( <i>Cladosporium phlei</i> )	Blossom Blight	Blossom Blight
Azoshy 250 SC	441											•	
Co-Op Pivot	489										•		
Dithane Rainshield	477		•								•		
Fitness	489										•		
Fontelis	465					•							
Headline EC	471		•						•	•	•		
Kingpin 75 WDG	-		•										
Lance AG (co-pack of Lance WDG and Headline EC)	471	•	•	•	•								
Lance WDG fungicide	473	•	•	•	•								
Manzate Pro-Stick	477		•										
Mpower Spade	495		•						•	•	•		
Overall 240 SC	469					•							
Penncozeb 75DF	477		•										
Pivot 418 EC	489										•		
Priaxor	484	•	•				•	•	•	•			
Prodex	469					•							
Propel	489										•		
Propi Super 25 EC	489										•		
Quadris	441											•	
Rovral Flo	469					•							
Serenade OPTI	511											•	•
Tilt 250E	489										•		

Refer to product pages and labels for application information as well as expectations for control vs suppression.

## Foliar Fungicide Product Pages

# Acapela

Fungicide Group

11

Refer to page 427

**Company:**

Corteva Agriscience Division of DowDuPont – PCP#30470

**Formulation:**

250 g per L picoxystrobin formulated as a suspension concentrate.

- Container size - 2 x 9.6 L, 115.2 L tote

**Crops, Diseases, Rates and Timing:**

Crop	Diseases	Application Rate (per acre)	Application Timing
Chickpea, dry bean, faba bean	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> ) Control of anthracnose ( <i>Colletotrichum lindemuthianum</i> ) in dry bean	350 mL	Make initial application at early bloom and follow with second application 7 to 10 days later at full bloom.
Field pea	Suppression of mycosphaerella blight ( <i>Mycosphaerella pinodes</i> )	240 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	350 mL	Make initial application at early bloom and follow with second application 7 to 10 days later at full bloom.
Lentil	Control of anthracnose ( <i>Colletotrichum truncatum</i> ), ascochyta blight ( <i>Ascochyta lentis</i> )	240 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	350 mL	Make initial application at early bloom and follow with second application 7 to 10 days later at full bloom.
Wheat	Control of leaf rust ( <i>Puccinia recondita</i> )	120 mL	Begin application prior to disease development. For early application apply at Zadok's stage 12-36.
	Suppression of tan spot ( <i>Pyrenophora tritici-repentis</i> ), Septoria leaf blotch ( <i>Septoria tritici</i> )		
	Control of leaf rust ( <i>Puccinia recondita</i> ), stripe rust ( <i>Puccinia striiformis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> ), powdery mildew ( <i>Erysiphe graminis</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> )	175 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. For optimizing yield and flag leaf disease control, apply <i>Acapela</i> at Zadok's stage 39-41 (flag leaf out stage).
Barley	Control of scald ( <i>Rhynchosporium secalis</i> )	120 mL	Begin application prior to disease development. For early application apply at Zadok's stage 12-36.
	Suppression of septoria leaf blotch ( <i>Septoria tritici</i> ), net blotch ( <i>Pyrenophora teres</i> )		



## Crops, Diseases, Rates and Timing *continued*:

Crop	Diseases	Application Rate (per acre)	Application Timing
Barley, <i>continued</i>	Control of septoria leaf blotch ( <i>Septoria tritici</i> ), powdery mildew ( <i>Erysiphe graminis</i> ), stripe rust ( <i>Puccinia striiformis</i> ), net blotch ( <i>Pyrenophora teres</i> ), scald ( <i>Rhynchosporium secalis</i> )	175 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. For optimizing yield and flag leaf disease control, apply <i>Acapela</i> at Zadok's stage 39-41 (flag leaf out stage).
Oats	Control of powdery mildew ( <i>Erysiphe graminis</i> ), stripe rust ( <i>Puccinia striiformis</i> ), crown rust ( <i>Puccinia coronata f.sp. avenae</i> )	175 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. For optimizing yield and flag leaf disease control, apply <i>Acapela</i> at Zadok's stage 39-41 (flag leaf out stage).
Rye	Control of scald ( <i>Rhynchosporium secalis</i> ), leaf rust ( <i>Puccinia recondita</i> )	120 mL	Begin application prior to disease development. For early application apply at Zadok's stage 12-36.
	Suppression of septoria leaf blotch ( <i>Septoria tritici</i> )		
	Control of leaf rust ( <i>Puccinia recondita</i> ), stripe rust ( <i>Puccinia striiformis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> ), powdery mildew ( <i>Erysiphe graminis</i> ), scald ( <i>Rhynchosporium secalis</i> )	175 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. For optimizing yield and flag leaf disease control, apply <i>Acapela</i> at Zadok's stage 39-41 (flag leaf out stage).
Triticale	Control of leaf rust ( <i>Puccinia recondita</i> )	120 mL	Begin application prior to disease development. For early application apply at Zadok's stage 12-36.
	Suppression of septoria leaf blotch ( <i>Septoria tritici</i> )		
	Control of leaf rust ( <i>Puccinia recondita</i> ), stripe rust ( <i>Puccinia striiformis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> ), powdery mildew ( <i>Erysiphe graminis</i> )	175 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. For optimizing yield and flag leaf disease control, apply <i>Acapela</i> at Zadok's stage 39-41 (flag leaf out stage).
Corn (field corn, sweet corn, seed popcorn)	Control of northern leaf blight ( <i>Setosphaeria turcica</i> , <i>Exserohilum turcicum</i> )	215 to 325 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
Soybean	Control of brown spot ( <i>Septoria glycines</i> ); frogeye leaf spot ( <i>Cercospora soja</i> )	175 to 350 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	350 mL	Initial preventative application at 100% bloom (1 flower blooming on all plants) and follow with second application 7 to 10 days later at full bloom.
Canola	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	325 to 485 mL	Apply at 20 to 50% bloom prior to disease development. Under high disease pressure, make a second application of another fungicide from a different fungicide group, 7 to 14 days later. Use the higher rate or shorter interval when disease pressure is high.

## Crops, Diseases, Rates and Timing *continued*:

Crop	Diseases	Application Rate (per acre)	Application Timing
Flax	Control of pasmo ( <i>Septoria linicola</i> )	240 to 355 mL	Begin application prior to disease development or 7 to 10 days after flower initiation (approximately 20% bloom) and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.

## Application Information:

- **Water Volume:** Use sufficient water to obtain thorough coverage of plants.
  - **Ground:** minimum 45 L per acre.
  - **Aerial:** minimum 20 L per acre.

## How it Works:

The active ingredient picoxystrobin is a broad spectrum strobilurin fungicide and is to be used as a preventative application when environmental conditions are favorable for disease development. Picoxystrobin has curative and locally systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Herbicides:** *Travallas* spring wheat (including durum) and barley.

**Corteva Agriscience Agriculture Division of DowDuPont supports the following mixes that are not on the *Acapela* label:**

- **Herbicides:** *Assure II*, *Barricade II*, *Refine SG +/- Perimeter II*
- **Insecticides:** *Coragen*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Dry legumes and canola** – DO NOT exceed 1 application before switching to a fungicide with a different mode of action; maximum season use rate is 700 mL per acre.
  - **Cereal grains, soybean** – DO NOT exceed 1 application before switching to a fungicide with a different mode of action; maximum season use rate is 1100 mL per acre.
  - **Corn** – DO NOT exceed 1 application before switching to a fungicide with a different mode of action; maximum season use rate for field, seed or popcorn is 1100 mL per acre and sweet corn is 1400 mL per acre.
- **Grazing:** No restrictions listed.
- **Preharvest interval:**
  - **Dry legumes and soybean** – 14 days
  - **Cereal grains** – 45 days (7 days for forage, 14 days for hay)
  - **Corn** – 7 days
  - **Canola** – 28 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** Crops that are on the product label may be replanted immediately after harvest. All other crops – 10 months following last application of picoxystrobin.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed. To prevent contamination, store this product away from food or feed.
- **Environment:** Observe prescribed buffer zones. Minimize off-target drift to reduce the effects on beneficial insects at the field boundary. DO NOT apply to areas prone to run-off and delay spraying if heavy rainfall is forecast.

## Hazard Rating:

None listed.

For an explanation of the symbols used here see pages 7 and 8.

# Allegro 500F

Fungicide Group

29

Refer to page 427

## Company:

Syngenta Canada – PCP#27517

## Formulation:

40% fluazinam.

- Container size - 2 x 10 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato	Late blight ( <i>Phytophthora infestans</i> )	160 mL	Begin applications when plants are 15 to 20 cm tall or when conditions favour disease development. Repeat application at 7 to 10 day intervals.
	Sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	160 to 240 mL	Begin applications at full bloom. Repeat application intervals of 7 to 10 days.
Dry bean	White mould ( <i>Sclerotinia sclerotiorum</i> )	240 to 405 mL	Begin applications when plants are at early to mid-bloom (10 to 50% bloom). Repeat application 7 to 10 days later.
Soybean	White mould ( <i>Sclerotinia sclerotiorum</i> )	180 to 470 mL	For suppression of white mould use 180 mL rate. For control of white mould use 355 to 470 mL rate. Begin application at the R1 (early bloom) to R2 (full bloom) stage of development and if needed, again 10 to 14 days later at early pod formation (R3).

## Application Information:

- **Water Volume:**
  - **Ground:** 80 to 240 L per acre. Spray volumes vary with amount of plant growth; apply in sufficient water to obtain adequate coverage of foliage.
  - **Aerial:** For potatoes, soybean and dry bean minimum of 18 L per acre.

## How it Works:

The active ingredient fluazinam is a pyridinamine fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

Note: Syngenta Canada supports the following mixes that are not on the *Allegro 500F* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides:** *Reglone* (potato)
- **Fungicides:** *Quadris*
- **Insecticides:** *Matador* (dry bean)

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Bean and soybean** – DO NOT exceed 2 applications of this product per season.
  - **Potato** – DO NOT exceed 3 consecutive applications or 10 total applications of this product per season.
- **Grazing:** No restrictions listed.

- **Preharvest interval:** 14 days (potatoes); 30 days (dry bean). DO NOT apply after growth stage R3, early pod formation in soybean.
- **Re-entry:** DO NOT re-enter treated areas within 24 hours of application.
- **Re-cropping:** Can be replanted with potatoes as soon as practical after the last application, 30 days for other root crops and leafy vegetables, and 70 days for all other crops. Fluazinam will carry over, DO NOT use in areas treated with this product during the previous season.
- **Storage:** Store product in a dry place separate from other pesticides, fertilizer, food, and feed.
- **Environment:** DO NOT contaminate aquatic habitats when cleaning and rinsing spray equipment or containers. DO NOT overspray non-target terrestrial or aquatic habitats.

### Hazard Rating:



Caution – Poison



Warning – skin irritant. Potential skin sensitizer.

For an explanation of the symbols used here see pages 7 and 8.

## Aprovia Top

Fungicide Group

7, 3

Refer to page 427

### Company:

Syngenta Canada – PCP#31526

### Formulation:

78 g per L benzovindiflupyr and 117 g per L difenoconazole formulated as an emulsifiable concentrate.

- Container size - 4 x 3.78L

### Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato	Control of early blight ( <i>Alternaria solani</i> )	260 to 390 mL	Begin applications prior to disease development and continue throughout the season on a 7 to 14 day interval.
	Suppression of brown spot ( <i>Alternaria solani</i> )		For early blight, use the high rate and short application interval under high disease pressure. Make no more than two consecutive applications before switching to a non-Group 7 and 3 fungicide.

### Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 60 L per acre
  - **Aerial:** Use a minimum water volume of 20 L per acre

### How it Works:

The active ingredient benzovindiflupyr is a succinate dehydrogenase inhibitor (SDHI) fungicide with broad spectrum activity. The active ingredient difenoconazole is a demethylation inhibitor (DMI) fungicide. For more information refer to "Fungicide Modes of Action" on page 426.

### Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT make more than 2 applications by air or more than 4 applications by ground. If applications are made by one method (ground or air), all consecutive applications must be made by the same method. It is not acceptable to mix aerial and ground applications in the same calendar year.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days.
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** There is no plant back restriction for potatoes, tuberous and corm vegetables, fruiting vegetables, cucurbit vegetables and plants in the rapeseed sub group. A plant back restriction of 60 days is required for cereals (wheat, barley, oats, rye, triticale) and corn. A plant back restriction of 6 months (180 days) is required for all other crops intended for food and feed.
- **Storage:** Keep in original container, tightly closed, during storage. Store in a cool, dry, well-ventilated area away from feed and foodstuffs and out of the reach of children and animals. To prevent contamination, store this product away from food or feed.
- **Environment:** Toxic to aquatic organisms and non-terrestrial plants. Observe buffer zones outlined in the label.

## Hazard Rating:



Danger Poison – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Azoxystrobin

*Quadris, Azoshy 250 SC*

Fungicide Group

11

Refer to page 427

## Company:

Syngenta Canada – (*Quadris* – PCP#26153)

Sharda Crop Chem Canada (*Azoshy 250 SC* – PCP#32263)

## Formulation:

250 g per L azoxystrobin formulated as a flowable suspension concentrate.

- Container size - 4 x 3.78 L jugs

## Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rates (per acre):	Application Timing:
Dry bean	Anthrachnose ( <i>Colletotrichum lindemuthianum</i> ), ascochyta blight ( <i>Ascochyta</i> spp.)	200 mL	Apply before disease is established and no later than onset of flowering; make second application 10 to 14 days later.
Chickpea, faba bean	Ascochyta blight ( <i>Ascochyta</i> spp.), anthracnose ( <i>Colletotrichum</i> spp.)	200 mL	Apply before disease is established and no later than onset of flowering; make second application 10 to 14 days later.
Lentil	Anthrachnose ( <i>Collectotrichum truncatum</i> ), ascochyta blight ( <i>Ascochyta lentis</i> ) Supression of white mould ( <i>Sclerotinia sclerotiorum</i> )*	200 mL	Apply before disease is established and no later than onset of flowering; make second application 10 to 14 days later.
Field pea	Mycosphaerella blight ( <i>Mycosphaerella pinodes</i> ), powdery mildew ( <i>Erysiphe pisi</i> ), anthracnose ( <i>Colletotrichum</i> spp.), ascochyta blight ( <i>Ascochyta</i> spp.)	200 mL	Apply before disease is established and no later than onset of flowering; make second application 10 to 14 days later.
Soybean	Powdery mildew ( <i>Microsphaera diffusa</i> ), cercospora leaf spot ( <i>Cercospora kikuchii</i> )	200 mL	Apply at the R1 to R3 stage, or when 5% disease in the field; make second application 14 days later.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases Controlled:	Application Rates (per acre):	Application Timing:
Canola	Blackleg ( <i>Leptosphaeria maculans</i> )	200 mL	Apply at the 2 to 6 leaf stage.
	Sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	280 to 400 mL	Apply at early bloom (prior to 30% bloom). This timing will also suppress alternaria black spot. Use the higher rate if there is a history of sclerotinia infection in the area and when conditions favour development.
	Alternaria black spot ( <i>Alternaria brassicae</i> , <i>A. raphani</i> )	200 mL	Apply at pod stage (90% petal fall).
Corn	Rust ( <i>Puccinia sorghi</i> )	180 mL	Apply before disease is established and make second application 7 to 14 days later.
Coriander** (for seed production)	Blossom blight ( <i>Aureobasidium</i> spp.)	180 to 450 mL	Apply once prior to disease establishment. Use high rate if high disease pressure.
Potato	Early blight ( <i>Alternaria solani</i> )	200 to 320 mL	Apply prior to disease development and repeat on a 7 to 14 day interval. Use the higher rate if extending treatment interval to 14 days. Apply in alternation with fungicides with a different mode of action. If late blight becomes established, discontinue use of azoxystrobin and use alternative fungicides.
	Late blight ( <i>Phytophthora infestans</i> )	320 mL	
	Rhizoctonia stem rot, stolon canker, black scurf ( <i>Rhizoctonia solani</i> ), silver scurf ( <i>Helminthosporium solani</i> )	4 to 6 mL per 100 m of row	Apply once as an in-furrow spray in 20 to 56 L per acre water at planting. Mount the spray nozzle so that spray is directed into the furrow as a 15 to 20 cm band just before the seed is covered. DO NOT apply by air.
	Black dot ( <i>Colletotrichum coccodes</i> )	200 to 320 mL	Apply on a 7 to 14 day interval prior to disease development. Use the high rate and short application interval under high disease pressures.

\* Suppression of white mould in lentils for *Quadris* only

\*\*DO NOT apply by air.

**Application Information:**

- **Water Volume:**
  - **Ground:** Use sufficient water volume to obtain adequate coverage. Use minimum 40 L per acre. In-furrow treatment in 20 to 56 L per acre.
  - **Aerial:** Use minimum of 18 L per acre. Ensure uniform application.

**How it Works:**

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) with broad spectrum contact and systemic activity. To be used as a preventative and curative fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

**Tank Mixes:**

**Insecticides:** For legumes and field corn, *Quadris* and *Azoshy 250 SC* may be tank-mixed with *Matador 120EC* insecticide.

For control of potato diseases and insects, *Quadris* and *Azoshy 250SC* can be tank-mixed with *Actara 240* insecticide.

Consult each label for pests controlled, appropriate timing, precautions, and specific application instructions.

**Fungicides:** For the control of early blight of potato, *Quadris* and *Azoshy 250 SC* may be tank-mixed with *Bravo 500*. For control of Rhizoctonia stem, stolon canker and black scurf in potato, *Quadris* and *Azoshy 250 SC* can be tank-mixed with *Ridomil Gold 480EC*. For control of ascochyta blight in chickpea, *Quadris* and *Azoshy 250 SC* must be tank-mixed with *Bravo 500*. *Azoshy 250 SC* and *Quadris* may be tank-mixed with *Tilt 250E* in legumes (including soybean), wheat and barley.

- **Note:** Syngenta Canada supports the following mixes with *Quadris* that are not on the *Quadris* label. Apply mixes according to the most restrictive use limitations for either product:
  - **Fungicides:** *Allegro 500F*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Coriander* – DO NOT exceed 1 application of this product per season.
  - *Bean, canola, chickpea, corn, lentil, pea, soybean* – DO NOT exceed 2 applications of this product per season.
  - *Potato* – DO NOT exceed 3 applications of this product per season.
- **Grazing:** DO NOT feed dried pea vines to livestock.
- **Preharvest interval:**
  - *Canola* - 30 days
  - *Coriander* - 21 days
  - *Corn* - 7 days
  - *Legumes* - 15 days
  - *Potatoes* - 1 day
- **Re-entry:** DO NOT re-enter treated areas until residues have dried.
- **Re-cropping:** DO NOT plant broadleaf or root crops within 30 days of application. DO NOT plant cereals within 45 days of application.
- **Storage:** Store in a cool, dry, well-ventilated area. DO NOT store below 0°C.
- **Environment:** This product is toxic to fish and aquatic organisms. Observe buffer zones outlined in the label.

## Hazard Rating:

None.

Other precautions: May irritate eyes.

For an explanation of the symbols used here see pages 7 and 8.

# Cabrio Plus

Fungicide Group

11, M3

Refer to page 427

## Company:

BASF Canada – PCP#30395

## Formulation:

5% pyraclostrobin and 55% metiram formulated as a water dispersible granule.

- Container size - 20 kg

## Crops, Diseases, Rates and Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) in potato. Application should begin prior to row closure or when conditions become favourable for the development of disease. For early blight apply on a 7 to 14 day interval and for late blight apply on a 7 to 10 day interval.

## Rates:

Apply at 0.91 to 1.35 kg per acre.

## Application Information:

- **Water Volume:**
  - *Ground:* minimum 80 L per acre.
  - *Aerial:* minimum 20 L per acre.

## How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity. The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad spectrum fungicide. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 3 applications of this product per season.
- **Grazing:** Crop can be grazed or fed to livestock.
- **Preharvest interval:** 3 days.
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** A plant back interval of 14 days is required for all crops not listed on the label.
- **Storage:** Store in original tightly closed container.
- **Environment:** Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

## Hazard Rating:

 Warning – Poison

 Warning – Eye and Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Cantus WDG Fungicide

Fungicide Group

7

Refer to page 427

## Company:

BASF Canada – PCP#30141

## Formulation:

70% boscalid formulated as a water dispersible granule.

- Container size - 4 x 2.83 kg

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato	Early blight ( <i>Alternaria solani</i> )	70 to 130 g	Apply prior to disease development and at 14 day intervals if conditions continue to favour disease development.

## Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 40 L per acre and ensure thorough coverage of foliage.
  - **Aerial:** Use a minimum water volume of 16 L per acre and ensure thorough coverage of foliage.
  - **Pivot and Sprinkler Irrigation:** DO NOT exceed 0.64 cm (1/4 inch) or 25,700 L per acre. Apply only through sprinkler systems including centre pivot, lateral move, end two, side (wheel) roll, traveler, big gun, solid set, or hand move irrigation systems. The system must contain functional valves to prevent water source contamination from backflow.

## How it Works:

The active ingredient boscalid is a carboxamide (SDHI) fungicide with systemic activity. It inhibits spore germination, mycelia growth and sporulation of the fungus on the leaf surface. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.



## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** 4 applications per season on potatoes.
- **Grazing:** No restriction listed.
- **Preharvest interval:** 30 days
- **Re-entry:** DO NOT re-enter treated area for 12 hours after application or until dry.
- **Re-cropping:** A plant back restriction of 14 days is required for all crops not on the label.
- **Storage:** Store in a cool, dry, locked, well-ventilated area without a floor drain.
- **Environment:** Toxic to aquatic organisms and non-target terrestrial plants. DO NOT apply to areas where runoff is likely to occur, or near any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed.

## Hazard Rating:



Caution Poison – Potential Skin Sensitizer



Warning – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Caramba

Fungicide Group

3

Refer to page 427

## Company:

BASF Canada – PCP#29767

## Formulation:

90 g per L metconazole formulated as an emulsifiable concentrate.

- Container size - Case (2 x 8.1L); 128 L drum; or 400 L tote

## Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre)*:	Application Timing:
Wheat	Control of leaf rust ( <i>Puccinia triticina</i> ), stripe rust ( <i>Puccinia striiformis</i> ), stem rust ( <i>Puccinia graminis</i> ), powdery mildew ( <i>Erysiphe graminis</i> f. <i>sp. tritici</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> ) Suppression of spot blotch ( <i>Cochliobolus sativus</i> )	200 to 280 mL	Apply prior to disease development or at the onset of disease.
	Suppression of fusarium head blight ( <i>Fusarium</i> spp.)	400 mL	Apply prior to development of the disease when environmental conditions are favourable for disease development. Apply within the time period when at least 75% of the heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases Controlled:	Application Rate (per acre)*:	Application Timing:
Barley	Control of net blotch ( <i>Pyrenophora teres</i> ), scald ( <i>Rhynchosporium secalis</i> ), leaf rust ( <i>Puccinia hordei</i> ); stripe rust ( <i>Puccinia striiformis</i> ), powdery mildew ( <i>Erysiphe graminis</i> ); Suppression of spot blotch ( <i>Cochliobolus sativus</i> )	200 to 280 mL	Apply prior to disease development or at the onset of disease.
	Suppression of fusarium head blight (FHB) ( <i>Fusarium</i> spp.)	400 mL	Apply prior to development of the disease when environmental conditions are favourable for disease development. Apply between full head emergence and up to 3 days after full emergence of main stem heads.
Oat	Control of crown rust ( <i>Puccinia coronata</i> ), septoria leaf blotch ( <i>Septoria avenae</i> )	200 to 280 mL	Apply prior to disease development or at the onset of disease.
	Suppression of fusarium head blight ( <i>Fusarium</i> spp.)	400 mL	Apply prior to development of the disease when environmental conditions are favourable for disease development. Apply within the time period when at least 75% of the heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower.
Corn*	Suppression of fusarium ( <i>Fusarium graminearum</i> ) and gibberella ( <i>Gibberella zeae</i> ) ear rots	400 mL	Apply when the crop is between silking and silk browning stage for maximum suppression. Ensure silk coverage for optimum efficacy.
Rye	Control of leaf rust ( <i>Puccinia recondita</i> ), stripe rust ( <i>Puccinia striiformis</i> ), powdery mildew ( <i>Erysiphe graminis</i> )	200 to 280 mL	Apply prior to disease development or at the onset of disease.
	Suppression of fusarium head blight ( <i>Fusarium</i> spp.)	400 mL	Apply prior to development of the disease when environmental conditions are favourable for disease development. Apply within the time period when at least 75% of the heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower.
Triticale	Control of leaf rust ( <i>Puccinia recondita</i> ), stripe rust ( <i>Puccinia striiformis</i> ), stem rust ( <i>Puccinia graminis</i> ), powdery mildew ( <i>Erysiphe graminis</i> f. <i>sp. tritici</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> ); Suppression of spot blotch ( <i>Cochliobolus sativus</i> )	200 to 280 mL	Apply prior to disease development or at the onset of disease.

\*A case can treat 40 acres after heading (suppression of FHB) or 60 to 80 acres before heading (leaf disease). A drum can treat 320 acres after heading (suppression of FHB) or 460 to 640 acres before heading (leaf disease).

\*Corn includes field corn, sweet corn, popcorn and seed production corn.

**Application Information:**

- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum 20 L per acre.
  - Consult nozzle manufacturers for specific nozzle and pressure recommendations.

**How it Works:**

The active ingredient, metconazole, is a broad spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

**Tank Mixes:**

None listed.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Wheat, oat, rye, barley, corn* – DO NOT exceed 1 application of this product per season.
- **Grazing:** All crops can be grazed or fed to livestock.
- **Preharvest interval:**
  - *Wheat, barley, oat, rye* – 30 days
  - *Field corn grain* – 20 days
  - *Sweet Corn* – see label harvesting restrictions
- **Re-entry:**
  - *Wheat, barley, oat, rye* – DO NOT re-enter treated areas within 12 hours of application.
  - *Corn* – DO NOT re-enter treated area for 12 hours or up to 3 days depending on re-entry activity (see label instructions).
- **Re-cropping:** A plant back interval of 35 days is required for all crops not listed on the label.
- **Storage:** Store in original tightly closed container. Protect from freezing.
- **Environment:** Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

## Hazard Rating:



Warning – Eye irritant

Check label for first-aid information.

For an explanation of the symbols used here see pages 7 and 8.

# Chlorothalonil

*Bravo 500/Bravo Zn/Echo 720/Echo 90DF*

Fungicide Group

M5

Refer to page 427

## Company:

Syngenta Canada (*Bravo 500* – PCP#15723, *Bravo Zn* – PCP#28900)

UAP (*Echo 720* – PCP#29355, *Echo 90DF* – PCP#29356)

## Formulations:

*Bravo 500* - 500 g per L chlorothalonil formulated as a suspension.

- Container size - 2 x 10 L case and 450 L

*Bravo Zn* - 500 g per L chlorothalonil formulated as a suspension.

- Container size - 2 x 10 L case and 450 L

*Echo 720* - 720 g per L chlorothalonil formulated as a suspension.

- Container size - 2 x 9.46 L case, 450 L and 984.1 L

*Echo 90DF* - 90% chlorothalonil formulated as a dry flowable.

- Container size - 10 kg

## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):		Application Timing:
		<i>Bravo 500</i>	<i>Echo 720</i>	
Wheat	Control of tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria glume blotch, septoria leaf blotch ( <i>Septoria tritici</i> )	600 to 1000 mL	405 to 690 mL	Begin application at flag leaf emergence; repeat 10 to 14 days later when heads are visible. A third application when heads are fully emerged may be necessary.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases:	Application Rate (per acre):		Application Timing:
		<i>Bravo 500</i>	<i>Echo 720</i>	
Wheat <i>continued</i>	Suppression of fusarium head blight ( <i>Fusarium</i> spp.)	800 to 1000 mL	570 to 690 mL	For suppression of fusarium head blight apply at early flowering (before flowering has started in the majority of tillers) and before the beginning of weather favouring disease.
Pea	Control of mycosphaerella blight ( <i>Mycosphaerella pinodes</i> )	800 to 1200 mL	570 to 850 mL	Begin application at early flowering and repeat 10 days later at early pod set or mid-flowering if necessary. Make a third application 10 to 14 days after the second application at pod fill should conditions remain favourable for disease.
Lentil	Control of ascochyta blight ( <i>Ascochyta lentis</i> ), anthracnose ( <i>Colletotrichum truncatum</i> )	800 to 1600 mL	570 to 1130 mL	For one application only, apply at early flowering. For two applications: apply first before flowering when bud formation is evident; apply second at early to mid-flowering 10 to 14 days after the first application but before rows close in.
Chickpea	Control of ascochyta blight ( <i>Ascochyta rabiei</i> )	1200 to 1600 mL for first application; 800 to 1200 mL for subsequent applications.	850 to 1130 mL for first application; 570 to 850 mL for subsequent applications.	Make first application at very early flowering and remaining applications at 10 day intervals.

Crop	Diseases Controlled:	Application Rate* (per acre):				Application Timing:
		<i>Bravo 500</i>	<i>Bravo Zn</i>	<i>Echo 720</i>	<i>Echo 90DF</i>	
Potato	Late blight ( <i>Phytophthora infestans</i> )	480 to 1000 mL	480 to 1000 mL	320 to 690 mL	280 to 530 g	Begin application when plants are 6 to 8 inches (15 to 20 cm) high or when disease threatens. Repeat applications at 7 to 10 day intervals or as necessary to maintain disease control.
	Early blight ( <i>Alternaria solani</i> )	640 to 1000 mL	640 to 1000 mL	445 mL	370 to 530 g	
	Botrytis vine rot ( <i>Botrytis cinerea</i> )	640 to 1000 mL	640 to 1000 mL	480 to 1000 mL	370 to 530 g	*Under high disease pressure, use higher rate and shorter spray intervals.

**Application Information:**

- **Water Volume:** Volume will vary with crop and amount of plant growth. Use sufficient water to obtain adequate coverage of foliage.
  - **Ground:** Spray volume will usually range from 90 to 640 L per acre for dilute sprays and 20 to 40 L per acre for concentrate sprays.
    - **Chickpea** - 90 L per acre. Ground application only.
  - **Aerial:** Use minimum of 12 L per acre.

**How it Works:**

The active ingredient chlorothalonil is a chloronitrile fungicide with multi-site contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

DO NOT combine with pesticides, surfactants or fertilizers unless prior use has shown the combination is physically compatible and non-injurious under your conditions of use.

**Fungicides:** For control of early blight in potato, *Bravo 500* may be tank-mixed with 200 mL per acre *Quadris*. DO NOT apply sequential applications of this tank-mix and DO NOT exceed 3 tank-mix applications per season. DO NOT apply to potatoes later than 2 days before harvest. For control of early blight, late blight, and botrytis vine rot in potato and for suppression of storage rots, pythium leak and pink rot, in potato *Bravo Zn* may be tank mixed with 80 mL per acre *Ridomil Gold 480 EC* or *Ridomil Gold 480 SL*.

**Herbicides:** On lentils, DO NOT apply in combination with *Poast* herbicide and *Merge* surfactant or within 48 hours of the application of *Poast* and *Merge*.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Lentil* – DO NOT exceed 2 applications of this product per season.
  - *Wheat, pea, chickpea* – DO NOT exceed 3 applications of this product per season.
  - *Potato (Echo 90DF)* – DO NOT exceed 12 applications of this product per season.
- **Grazing:** DO NOT graze treated areas. DO NOT feed straw from treated crops to livestock.
- **Preharvest interval:**
  - *Potato* – 1 day
  - *Lentil* – 48 days
  - *Chickpea* – *Bravo 500* - 14 days, *Echo 720* - 48 days
  - *Wheat* – 30 days
  - *Pea* – 32 days
- **Re-entry:** DO NOT re-enter treated area within 48 hours of application. If required, and at least 4 hours have passed since application, individuals may re-enter treated area for short-term tasks not involving hand labour. Long pants, long-sleeved shirt, and chemical resistant gloves must be worn.
- **Re-cropping:** None.
- **Storage:** DO NOT store near feed or food stuffs. Store in a cool, dry, ventilated place. Protect from excessive heat.
- **Environment:** DO NOT apply if weather conditions favour drift from area being treated. DO NOT contaminate lakes, streams or ponds. Observe a buffer zone of 100 m for aerial applications and 15 m for ground applications to protect aquatic systems.

## Hazard Rating:



Caution – Poison



Warning – Causes severe eye damage

For an explanation of the symbols used here see pages 7 and 8.

# Contans WG

**Fungicide Group**  
**Not classified, bio-  
fungicide**

*Refer to page 427*

## Company:

Bayer, distributed by UAP - PCP#29066

## Formulation:

Wettable Granules - 5.30% *Coniothyrium minitans* strain CON/M/91-08. Contains minimum of  $1 \times 10^9$  cfu per gram.

- Container size - 20kg

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Pre-plant - Soils where canola, sunflower, safflower, dry bean or soybean will be planted	White mould or sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> ) and rots caused by <i>S. minor</i>	400 to 800 g	Prior to planting of spring crop; three months before the typical onset of sclerotinia stem rot or white mould.  In fall, prior to spring planting of susceptible crop. After application to the soil, the product should be incorporated to within 5 cm of the topsoil.  Incorporation should take place as soon as possible after application (within 1 week maximum).
		800 to 1600 g	If soil incorporation is to a depth greater than 5 cm, higher rate should be applied.
Postharvest - On harvest residue of susceptible crops		200 to 400 g	Prior to the next soil treatment, the residues of the susceptible crops in rotation can be also treated to help reduce inoculum loads of sclerotia in the field.

## Application Information:

- Use sufficient water volumes to give thorough coverage of the soil surface and/or the crop residue (10 gallons per acre of water volume).
- DO NOT allow spray mixture to stand overnight or for prolonged periods; should be used within 24 hours of being prepared.
- After incorporation, treated soils should not be disturbed to avoid bringing untreated sclerotia from lower soil depths to the top soil layer.
- As part of an overall long-term pest management strategy, it is recommended to use other management practices along with *Contans WG* such as in season foliar fungicide applications and proper crop rotations.
- DO NOT apply by air.

## How it Works:

The active ingredient, *Coniothyrium minitans*, is a fungus that infects the sclerotia of *Sclerotinia sclerotiorum* and *S. minor*. Infection of sclerotial bodies prevents production of ascospores and mycelial structures that infect plants. Regular use of *Contans WG* in successive years within a longterm management strategy will improve disease control.

## Tank Mixes:

DO NOT tank-mix with fungicides or fertilizers. Also, DO NOT tank mix with acids, alkalines or any product that attacks organic materials. Contact UAP for more information on what products are compatible with *Contans WG*.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** Can be applied up to and including the day of harvest.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Maximum storage period of one year at 4°C or below. Up to 6 weeks at temperatures between 4°C and 23°C. Store in a dry area inaccessible to children. Store in original container away from food or feed.
- **Environment:** DO NOT apply this product directly to freshwater habitats, estuarine/marine habitats. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Hazard Rating:



Caution – Potential Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Copper

Copper 53W/Copper Spray/Cueva/Parasol WG

## Fungicide Group

M1

Refer to page 427

### Company:

W. Neudorff GmbH KG (Cueva – PCP#31825), Distributed by Engage Agro Corporation

Loveland Products Canada, (Copper 53W – PCP#09934, Copper Spray – PCP#19146)

Nufarm Agriculture Inc. (Parasol WG – PCP#29063)

### Formulations, Crops, Diseases, Rates and Timing:

Product		Copper 53W	Copper Spray	Cueva	Parasol WG
Formulation and Container Size		53% tribasic copper sulphate (wetttable powder). 10 kg	50% copper oxychloride (wetttable powder). 10x2 kg	Copper as 1.8% copper octanate (solution). 1-1000L	50% elemental copper as copper hydroxide (wetttable granule). 10 kg
Crop	Disease	Application Rate and Timing			
Potato	Septoria leaf spot ( <i>Septoria lycopersici</i> )	-	-	Use a 0.5% to 2% solution, applied at 190 to 380 L per acre. Apply 2 weeks before disease normally appears (make use of predictive disease models if available) and repeat using 5 to 10 day intervals.	-
	Early blight ( <i>Alternaria soliani</i> )	2.2 kg per acre Apply when plants are 5 to 7 inches (12 to 18 cm) tall. Repeat at 7 day intervals.	1.6 kg per acre Apply when plants are 4 to 8 inches (10 to 20 cm) tall. Repeat at 7 to 10 day intervals.		0.44 to 1.0 kg per acre Apply when plants are 6 inches (15 cm) tall. Apply combined with 0.7 to 0.9 kg of mancozeb (80%) per acre, at 7 to 10 day intervals.
	Late blight ( <i>Phytophthora infestans</i> )				
	Tuber blight ( <i>Phytophthora infestans</i> )	-	-	-	1.36 kg per acre (vine kill). Apply with dessiccant at vine kill or alone after vine kill, prior to harvest.
Dry bean	Anthracnose ( <i>Colletotrichum truncatum</i> )	2.2 kg per acre. Apply prior to disease development or at the onset of disease	-	-	0.9 to 1.3 kg per acre. Apply prior to disease development or at the onset of disease
	Downy mildew ( <i>Phytophthora phaseoli</i> )		-	-	-
	Common bacterial blight ( <i>Xanthomonas campestris</i> pv. <i>phaseoli</i> ), halo blight ( <i>Pseudomonas syringae</i> pv. <i>phaseolicola</i> )			Use a 0.5% to 2% solution, applied at 190 to 380 L per acre. Apply 2 weeks before disease normally appears (make use of predictive disease models if available).  Re-apply using 5 to 10 day intervals.	
Dry bean, soybean, field pea, lentil and chickpea	Ascochyta blight ( <i>Ascochyta pisi</i> ), brown spot ( <i>Pseudomonas syringae</i> pv. <i>syringae</i> ), powdery mildew ( <i>Erysiphe</i> spp.), rust ( <i>Uromyces appendiculatus</i> )				

## Application Information:

- **Ground:** Use enough water to ensure thorough coverage. As noted on the labels, 400 L per acre (*Copper 53W* and *Copper Spray*); boom height must be 60 cm or less above the crop or ground (*Cueva*).
- **Aerial:** DO NOT apply by air

## How it Works:

The active ingredients containing copper are inorganic fungicides with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Cueva*: DO NOT exceed 15 applications per year.
  - *Bean (Parasol WG)* – DO NOT exceed 6 applications per season.
  - *Potato (Parasol WG)* – DO NOT exceed 10 applications per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** Do not apply within one day of harvest.
- **Re-entry:**
  - *Copper 53W, Copper Spray, and Parasol WG* – DO NOT re-enter treated areas within 48 hours of application
  - *Cueva* – 4 hours
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in original container in a cool, dry, well ventilated area. To prevent contamination store this product away from food or feed. Protect from freezing. Keep away from heat, fire, and sparks.
- **Environment:** DO NOT apply or allow to drift onto streams or any body of water. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.
- **Toxicity:** Toxic to birds, small wild mammals and aquatic organisms (indicated on *Cueva* label).

## Hazard Rating:



Warning – Poison – (*Copper 53W, Copper Spray*)



Caution – Poison – (*Parasol WG*)

For an explanation of the symbols used here see pages 7 and 8.

# Cosavet DF Edge

Fungicide Group  
M2

Refer to page 427

## Company:

Sulphur Mills Ltd., distributed by Engage Agro – PCP#31869

## Formulation:

80% sulphur formulated as water dispersible granules

- Container size - 13.6 kg bag

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Field pea	Control of powdery mildew ( <i>Erysiphe pisi</i> )	0.6 kg	Apply at first appearance of disease and repeat at 7 to 10 day intervals as necessary.



## Application Information:

- **Water Volume:**
  - **Ground:** minimum 40 L per acre.

## How it Works:

The active ingredient sulphur is an inorganic fungicide with multisite activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 8 applications of *Cosavet DF Edge* per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 1 day
- **Re-entry:** DO NOT re-enter treated areas within 24 hours of application.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in a cool, dry, locked and well-ventilated area without a floor drain.
- **Environment:** No restrictions listed.

## Hazard Rating:

None listed.

# Cotegra

**Fungicide Group**  
**3, 7**

Refer to page 427

## Company:

BASF Canada – PCP#32530

## Formulation:

250 g per L boscalid and 150 g per L prothioconazole formulated as a suspension concentrate.

- Container size - 2 x 9.6 L per case

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Canola (including rapeseed and oriental mustard)	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	240 to 280 mL	Apply <i>Cotegra</i> at 20 to 50% flowering. Select the use rate based on relative disease pressure. Use the high rate when risk for disease development is high (i.e narrow host rotation with disease history and high potential for inoculum).  Apply a second application 7 to 14 days if disease persists or weather conditions are conducive for disease development.
Lentil, field pea, chickpea	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	280 mL	Apply <i>Cotegra</i> at the beginning of flowering or at the onset of disease symptoms. Apply a second application 7 to 14 days if disease persists or weather conditions are conducive for disease development.
Dry bean; faba bean	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	400 mL	Apply <i>Cotegra</i> at 20 to 50% flowering. Apply a second application 7 to 14 days if disease persists or weather conditions are conducive for disease development.

**Crops, Diseases, Rates and Timing *continued*:**

Crop	Diseases	Application Rate (per acre)	Application Timing
Soybean	Control of frogeye leaf spot ( <i>Cercospora soja</i> )  Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> ), brown spot ( <i>Septoria glycines</i> )	280 mL	Apply <i>Cotegra</i> prior to disease development when conditions are favourable for disease development or at the onset of disease symptoms. Apply a second application 7 to 14 days if disease persists or weather conditions are conducive for disease development.

**Application Information:**

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 40 L per acre and ensure thorough coverage of foliage.
  - **Aerial:** Use a minimum water volume of 20 L per acre and ensure thorough coverage of foliage.

**How it Works:**

The active ingredient boscalid is a carboxamide (SDHI) fungicide with systemic activity. The active ingredient prothioconazole is a triazole fungicide with broad-spectrum systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.

**Tank Mixes:**

None registered.

**Restrictions:**

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Canola, mustard, dry bean, chickpea, lentil, pea, soybean* – DO NOT exceed 2 applications of this product per season.
- **Grazing:** All crops can be grazed or fed to livestock 7 days after application.
- **Preharvest interval:**
  - *Beans, chickpea, lentil, pea, soybean* - 21 days
  - *Canola, rapeseed, and oriental mustard* – 36 days
- **Re-entry:** DO NOT re-enter treated area for 24 hours after application.
- **Re-cropping:** A plant back restriction of 14 days is required for all crops not on the label. 30 days for all crops NOT on the label.
- **Storage:** Store the leftover product in original tightly closed container. Protect from freezing. Store in a cool, dry, locked, well-ventilated area without a floor drain.
- **Environment:** Toxic to aquatic organisms. Observe buffer zones and DO NOT apply to any body of water or where runoff is likely to occur.

**Hazard Rating:**

Caution Poison

For an explanation of the symbols used here see pages 7 and 8.

# Curzate 60 DF

Fungicide Group

27

Refer to page 427

**Company:**

Corteva Agriscience Agriculture Division of DowDuPont - PCP#26284

**Formulation:**

60% cymoxanil formulated as a dry flowable.

- Container size - 1.8 kg

## Crops, Diseases Timing:

Control of late blight (*Phytophthora infestans*) in potato. Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5 to 7 day intervals; however, at least 20 days must pass between the second and third application.

## Rate:

Apply *Curzate 60 DF* at 90 g per acre

Plus

*Manzate DF* or *Manzate Pro-Stick* at 540 g to 650 g per acre

## Application Information:

- **Water Volume:**
  - **Ground:** Utilize sufficient water to obtain thorough coverage - 80 to 400 L per acre.
  - **Aerial:** Apply by air with a minimum water volume of 20 L per acre.

## How it Works:

The active ingredient cymoxanil is a cyanoacetamide-oxime fungicide with locally systemic activity. To be used as a preventative, curative and inhibitive (antisporeulant) fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

DO NOT use *Curzate 60 DF* alone. Use only in a tank mix with *Manzate DF* or *Manzate Pro-Stick*.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 4 applications of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 8 days
- **Re-entry:** DO NOT re-enter treated areas within 24 hours of application.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store product in original container in a secure, dry area away from food or feed. Protect against humid air and water. Not for use or storage in or around the home. Keep container tightly closed.
- **Environment:** A buffer zone of 50 m is required between the down-wind edge of the boom and sensitive aquatic habitats such as ponds, lakes, rivers, streams, and wetlands. DO NOT contaminate these habitats when cleaning and rinsing equipment or containers. DO NOT clean sprayer near well or water source or near desirable vegetation.

## Hazard Rating:



Danger – Poison



Caution – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Delaro 325 SC

## Fungicide Group

### 3, 11

Refer to page 427

## Company:

Bayer – PCP#31533

## Formulation:

175 g per L of prothioconazole and 150 g per L of trifloxystrobin formulated as a suspension concentrate.

- Container size - 7.1 L

## Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Field pea	Mycosphaerella blight ( <i>Mycosphaerella pinodes</i> ), ascochyta blight ( <i>Ascochyta pisi</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	356 mL	Apply at the first sign of disease.  When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later.  Use shorter intervals for best protection.
Chickpea	Ascochyta blight ( <i>Ascochyta rabiei</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )		
Lentils	White mould ( <i>Sclerotinia sclerotiorum</i> ), ascochyta blight ( <i>Ascochyta lentis</i> ), grey mould ( <i>Botrytis cinerea</i> ), anthracnose ( <i>Colletotrichum truncatum</i> )		
Soybean	Brown spot ( <i>Septoria glycines</i> ), phomopsis stem blight ( <i>Phomopsis longicolla</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> )	230 mL	Apply preventatively or at the first signs of disease from early flowering (R1) to complete pod fill (R5).  When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. Continue applications as needed on a 10 to 14 day interval.
Corn	Common rust ( <i>Puccinia sorghi</i> ), eye spot ( <i>Aureobasidium zeae</i> ), Northern corn leaf blight ( <i>Setosphaeria turcica</i> ; anamorph <i>Exserohilum turcicum</i> ), grey leaf spot ( <i>Cercospora zeaemaydis</i> )	230 mL	Apply at first sign of disease.  When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later.
Flax	Pasmo ( <i>Septoria linicola</i> ), stem rot ( <i>Sclerotinia sclerotiorum</i> )	356 mL	Apply <i>Delaro 325 SC</i> when crop is in the 20 to 90% bloom stage. Best protection will be achieved when the fungicide is applied prior to petals beginning to fall. Application at this time will allow for the maximum number of petals to be protected.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum 20 L per acre.

## How it Works:

The active ingredient prothioconazole is a triazole fungicide with broad spectrum systemic activity. The active ingredient trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

Bayer supports the following mixes that are not on the *Delaro 325 SC* label. Apply mixes according to the most restrictive use limitations for either product:

- **Insecticides:** *Decis*, *Lorsban*, *Matador*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 2 applications of *Delaro 325 SC* per season in field pea, chickpea, lentil, soybean and corn. DO NOT exceed 1 application of *Delaro 325 SC* per season in flax.
- **Grazing:** No restrictions listed.

- **Preharvest interval:**
  - *Field pea, chickpea, lentil* – 30 days
  - *Soybean* – 20 days
  - *Corn* – 14 days
  - *Flax* – 36 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** Crops listed on label, corn, cereals and sugarbeet may be planted immediately following last application. DO NOT plant any other crops within 30 days of application of *Delaro 325 SC*.
- **Storage:** Store this product away from food or feed. Keep away from fire or open flame or other sources of heat. Do not store at temperatures below freezing. If stored for 1 year or longer, shake well before using. Store away from feed, seed, fertilizer, plant and foodstuffs. Do not store in or around the home. Keep in original container during storage.
- **Environment:** Toxic to aquatic organisms and non-target terrestrial plants. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. DO NOT apply to areas where runoff is likely to occur.

## Hazard Rating:



Caution – Eye irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Double Nickel LC/Double Nickel 55

Fungicide Group  
44

Refer to page 427

## Company:

Distributed by UAP – (*Double Nickel LC; Double Nickel 55*)

## Formulations:

**Double Nickel LC (PCP#31887):**  $1 \times 10^{10}$  *Bacillus amyloliquefaciens* strain D747 spores/mL (minimum) formulated in an aqueous suspension.

- Container size - 500 L

**Double Nickel 55 (PCP#31888):**  $5 \times 10^{10}$  *Bacillus amyloliquefaciens* strain D747 spores/g formulated in a water dispersible granule.

- Container size - 4 x 2.26 kg

## Crops, Diseases, Rates and Timing:

Crops:	Diseases Controlled:	Application Rates:		Application Timing:
		<i>Double Nickel LC</i> (L/acre)	<i>Double Nickel 55</i> (kg/acre)	
Potato	White mould ( <i>Sclerotinia sclerotiorum</i> )	0.4 to 2 L	0.08 to 0.4 kg	Begin preventative foliar application when conditions are favorable for disease development. Repeat application every 3 to 10 days if the favorable conditions for disease development persist. Apply when disease pressure is low or newly emerged plants.

**Crops, Diseases, Rates and Timing *continued*:**

Crops:	Diseases Controlled:	Application Rates:		Application Timing:
		Double Nickel LC (L/acre)	Double Nickel 55 (kg/acre)	
Potato <i>continued</i>	White mould ( <i>Sclerotinia sclerotiorum</i> )	2 to 5* L	0.4 to 1* kg	Use higher rate (*) when disease pressure is moderate to high or when environmental conditions or plant stage is conducive to rapid disease development
	Early blight ( <i>Alternaria solani</i> )	1 to 4 L	0.2 to 0.8 kg	Begin foliar application on onset of crop cover to formation of tuber. Repeat application every 3 to 10 days if the favorable conditions for disease development persist.
	Black scurf ( <i>Rhizoctonia solani</i> )	0.4 to 2 L	0.08 to 0.4 kg	Apply in soil at the time of planting, following the instructions for Banded/in-furrow application
Soybean	White mould ( <i>Sclerotinia sclerotiorum</i> )	1 to 4 L	0.2 to 0.8 kg	Begin foliar application from early flowering to pod set. Repeat application every 3 to 10 days if the favorable conditions for disease development persist.

**Application Information:**

- **Foliar:** Mix in sufficient volume of water to achieve thorough coverage of the crop canopy with minimal runoff.
- **For control of early blight, black scurf in potato and white mould in soybean:** Apply lower rate under low disease pressure or to smaller, newly emerged plants. Higher rates may be applied when disease pressure is moderate to high or when environmental conditions and plant stage are conducive to rapid disease development. Apply more frequently (3 to 7 days) or rotate with other fungicides for improved performance.
- **Soil application:** Apply by banded/in-furrow application. Mix the required amount of product in water and apply as banded spray (10 to 15 cm wide) or seedrow drench centered over the furrow. Apply directly over the seeds in the furrow just before seeds are covered with soil. Refer to the product labels for the table with application rates for different row spacing's.

**How it Works:**

The active ingredient, *Bacillus amyloliquifaciens* strain D747, is a beneficial bacterium with broad spectrum activity. *B. amyloliquifaciens* colonizes the plant surfaces preventing establishment of disease-causing fungi and bacteria.

**Tank Mixes:**

None registered.

**Restrictions:**

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** Can be applied every 3 to 10 days as long as conditions favor disease development.
- **Grazing:** No restrictions listed.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in original container away from children and direct sunlight, at 4 to 25°C for up to one year. Do not contaminate feed/food.
- **Environment:** To reduce runoff into aquatic habitats, avoid application when heavy rain in forecast. Runoff can also be reduced by including a vegetative strip between the treated area and edge of water body.

**Hazard Rating:**

Possible eye irritant and may cause sensitization.

# Dyax

Fungicide Group

7, 11

Refer to page 427

## Company:

BASF Canada – PCP#32746

## Formulation:

250 g per L of fluxapyroxad and 250 g per L of pyraclostrobin formulated as a suspension concentrate.

- Container size - 2 x 9.6 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate* (per acre)	Application Timing
Chickpea	Control of ascochyta blight ( <i>Ascochyta rabiei</i> ) Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	160 mL	Apply at the onset of symptoms and prior to row closure at the beginning of flower. Do not make sequential applications of <i>Dyax</i> .
Lentil	Control of anthracnose ( <i>Colletotrichum truncatum</i> ) and ascochyta blight ( <i>Ascochyta lentis</i> ) Suppression of white mold ( <i>Sclerotinia sclerotiorum</i> )	160 mL	Apply at the onset of symptoms and prior to row closure at the beginning of flower.
Faba bean	Suppression of Ascochyta blight ( <i>Ascochyta</i> spp.) and white mould ( <i>Sclerotinia sclerotiorum</i> )	160 mL	Apply at the beginning of flowering or at the onset of symptoms.
Field pea	Control of powdery mildew ( <i>Erysiphe pisi</i> ) and mycosphaerella blight ( <i>Mycosphaerella pinodes</i> ) Suppression of white mold ( <i>Sclerotinia sclerotiorum</i> )	160 mL	Apply at the onset of symptoms and prior to row closure at the beginning of flower.
Dry bean	Control of anthracnose ( <i>Colletotrichum lindemuthianum</i> ), powdery mildew ( <i>Erysiphe</i> spp.) and rust ( <i>Uromyces appendiculatus</i> )	160 mL	Apply at the beginning of flowering.
Soybean	Suppression of septoria brown spot ( <i>Septoria glycines</i> ), frog-eye leaf spot ( <i>Cercospora soja</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> )	160 mL	Apply prior to disease development when conditions are favourable for disease development.

\* Product label indicates a lower rate but the product is not marketed at this rate due to fungicide stewardship of the individual components and resistance management.

DO NOT make sequential applications of *Dyax*. If disease persists or weather conditions are favourable for disease development, make a second application 10 to 14 days later, with a fungicide that contains a different mode of action. Use the shorter interval when disease pressure is high.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum 20 L per acre.

## How it Works:

The active ingredient fluxapyroxad is a carboximide (SDHI) fungicide with system activity. The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 1 sequential application of this product per season with a maximum of two total applications per season.
- **Grazing:** All crops on this label can be grazed or fed to livestock. Observe the minimum pre-harvest intervals for each crop.
- **Preharvest interval:**
  - *Field pea, lentil, chickpea, faba bean, dry bean* – 30 days
  - *Soybean* – 21 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** Crops listed on label, tuberous and corm vegetables, fruiting vegetables, pome fruits and stone fruits may be planted immediately following last application. A plant-back interval of one year is required for all other crops.
- **Storage:** Store this product away from food or feed.
- **Environment:** Maintain specified buffer zones. Toxic to aquatic organisms, small mammals, and non-target terrestrial plants.

## Hazard Rating:



Danger Poison – Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Elatus

Fungicide Group

7, 11

Refer to page 427

## Company:

Syngenta Canada

## Formulations:

The Elatus package has 2 components:

- *Elatus A Fungicide* (PCP #31973): 250 g/L azoxystrobin, formulated as a suspension
- *Elatus B Fungicide* (PCP #31977): 100 g/L benzovindiflupyr, formulated as an emulsifiable concentrate



## Crops, Diseases, Rates and Timing:

Crops:	Diseases:	Rate <i>Elatus A</i>	Rate <i>Elatus B</i>	Application Timing:
Chickpea	Ascochyta blight ( <i>Ascochyta</i> spp.), anthracnose ( <i>Colletotrichum</i> spp.) Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	200 mL per acre	200 to 300 mL per acre	In pulse crops, the first application must be applied before disease is established and no later than the onset of flowering.  A second application can be made 10 to 14 days later, if disease pressure is severe or conditions are conducive to disease development.
Dry bean including faba bean	Ascochyta blight ( <i>Ascochyta</i> spp.), anthracnose ( <i>Colletotrichum</i> spp.) Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )			
Field pea	Ascochyta blight ( <i>Ascochyta</i> spp.), anthracnose ( <i>Colletotrichum</i> spp.), mycosphaerella blight ( <i>Mycosphaerella pinodes</i> ), powdery mildew ( <i>Microsphaera diffusa</i> , <i>Erisiphe pisi</i> , <i>E. polygoni</i> ) Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )			
Lentil	Ascochyta blight ( <i>Ascochyta</i> spp.), anthracnose ( <i>Colletotrichum</i> spp.) Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )			
Potato	Control of silver scurf ( <i>Helminthosporium solani</i> ), rhizoctonia stem canker and rhizoctonia stolon canker ( <i>Rhizoctonia</i> spp.), black scurf ( <i>Rhizoctonia solani</i> )	4 to 6 mL per 100 m row	200 to 300 mL per acre	Apply once as an in furrow spray in 20 to 55 L per acre of water at planting. Mount the spray nozzle so the spray is directed into the furrow as a 15 to 20 cm band just before the seed is covered. Do not apply by air.
	Suppression of verticillium wilt ( <i>Verticillium dahlia</i> )	-	300 mL per acre	
Soybean	Control of cercospora leaf spot ( <i>Cercospora kikuchii</i> ), powdery mildew ( <i>Microsphaera diffusa</i> , <i>Erisiphe pisi</i> , <i>E. polygoni</i> ), septoria brown spot ( <i>Septoria glycines</i> ) Suppression of pod and stem blight ( <i>Diaporthe phaseolorum</i> )	200 mL per acre	200 to 300 mL per acre	Make first application at the R1 to R3 developmental stage or when there is a 5% disease level in the field. A second application may be made 14 days later, if conditions are conducive to disease development.

As of January 1, 2019, [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from pulse crops treated with this product may have market access concerns. Please see page 10 for more information AND consult potential grain buyers before using this product.

## Application Information:

- If disease pressure is high, use the highest rate and shortest application interval. For best results, use sufficient water volume to provide thorough coverage.
- **Ground:** minimum of 40 to 80 L per acre water volume is recommended.
- **Aerial:** minimum of 18 L per acre water volume is recommended.
- Use sufficient water to obtain thorough coverage of plants. DO NOT apply under periods of dead calm. Avoid application of this product when winds are gusty.

## How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) broad spectrum contact and systemic activity with preventative and curative applications. The active ingredient benzovindiflupyr is a succinate dehydrogenase inhibitor (SDHI) fungicide with broad spectrum activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

The Elatus package has 2 components. Add *Elatus A* (SC) and any additional SC formulation mix partners prior to adding *Elatus B* (EC) and any additional EC formulation mix partners.

It is not recommended to combine solid (WG or DF) formulations with liquid tank mix partners within a single batch. Batch mix any WG or DF formulation mix partners before *Elatus A* (SC) and any additional SC formulation mix partners. Any SN or SL formulation mix partners should be added by induction or an additional batch mix after the EC (*Elatus B*) and any additional EC formulation mix partners.

## Restrictions:

Note that Elatus contains 2 components with separate labels. Follow the most restrictive precautions, restrictions, and directions found on each of the *Elatus A* and *Elatus B* labels.

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT apply consecutive applications and DO NOT apply more than 2 applications per season.
- **Grazing:** DO NOT feed dried pea vines to livestock.
- **Preharvest interval:** DO NOT apply on pulse crops within 15 days of harvest. DO NOT apply on soybean within 14 days of harvest.
- **Re-entry:** DO NOT re-enter fields for 12 hours after application.
- **Re-cropping:** Potatoes, pulse crops (including dried pea and bean subgroup), soybean, fruiting and curcurbit vegetables, cereals (wheat, barley, oat, rye, triticale), corn, and rapeseed (including canola, mustard, flax, and borage) may be planted immediately after last application as long as they are also registered for use with azoxystrobin products. All other crops intended for food and feed may be planted 180 days after last application of *Elatus*.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed. To prevent contamination, store this product away from food or feed.
- **Environment:** DO NOT use to control aquatic pests. *Elatus A* is extremely phytotoxic to certain apple varieties. DO NOT use where spray drift may reach apple trees.

## Hazard Rating:



Warning Poison - corrosive to eyes and skin

For an explanation of the symbols used here see pages 7 and 8.

# Elixir

Fungicide Group  
M3, M5

Refer to page 427

## Company:

United Phosphorus Inc. – PCP#32271

## Formulation:

62.5% mancozeb and 12.5% chlorothalonil formulated as a water dispersible granule.

- Container size - 20kg

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato	Late blight ( <i>Phytophthora infestans</i> ), Early blight ( <i>Alternaria solani</i> )	1.68 kg to 2.24 kg	Begin applications when plants are 10 to 15 cm high by applying 1.68 kg per acre. As the vines increase in size apply at 2.24 kg per acre at intervals of 7 to 10 days. Use the shortest interval when plants are actively growing.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 80 L per acre.
  - **Aerial:** minimum 20 L per acre.
- A spreader sticker may be used if needed. DO NOT apply during periods of dead calm.

## How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with multi-site contact activity. The active ingredient chlorothalonil is a chloronitrile fungicide with multi-site contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT apply more than 22.4 kg per acre.
- **Preharvest interval:** 1 day
- **Re-entry:** DO NOT re-enter treated areas within 48 hours of application.
- **Re-cropping:** No restrictions listed.
- **Storage:** Never allow to get wet.
- **Environment:** To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted or heavy clay. Avoid application when heavy rain is in the forecast.
- **Toxicity:** Toxic to aquatic organisms.

## Hazard Rating:



Warning Poison – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Evito 480

Fungicide Group

11

Refer to page 427

## Company:

Arysta LifeScience Canada (PCP#30408)

## Formulation:

480 g/L fluoxastrobin formulated as a suspension.

- Container size - 4.8 L

## Crops, Diseases, Rates and Timing:

Crops	Diseases	Application rate (per acre)	Timing
Wheat	Control of leaf rust ( <i>Puccinia triticina</i> , <i>P. hordei</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), stripe rust ( <i>Puccinia striiformis</i> ), stem rust ( <i>Puccinia graminis</i> ) Suppression of septoria leaf blotch ( <i>Septoria tritici</i> )	59 to 118 mL	Apply preventively and repeat if needed after a 14 to 21 day interval. Use the higher rates and shorter interval when disease pressure is high. Apply prior to disease development from Feekes 5 (Zadok's 30) up to late head emergence at Feekes 10.5 (Zadok's 59).
	Powdery mildew ( <i>Erysiphe graminis</i> )	74 to 118 mL	

## Crops, Diseases, Rates and Timing *continued*:

Crops	Diseases	Application rate (per acre)	Timing
Barley	Leaf rust ( <i>Puccinia triticina</i> , <i>P. hordei</i> ), stripe rust ( <i>Puccinia striiformis</i> ), stem rust ( <i>Puccinia graminis</i> ), net blotch ( <i>Pyrenophora teres</i> )	59 to 118 mL	Apply preventively and repeat if needed after a 14 to 21 day interval. Use the higher rates and shorter interval when disease pressure is high.
	Powdery mildew ( <i>Erysiphe graminis</i> )	74 to 118 mL	Apply prior to disease development from Feekes 5 (Zadok's 30) up to late head emergence at Feekes 10.5 (Zadok's 59).
Corn	Common rust, ( <i>Puccinia sorghi</i> ), grey leaf spot ( <i>Cercospora maydis</i> ) Suppression of northern corn leaf blight ( <i>Setosphaeria turcica</i> ; anamorph: <i>Exserohilum turcicum</i> )	59 to 120 mL	Apply preventatively and repeat if needed after 7 to 10 day intervals. Use higher rates and shorter intervals when disease pressure is high.
Soybean	Control of frogeye leaf spot ( <i>Cercospora sojina</i> )	59 to 120 mL	Apply preventatively and repeat if needed after a 14 to 21 day interval. Use the higher rate and shorter interval when disease pressure is high.
Potato	Suppression of late blight ( <i>Phytophthora infestans</i> )	112 mL	Apply preventatively and repeat on a 7 day interval. If disease symptoms develop, switch to a fungicide with a different mode of action.
	Black scurf ( <i>Rhizoctonia solani</i> )	1.55 to 2.33 mL product / 100m row	Apply as an in-furrow application or banded application shortly after plant emergence, during herbicide application or cultivation.

## Application Information:

- **Water Volume:**
  - **Ground:** Apply in a minimum of 80 L of water per acre.
  - **Aerial:** Apply in a minimum of 20 L of water per acre.

## How it Works:

The active ingredient fluoxastrobin is a systemic fungicide that works by interfering with respiration in plant pathogenic fungi, and is a potent inhibitor of spore germination and mycelial growth. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Wheat and Barley:** propiconazole, tebuconazole, *Caramba*, *Proline 480 SC*, *Prosaro 250 EC*.

**Corn:** propiconazole (field, seed, sweet), chlorothalonil (sweet corn only).

**Soybean:** propiconazole, tebuconazole

**Potatoes:** chlorothalonil, mancozeb, metiram.

Refer to tank mix partner labels for use in directions, restrictions and precautions.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Wheat, Barley, Corn, Soybean** – 2 applications per year
  - **Potatoes** – 3 applications per year
- **Grazing:** Do not apply within 7 days of harvest for hay and forage. If wheat forage will be harvested, make only one application.
- **Preharvest interval:**
  - **Barley, wheat** – 40 days
  - **Potatoes** – 7 days
  - **Corn** – 30 days (grain) or 7 days (sweet)
  - **Soybean** – DO NOT apply later than R6 (full seed)
- **Re-cropping:**
  - Cereal grains and forage grasses may be planted following a 30 days plant back interval.
  - Canola, flax and sunflower may be planted following a 180 days plant back interval.
  - All crops on the *Evito 480* label may be planted immediately following harvest.
  - Alfalfa may be planted following a 30 days plant back interval.
  - For all other crops, DO NOT plant back within one year of the last field application.

- **Storage:** Store in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, or feed. Store in original container and out of reach of children, preferably in a locked storage area. *Evito 480* is not affected by freezing.
- **Environment:** Toxic to aquatic organisms. Observe buffer zones as specified on the label. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay.

## Hazard Rating:

Potential skin sensitizer.

# Fontelis

Fungicide Group

7

Refer to page 427

## Company:

Corteva Agrisciences Agriculture Division of DowDuPont – PCP#30331

## Formulation:

200 g per L penthiopyrad formulated as a suspension.

- Container size - 4 x 3.79 L jug

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Alfalfa	Sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	500 to 700 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.

## Application Information:

- **Water Volume:**
  - **Ground:** 45 L per acre.
  - **Aerial:** 16 L per acre.
- Use sufficient water to obtain thorough coverage of plants. DO NOT apply under periods of dead calm. Avoid application of this product when winds are gusty.

## How it Works:

The active ingredient penthiopyrad is a carboxamide fungicide with broad spectrum, locally systemic and curative properties recommended for foliar and soil borne plant diseases. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed two sequential applications of this product before switching to a fungicide with a different mode of action. DO NOT exceed 1.4 L per acre in one season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days
- **Re-entry:** DO NOT re-enter treated areas until 12 hours after application.
- **Re-cropping:** Crops and crop groups on the *Fontelis* label as well as the following crops may be planted immediately after harvest: canola, cereal grains crop subgroup, corn, cotton, legume vegetables crop subgroup, soybean, sugarbeet, tuberous and corm vegetables and leaves crop subgroup. All other crops cannot be planted until 12 months after the last application.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.
- **Environment:** This product is toxic to aquatic organisms. When using *Fontelis*, consult the product label for buffer zones.

## Hazard Rating:

Potential Skin Sensitizer

# Forum

Fungicide Group

40

Refer to page 427

## Company:

BASF Canada – PCP#32026

## Formulation:

500 g per L of dimethomorph formulated as a suspension concentrate.

- Container size - 2 x 4.5 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato	Late blight ( <i>Phytophthora infestans</i> )	182 mL	Make the first application when disease threatens or when visible signs of disease occur in nearby fields. Apply every 5 to 7 days under high pressure or every 7 to 10 days under low pressure. A minimum interval of 5 days between applications is required.
	Tuber blight ( <i>Phytophthora infestans</i> )	182 mL	Apply after first desiccation to target stem lesions to reduce tuber blight.

## Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 20 L per acre
  - **Aerial:** Use a minimum water volume of 80 L per acre.

## How it Works:

The active ingredient dimethomorph is a carboxylic acid amide fungicide with contact, systemic and antispore activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Fungicides:** For resistance management and early blight control (*Alternaria solani*), *Forum* must be tank-mixed with one of *Polyram DF*, *Dithane DG Rainshield* or *Bravo* at the product label rate.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 3 applications.
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** DO NOT plant a new crop in the treated area within 120 days of the last application.
- **Storage:** Store under cool and dry conditions in secure, well-ventilated buildings, away from foodstuffs and animal feed and out of reach of children.
- **Environment:** Toxic to aquatic organisms and mammals. Observe buffer zones outlined in the label.

## Hazard Rating:



Danger – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Fullback 125SC

Fungicide Group

3

Refer to page 427

## Company:

FMC Corporation – PCP#31679

Distributed by: Engage Agro Corporation

## Formulation:

Flutriafol 125.08 g per L formulated as a suspension concentrate.

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Soybean	Cercospora blight and leaf spot ( <i>Cercospora kikuchii</i> ), brown spot ( <i>Septoria glycines</i> ), frog-eye leaf spot ( <i>Cercospora sojina</i> )	207 to 414 mL	Apply as a broadcast foliar spray to soybean plants in R3 growth stage (early pod fill) or when environmental conditions are favourable for disease development. Apply second application if conditions are conducive for heavy disease development. Use the higher rate and shorter spray interval under severe sustained disease pressure Spray Interval 14 to 21 days

## Application Information:

- **Water Volume:** minimum 40 L per acre.
- **ASABE medium** droplets. Boom height must be 60 cm or less above the crop.
- DO NOT apply by air

## How it Works:

Flutriafol is a demethylation inhibitor with contact and systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

*Fullback 125SC* may be tank mixed with *Headline EC Fungicide* at the label rates for resistance management. If compatibility is in question, use the compatibility jar test before mixing the entire tank.

## Restrictions:

- **Resistance management:** Refer to page 426.  
**Rainfall:** Within 2 hours may reduce effectiveness.
- **Maximum number of applications:** DO NOT apply more than 828 mL per acre per season. Do not apply more than 3 applications per growing season. Only one application at 414 mL per acre may be made to any one field during a single growing season. Apply only to soybean harvested for dry seed. Flutriafol is persistent and may carryover. It is recommended that any products containing flutriafol not be used in areas treated with this product during the previous season.
- **Grazing:** DO NOT feed forage or hay to animals or permit animals to graze.
- **Preharvest interval:** DO NOT apply within 21 days of harvest.
- **Re-entry:** 12 hours.
- **Re-cropping:** Labeled crops may be planted anytime. Field corn, popcorn may be planted 150 days after application and sweet corn may be planted 200 days after application. All other unlabeled crops may be planted 365 days after application.
- **Storage:** Store unused product in original container in a cool, dry area. Do not contaminate water, food or feed by storage, disposal or cleaning of equipment. Shelf life of *Fullback 125 SC* is 3 years.
- **Environment:** Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. See label for more information on ground water contamination and surface water advisory. Avoid application when heavy rain is forecast. Toxic to aquatic organisms and non-target terrestrial plants. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

## Hazard Rating:

Potential Skin Sensitizer.

Keep out of reach of children and prevent access by unauthorized personnel.

# Gavel 75 DF

Fungicide Group

22, M3

Refer to page 427

## Company:

Gowan Canada - PCP#26842

## Formulation:

66.7% mancozeb and 8.43% zoxamide formulated as a dry flowable.

- Container size - 13.6 kg

## Crops, Diseases Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) in potato. Optimum disease control is achieved when the fungicide is applied in a regularly scheduled preventative spray program. Begin applications at the first sign of disease or when blight is reported in the area. Apply at 0.90 kg per acre every 7 days under high disease pressure when either disease is present or environmental conditions favour continued disease development.

Apply at 0.70 kg per acre every 7 days under low disease pressure and environmental conditions unfavorable for disease development.

## Rate:

Apply at 0.70 to 0.90 kg per acre.

## Application Information:

- Thorough, uniform coverage is essential for good disease control.
- **Water Volume:**
  - **Ground:** 90 L per acre.
  - **Aerial:** 18 to 36 L per acre. Use 36 L of water under high disease pressure to provide better crop coverage.

## How it Works:

To be used as a preventative fungicide application. The active ingredient zoxamide is a benzamide fungicide with contact activity. The mancozeb component is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 6 applications of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 3 days
- **Re-entry:** DO NOT re-enter treated areas within 48 hours of application.
- **Re-cropping:** A 30 day plant back interval (PBI) is required for leafy vegetables and root and tuber vegetables. For all other crops not included on the label, the PBI should be 140 days.
- **Storage:** DO NOT allow product to freeze. Keep away from fire and sparks. Store in a cool, dry, well ventilated place away from feed or food.
- **Ground application:** a buffer zone of 25 m for application by ground sprayer should be established between the last spray swath and the edge of aquatic systems. A buffer zone of 5 m for application by ground sprayer should be established between the last spray swath and the edge of terrestrial habitats such as hedgerows, windbreaks, woodlots, vegetative strips and other vegetation. This pesticide is toxic to fish.
- **Aerial application:** a buffer zone of 20 m is required between the downwind edge of the boom and the closest edge of sensitive aquatic habitats.

## Hazard Rating:



Caution – causes moderate eye irritation

For an explanation of the symbols used here see pages 7 and 8.



# Iprodione

Rovral Flo/Overall 240 SC/Prodex SC

Fungicide Group

2

Refer to page 427

## Company:

FMC Corporation (*Rovral Flo* - PCP#29315)

ADAMA Canada (*Overall 240 SC* - PCP#30275)

Sharda CropChem Canada (*Prodex SC* - PCP#32490)

## Formulation:

240 g per L iprodione formulated as a suspension (*Rovral Flo*)

240 g per L iprodione formulated as a suspension concentrate (*Overall 240 SC, Prodex SC*)

- Container size - 8.4 L (*Overall 240 SC, Prodex SC*); 2 x 8.4 L, 409 L (*Rovral Flo*)

## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Canola	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )  Suppression of alternaria black spot ( <i>Alternaria brassicae</i> , <i>A. raphani</i> )	Single application*: 0.85 to 1.25 L  Split application*: 0.42 to 0.63 L at 20% bloom; followed by 0.42 L at 50% bloom.  Single application for low disease pressure (sclerotinia stem rot) and light crop stands: 0.63L	Apply at 20 to 50% bloom stage (approximately 4 to 8 days after crop begins to flower). Best protection achieved when applied at the 20 to 30% bloom stage (prior to petal fall). Can be applied until 50% bloom stage (when crop is at its maximum yellow color and prior to significant petal fall).
Canola <i>continued</i>	Control of alternaria black spot ( <i>Alternaria brassicae</i> , <i>A. raphani</i> )	Single application: 0.85 L  Split applications: 0.42 L each application.	Single application: Apply at early green pod stage.  Split application: Apply first application at 20 to 50% bloom, followed by second application at early green pod stage.
Alfalfa (grown for seed)	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	0.85 to 1.25 L*	Make a single application at the 20 to 50% bloom stage.

\* Lower rate recommended for most crops; use higher rate for fields with history of severe disease pressure and dense crop stands.

## Application Information:

- **Water Volume:** Good coverage of the plants is essential.
  - **Ground:** 40 L per acre.
  - **Aerial (canola only):** minimum 18 L per acre.

## How it Works:

The active ingredient iprodione is a dicarboximide fungicide with contact activity. To be used as a preventative and eradicant fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 2 applications of this product per season.
- **Grazing:** DO NOT use treated alfalfa for animal feed.
- **Preharvest interval:** 38 days.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** DO NOT freeze.
- **Environment:** DO NOT apply directly to water. DO NOT contaminate sensitive areas through spray drift, direct application, disposal of waste or cleaning equipment. Observe specified buffer zones.

## Hazard Rating:



Caution – Poison



Warning – Skin and Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Kenja 400SC

Fungicide Group

7

Refer to page 427

## Company:

IAK Biosciences Corporation, distributed by Engage Agro – PCP#31758

## Formulation:

400 g per L isofetamid formulated as a suspension

- Container size - 4 x 4L

## Crops, Diseases, Rates and Timing:

Crop	Diseases Controlled:	Application Rate (per acre)	Application Timing
Dry bean, faba bean, chickpea, lentil, field pea	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	0.51 L	Apply at flowering prior to disease development. Can apply a subsequent application 7 to 14 days if disease risk is high and environmental conditions are conducive for disease development.  DO NOT apply more than 2 applications of <i>Kenja 400 SC</i> per season.

## Application Information:

- Thorough, uniform coverage is essential for good disease control.
- **Water Volume:**
  - **Ground:** minimum 20 L per acre.

## How it Works:

The active ingredient isofetamid is a carboximide (SDHI) fungicide with system activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 2 applications of *Kenja 400 SC* per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 30 days
- **Re-entry:** DO NOT re-enter treated areas within 24 hours of application.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in a dry, secure place.
- **Environment:** Toxic to birds, small wild animals and aquatic organisms. Avoid application to areas with a moderate to steep slope, compacted soil or clay to reduce runoff. Avoid application when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body. Follow buffer zones as per the product label.

## Hazard Rating:

None listed.

# Lance AG

## Fungicide Group

7, 11

Refer to page 427

*Lance AG is a co-pack of Lance WDG (boscalid fungicide, page 473) and Headline EC (pyraclostrobin fungicide, page 471). Due to the formulation of Lance AG, the range of diseases controlled by Lance AG are not the same as for the individual components. Please refer to the table below. For other detailed information on the component products, please see the product pages from Lance WDG and Headline EC.*

## Company:

BASF Canada (*Lance WDG Fungicide* – PCP#27495; *Headline EC* – PCP#27322)

## Formulations:

Lance AG A Fungicide: 70% boscalid formulated as a water dispersible granular.

Lance AG B Fungicide: 250 g per L of pyraclostrobin formulated as an emulsifiable concentrate.

Case of 2 Split chambered jugs containing 3.3 L *Headline EC* (*Lance AG B*) and 3.5 kg *Lance WDG* (*Lance AG A*).

## Crops, Diseases, Rates and Timing:

(Ground, Aerial, and Pivot or Sprinkler Irrigation Applications)

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Canola (including rapeseed), canola quality <i>B. juncea</i> and oilseed/condiment mustard	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> ) Suppression of alternaria black spot ( <i>Alternaria brassicae</i> and <i>Alternaria raphani</i> )	132 mL per acre <i>Lance AG</i> (B) and 140 g per acre <i>Lance AG</i> (A) (one jug does 25 acres)	Apply at 20 to 50% flowering.
Field Pea	Control of ascochyta blight ( <i>Ascochyta</i> spp.), mycosphaerella blight ( <i>Mycosphaerella pinodes</i> ), grey mould ( <i>Botrytis cinerea</i> ), powdery mildew ( <i>Erysiphe</i> spp.) Suppression of downy mildew ( <i>Peronospora viciae</i> f. sp. <i>pisi</i> )	165 mL per acre <i>Lance AG</i> (B) and 175 g per acre <i>Lance AG</i> (A) (one jug does 20 acres)	Apply at the beginning of flowering or at the onset of symptoms. In a planned two pass application, product should be sprayed as a second pass 10 to 14 days after first application.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Lentil	Control of anthracnose ( <i>Colletotrichum truncatum</i> ), ascochyta blight ( <i>Ascochyta lentis</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	165 mL per acre Lance AG (B) and 175 g per acre Lance AG (A) (one jug does 20 acres)	Apply at the beginning of flowering or at the onset of symptoms. In a planned two pass application, product should be sprayed as a second pass 10 to 14 days after first application.
Chickpea	Control of ascochyta blight ( <i>Ascochyta lentis</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	165 mL per acre Lance AG (B) and 175 g per acre Lance AG (A) (one jug does 20 acres)	Apply at the beginning of flowering or at the onset of symptoms. If diseases persists or weather conditions are favourable for disease, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.
Alfalfa (for seed production only)	Control of common leaf spot ( <i>Pseudopeziza medicaginis</i> ), blossom blight ( <i>Sclerotinia sclerotiorum</i> , <i>Botrytis cinerea</i> ), spring black stem ( <i>Phoma medicaginis</i> ), leaf spot ( <i>Leptosphaeruloina briosiani</i> )	165 mL per acre Lance AG (B) and 175 g per acre Lance AG (A) (one jug does 20 acres)	Apply at 10 to 30% bloom or at the onset of symptoms. If diseases persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.

\* Do not apply by air

**Application Information:**

- **Water Volume:**
  - **Ground:** Use a minimum volume of 40 L per acre and ensure thorough coverage of foliage.
  - **Aerial:** Use a minimum volume of 20 L per acre and ensure thorough coverage of foliage.

**Restrictions:**

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Alfalfa** – Do not exceed one application of this product per season.
  - **All other crops** – do not exceed 2 applications per season and rotate applications with a fungicide that contains a different mode of action.
- **Grazing:** Do not feed alfalfa hay or forage to livestock. All other crops on this label can be grazed – follow pre-harvest interval.
- **Preharvest interval:**
  - **Field pea, lentil, chickpea, faba bean** – 30 days
  - **Canola** – 21 days
  - **Alfalfa** – not applicable
- **Re-entry:** DO NOT re-enter treated areas until 12 hours after application.
- **Re-cropping:** All labelled crops and the tuberous and corm vegetables, fruiting vegetables, pome fruits and stone fruits may be planned immediately following the last application. A plant back restriction of 14 days for all other crops not on label.
- **Storage:** Store in a cool, dry, locked, well-ventilated area away from food or feed.
- **Environment:** DO NOT apply to any water body. Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones outlined in the label.

**Hazard Rating:**

Caution Poison – Potential Skin Sensitizer



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Lance WDG

Fungicide Group

7

Refer to page 427

## Company:

BASF Canada – PCP#27495

## Formulation:

70% boscalid formulated as a water dispersible granular.

- Container size - 2 x 2.83 kg per case

## Crops, Diseases, Rates and Timing:

(Ground, Aerial, and Pivot or Sprinkler Irrigation Applications)

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Alfalfa (seed production only)	Control of blossom blight ( <i>Sclerotinia sclerotiorum</i> , <i>Botrytis cinerea</i> ), common leaf spot ( <i>Pseudopeziza medicaginis</i> ), spring black stem ( <i>Phoma medicaginis</i> ), leaf spot ( <i>Leptosphaerulina briosiani</i> )	170 g	Apply at 20 to 50% flowering. Apply every 7 to 14 days if disease persists, or weather conditions are favourable for disease development.
Canola, mustard (oilseed and condiment)	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	140 g	Apply at 20 to 50% flowering. Apply a second time 7 to 14 days later up to full bloom if disease persists, or weather conditions are favourable for disease development.
	Control of black spot ( <i>Alternaria brassicae</i> and <i>A. raphani</i> )	140 g	Apply at late flowering to early green pod.
Dry bean, faba bean	Control of white mould ( <i>Sclerotinia sclerotiorum</i> )	225 to 310 g	Apply at 20 to 50% flowering. Apply a second time 7 to 14 days later if disease persists, or weather conditions are favourable for disease development.  Use the higher rate to obtain extended protection and maximum yield benefit.

(Ground Application Only)

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Field pea**	Control of ascochyta blight ( <i>Ascochyta</i> spp.), mycosphaerella blight ( <i>Mycosphaerella pinodes</i> ), grey mould ( <i>Botrytis cinerea</i> )	170 g	Apply at the beginning of flowering. Apply a second time 7 to 14 days later if disease persists, or weather conditions are favourable for disease development.

\*\* DO NOT apply by air

(Ground and Aerial Applications)

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Chickpea*, lentil	Control of ascochyta blight ( <i>Ascochyta</i> spp.), white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	170 g	Apply at the beginning of flowering. Apply a second time 7 to 14 days later if disease persists, or weather conditions are favourable for disease development.
Sunflower	Suppression of sclerotinia head rot ( <i>Sclerotinia sclerotiorum</i> ), leaf spot ( <i>Alternaria helianthi</i> )	140 to 260 g	Apply at early flower for optimal disease suppression. Use the higher rate when disease pressure is high or there is a history of high disease in the field.

\* For the control of ascochyta blight in chickpea, Lance should be mixed with 160 to 240 mL per acre Headline EC.

## Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 40 L per acre and ensure thorough coverage of foliage.
  - **Aerial (registered for all crops but field pea):** Use a minimum water volume of 16 L per acre and ensure thorough coverage of foliage.
  - **Pivot and Sprinkler Irrigation:** DO NOT exceed 0.64 cm (1/4 inch) or 25,700 L per acre. Apply only through sprinkler systems including centre pivot, lateral move, end two, side (wheel) roll, traveler, big gun, solid set, or hand move irrigation systems.

## How it Works:

The active ingredient boscalid is a carboxamide (SDHI) fungicide with systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Insecticides:** For control of corn borer in succulent beans, *Lance* can be tank-mixed with *Matador 120 EC* at 37 mL per acre.

**Fungicides:** For the control of ascochyta blight on chickpea, *Lance* at rate of 140 to 170 g per acre should be applied with 160 to 240 mL per acre *Headline EC*.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Sunflower** – DO NOT exceed 1 application of this product per season.
  - **Canola, mustard, dry bean, chickpea, lentil, pea** – DO NOT exceed 2 applications of this product per season.
  - **Alfalfa** – DO NOT exceed 3 applications of this product per season.
- **Grazing:** All crops except alfalfa (grown for seed) can be grazed or fed to livestock.
- **Preharvest interval:**
  - **Beans, canola, chickpea, lentil, pea** - 21 days
  - **Alfalfa** - not applicable
- **Re-entry:** DO NOT re-enter treated area for 12 hours after application or until dry.
- **Re-cropping:** A plant back restriction of 14 days is required for all crops not on the label.
- **Storage:** Store in a cool, dry, locked, well-ventilated area without a floor drain.
- **Environment:** DO NOT apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed

## Hazard Rating:



Caution Poison – Potential Skin Sensitizer



Warning – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# LifeGard WG

Fungicide Group  
P 06

Refer to page 427

## Company:

Certis USA, distributed by UAP – PCP#32526

## Formulation:

40% *Bacillus mycoides* (strain J) formulated as a wettable granule. Guarantee – 3 x 10<sup>10</sup> spores per gram.

- Container size - 0.454 kg

## Crops, Diseases, Rates and Timing:

Crop	Diseases Suppressed	Application Rate	Application Timing
Potato	Suppression of early blight ( <i>Alternaria solani</i> ), late blight ( <i>Pytophthora infestans</i> )	Apply at a concentration of 0.33g per L of water. The amount of <i>LifeGard WG</i> applied will depend on the spray volume used to adequately cover the crop.  Do not apply less than 28 grams of <i>LifeGard WG</i> per acre.	Repeat applications at 7 day intervals.
	Partial suppression of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )		Apply at 7 to 14 day intervals. Use the shorter interval when high disease pressure is anticipated.

Note: *LifeGard* is most beneficial when applied in alternation with other foliar fungicides that are registered for the specific use/pathogen.

## Application Information:

- **Water Volume:**
  - 20 to 100 L per acre. Use water volumes to give good canopy penetration and coverage of plant parts to be protected.

## How it Works:

*Bacillus mycoides* is a bacterium bio-fungicide that works as a host plant defence inducer. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 0 days
- **Re-entry:** 4 hours
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in a dry area inaccessible to children in the original container. Store at or below 25°C. Use within 6 months.
- **Environment:** May be toxic to bees. Bees can be exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply to flowering crops if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is in the forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

## Hazard Rating:



Danger – Eye irritant, potential sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Luna Tranquility

Fungicide Group  
7, 9

Refer to page 427

## Company:

Bayer – PCP#30510

## Formulation:

125 g per L fluopyram and 375 g per L pyrimethanil formulated as a suspension concentrate.

- Container size - 2 x 4.86 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato	Control of early blight ( <i>Alternaria solani</i> ), brown leaf spot ( <i>Alternaria alternata</i> )	245 mL	Begin fungicide applications preventatively. Continue as needed on a 7 to 14 day interval. When disease pressure is severe, use the shorter intervals.
	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )  Suppression of black dot ( <i>Colletotrichum coccodes</i> )	325 mL	

## Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 80 L per acre and ensure thorough coverage of foliage.
  - **Aerial:** Use a minimum water volume of 20 L per acre and ensure thorough coverage of foliage.

## How it Works:

The active ingredient fluopyram is a carboxamide fungicide with systemic activity. The active ingredient pyrimethanil is an anilinopyrimidine fungicide with contact and systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT apply more than 1.3 L per acre of this product per season.
- **Grazing:** No restriction listed.
- **Preharvest interval:** 7 days
- **Re-entry:** DO NOT re-enter treated areas until 12 hours after application.
- **Re-cropping:** A plant back restriction of 30 days is required for canola, cereal grains, corn, soybean, dry bean, chickpea, lentil, and alfalfa.
- **Storage:** DO NOT store below freezing. If stored for one year or longer, shake well before using. Store the tightly closed container away from feeds, seeds, fertilizer, plants and foodstuffs. Keep the product in the original container during storage.
- **Environment:** Toxic to aquatic organisms and birds. DO NOT apply directly to water, to areas where surface water is present, or to intertidal areas below the high water mark. Observe buffer zones outlined in the label.

## Hazard Rating:

None listed.



# Mancozeb

*Dithane Rainshield/Manzate Pro-Stick/Penncozeb 75 DF*

Fungicide Group  
M3

Refer to page 427

## Company:

Corteva Agrisciences Division of DowDuPont (*Dithane Rainshield* – PCP#20553)

United Phosphorus Inc (*Manzate Pro-Stick* – PCP#28217, *Penncozeb 75 DF* – PCP#25397)

## Formulations:

*Dithane Rainshield* - 75% mancozeb formulated as a water dispersible granule.

- Container size - 3.5 to 544 kg

*Manzate Pro-Stick* - 75% mancozeb formulated as a dry flowable.

- Container size - 10 to 20kg

*Penncozeb 75 DF* - 75% mancozeb formulated as a wettable granule.

- Container size - 2.5 to 250 kg

## Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Potato	Early blight ( <i>Alternaria solani</i> ), late blight ( <i>Phytophthora infestans</i> )	0.45 to 0.9 kg	Apply at 0.45 kg per acre rate when plants are 10 to 15 cm high; increase to 0.7 kg per acre as plants increase in size, and 0.9 kg per acre at row closure. Apply every 7 to 10 days. Spray interval may be reduced to 5 to 6 days during periods of wet weather favouring late blight and/or vigorous crop growth.
Wheat	Tan spot ( <i>Pyrenophora tritici-repentis</i> ), leaf rust ( <i>Puccinia recondita</i> ), septoria leaf blotch ( <i>Septoria tritici</i> )	0.45 to 0.9 kg	Apply 0.45 kg per acre early (when crop is in the 3-leaf to tillering stage); apply 0.9 kg per acre later (when head is fully emerged, but prior to flowering).
Lentil	Anthrachnose ( <i>Colletotrichum truncatum</i> ), ascochyta blight ( <i>Ascochyta lentis</i> )	0.9 kg	Apply first application before flower when bud formation is evident; apply second application 10 to 14 days later at early to mid-bloom but prior to row closure. A third application may be applied 10 to 14 days later.
Alfalfa (for seed)	Leaf and stem spot diseases ( <i>Pseudopeziza medicaginis</i> )	0.6 kg	Apply first application prior to 50% bloom; apply second application 7 to 10 days later; apply third application 10 days after second.

## Application Information:

- **Water Volume:** Thorough uniform coverage is essential for good disease control.
  - **Ground:** 40 L per acre (wheat); 40-80 L per acre (lentil).
  - **Aerial:** 16 L per acre (wheat, lentil, potato).

## How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with multi-site contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Fungicides (potato only):** For late blight control, *Manzate Pro-stick* can be tank-mixed with *Curzate 60 DF*.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Wheat* – DO NOT exceed 2 applications of this product per season.
  - *Lentil, alfalfa* – DO NOT exceed 3 applications of this product per season.
- **Grazing:** DO NOT graze or feed treated crop or straw to livestock. DO NOT graze or cut treated alfalfa for hay.
- **Preharvest interval:**
  - *Potato* - 1 day
  - *Lentil* - 35 days
  - *Wheat* - 40 days
- **Re-entry:** DO NOT re-enter treated areas within 24 hours of application.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in cool, dry, well-ventilated place. Keep away from fire and sparks.
- **Environment:** Toxic to aquatic organisms. DO NOT contaminate any body of water by direct application, drift or by cleaning equipment.

## Hazard Rating:



Warning – Poison



Danger – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Nexicor

Fungicide Group  
3, 7

Refer to page 427

## Company:

BASF Canada – PCP#32678

## Formulation:

30 g per L fluxapyroxad, 200 g per L pyraclostrobin and 125 g per L propiconazole formulated as a emulsifiable concentrate.

- Container size - Case (2 x 8 L)

## Crops, Diseases, Rates and Timing:

Crop	Diseases Controlled	Application Rate (per acre)	Timing and Application Information
Wheat (all types including durum) Triticale	Leaf rust ( <i>Puccinia recondita</i> ), stripe rust ( <i>Puccinia striiformis</i> ), tan spot ( <i>Pyrenophora tritici- repentis</i> ), septoria leaf spot ( <i>Septoria tritici</i> )	200 mL	Fungicide performance is best when <i>Nexicor</i> is applied prior to disease development or at the onset of disease. To maximize yield in cereals, it is important to protect the flag leaf from disease. Optimum time to apply a single application of <i>Nexicor</i> is immediately after flag leaf emergence (GS 37-39).  Apply a maximum of one application of <i>Nexicor</i> per season. <i>Nexicor</i> may be applied for control of listed foliar diseases and followed with a fungicide that targets Fusarium head blight at anthesis stage (GS 61-65).
Barley	Net blotch ( <i>Pyrenophora teres</i> ), Stripe rust ( <i>Puccinia striiformis</i> )		
Rye	Leaf rust ( <i>Puccinia recondita</i> )		
Oats	Crown rust ( <i>Puccinia coronate</i> )		
Canola	Blackleg ( <i>Leptosphaeria maculans</i> )	200 mL	To maximize yield in canola, it is important to protect young seedlings from blackleg infections. Apply <i>Nexicor</i> at the 2 to 6 leaf stage. Apply a maximum of one <i>Nexicor</i> application per year.

## How it Works:

The active ingredient fluxapyroxad is a SDHI fungicide with systemic activity. The active ingredient pyraclostrobin is a member of the strobilurins class of chemistry used as a broad spectrum fungicide. The active ingredient propiconazole is a triazole fungicide with broad spectrum systemic activity. Best utilized as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Herbicides:** In Canola, *Nexicor* can be tank mixed with the following herbicides: *Odyssey WDG Herbicide*, *Odyssey Ultra Herbicide* tank mix (components of *Odyssey Ultra A* and *Odyssey Ultra B*), or *Ares* in Clearfield canola, *Liberty Herbicide* (150 SN or 200 SN) in glufosinate ammonium tolerant canola (eg: *LibertyLink* canola), registered glyphosate herbicides in glyphosate tolerant canola (eg: *Roundup Ready* canola), *Equinox EC Herbicide* in canola and *Poast Ultra* in canola.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 1 application of this product per season.
- **Grazing:** All crops can be grazed within 3 days of application.
- **Preharvest interval:** 45 days for cereals; 30 days for canola.
- **Re-entry:** DO NOT re-enter treated areas within 12 hours after application.
- **Re-cropping:** A plant back interval of 35 days is required for all crops not listed on the label.
- **Storage:** Store in original tightly closed container. Protect from freezing. Store this product away from food or feed.
- **Environment:** Observe buffer zones specified on the label. Do not apply on any body of water and prevent cleaning of equipment and reduce risk of runoff from treated areas into aquatic habitats by avoid application to areas with a moderate to steep slope, compacted soil. Toxic to aquatic organisms and non-target terrestrial plants.

## Hazard Rating:



Warning – Poison

Skin and eye irritant.

For an explanation of the symbols used here see pages 7 and 8.

# Orondis Ultra

Fungicide Group  
40, 49

Refer to page 427

## Company:

Syngenta Canada – PCP#32805

## Formulation:

250 g per L mandipropamid and 30 g/L oxathiapiprolin formulated as a suspension concentrate.

- Container size - 4 x 3.78 L

## Crops, Diseases, Rates and Timing:

Control of late blight (*Phytophthora infestans*) on potato. Begin applications prior to disease development. Continue applications on 7 to 10 day interval.

## Rates:

0.16 to 0.24 L per acre.

## Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 40 L per acre.
  - **Aerial:** Use a minimum water volume of 18 L per acre.

## How it Works:

The active ingredient mandipropamid is a carboxylic acid amide (CAA) fungicide with contact and systemic activity. To be used as a preventative and inhibitive (prevents spore germination) fungicide application. The active ingredient oxathiapiprolin is an oxysterol binding protein homologue inhibitor with activity against diseases caused by oomycete fungi. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 4 applications of this product per season.
- **Grazing:** No restriction listed.
- **Preharvest interval:** 14 days
- **Re-entry:** DO NOT re-enter treated areas until 12 hours after application.
- **Re-cropping:** There is no re-cropping restriction for all crops listed on the *Orondis Ultra* label. The re-cropping restriction is 30 days for all other crops and 180 days for legume vegetables except succulent peas.
- **Storage:** Keep in the original container, tightly closed during storage. Store in a cool, dry, well-ventilated area away from feed and foodstuffs and out of the reach of children and animals. To prevent contamination store this product away from food or feed.
- **Environment:** Toxic to aquatic organisms. To reduce runoff into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Runoff into aquatic habitats may be reduced by including a vegetative strip between the treated area and the edge of the water body.

## Hazard Rating:

None listed.

# Phosphorous acid

*Rampart/Confine Extra*

Fungicide Group

33

Refer to page 427

## Company:

Loveland Products Canada (*Rampart* - PCP #30654)

Winfield United Canada (*Confine Extra* - PCP #30648)

## Formulation:

53.0% mono- and di-potassium salts of phosphoric acid.

- Container size - *Confine Extra* 9.46 to 946.35 L ; *Rampart* 9.46 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases Suppressed	Application Rate (per acre)		Application Timing
		<i>Confine Extra</i>	<i>Rampart</i>	
Potato*	Late blight ( <i>Phytophthora infestans</i> ), pink rot ( <i>Phytophthora erythroseptica</i> )	2 to 4 L	1.2 to 3.2 L	Begin applications when conditions are favourable for disease and continue on a 7 to 14 day interval. Use the higher rate and shorter application interval when disease pressure is moderate to high. Use a maximum of 5 foliar and/or chemigation** applications per growing season.

\* Not recommended for use on potatoes intended for seed.

\*\* Chemigation application for *Confine Extra* only.

## Application Information:

- **Water Volume:**
  - **Ground:**
    - *Confine Extra* - minimum of 40 L per acre
    - *Rampart* - minimum 120 L per acre
  - **Aerial:**
    - *Confine Extra* - DO NOT apply by air
    - *Rampart* - minimum of 40 L per acre

## How it Works:

The active ingredient mono- and di-potassium salts of phosphorous acid is a phosphonate fungicide with systemic activity to suppress pathogen inoculum. To be used as a preventative fungicide application on harvested tubers. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Preharvest interval:** DO NOT apply within 1 day of harvest.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** DO NOT store near food or feed.
- **Environment:** DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of waste.

## Hazard Rating:



Caution – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Phostrol

Fungicide Group

33

Refer to page 427

## Company:

Engage Agro Corporation – PCP#30449

## Formulation:

53.6% mono- and dibasic sodium, potassium, and ammonium phosphites formulated as a liquid flowable.

- Container size - 2 x 10 L and 1000 L

## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate	Application Timing:
Potato	Suppression of pink rot ( <i>Phytophthora erythroseptica</i> )	2.3 to 4.7 L per acre	In-furrow: Apply in a band at planting directly over the seed pieces prior to row closure.
	Control of late blight ( <i>Phytophthora infestans</i> )	1.2 to 4.7 L per acre	Foliar applications: For preventative control of late blight and preventative suppression of pink rot begin applications when conditions favouring disease development exist and continue on a 7 to 14 day interval.
	Suppression of pink rot ( <i>Phytophthora erythroseptica</i> )	2.3 to 4.7 L per acre	

## Crops, Diseases, Rates and Timing *continued*:

Crop:	Diseases:	Application Rate	Application Timing:
Potato <i>continued</i>	Control of late blight ( <i>Phytophthora infestans</i> ), pink rot ( <i>Phytophthora erythroseptica</i> )	0.42 L in 2 L water to 1 tonne tubers	Post harvest control: Apply directly to the tubers and ensure complete and even coverage.
Field pea	Suppression of early season root rot ( <i>Aphanomyces euteiches</i> , <i>Pythium ultimum</i> )	1.2 L per acre	At crop emergence followed by a second application 14 days later or in-furrow at planting followed by a second application at crop emergence.

## Application Information:

- **Water Volume:**
  - **Ground:**
    - *Potato*: Minimum of 12 L per acre for in-furrow treatment and minimum of 81 L per acre for foliar applications.
    - *Field pea*: Minimum of 40 L per acre.
  - **Aerial:**
    - *Potato*: Minimum of 20 L per acre

## How it Works:

The active ingredient mono- and dibasic sodium, potassium, and ammonium phosphite is a phosphonates fungicide with systemic activity to suppress pathogen inoculum. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Pink rot:** *Ridomil Gold 480SL* (in-furrow), *Ridomil Gold MZ* and *Ridomil Gold Bravo Twin Pack* (foliar)

**Late Blight:** May be tank mixed with one of the following fungicides: *Bravo 500*, *Bravo ZN*, *Echo 720*, *Echo 90DF*, *Ridomil Gold Bravo Twin Pack*, *Dithane Rainshield*, *Manzate Pro-Stick*, *Gavel 75DF*, *Penncozeb 75DF*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Potato*: DO NOT exceed 7 applications of this product per season.
  - *Field pea*: DO NOT exceed 2 applications of this product per season.
- **Grazing:** Do NOT graze treated fields or feed treated forage to livestock.
- **Preharvest interval:**
  - *Potato*: May be applied up to the day of harvest and post harvest.
  - *Field pea*: preharvest interval is 21 days.
- **Re-entry:** Re-entry interval after application is 12 hours.
- **Re-cropping:** No restriction listed.
- **Storage:** Store in a cool, dry, secure and well ventilated area. To prevent contamination, store this product away from food or feed. Keep pesticide in original container. Not for use in or around home. Do not store near open flame.
- **Environment:** Avoid run-off from treated areas into aquatic areas.
  - To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.
  - Avoid application when heavy rain is forecast.
  - Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.
- **Toxicity:** Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

## Hazard Rating:



Caution – Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Polyram DF

Fungicide Group

M3

Refer to page 427

## Company:

BASF Canada – PCP#20087

## Formulation:

80% metiram formulated as a water dispersable granule.

- Container size - 1 to 25 kg

## Crops, Diseases, Rates and Timing:

Crop	Diseases Controlled	Application Rates and Timing
Potato	Late blight ( <i>Phytophthora infestans</i> ), early blight ( <i>Alternaria solani</i> )	Apply at 7 to 10 day intervals using 445 to 705 g per acre until plants cover row. Then increase the rate to 910 g per acre until tops are killed.  <b>OR</b> Apply at 5 to 7 day intervals using 445 to 705 g per acre starting when plants are 15 cm high and continuing until tops are killed.  With either option, use the shorter intervals when conditions are favourable for infection.

## Application Information:

- **Water Volume:**
  - **Ground:** none listed.
  - **Aerial:** minimum 20 L per acre.

## How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity. For more information refer to “Fungicide Modes of Action” on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Preharvest interval:** DO NOT apply within 1 day of harvest.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in original, tightly-closed container. DO NOT store near food, feed, seed, or fertilizers. Store in cool, dry, locked, well-ventilated area without floor drain.
- **Environment:** DO NOT apply to any body of water. Avoid drifting of spray onto any body of water or non-target area. Specific buffer zones should be observed.

## Hazard Rating:

Potential skin sensitizer

# Priaxor

Fungicide Group

7, 11

Refer to page 427

## Company:

BASF Canada – PCP#30567

## Formulation:

167 g per L of fluxapyroxad and 333 g per L of pyraclostrobin formulated as a suspension concentrate.

- Container size - 2 x 9.6

## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre)	Application Timing:
Wheat, triticale	Control of tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> ; <i>S. nodorum</i> ), leaf rust ( <i>Puccinia recondita</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), stripe rust ( <i>Puccinia striiformis</i> ), powdery mildew ( <i>Erysiphe graminis</i> f. sp. <i>tritici</i> )	90 to 120 mL	Apply prior to disease development or at the onset of disease symptoms.  Applications should be made prior to head emergence.  Use the higher rate when disease pressure is high.
Barley	Control of net blotch ( <i>Pyrenophora teres</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), scald ( <i>Rhynchosporium secalis</i> ), stripe rust ( <i>Puccinia striiformis</i> )		
Rye	Control of leaf rust ( <i>Puccinia recondita</i> ), powdery mildew ( <i>Erysiphe graminis</i> )		
Oat	Control of crown rust ( <i>Puccinia coronata</i> )		
Corn	Control of common rust ( <i>Puccinia sorghi</i> ), Northern leaf blight ( <i>Setosphaeria turcica</i> )	120 mL	Apply prior to disease development.
Canola (including rapeseed, canola quality <i>Brassica juncea</i> ) and mustard (oilseed and condiment)	Control of blackleg ( <i>Leptosphaeria maculans</i> )	90 to 120 mL	Apply at 2 to 6 leaf (rosette) stage. Use the high rate under high disease pressure.
	Control/suppression of black spot ( <i>Alternaria brassicae</i> , <i>A. raphani</i> )	90 to 120 mL	Apply at 20 to 50% bloom for suppression. For control, apply at early pod stage. Use the high rate under high disease pressure.
	Suppression of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	180 mL	Apply at 20 to 50% bloom.
Chickpea	Control of ascochyta blight ( <i>Ascochyta rabiei</i> )	120 to 180 mL	Apply at the beginning of flowering or at the onset of symptoms.
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	180 mL	Apply at the beginning of flowering.
Lentil	Control of anthracnose ( <i>Colletotrichum truncatum</i> )	120 mL	Apply at the beginning of flowering or at the onset of symptoms.
	Control of ascochyta blight ( <i>Ascochyta lentis</i> )	120 to 180 mL	
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	180 mL	Apply at the beginning of flowering.



## Crops, Diseases, Rates and Timing *continued*:

Crop:	Diseases:	Application Rate (per acre)	Application Timing:
Faba bean	Control of powdery mildew ( <i>Erysiphe</i> spp.)	120 mL	Apply at the beginning of flowering or at the onset of symptoms.
	Control of ascochyta blight ( <i>Ascochyta</i> spp.)	120 to 180 mL	
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	180 mL	Apply at the beginning of flowering.
Field pea	Control of powdery mildew ( <i>Erysiphe pisi</i> )	120 mL	Apply at the beginning of flowering or at the onset of symptoms.
	Control of mycosphaerella blight ( <i>Mycosphaerella pinodes</i> ); suppression of downy mildew ( <i>Perenospora viciae f.sp. pisi</i> )	120 to 180 mL	For control of <i>Mycosphaerella</i> blight and suppression of white mould apply at the beginning of flowering. For suppression of downy mildew, apply at the beginning of flowering or at the onset of symptoms.
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	180 mL	
Dry bean	Control of anthracnose ( <i>Colletotrichum lindemuthianum</i> ), powdery mildew ( <i>Erysiphe</i> spp.), rust ( <i>Uromyces appendiculatus</i> )	120 mL	Apply at the beginning of flowering.
Soybean	Control of septoria brown spot ( <i>Septoria glycines</i> ), frogeye leaf spot ( <i>Cercospora soja</i> )	97 to 120 mL	Apply prior to disease development when conditions are favourable for disease development. Use the high rate when disease pressure is high.
	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	180 mL	
Sunflowers	Suppression of leaf rust ( <i>Puccinia helianthi</i> )	120 mL	Apply at first sign of disease.
Flax	Control of pasmo ( <i>Septoria linicola</i> )	90 to 120 mL	Apply at 20 to 50% flowering.
	Suppression of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	180 mL	
Alfalfa (for seed production)	Control of common leaf spot ( <i>Pseudopeziza medicaginis</i> )	120 mL	Apply at the beginning of flowering (10 to 30% bloom) or at the onset of disease.
	Suppression of blossom blight ( <i>Sclerotinia sclerotiorum</i> )	180 mL	
Bluegrasses; fescues; rye- grasses (for seed production)	Control of leaf rust ( <i>Puccinia recondita</i> ), stem rust ( <i>P. graminis</i> ); suppression of powdery mildew ( <i>Erysiphe graminis</i> )	90 to 120 mL	Apply prior to disease development when conditions are favourable for disease development. Use the high rate when disease pressure is high.
Non grass animal feeds including: Alfalfa, clover, Sainfoin, trefoil, vetch, crown vetch, milk vetch, and including mixed stands of forages grown for feed	Common leaf spot ( <i>Pseudopeziza medicaginis</i> )	120 to 180 mL	For optimal disease control, apply at the beginning of flowering (10 to 30% bloom) or at the onset of disease. Make one application per forage cutting for feed (follow preharvest intervals), with a maximum of 2 applications per season.
	Blossom blight ( <i>Sclerotinia sclerotiorum</i> )	180 mL	

DO NOT make sequential applications of *Priaxor*. If disease persists or weather conditions are favourable for disease development, make a second application 10 to 14 days later, with a fungicide that contains a different mode of action. Use the shorter interval when disease pressure is high.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum 20 L per acre.

## Crops, Diseases, Rates and Timing *continued*:

### How it Works:

The active ingredient fluxapyroxad is a carboximide (SDHI) fungicide with system activity. The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.

### Tank Mixes:

**Herbicides:** In all canola systems, *Priaxor* can be tank mixed with *Poast Ultra* and *Equinox*. In Clearfield canola and Clearfield canola quality *Brassica juncea*, *Priaxor* can be tank mixed with *Odyssey*, or *Odyssey* plus *Equinox*. BASF Canada also supports the tank mix of *Priaxor* with *Odyssey DLX*, *Odyssey Ultra*, *Tensile*, and *Ares* in Clearfield canola. In Liberty Link canola, *Priaxor* can be tank mixed with *Liberty*. In Roundup Ready canola, *Priaxor* can be tank mixed with glyphosate herbicides.

**Fungicides:** In canola and mustard, *Priaxor* can be tank mixed with *Lance WDG Fungicide* at 140 g per acre at 20 to 50% bloom to control sclerotinia stem rot and suppress alternaria black spot.

### Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 1 sequential application of this product per season.
  - *Alfalfa, forage grasses* – DO NOT exceed 1 application of this product per season.
  - *Barley, oat, rye, wheat, triticale, corn, soybean, canola, mustard, sunflower, flax, soybean, field pea, lentil, chickpea, faba bean, dry bean* – DO NOT exceed 2 applications of this product per season.
- **Grazing:** DO NOT feed grass hay or forage to livestock. All other crops on this label can be grazed or fed to livestock.
- **Preharvest interval:**
  - *Barley, rye, wheat, oat* – apply no later than the end of flowering
  - *Field pea, lentil, chickpea, faba bean, dry bean* – 30 days
  - *Corn, soybean, canola, sunflower, flax* – 21 days
  - *Forage grasses* – 14 days
  - *Sweet corn* – 7 days
  - *Alfalfa* – not applicable
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** Crops listed on label, tuberous and corm vegetables, fruiting vegetables, pome fruits and stone fruits may be planted immediately following last application. DO NOT plant any other crops within one year of application of *Priaxor*.
- **Storage:** Store this product away from food or feed.
- **Environment:** Maintain specified buffer zones. Toxic to aquatic organisms, small mammals, and non-target terrestrial plants.

### Hazard Rating:



Danger Poison – Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

## Proline 480 SC

Fungicide Group

3

Refer to page 427

### Company:

Bayer - PCP#28359

### Formulation:

480 g per L prothioconazole formulated as a suspension concentrate.

- Container size - 5.1 litre

## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Wheat	Control of septoria leaf blotch ( <i>Septoria tritici</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), leaf rust ( <i>Puccinia recondita</i> )	125 mL <sup>1</sup>	Apply as a preventative foliar spray when the earliest disease symptoms appear on leaves and stems. A second application may be made after 7 days.
	Control of glume blotch ( <i>Stagonospora nodorum</i> )	170 mL <sup>1</sup>	Apply within the time period when at least 75% of heads on the main stem are fully emerged to when 50% of heads on the main stem are in flower. For FHB, use higher rate when disease pressure is expected to be high or to provide the highest level of mycotoxin reduction.
	Suppression of fusarium head blight (FHB) ( <i>Fusarium</i> spp.)	125 to 170 mL <sup>1</sup>	
Pearl millet, proso millet, rye, triticale	Control of foliar rusts caused by <i>Puccinia</i> spp.	125 mL	Apply as a preventative foliar spray when disease symptoms appear.
	Suppression of fusarium head blight ( <i>Fusarium</i> spp.)	125 to 170 mL <sup>1</sup>	Apply as a preventative spray.
Barley	Control of net blotch ( <i>Pyrenophora teres</i> ), scald ( <i>Rhynchosporium secalis</i> ), spot blotch ( <i>Cochliobolus sativus</i> )	125 mL <sup>1</sup>	Apply as a preventative foliar spray when the earliest disease symptoms appear on leaves and stems. A second application may be made after 7 days.
	Suppression of fusarium head blight (FHB) ( <i>Fusarium</i> spp.)	125 to 170 mL <sup>1</sup>	Apply within the time period when 70 to 100% of barley heads on the main stem are fully emerged to 3 days after full head emergence. Use higher rate when disease pressure is expected to be high or to provide the highest level of mycotoxin reduction.
Oat	Control of crown rust ( <i>Puccinia coronata</i> )	125 mL <sup>1</sup>	Apply as a preventative foliar spray when the earliest disease symptoms appear on leaves and stems. A second application may be made after 7 days.
Corn	Suppression of Fusarium and Gibberella ear rots ( <i>Fusarium</i> spp. and <i>Gibberella</i> spp.); control of rusts ( <i>Puccinia sorghi</i> , <i>Puccinia polysora</i> ), northern leaf blight ( <i>Setosphaeria turcica</i> )	170 mL <sup>1</sup>	Apply from silking (tip of stigmata visible) to silk browning (stigmata drying).
Canola, rapeseed, oriental mustard, <i>Brassica carinata</i>	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	125 to 150 mL <sup>2</sup>	Apply at 20 to 50% bloom stage (prior to petal fall). Use high rate if history of heavy disease or if dense crop stand.
Soybean	Control of frogeye leaf spot ( <i>Cercospora sojina</i> )	85 mL	Apply when first disease symptoms are found or when the risk of infection is imminent.
Chickpea	Control of ascochyta blight ( <i>Ascochyta rabiei</i> )	125 to 170 mL <sup>2</sup>	Apply at first sign of disease. Repeat applications every 10 to 14 days. Use high rate when conditions favour disease or when growing susceptible varieties.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Lentil	Control of ascochyta blight ( <i>Ascochyta lentis</i> )  White mould ( <i>Sclerotinia sclerotiorum</i> )	125 to 170 mL <sup>2</sup>	Apply at the beginning of flowering or at the first sign of disease.  A maximum of 340 ml/ac can be applied per crop year for lentil.  After the initial application, 1 additional application may be made 10 to 14 days afterwards if conditions remain favourable for continued or increased disease development.  Apply the higher rate when conditions favour disease development or when growing less disease resistant varieties.  Maximum of two applications per year.
Flax (linseed), borage	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	125 to 150 mL <sup>2</sup>	Apply at 20 to 50% bloom. Best protection will be achieved when the fungicide is applied prior to petals beginning to fall, allowing the maximum number of petals to be protected. Use high rate in fields with a history of heavy disease pressure or for dense crop stands.
Sunflower <sup>3</sup> (excluding those for export), safflower	Suppression of sclerotinia head rot ( <i>Sclerotinia sclerotiorum</i> )	170 mL <sup>1</sup>	Apply when crop is in 10 to 50% disk flower bloom stage.

<sup>1</sup> Apply with non-ionic surfactant, i.e. *AgSurf* or *Agral 90* at 0.125% v/v.

<sup>2</sup> May be applied with the lowest rate of non-ionic surfactant, i.e. *AgSurf* or *Agral 90*.

**Application Information:**

- DO NOT apply during periods of dead calm or when winds are gusty. Ensure uniform coverage.
- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum of 20 L per acre. Follow detailed label recommendations for aerial application.

**How it Works:**

The active ingredient prothioconazole is a triazole fungicide with broad-spectrum systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

**Tank Mixes:**

None registered.

Bayer supports the following mixes that are not on the *Proline 480 SC* label. Apply mixes according to the most restrictive use limitations for either product:

- **Insecticides:** *Decis*, *Lorsban*, *Matador*, *Sevin XLR*

**Restrictions:**

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Corn, flax, borage, sunflower, soybean, safflower* – DO NOT exceed 1 application of this product per season.
  - *Wheat, barley, oat, canola, lentil* – DO NOT exceed 2 applications of this product per season.
  - *Chickpea* – DO NOT exceed 3 applications of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:**
  - *Barley, wheat, oat, rye, triticale, millet* – 30 days
  - *Canola, flax, borage* – 36 days
  - *Chickpea, lentil* – 7 days
  - *Corn* – 14 days
  - *Soybean* – 20 days
  - *Sunflower, safflower* – 45 days

- **Re-entry:** DO NOT re-enter treated areas within 24 hours of application.
- **Re-cropping:** May be re-planted with any crop specified on the label as soon as practical. For crops not listed, wait 30 days.
- **Storage:** DO NOT store at temperatures below freezing. Keep in original tightly closed container and store away from feeds, seeds, fertilizer, plants and food stuffs. Keep away from sources of heat. Shake well before using if stored for more than 1 year.
- **Environment:** Toxic to aquatic organisms. DO NOT apply directly to freshwater, estuaries or marine habitats. DO NOT contaminate bodies of water by cleaning of equipment or disposal of wastes. Observe the specified buffer zones.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Propiconazole

Fungicide Group  
3

*Tilt 250E/Bumper 432 EC/Pivot 418 EC/Propel/Nufarm Propiconazole Fungicide/Propi Super 25 EC/Fitness/  
Co-Op Pivot*

Refer to page 427

## Company:

Sharda Cropchem (*Propi Super 25 EC* – PCP#32240)  
 Syngenta Canada (*Tilt 250E* – PCP#19346, *Propel* - PCP#29548)  
 ADAMA Canada (*Bumper 432 EC* – PCP#28017)  
 Interprovincial Cooperative Ltd. (*Pivot 418 EC* – PCP#28219)  
 Nufarm Agriculture Inc (*Nufarm Propiconazole Fungicide* – PCP#30367)  
 Loveland Products (*Fitness* – PCP#32639)  
 Federated Co-operatives Limited (*Co-Op Pivot*)

## Formulations:

*Tilt 250E* - 250 g per L propiconazole formulated as an emulsifiable concentrate.

- Container size - 2 x 8 L

*Propi Super 25 EC* - 250 g per L propiconazole formulated as an emulsifiable concentrate.

- Container size - 2 x 8 L

*Bumper 432 EC* - 432 g per L propiconazole formulated as an emulsifiable concentrate.

- Container size - 4.8 L

*Pivot 418 EC* and *Fitness* - 418 g per L propiconazole formulated as an emulsifiable concentrate.

- Container size - 2 x 4.8 L

*Propel* - 250 g per L propiconazole formulated as an emulsifiable concentrate.

- Container size - 8 L

*Nufarm Propiconazole Fungicide* - 418 g per L propiconazole formulated as an emulsifiable concentrate.

- Container size - 2 x 9.6 L

*Co-Op Pivot* - 418 g per L propiconazole formulated as an emulsifiable concentrate.

- Container size - 1 to 1,000 L

## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rates (per acre):		Application Timing:
		250 g/L products	418 g/L and 432 g/L products	
Wheat	Suppression of septoria leaf blotch ( <i>Septoria tritici</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> )	100 to 200 mL	60 to 120 mL	Apply with herbicide application at growth stage 12 to 23. If there is a history of high disease pressure in the field and/or field conditions favour disease development use the higher rate.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases:	Application Rates (per acre):		Application Timing:
		250 g/L products	418 g/L and 432 g/L products	
	Control of septoria leaf blotch ( <i>Septoria tritici</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria glume blotch ( <i>S. tritici</i> ), stripe rust ( <i>Puccinia striiformis</i> ), leaf rust ( <i>Puccinia triticina</i> ), stem rust ( <i>Puccinia graminis</i> ), powdery mildew ( <i>Erysiphe graminis f.sp. tritici</i> )	200 mL	120 mL	Apply at early stages of disease development (tillering or stem elongation). A second application is recommended if disease pressure continues which can be made up to half-emergence of the head.
Barley	Suppression of net blotch ( <i>Pyrenophora teres</i> )	100 to 200 mL	60 to 120 mL	Apply with herbicide application at growth stage 12 to 23. If there is a history of high disease pressure in the field and/or field conditions favour disease development use the higher rate.
	Control of spot blotch ( <i>Cochliobolus sativus</i> ), net blotch ( <i>Pyrenophora teres</i> ), scald ( <i>Rhynchosporium secalis</i> ), leaf rust ( <i>Puccinia hordei</i> ), stem rust ( <i>Puccinia graminis</i> ), septoria leaf blotch ( <i>Septoria spp.</i> ), powdery mildew ( <i>Blumeria graminis</i> )	200 mL	120 mL	Apply at early stages of disease development (tillering or stem elongation). A second application is recommended if disease pressure continues which can be made up to half-emergence of the head.
Oat	Control of septoria leaf blotch ( <i>Septoria avenae</i> ), crown rust ( <i>Puccinia coronata</i> )	200 mL	120 mL	
Corn	Control of rust ( <i>Puccinia sorghi</i> )	200 mL	120 mL	Apply when rust pustules first appear, make second application 14 days later.
	Control of northern leaf blight ( <i>Setosphaeria turcicum</i> )	100 to 200 mL	60 to 120 mL	Apply when disease first appears. Use higher rate if disease pressure is high.
Canola	Control of blackleg ( <i>Leptosphaeria maculans</i> )	200 mL	120 mL	Apply during the rosette stage.
Soybean (grown for seed)	Control of frog-eye leaf spot ( <i>Cercospora sojina</i> )	120 to 184 mL	202 to 307 mL	Apply when disease first appears. Under severe disease pressure make a second application 14 days later
Dry bean	Control of rust ( <i>Uromyces spp.</i> )	200 mL	120 mL	Apply at the first sign of disease, make second application 14 to 21 days later.
	Control of powdery mildew ( <i>Erysiphe spp.</i> ) <sup>†</sup>	200 mL	-	Apply at the first sign of disease, make second application 14 days later if disease continues.
Lentil, field pea, chickpea, faba bean <sup>‡</sup>	Control of powdery mildew ( <i>Microsphaera diffusa</i> , <i>Erysiphe pisi</i> , <i>E. polygoni</i> )	200 mL	--	Apply at the first sign of disease, make second application 14 days later if disease continues.
Soybean	Control of powdery mildew ( <i>Microsphaera diffusa</i> ) <sup>†</sup> , cercospora leaf spot ( <i>Cercospora kikuchii</i> )	200 mL	--	
Canaryseed*	Suppression of septoria leaf mottle ( <i>Septoria triseti</i> )	200 mL	120 mL	Apply at flag leaf emergence.
Timothy* <sup>†</sup>	Control of purple eyespot ( <i>Cladosporium phlei</i> )	200 mL	120 mL	Apply at the first sign of disease (usually at the beginning of flowering). Can be applied up to full flowering, spray interval of 14 days.

\* Ground application only.

<sup>†</sup> Only TILT 250E, Pivot 418 EC, Propi Super 25 EC, Propel, Fitness, and Co-Op Pivot are registered for use on this crop.<sup>‡</sup> Only TILT 250 EC, Propi Super 25 EC and Propel are registered for these uses

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 80 L per acre.
  - **Aerial:** 16 to 20 L per acre.

## How it Works:

The active ingredient propiconazole is a triazole fungicide with broad spectrum systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Herbicides:** In wheat and barley only, propiconazole may be tank-mixed with one of the following: 2, 4-D amine, MCPA amine, *Buctril-M* or *Pardner* and in wheat only, may be applied with *Horizon 240EC*. In wheat and barley only, *Pivot 418 EC*, *Co-Op Pivot* and *Fitness* may be tank-mixed with *Logic M* or *Brotex 240*; *Pivot 418 EC*, *Co-Op Pivot*, *Bumper 432 EC*, *Fitness* or *Nufarm Propiconazole Fungicide* may be tank-mixed with *Badge* or *Bromotril 240 EC*. In spring wheat and barley only, *Tilt 250E* or *Propel* may be tank-mixed with *Axial 100EC*. Refer to labels for tank-mix precautions.

**Fertilizers:** *Propiconazole* may be applied with up to 4 kg per acre (9 lb per acre) of actual nitrogen. The appropriate amount of urea can be dissolved in water and added to the spray tank before adding the fungicide. Excessive nitrogen or application during hot weather may result in crop injury. DO NOT add nitrogen when tank-mixing *propiconazole* with a herbicide.

**Insecticides:** In field corn, *propiconazole* can be tank-mixed with one of the following: *Matador 120EC/Silencer 120EC* or *Ripcord*. In legumes, *Tilt 250E* or *Propel* can be tank-mixed with *Matador 120EC*.

**Note:** Syngenta Canada supports the following mixes that are not on the respective labels. Apply mixes according to the most restrictive use limitations for either product. Application of unlabeled tank-mixes is permitted as long as both products are registered and being used within their registered use pattern (eg: application rate, application timing, number of applications per season, pre-harvest interval, pest claim etc.).

### Propel Tank Mixes:

- **Herbicides:** *Axial*, *Broadband*, *Horizon NG*

### Tilt Tank Mixes:

- **Herbicides:** *Liberty*, *Sierra 2.0*, *Broadband*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Wheat, barley, corn, bean, legume, timothy** – DO NOT exceed 2 applications of this product per season.
- **Grazing:** DO NOT graze animals on treated green crops within 3 days of application. DO NOT feed straw treated with herbicide tank mixes to livestock. DO NOT use treated soybean seed for animal feed.
- **Preharvest interval:**
  - **Wheat, oat, barley** - 45 days
  - **Canola** - 60 days
  - **Corn** - 14 days if tank-mixed with an insecticide
  - **Soybean** - 50 days
  - **Bean** - 28 days
  - **Timothy** - 14 days
- **Re-entry:** DO NOT allow entry into treated area until dry or for 12 hours; whichever is greater.
- **Re-cropping:** No restrictions listed.
- **Storage:** DO NOT freeze. Store products away from food or feed.
- **Environment:** Toxic to aquatic organisms. DO NOT contaminate any body of water by direct application, drift or by cleaning equipment.

## Hazard Rating:



Warning – Poison (*Bumper 432 EC*, *Pivot 418 EC*, *Co-Op Pivot*, *Nufarm Propiconazole Fungicide*)



Caution – Poison (*Tilt 250 EC*, *Propel*, *Propi Super 25 EC*)



Warning – Eye and Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.



# Propulse

Fungicide Group

3, 7

Refer to page 427

## Company:

Bayer – PCP#30511

## Formulation:

200 g per L prothioconazole and 200 g per L fluopyram formulated as a suspension concentrate.

- Container size - 6.1 litres

## Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre)*:	Application Timing:
Dry bean	Ascochyta blight ( <i>Ascochyta</i> spp.), anthracnose ( <i>Colletotrichum lindemuthianum</i> )	200 to 300 mL	Apply preventatively when disease pressure is high or when agronomic or weather conditions are conducive to disease development. Continue applications as needed, on a 10 to 14 day interval. Use the higher rate when conditions for heavy infestation exist.
	White mould ( <i>Sclerotinia sclerotiorum</i> )	300 mL	Begin fungicide applications preventatively. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7 to 14 day interval. Use shorter intervals for best protection.
Faba bean	Ascochyta blight ( <i>Ascochyta</i> spp.)	200 to 300 mL	Apply preventatively when disease pressure is high or when agronomic or weather conditions are conducive to disease development. Continue applications as needed, on a 10 to 14 day interval. Use the higher rate when conditions for heavy infestation exist.
	White mould ( <i>Sclerotinia sclerotiorum</i> )	300 mL	Begin fungicide applications preventatively. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7 to 14 day interval. Use shorter intervals for best protection.

## Application Information:

- **Water Volume:** Use sufficient water and spray pressure to provide thorough and uniform coverage of plants. DO NOT apply under periods of dead calm. Avoid application of this product when winds are gusty.
  - **Ground:** minimum 40 L per acre.

## How it Works:

The active ingredient prothioconazole is a triazole fungicide with broad-spectrum systemic activity. The active ingredient fluopyram is a carboxamide fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426. Make no more than 2 sequential applications before switching to a fungicide with a different mode of action.
- **Maximum number of applications:** DO NOT apply more than 605 mL per acre per season.
- **Grazing:** DO NOT graze treated area, and do not harvest for forage or hay for 7 days after application.



- **Preharvest interval:** DO NOT apply within 14 days of harvest.
- **Re-entry:** DO NOT re-enter treated areas until 24 hours after application.
- **Re-cropping:** DO NOT replant to alfalfa for 14 days after application. Dry beans, faba beans, chickpeas, guar, lentils, cereals, corn, soybeans, peanuts, cucurbit vegetables, oilseeds, tuberous and corn vegetables and sugarbeets may be rotated anytime following the last application of *Propulse* fungicide. All other crops may be replanted 30 days following the last application.
- **Aerial Application:** DO NOT apply by air.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Do not store below freezing. If stored for one year or longer, shake well before using.
- **Environment:** This product is toxic to birds and aquatic organisms. When using *Propulse* consult the product label for buffer zones.

## Hazard Rating:

None listed.

# Prosaro 250 EC/Prosaro XTR

Fungicide Group  
3

Refer to page 427

## Company:

Bayer – (*Prosaro 250 EC* – PCP#29821; *Prosaro XTR* – 32824)

**\*NOTE:** *Prosaro 250EC* is no longer manufactured but product still remains in the distribution system. This product may be removed from future editions.

## Formulation:

***Prosaro 250 EC* and *Prosaro XTR*:** 125 g per L prothioconazole and 125 g per L tebuconazole, formulated as an emulsifiable concentrate.

- Container size - 6.5 litres; 104 L tote

## Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Wheat*	Control of septoria leaf blotch ( <i>Septoria tritici</i> ), glume blotch ( <i>S. tritici</i> , <i>Stagonospora nodorum</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), leaf rust ( <i>Puccinia recondita</i> ), stem rust ( <i>Puccinia graminis</i> ), stripe rust ( <i>Puccinia striiformis</i> ), powdery mildew ( <i>Erysiphe graminis</i> )	325 mL	FHB: apply within the time period from when at least 75% of the heads on the main stem are fully emerged to when 50% of heads on the main stem are in flower.  Application at this timing will also control the listed leaf diseases.
	Suppression of fusarium head blight (FHB) ( <i>Fusarium graminearum</i> )		
Barley*	Control of net blotch ( <i>Pyrenophora teres</i> ), scald ( <i>Rhynchosporium secalis</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), septoria leaf blotch ( <i>Septoria passerinii</i> ), leaf rust ( <i>Puccinia hordei</i> ), stem rust ( <i>Puccinia graminis</i> ), stripe rust ( <i>Puccinia striiformis</i> ), powdery mildew ( <i>Erysiphe graminis</i> )	325 mL	FHB: apply within the time period when 70 to 100% of barley heads on the main stem are fully emerged to 3 days after full head emergence.  Application at this timing will also control the listed leaf diseases.
	Suppression of fusarium head blight (FHB) ( <i>Fusarium spp.</i> )		
Oat	Control of crown rust ( <i>Puccinia coronata</i> ), stem rust ( <i>Puccinia graminis</i> ), stagonospora leaf blotch ( <i>Stagonospora nodorum</i> ), black stem ( <i>Stagonospora avenae</i> syn. <i>Septoria avenae</i> )	325 mL	Apply as a preventative foliar spray when the earliest disease symptoms appear on leaves and stems. Fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted and/or under prolonged conditions favorable for disease development

\**Prosaro 250 EC* and *Prosaro XTR* may be applied sequentially after an application of *Folicur 250EW*. The minimum interval between applications is 7 days.

## Application Information:

- DO NOT apply during periods of dead calm or when winds are gusty. Ensure uniform coverage.
- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum 20 L per acre. Follow detailed label recommendations for aerial application.

## How it Works:

The active ingredients prothioconazole and tebuconazole are demethylation inhibitors with broad-spectrum systemic activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

Bayer supports the following mixes that are not on the *Prosaro 250 EC* label. Apply mixes according to the most restrictive use limitations for either product:

- **Insecticides:** *Lorsban*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 1 application of this product per season.
- **Grazing:** DO NOT allow livestock to graze or feed green forage to livestock prior to 6 days after treatment with *Prosaro 250 EC* fungicide. Straw cut after harvest may be fed or used for bedding.
- **Preharvest interval:** 36 days
- **Re-entry:** DO NOT re-enter treated fields until 12 hours post-application.
- **Re-cropping:** Treated areas may be replanted with any crop specified on the label and soybean as soon as practical after last application. For oat, DO NOT plant back within 30 days of application. For all other crops, DO NOT plant back until 120 days after application. Tebuconazole is persistent and will carryover. It is recommended that any products containing tebuconazole not be used in areas treated with this product during the previous season.
- **Storage:** DO NOT store in or around the home. DO NOT store at temperatures below freezing. Keep in original tightly closed container and store away from feeds, seeds, fertilizer, plants and food stuffs. Keep away from sources of heat. Shake well before using if stored for more than 1 year. DO NOT contaminate water, food, or feed by storage or disposal.
- **Environment:** Toxic to birds, small wild animals, aquatic organisms, and non-target plants. As this product is not registered for the control of pests in aquatic systems, DO NOT use to control aquatic pests. DO NOT apply to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Runoff is hazardous to aquatic organisms in neighbouring areas. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body. Follow buffer zones as per the product label.

## Hazard Rating:



Danger Eye irritant



Caution – Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Pyraclostrobin

Headline EC, MPower Spade

Fungicide Group

11

Refer to page 427

## Company:

BASF Canada – (Headline EC - PCP#27322)

New Agco Inc distributed bu AgraCity Crop and Nutrition Ltd (MPower Spadel - PCP#32927)

## Formulations:

Headline EC - 250 g per L of pyraclostrobin formulated as an emulsifiable concentrate.

- Container size - Case (2 x 6.5 L); 120 L shuttle; 400 L tote

MPower Spade - 250 g per L of pyraclostrobin formulated as an emulsifiable concentrate.

- Container size – Case (2 x 6.5 L); 120 L drum (bulk)

## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Wheat	Control of tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> , <i>S. nodorum</i> ), leaf rust ( <i>Puccinia recondita</i> )	121 to 242 mL	Apply single application immediately after flag leaf emergence. Use higher rate to obtain extended protection. If disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.  To maximize yields in cereals, it is important to protect the flag leaf from disease.
	Control of powdery mildew ( <i>Erysiphe graminis</i> f. sp. <i>tritici</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), stripe rust ( <i>Puccinia striiformis</i> )	161 to 242 mL	
Barley	Control of net blotch ( <i>Pyrenophora teres</i> )	121 to 242 mL	
	Control of scald ( <i>Rhynchosporium secalis</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), stripe rust ( <i>Puccinia striiformis</i> )	161 to 242 mL	
Rye	Control of leaf rust ( <i>Puccinia recondita</i> )	121 to 242 mL	
	Control of powdery mildew ( <i>Erysiphe graminis</i> )	161 to 242 mL	
Oat Headline EC only	Control of crown rust ( <i>Puccinia coronata</i> )	121 to 161 mL	
Canola, rape-seed, canola quality <i>Brassica juncea</i> , mustard (oilseed and condiment) Headline EC only	Control of black spot ( <i>Alternaria brassicae</i> , <i>A. raphani</i> ), blackleg ( <i>Leptosphaeria maculans</i> )	121 to 161 mL	Apply in tank mix with supported canola herbicides to control blackleg at the 2 to 6-leaf (rosette) stage. Apply to control alternaria black spot at 20 to 50% bloom (suppression) to early pod stage (90% bloom) for control.  Headline EC can be tank-mixed with Lance WDG Fungicide at 20 to 50% flower to control sclerotinia stem rot and suppress black spot.
Corn	Control of common rust ( <i>Puccinia sorghi</i> )	161 to 242 mL	Begin all applications prior to disease development. If disease persists or weather conditions are favourable for disease development, apply a second time 10 to 14 days later with a fungicide that contains a different mode of action. Use higher rate and shorter interval when disease pressure is high.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Chickpea	Control of ascochyta blight ( <i>Ascochyta rabiei</i> )	161 to 242 mL <i>Headline EC</i> must be tank-mixed with 0.14 to 0.17 kg per acre Lance WDG	Apply a tank-mix of <i>Headline EC</i> with <i>Lance</i> at the beginning of flowering or the onset of symptoms. Ascochyta blight can develop quickly once established so early detection is essential. DO NOT apply sequential applications of this tank-mix; alternate to a fungicide with a mode of action other than Group 7 or 11 for at least one application.
Lentil	Control of anthracnose ( <i>Colletotrichum truncatum</i> ), ascochyta blight ( <i>Ascochyta lentis</i> )	161 mL	Apply at the beginning of flowering or at the onset of symptoms for more aggressive diseases (anthracnose is lentils). If disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.
Field pea	Control of mycosphaerella blight ( <i>Mycosphaerella</i> spp., <i>Ascochyta</i> spp.), powdery mildew ( <i>Erysiphe</i> spp.)	161 mL	
	Suppression of downy mildew ( <i>Peronospora viciae</i> f.sp. <i>pisi</i> )	161 to 242 mL	
Dry bean	Control of anthracnose ( <i>Colletotrichum lindemuthianum</i> ), powdery mildew ( <i>Erysiphe</i> spp.), rust ( <i>Uromyces</i> spp.)	161 mL	
Faba bean	Control of ascochyta blight ( <i>Ascochyta fabae</i> ), powdery mildew ( <i>Erysiphe</i> spp.)	161 mL	For optimum disease suppression, apply prior to disease development. If disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.
Sunflower <i>Headline EC only</i>	Suppression of rust ( <i>Puccinia helianthi</i> )	161 mL	
Flax (including low-linolenic acid varieties) <i>Headline EC only</i>	Control of pasmo ( <i>Septoria linicola</i> )	121 to 161 mL	Apply at the mid flower stage (7 to 10 days after the initiation of flowering). If disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.
Alfalfa (for seed production)	Control of common leaf spot ( <i>Pseudopeziza medicaginis</i> )	161 mL	Apply at the beginning of flowering (10 to 30% bloom) or at the onset of disease.
Bluegrasses; fescues; rye-grasses (for seed production)	Control of leaf rust ( <i>Puccinia recondita</i> ), stem rust ( <i>P. graminis</i> ) Suppression of powdery mildew ( <i>Erysiphe graminis</i> )	161 to 271 mL	Apply prior to disease development. If disease conditions exist, apply again 12 to 14 days later with a fungicide that contains a different mode of action. Use higher rate and shorter interval when high disease pressure.
Potato*	Control of early blight ( <i>Alternaria solani</i> )	182 to 271 mL	Apply prior to row closure or when conditions become favourable for disease development. Apply on a 7 to 14 day interval.  Under high disease pressure, use higher rate or tank mix <i>Headline EC</i> with <i>Bravo 500</i> .  It is recommended that no more than 1 application of <i>Headline EC</i> or <i>MPower Spade</i> is made before switching to a fungicide with an alternate mode of action.

## Crops, Diseases, Rates and Timing *continued*:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Potato* <i>continued</i>	Control of late blight ( <i>Phytophthora infestans</i> )	182 to 271 mL	Apply prior to row closure or when conditions become favourable for disease development. Apply on a 5 to 7 day interval. Under high disease pressure, use higher rate or tank mix <i>Headline EC</i> with <i>Bravo 500</i> . If using a tank-mix, apply on a 7 to 10 day interval.  DO NOT make more than 1 application of <i>Headline EC</i> or <i>MPower Spade</i> before switching to a fungicide with an alternate mode of action.
Timothy hay**	Control of brown stripe ( <i>Cercosporidium graminis</i> ), leaf streak ( <i>Drechslera phlei</i> ), purple eye spot ( <i>Cladosporium phlei</i> )	161 to 271 mL	Apply prior to disease development. Use higher rate when disease pressure is high. If disease persists or weather conditions are favourable for disease development, apply a second time 14 days later, with a fungicide with a different mode of action. In absence of an alternative fungicide registered for the specific diseases to be treated, for resistance management purposes, the maximum number of applications is limited to one.  DO NOT apply more than 162 mL per acre by aerial application.
Soybean	Control of frog-eye leaf spot ( <i>Cercospora sojina</i> )	161 to 242 mL	Apply at the beginning of flowering. If disease persists or weather conditions are favourable for disease development, apply a second time 10 to 14 days later with a fungicide that contains a different mode of action.

\* BASF Canada does not recommend use of *Headline EC* alone on potato due to potential for fungicide resistance.

\*\* Minor use label expansion.

## Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 40 L per acre on oilseeds, cereals, pulses, alfalfa and grasses; use 80 L per acre on potatoes. Ensure thorough coverage of foliage.
  - **Aerial:** Use a minimum water volume of 20 L per acre. Ensure thorough coverage of foliage. DO NOT apply more than 160 mL per acre by aerial application.
  - **Pivot or Sprinkler irrigation (Headline EC):** DO NOT exceed 0.64 cm (1/4 inch) (63,500 L) per hectare. DO NOT apply registered tank mixes in potato, chickpea, and canola by pivot or sprinkler irrigation. Apply only through overhead sprinkler systems including centre pivot and lateral move containing low pressure drop nozzles.

## How it Works:

The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**MPower Spade:** no registered tank mixes.

**Herbicides:** *Headline EC* at a rate of 120 to 160 mL per acre can be tank mixed with *Odyssey* on canola quality *Brassica juncea* with Clearfield trait, *Ares*, *Odyssey*, *Odyssey DLX*, and *Tensile* on Clearfield canola, *Liberty Herbicide* (150SN or 200SN) in glufosinate ammonium tolerant canola (eg: LibertyLink canola), registered glyphosate herbicides in glyphosate-tolerant canola (eg: Roundup Ready), *Poast Ultra* in canola, and *Equinox EC* in canola and canola quality *Brassica juncea*.

**Fungicides:** On chickpea, *Headline EC* at a rate of 160 to 240 mL per acre must be applied in tank-mix with 140 to 170 grams per acre *Lance* for control of ascochyta blight. On potatoes, *Headline EC* at rates of 180 to 270 mL per acre may be applied in tank-mix with *Bravo 500* at label rates, additional use recommendations, restrictions, and precautions for the control of late blight. On canola, *Headline EC* can be tank mixed with *Lance Fungicide* at 142 grams per acre at 20 to 50% flowering to control sclerotinia stem rot and suppress black spot.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Note:** BASF Canada does not recommend use of *Headline* alone on potato due to potential for resistance.
- **Maximum number of applications:** DO NOT exceed 1 sequential application of *Headline EC* or *Mpower Spade* per season. Any subsequent applications of this product must be in combination with a fungicide that contains a different mode of action.
  - *Alfalfa* – DO NOT exceed 1 application per season.
  - *Canola, rapeseed, canola quality Brassica juncea, mustard, flax, dry bean, faba bean, lentil, field pea, chickpea, bluegrass, fescue grass, ryegrass, corn, sunflower* – DO NOT exceed 2 applications of this product per season.
  - *Potato* – DO NOT exceed 3 applications per season.
- **Grazing:** DO NOT graze treated corn crops within 6 days of last application. DO NOT feed alfalfa hay or forage to livestock. All other crops listed can be grazed or fed to livestock.
- **Preharvest interval:**
  - *Barley, rye, wheat, oat* – apply no later than the end of flowering
  - *Corn* – 7 days
  - *Pulses* – 30 days
  - *Forage grasses* – 14 days
  - *Alfalfa* – not applicable
  - *Oilseeds* – 21 days
  - *Potatoes* – 3 days
  - *Soybean* – 21 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** Crops listed on label may be planted immediately following last application. Wait 14 days before planting all other crops.
- **Storage:** Store in a cool, dry, locked, well-ventilated area without a floor drain. DO NOT freeze.
- **Environment:** Avoid overspray or drift to sensitive habitats. Maintain specified buffer zones. DO NOT spray non-target terrestrial or aquatic habitats.

## Hazard Rating:



Danger – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Quadris Top

Fungicide Group  
3, 11

Refer to page 427

## Company:

Syngenta Canada – PCP#30518

## Formulation:

200 g per L azoxystrobin and 125 g per L difenconazole formulated as a flowable suspension concentrate.

- Container size - 2 x 10.125 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato	Control of early blight ( <i>Alternaria solani</i> )	229 to 405 mL	Apply on a 7 to 14 day interval, starting prior to disease establishment.

## Crops, Diseases, Rates and Timing *continued*:

Crop	Diseases	Application Rate (per acre)	Application Timing
Potato <i>continued</i>	Suppression of brown spot ( <i>Alternaria alternata</i> ), black dot ( <i>Colletotrichum coccodes</i> )	229 to 405 mL	Apply prior to disease. Apply no more than 1 application to target these diseases. If disease pressure is high, use the highest rate.
	Suppression of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	405 mL	Apply at full bloom. Repeat applications at intervals of 7 to 10 days.

## Application Information:

- **Water Volume:**
  - **Ground:** Use sufficient water volume to obtain adequate coverage. Use minimum 60 L per acre.
  - **Aerial:** Use sufficient water volume to obtain adequate coverage. Use minimum 60 L per acre.

## How it Works:

The active ingredient azoxystrobin belongs to a strobilurin group of fungicides and difenconazole is a triazole fungicide. Together they provide broad spectrum preventative and systematic. To be used as a preventative and curative fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed three applications per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days
- **Re-entry:** DO NOT re-enter treated areas until 12 hours after application.
- **Re-cropping:** DO NOT plant any other crop for a period of 60 days following application to the preceding crop unless *Quadris Top* or *Inspire* are registered for that crop.
- **Storage:** Store in cool, dry place. Do not store food, beverages or tobacco products in storage area.
- **Environment:** This product is toxic to aquatic organisms (or invertebrates), fish and mammals. Observe buffer zones outlined in the label.

## Hazard Rating:



Caution – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Quash

## Fungicide Group

### 3

Refer to page 427

## Company:

Valent Canada distributed by Nufarm Agriculture Inc – PCP#30402

## Formulation:

50.0% metconazole formulated as water dispersible granules.

- Container sizes - 8 x (2 x 280g) = 4.48kg/case



## Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Canola	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	57 to 115 g	Make a single, preventative application between 20 and 50% bloom.
Dry bean	Suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )	115 g	Apply prior to disease development. Make first application at 20 to 50% bloom stage, before disease symptoms are visible. Make second application at full bloom.  DO NOT make the second application until 9 days have passed since the first application.
Field pea	Control of powdery mildew ( <i>Erysiphe pisi</i> ), suppression of white mould ( <i>Sclerotinia sclerotiorum</i> )		
Chickpea	Suppression of ascochyta blight ( <i>Ascochyta rabiei</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> )		
Lentil	Suppression of ascochyta blight ( <i>Ascochyta lentis</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> )		
Potato	Control of early blight ( <i>Alternaria solani</i> )	70 to 115 g	Apply prior to infection for preventative control. If conditions are favourable for disease development, make additional applications at 7 to 10 day intervals.
	Suppression of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	115g	Make first application prior to infection, generally at row closure and/or first bloom. Make second application 14 days later, if conditions favor white mould development.
Sunflower*	Control of rust ( <i>Puccinia helianthi</i> ) Suppression of sclerotinia head rot ( <i>Sclerotinia sclerotiorum</i> )	115g	Sclerotinia: First preventative application at early to mid-bloom or 7 to 14 days later.  Rust: Apply when conditions favour disease development prior to infection.

As of January 1, 2019 [www.keepingitclean.ca](http://www.keepingitclean.ca) indicates that grain from canola crops treated with this product may have market access concerns. Please see page 10 for more details AND **consult potential grain buyers before using this product.**

\*NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for fungicide performance. Those who apply these uses do so at their own risk.

## Application Information:

- DO NOT apply during periods of dead calm or when winds are gusty. Ensure uniform coverage.
- **Water Volume:**
  - **Ground:** minimum 80 L per acre.
  - **Aerial:** minimum 20 L per acre.
- Consult nozzle manufacturers for specific nozzle and pressure recommendations. Ensure thorough coverage for optimal disease control/suppression.

## How it Works:

The active ingredient metconazole is a broad spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Canola** – DO NOT exceed more than 115g per acre of this product per season.
  - **Dry bean, field pea, chickpea, lentil** – DO NOT exceed 2 applications of this product per season.
  - **Sunflower** – DO NOT exceed 2 applications of this product per season.
  - **Potato** – DO NOT exceed 3 applications of this product per season at the high rate. DO NOT exceed 4 applications of this product per season at the low rate.



- **Grazing:** No restrictions listed.
- **Preharvest interval:**
  - *Potato* – 1 day
  - *Dry bean, field pea, chickpea, lentil* – 21 days
  - *Canola* – 45 days
  - *Sunflower* – 21 days.
- **Re-entry:**
  - *Potato* – DO NOT re-enter treated areas within 12 hours of application.
  - *Canola* – DO NOT re-enter treated areas within 12 hours of application.
  - *Dry bean, field pea, chickpea, lentil* – DO NOT re-enter treated areas within 1 day of application.
  - *Sunflower* – DO NOT re-enter treated area within 6 days of application.
  - Re-entry intervals maybe longer for more intensive activities in potatoes and legume crops, see label for complete list of re-entry periods.
- **Re-cropping:** A plant back interval of 30 days is required for all crops not listed on the *Quash* label.
- **Storage:** Store in original tightly closed container. Protect from freezing. Store in cool, dry place. Store this product away from food or feed.
- **Environment:** Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

## Hazard Rating:



Caution – Poison

Check label for first-aid information.

For an explanation of the symbols used here see pages 7 and 8.

# Quilt

Fungicide Group  
3, 11

Refer to page 427

## Company:

Syngenta Canada – PCP#28328

## Formulation:

75 g per L azoxystrobin and 125 g per L propiconazole formulated as a suspension concentrate.

- Container size - 2 x 10.125 L case and 101.25 tote

## Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Dry bean	Anthracnose ( <i>Colletotrichum truncatum</i> )	405 to 607 mL	Make first application before disease is established and no later than the onset of flowering. A second application 14 days later may be needed if conditions persist. Apply the high rate under conditions of high disease pressure.
	Powdery mildew ( <i>Microsphaera diffusa</i> , <i>Erysiphe</i> spp.)	405 mL	Make first application at the first sign of disease. A second application 14 days later may be needed if conditions persist.
Lentil Soybean	Anthracnose ( <i>Colletotrichum truncatum</i> )	405 to 607 mL	Make first application before disease is established and no later than the onset of flowering. A second application 14 days later may be needed if conditions persist. Apply the high rate under conditions of high disease pressure.

**Crops, Diseases, Rates and Timing *continued*:**

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Lentil Soybean <i>continued</i>	Powdery mildew ( <i>Erysiphe</i> spp.)	405 mL	Make first application at the first sign of disease. A second application 14 days later may be needed if conditions persist.
Chickpea Faba bean	Powdery mildew ( <i>Erysiphe</i> spp.)	405 mL	Make first application at the first sign of disease. A second application 14 days later may be needed if conditions persist. Apply the high rate under conditions of high disease pressure.
Field pea	Mycosphaerella blight ( <i>Mycosphaerella pinodes</i> )	405 to 607 mL	
	Powdery mildew ( <i>Erysiphe pisi</i> , <i>Microsphaera diffusa</i> )	405 mL	
Canola	Blackleg ( <i>Leptosphaeria maculans</i> )	405 mL	Apply during the rosette stage between 2 <sup>nd</sup> true leaf and bolting.
Soybean	Frogeye leaf spot ( <i>Cercospora sojina</i> )	405 to 607 mL	Make the first application at growth stage R3 (early pod set) and 14 days late at approximately growth stage R5.
Barley	Net blotch ( <i>Pyrenophora teres</i> )	202* to 405 mL	At first sign of disease starting at the two leaf stage. Use the higher rate if there is a history of high disease pressures in the field and/or field conditions favour disease.
	Net blotch ( <i>Pyrenophora teres</i> ), septoria leaf blotch ( <i>Septoria</i> spp.), scald ( <i>Rhynchosporium secalis</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> )	304 mL	Apply between stem elongation and half-head emergence.
	Stripe rust ( <i>Puccinia striiformis</i> )	304 to 405 mL	For stripe rust, use the higher rate if there is a history of high disease pressures in the field and/or field conditions favour disease development.
	Leaf rust ( <i>Puccinia hordei</i> )	405 mL	
Wheat	Tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf blotch ( <i>Septoria</i> spp.)	202* to 405 mL	At first sign of disease starting at the two leaf stage. Use the higher rate if there is a history of high disease pressures in the field and/or field conditions favour disease.
Wheat, <i>continued</i>	Septoria leaf blotch ( <i>Septoria</i> spp.), tan spot ( <i>Pyrenophora tritici-repentis</i> )	304 mL	Apply between stem elongation and half-head emergence.
	Stripe rust ( <i>Puccinia striiformis</i> ), leaf rust ( <i>Puccinia triticina</i> )	304 to 405 mL	For stripe rust and leaf rust in wheat, use the higher rate if there is a history of high disease pressures in the field and/or field conditions favour disease development.
Rye	Scald ( <i>Rhynchosporium secalis</i> ), septoria leaf blotch ( <i>Septoria</i> spp.), tan spot ( <i>Pyrenophora tritici-repentis</i> )	304 mL	
Triticale	Septoria leaf blotch ( <i>Septoria</i> spp.), tan spot ( <i>Pyrenophora tritici-repentis</i> )	304 mL	
Oat	Septoria leaf blotch ( <i>Septoria</i> spp.), net blotch ( <i>Pyrenophora teres</i> )	304 mL	Apply between stem elongation and half-head emergence.
	Crown rust ( <i>Puccinia coronata</i> )	304 to 405 mL	For crown rust, use the higher rate if there is a history of high disease pressures in the field and/or field conditions favour disease development.
Field, sweet, and popping corn (including seed production)	Rust ( <i>Puccinia sorghi</i> ), northern leaf blight ( <i>Setosphaeria turcicum</i> ) Suppression of anthracnose leaf blight ( <i>Colletotrichum graminicola</i> )	304 to 405 mL	Make first application at the first sign of disease, followed by a second application 14 days after the first, if environmental conditions are favourable for disease development.

\*Suppression only at rates less than 304 mL per acre

## Application Information:

- **Water Volume:**
  - **Ground:** Apply in a minimum of 18 L of water per acre for legume vegetables and soybean. Apply in a minimum of 40 L of water per acre for other crops.
  - **Aerial:** Apply in a minimum of 18 L of water per acre.

## How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) with broad spectrum contact and systemic activity. The active ingredient propiconazole is a triazole fungicide with broad-spectrum systemic activity. To be used as a preventative and curative fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Insecticides:** *Quilt* can be tank-mixed with insecticide *Matador 120EC* for foliar disease and insect control in cereals. Consult each label for pests controlled, precautions, and specific application instructions

Note: Syngenta Canada supports the following mixes that are not on the *Quilt* label. Apply mixes according to the most restrictive use limitations for either product. Application of unlabelled tank-mixes is permitted as long as both products are registered and being used within their registered use pattern (eg: application rate, application timing, number of applications per season, pre-harvest interval, pest claim etc.).

- **Herbicides:** *Axial*, *Broadband* + registered tank mixes, *Horizon NG*, *Sierra*
- **Fungicides:** *Quadris*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - *Canola* – DO NOT exceed 1 application of this product per season.
  - *Soybean, dry bean, faba bean, chickpea, field pea, lentil, barley, wheat, rye, triticale, oat, corn* – DO NOT exceed 2 applications of this product per season.
- **Preharvest interval:**
  - *Soybean and dry legume vegetables, canola* – 30 days
  - *Succulent podded and shelled legume vegetables* – 15 days
  - *Soybean hay and dry pea hay* – 14 days
  - *Wheat, barley, rye, triticale, and oat* – 45 days
  - *Field corn, sweet corn, and popcorn* – 14 days
- **Re-entry:** DO NOT re-enter treated fields within 12 hours of application.
- **Re-cropping:** Oat and rye may be planted 45 days after *Quilt* application. DO NOT plant any other crop intended for food, grazing, or any component of animal feed or bedding within 105 days of *Quilt* application to the preceding crop unless the second crop appears on the *Quilt* label.
- **Storage:** Store in a cool, dry, well ventilated area away from feed and foodstuffs, and out of reach of children and animals. DO NOT store at temperatures below freezing. Keep in original container, tightly closed, during storage.
- **Environment:** Azoxystrobin is persistent and will carry over. *Quilt* is toxic to aquatic organisms and is extremely phytotoxic to certain apple varieties. Avoid spraying when the wind is blowing towards a nearby sensitive crop, garden, terrestrial habitat (such as shelterbelt), or aquatic habitat. DO NOT contaminate irrigation or drinking water supplies by cleaning of equipment or disposal of wastes. Avoiding spray drift is the responsibility of the applicator.

## Hazard Rating:



Caution – Poison and skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Ranman 400SC

Fungicide Group

21

Refer to page 427

## Company:

ISK Biosciences Corporation; distributed by Engage Agro Corporation – PCP#30716

## Formulation:

400 g per L cyazofamid formulated as a suspension concentrate.

- Container size - 500 mL and 200 L

## Crops, Diseases and Timing:

Control of late blight (*Phytophthora infestans*) on potato. Begin applications on a 7 day schedule when warning systems forecast disease infection periods or at row closure. Use the low rate under low disease pressure and increase the rate as disease pressure and/or crop development increases, up to the maximum rate. For late blight tuber rot control, ensure that the last 2 to 3 applications prior to desiccation are made at the maximum rate following resistance management practices.

## Rates:

40 to 80 mL per acre. *Ranman 400SC* should be tank mixed with a non-ionic or organo-silicone surfactant (such as Sylgard 309 at 60 mL per acre).

## Application Information:

- DO NOT make sequential applications. After one application alternate with at least one application of fungicide with a different mode of action.
- **Water Volume:**
  - **Ground:** Apply in a minimum of 20 L of water.
  - **Aerial:** Use sufficient volume to obtain coverage of the foliage, 80 to 240 L per acre.

## How it Works:

The active ingredient cyazofamid is a cyanoimidazole fungicide with contact activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 6 applications of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 7 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** A plant back interval of 30 days is required.
- **Storage:** Store product in original container in a secured dry place separate from other pesticides, fertilizer, food and feed.
- **Environment:** 20 m (fixed wing) and 15 m (helicopter) buffer zones for aerial applications in proximity of terrestrial habitats. For freshwater and marine habitats buffer zones for aerial are the same as field sprayer applications.

## Hazard Rating:

None listed.

# Reason 500SC

Fungicide Group

11

Refer to page 427

## Company:

Bayer – PCP#27462

## Formulation:

500 g per L fenamidone formulated as a suspension concentrate.

- Container size - 2 L

## Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) on potato. Begin application when plants are 15 to 20 cm high or when disease threatens. Apply a fungicide with a different mode of action within 7 to 10 days after each application using the shorter interval when conditions favor disease development. Ensure even application.

## Rates:

Apply at 80 mL per acre as a tank mix with either *Dithane DG\** at 500 g per acre or *Bravo 500* at 500 mL per acre.

\*When using other formulations of mancozeb, adjust application rates to apply 375 g active ingredient per acre.

## Application Information:

- **Water Volume:**
  - *Aerial:* Use minimum of 14 L per acre at a pressure no less than 300 kPa.

## How it Works:

The active ingredient fenamidone is a strobilurin fungicide with contact activity. To be used as a preventative and inhibitive (spore germination and antisporeulant) fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Fungicides:** To be applied ONLY as a tank-mix with mancozeb fungicides or *Bravo 500*. Follow mixing instructions provided on the label.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 6 applications or 0.48 L per acre of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days
- **Re-entry:** DO NOT re-enter treated areas until residues have dried.
- **Re-cropping:** A 30 day plant-back interval is required for potato and all other crops.
- **Storage:** DO NOT allow product to freeze. If stored more than 1 year, shake well before using. Keep away from fire, open flame or other sources of heat. Store in tightly closed container away from fertilizer, seeds, feed or food
- **Environment:** For ground application maintain an 8 m buffer zone between areas sprayed and aquatic systems. For aerial application allow a 10 m buffer. Toxic to fish and other aquatic organisms; DO NOT apply where runoff is likely to occur.

## Hazard Rating:



Caution Poison – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Regalia Maxx

Fungicide Group  
Not classified, bio-  
fungicide

Refer to page 427

## Company:

Marrone Bio Innovations – PCP#30199  
Distributed by Engage Agro Corporation

## Formulation:

20% extract of *Reynoutria sachalinensis* formulated as a suspension concentrate.

- Container size - 4 x 5 L

## Crops, Diseases and Timing:

Partial suppression of septoria leaf blotch (*Septoria tritici*) in wheat. Apply preventatively or when disease systems first appear after initial jointing. Repeat applications in 7 to 14 day intervals depending upon crop growth and disease pressure.

## Rates:

0.25% v/v in 160 to 240 L of water per acre.

## Application Information:

- DO NOT apply by air. When environmental conditions and plant stage are conducive to rapid disease development use *Regalia Maxx* in a rotational program with other registered fungicides.
- **Water Volume:**
  - **Ground:** minimum of 160 to 240 L per acre

## How it Works:

*Reynoutria sachalinensis* is a plant extract to induce the plants' natural defense mechanisms against certain fungal and bacterial disease. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** No maximum number of applications specified.
- **Grazing:** No restrictions listed.
- **Preharvest Interval:** May be applied up to the day of harvest.
- **Re-entry:** DO NOT re-enter into treated areas until the spray is dried.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in original tightly closed container.
- **Environmental Hazards:** DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Hazard Rating:

None listed.

# Revus

Fungicide Group

40

Refer to page 427

## Company:

Syngenta Canada – PCP#29074

## Formulation:

250 g per L mandipropamid formulated as a suspension concentrate.

- Container size - 4 x 3.78 L

## Crops, Diseases and Timing:

Control of late blight (*Phytophthora infestans*) on potato. Begin applications prior to disease development. Continue applications on 7 to 10 day intervals, following resistance management guidelines.

## Rates:

0.17 to 0.24 L per acre. The use of a non-ionic adjuvant (0.25% v/v) is recommended.

## Application Information:

- **Water Volume:**
  - **Ground:** Use a minimum water volume of 40 L per acre. In situations where dense canopy or pest pressure is high, use greater water volumes.
  - **Aerial:** Use a minimum water volume of 18 L per acre.
  - **Nozzles:** DO NOT apply using any type of ultra low volume (ULV) spray system.

## How it Works:

The active ingredient mandipropamid is a carboxylic acid amide (CAA) fungicide with contact and systemic activity. To be used as a preventative and inhibitive (prevents spore germination) fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

Fungicides: *Bravo 500*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 4 applications of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days
- **Re-entry:** DO NOT re-enter treated area within 12 hours of application.
- **Re-cropping:** DO NOT plant any crop which is not registered for use with *Revus* for a period of 30 days after the last application.
- **Storage:** Store in a cool dry place away from food, beverages, and tobacco products.
- **Environment:** To reduce runoff into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Runoff into aquatic habitats may be reduced by including a vegetative strip between the treated area and the edge of the water body.

## Hazard Rating:



Caution – Poison



Warning – Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Ridomil Gold Products

Fungicide Group

4

*Ridomil Gold/Bravo, Ridomil Gold SL/Bravo/  
Ridomil Gold 480EC/Ridomil Gold 480SL*

Fungicide Group

M5

*Ridomil Gold/Bravo,  
Ridomil Gold SL/Bravo  
Refer to page 427*

## Company:

Syngenta Canada

- (*Ridomil Gold/Bravo* – PCP#26443; *Ridomil Gold SL/Bravo* – PCP#29239; *Ridomil Gold 480EC* – PCP#25384; *Ridomil Gold 480SL* – PCP#28474)

## Formulations:

*Ridomil Gold/Bravo* - 500 g per L chlorothalonil and 480 g per L metalaxyl-M.

- Container size - 8.83 L jug twin-pak

*Ridomil Gold SL/Bravo* - 500 g per L chlorothalonil and 480 g per L metalaxyl-M formulated as a soluble concentrate.

- Container size - 8.83 L jug twin-pak

*Ridomil Gold 480EC* - 480 g per L metalaxyl-M formulated as an emulsifiable concentrate.

- Container size - 4 x 3.78 L jugs

*Ridomil Gold 480SL* - 480 g per L metalaxyl-M formulated as a solution.

- Container size - 10 x 0.5 L or 4 x 3.78 L jugs

## Crops, Diseases, Rates and Timing:

Crop	Diseases Controlled	Application Rate	Application Timing
Potato	<b><i>Ridomil Gold/Bravo,</i> <i>Ridomil Gold SL/Bravo:</i></b> Early blight ( <i>Alternaria solani</i> ), late blight ( <i>Phytophthora infestans</i> ), late blight tuber rot, botrytis vine rot ( <i>Botrytis cinerea</i> )  Suppression of pythium leak ( <i>Pythium</i> spp.) and pink rot ( <i>Phytophthora erythroseptica</i> )	<b><i>Ridomil Gold/Bravo,</i> <i>Ridomil Gold SL/Bravo:</i></b> One 8.83 L jug treats 10 acres. The entire contents of the jug must be added to the spray tank or an improper mixture will result.	Begin preventive applications early in the season when conditions are favorable for disease (before infection), no later than when the plant foliage meets within the row uniformly across the field. Apply a second and third application at 14 day intervals. Other registered contact fungicides should be applied 7 days after each application.
	<b><i>Ridomil Gold 480EC, Ridomil Gold 480SL:</i></b> Suppression of pink rot ( <i>Phytophthora erythroseptica</i> ) as in-furrow treatment.	<b><i>Ridomil Gold 480EC,</i> <i>Ridomil Gold 480SL:</i></b> 4 mL per 100 m row, applied in-furrow at planting.	

## Application Information:

- **Water Volume:**
  - **Ground:** use sufficient water to ensure thorough coverage of foliage. Use a water volume of 90 to 640 L per acre.
    - *In-furrow treatment:* use a minimum of 12 L per acre. For tank mixes with *Quadris* water volume should be 20 to 56 L per acre.
  - **Aerial:** use a minimum water volume of 20 L per acre.

## How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. The active ingredient chlorothalonil is a chloronitrile fungicide with contact activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

*Ridomil Gold/Bravo, Ridomil Gold SL/Bravo* - None registered.

*Ridomil Gold 480EC, Ridomil Gold 480SL* - May be tank mixed with *Quadris* for in-furrow treatment to control rhizoctonia stem rot, stolon canker, black scurf and suppression of pink rot.



## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:**
  - **Ground/aerial** (*Ridomil Gold/Bravo*, *Ridomil Gold SL Bravo*) – DO NOT exceed 3 applications of this product per season.
  - **In-furrow** (*Ridomil Gold 480EC*, *Ridomil Gold 480SL*) – DO NOT exceed 1 application of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days for *Ridomil Gold SL/Bravo*
- **Re-entry:** *Ridomil Gold 480EC*, *Ridomil Gold 480SL* – DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** A plant back interval of 30 days for root crops is required after the in-furrow application.
- **Storage:** Protect from excessive heat.
- **Environment:** DO NOT apply where runoff is likely to occur. DO NOT use on coarse textured gravelly soils, soils with less than 2% organic matter or in areas where the water table may be high. Avoid application by ground or air near or around bodies of water. DO NOT contaminate streams or ponds by spray drift, by cleaning equipment, or disposal of wastes. A buffer zone of 100 m for aerial application and 15 m for ground application should be observed to protect water bodies.

## Hazard Rating:

*Ridomil Gold/Bravo*, *Ridomil Gold SL/Bravo*



Warning Poison – Eye irritant

*Ridomil Gold 480EC*



Caution Poison. Warning – Eye irritant

*Ridomil Gold 480SL*



Caution Poison. Warning – Eye irritant, skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Scala SC

Fungicide Group

9

Refer to page 427

## Company:

Bayer – PCP#28011

## Formulation:

400 g per L pyrimethanil formulated as a suspension concentrate.

- Container size – 6.07 L

## Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) on potato. Apply when plants are 15 to 20 cm high or when disease threatens. Repeat applications at 7 to 14 day intervals or as necessary to maintain disease control. If severe disease conditions exist, use the 7 day interval. Minimum spray interval is 7 days. Ensure complete coverage.

## Rates:

Apply at 300 mL per acre as a tank mix with *Bravo 500*.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum of 120 L per acre.
  - **Aerial:** minimum of 14 L per acre.

## How it Works:

The active ingredient pyrimethanil is an anilinopyrimidine fungicide with contact and systemic activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Fungicides:** To be applied ONLY as a tank mix with *Bravo 500*. Follow mixing instructions provided on the label.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 6 applications or 2.4 L per acre of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 7 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** A 30 day plant-back interval is required for potatoes and wheat and 130 days for all other crops.
- **Storage:** DO NOT allow product to freeze. If stored more than 1 year, shake well before using. Store in tightly closed container away from fertilizer, seeds, feed or food.
- **Environment:** Maintain a 1 m buffer zone between areas sprayed and aquatic systems. Toxic to aquatic organisms. DO NOT apply where runoff is likely to occur.

## Hazard Rating:



Caution Poison – Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Sercadis

Fungicide Group

7

Refer to page 427

## Company:

BASF Canada – PCP#31697

## Formulation:

300 g per L fluxapyroxad formulated as a suspension concentrate.

- Container size - 2 x 1.35 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases Controlled	Application Rate (per acre)	Application Timing
Potato	Rhizoctonia canker ( <i>Rhizoctonia</i> spp.)	135 mL	Apply in-furrow.
	Early blight ( <i>Alternaria solani</i> )	68-135 mL	Apply to foliage prior to disease development.
	Sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	135 mL	Apply at the beginning of flowering. Apply a second time 7 to 14 days later if disease persists or weather conditions are favorable for disease development.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum 20 L per acre.

## How it Works:

The active ingredient fluxapyroxad is a carboximide (SDHI) fungicide with system activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

In foliar applications always tank mix *Sercadis* with an alternate mode of action effective against the targeted disease. BASF Canada supports the tank mix of *Sercadis* with *Polyram DF*, *Dithane* and *Bravo* in potato. In foliar applications, the use of a non-ionic surfactant at 0.125 v/v is recommended.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 3 applications of this product per season
- **Grazing:** No restrictions listed.
- **Preharvest Interval:** 7 days
- **Re-entry:** Re-entry interval after application is 12 hours.
- **Re-cropping:** Tuberous and corm vegetables, sugar beets, legume vegetables, fruiting vegetables, pome fruits, stone fruits, cereal and oilseeds may be planted immediately following the last application. A plan-back interval of one year is required for all other crops.
- **Storage:** Store this product away from food or feed.
- **Environmental Hazards:** Observe buffer zones specified on label. The use of this chemical may result in contamination of ground water, particularly in areas where soils are permeable (for example sandy soils) and/or the depth of the water table is shallow.
- **Toxicity:** Toxic to aquatic organisms and small mammals

## Hazard Rating:

Warning – contains the allergen soy

# Serenade OPTI

Fungicide Group

44

Refer to page 427

## Company:

Bayer – PCP#31666

## Formulation:

*Serenade OPTI*: 26.2% *Bacillus subtilis* (QST 713 strain) formulated as a wettable powder

- Container size – 2.72 kg

## Crops, Diseases, Rates and Timing:

Crop	Diseases Suppressed	Application Rate (per acre)	Application Timing
Dry bean, chickpea, lentil, field pea	White mould ( <i>Sclerotinia sclerotiorum</i> ), grey mould ( <i>Botrytis cinerea</i> )	0.7 to 1.3 kg	Product should be applied prior to or in the early stages of disease development; repeat applications on 7 to 10 day intervals if conditions for disease persist.
Soybean	White mould ( <i>Sclerotinia sclerotiorum</i> )	0.2 to 0.8 kg	Use maximum label rates and shortened spray intervals for conditions conducive to rapid disease development.
	Brown spot ( <i>Septoria glycines</i> )	0.04 to 0.2 kg	When conditions are conducive to heavy disease pressure, use in a rotational program with other registered fungicides.
	Frogeye leaf spot ( <i>Cercospora soja</i> )	0.04 to 0.2 kg	

**Crops, Diseases, Rates and Timing *continued*:**

Crop	Diseases Suppressed	Application Rate (per acre)	Application Timing
Potato	Sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	0.4 to 1.3 kg	Begin application soon after emergence and when conditions are conducive to disease development. Repeat as necessary on a 7 to 10 day interval.
	Early blight ( <i>Alternaria solani</i> )	0.4 to 0.9 kg	
	Silver scurf ( <i>Helminthosporium solani</i> )	7 to 14 g per tonne	For post-harvest application to aid in the control of silver scurf. See label for details.
Canola, flax, borage, camelina, mustard	Sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	0.1 to 0.4 kg	Begin application at 20 to 30% bloom. A second application may be made 7 to 10 days later, at approximately 50% bloom and prior to significant petal fall, if conditions for disease development remain favourable. Use higher rates in fields with a history of heavy disease pressure.
Caraway, coriander, fenugreek	Botrytis grey mould ( <i>Botrytis cinerea</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> )	0.7 to 1.3 kg	Begin application when environmental conditions are conducive to disease development. Repeat as necessary on a 7 to 10 day interval.

**Application Information:**

- **Water Volume:**
  - Use water volumes to give good canopy penetration and coverage of plant parts to be protected. Ground application only for all crops, except canola (ground or air).

**How it Works:**

*Bacillus subtilis* is a bacterium that works as a bio-fungicide to prevent infection of labeled diseases by multi-site biochemical activity. For more information refer to "Fungicide Modes of Action" on page 426.

**Tank Mixes:**

None registered.

**Restrictions:**

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** Can be applied up to and including the day of harvest.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Maximum storage period of two years at room temperatures up to 25°C. Store in a dry area inaccessible to children. Store in original container.
- **Environment:** DO NOT contaminate water, food, or feed by storage and disposal.

**Hazard Rating:**

None listed.

Potential skin sensitizer.

# Serenade Soil

Fungicide Group

44

Refer to page 427

## Company:

Bayer – PCP#30647

## Formulation:

1.34% *Bacillus subtilis* (QST 713 strain) formulated as a wettable powder.

- Container sizes – 9.46L, 511L

## Crops, Diseases and Timing:

Suppression of rhizoctonia root rot, black scurf and stem canker (*Rhizoctonia solani*), phytophthora root rot and pink rot (*Phytophthora erythroseptica*), pythium root rot (*Pythium* spp.) and fusarium root rot (*Fusarium* spp.). Apply in furrow at planting.

## Rates:

Apply at 1.1 to 5.7 L per acre in furrow at seeding.

## Application Information:

- **Water Volume:**
  - Apply as an in-furrow spray in the appropriate amount of water per acre for crop at planting.

## How it Works:

*Bacillus subtilis* is a bacterium that works as a bio-fungicide to prevent infection of labeled diseases by multi-site biochemical activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** Can be applied up to and including the day of harvest.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Maximum storage period of two years at room temperatures up to 25°C. Store in a dry area inaccessible to children. Store in original container.
- **Environment:** DO NOT contaminate water, food, or feed by storage and disposal.

## Hazard Rating:

None listed.

Potential skin sensitizer.

# Tanos 50 DF

Fungicide Group

11, 27

Refer to page 427

## Company:

Corteva AgriScience Division of DowDuPont – PCP#27435

## Formulation:

25% famoxadone and 25% cymoxanil formulated as a dry flowable.

- Container size - 4 x 3.4 kg

## Crops, Diseases and Timing:

**Potato** - Early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*). Make the first application following one or two applications of a preventative broad spectrum fungicide such as chlorothalonil or mancozeb. A minimum 12 day application interval must pass between the first and second application of *Tanos 50 DF*. A minimum 24 day application interval must pass between the second and third application of *Tanos 50 DF*. Fungicides other than *Tanos 50 DF* may be used as necessary to protect the crop during these intervals.

## Rates:

225 to 340 g per acre.

## Application Information:

- **Water Volume:**
  - **Ground:** Use sufficient water to obtain thorough coverage. With a conventional sprayer use no less than 100 to 120 L per acre. With an air-assisted sprayer use no less than 44 L per acre.
  - **Aerial:** minimum 20 L per acre.

## How it Works:

The active ingredient cymoxanil is a cyanoacetamideoxime fungicide with locally systemic activity. The active ingredient famoxadone is a strobilurin fungicide with broad spectrum activity. To be used as a preventative, curative and inhibitive (against sporulation) fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

Tank mix solutions containing boron may affect product solubility. When using boron containing solutions, add the correct amount of *Tanos 50 DF* first and boron containing solution last.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 6 applications of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days
- **Re-entry:** DO NOT re-enter treated areas within 24 hours of application.
- **Re-cropping:** Crops that are on the product label may be planted back at any time. A 30-day plantback interval is required for cereal grains. All other crops may be planted following a 1 year interval.
- **Storage:** Store product closed in original container only. Protect against humid air and water. Avoid contact with food, drink and livestock feed material.
- **Environment:** Toxic to fish and aquatic organisms. Observe prescribed buffer zones. Toxic to birds, mammals and harmful to beneficial arthropods. Minimize off-target drift to reduce the effects on wildlife at the field boundary. DO NOT apply to areas prone to run-off.

## Hazard Rating:



Warning Poison – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Tebuconazole

*Folicur 250EW/Palliser/Hornet 432 F*

Fungicide Group

3

Refer to page 427

## Company:

Bayer (*Folicur 250EW*\* – PCP#29820, *Palliser* – PCP#30491)

Nufarm Agriculture Inc. (*Hornet 432 F* – PCP#32500)

**\*NOTE: *Folicur 250EW* is no longer manufactured but product still remains in the distribution system. This product may be removed from future editions.**

## Formulations:

*Folicur 250EW* – 250 g per L tebuconazole formulated as an emulsion in water.

- Container size - 8.1 L

*Palliser* – 432 g per L tebuconazole formulated as a suspension.

- Container size - 9.46 L

*Hornet 432 F* – 432 g per L tebuconazole formulated as a suspension.

- Container size - 2 x 9.46 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)		Timing
		<i>Palliser</i> */ <i>Hornet 432 F</i>	<i>Folicur 250EW</i>	
Wheat**	Suppression of fusarium head blight ( <i>Fusarium graminearum</i> )  Control of septoria glume blotch ( <i>Stagonospora nodorum</i> )	120 mL	200 mL	<b>Timing of application is critical:</b> Apply within the time period from when at least 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower.  <b>Spray coverage is essential for optimum efficacy:</b> Spray equipment must be set to provide good coverage to heads (e.g. forward and backward mounted nozzles, or nozzles that have a two-directional spray).
	Control of tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> ), leaf rust ( <i>Puccinia triticina</i> ), stem rust ( <i>Puccinia graminis</i> ), stripe rust ( <i>Puccinia striiformis</i> )	90 to 120 mL	150 to 200 mL	Apply at the first sign or very early stage of disease, up to the end of the flowering stage.  Use the higher rate when weather conditions are conducive for disease.
	Control of powdery mildew ( <i>Erysiphe graminis</i> )	120 mL	200 mL	
Barley**	Control of net blotch ( <i>Pyrenophora teres</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), scald ( <i>Rhynchosporium secalis</i> ), leaf rust ( <i>Puccinia hordei</i> ), stem rust ( <i>Puccinia graminis</i> ), stripe rust ( <i>Puccinia striiformis</i> ), septoria leaf blotch ( <i>Septoria passerinii</i> ), powdery mildew ( <i>Erysiphe graminis</i> )	90 to 120 mL	150 to 200 mL	Apply at the first sign or very early stage of disease, up to the end of the flowering stage.  Use the higher rate when weather conditions are conducive for disease.
Oat	Control of crown rust ( <i>Puccinia coronata</i> ), stem rust ( <i>Puccinia graminis</i> )	90 mL	150 mL	
	Control of Stagonospora ( <i>Septoria</i> ) leaf blotch ( <i>Stagonospora avenae</i> ); teleomorph – <i>Phaeosphaeria avenaria</i> f. sp. <i>avenaria</i>	-	150 to 200 mL	

## Crops, Diseases, Rates and Timing *continued*:

Crop	Diseases	Application Rate (per acre)		Timing
		<i>Palliser</i> */ <i>Hornet 432 F</i>	<i>Folicur 250EW</i>	
Soybean	Control of frogeye leaf spot ( <i>Cercospora sojina</i> )*** Control of powdery mildew ( <i>Microsphaera diffusa</i> )****	89 to 118 mL	150 to 200 mL	Apply when first symptoms of disease can be found or risk of infection is imminent.  Use the higher rate when disease pressure is severe.

\* *Palliser* and *Hornet 432 F* are recommended to be used with a registered non-ionic surfactant, such as *Agral 90* or *AgSurf*, at 1.25 L per 1000 L of spray solution.

\*\* *Folicur 250EW* and *Hornet 432F* may be applied in sequence with *Prosaro 250 EC* and *Prosaro XTR*. The minimum interval between applications is 7 days.

\*\*\* *Palliser* and *Hornet 432 F* are not registered for control of frogeye leaf spot in soybean.

\*\*\*\* *Palliser* and *Hornet 432 F* are not registered for control of powdery mildew in soybean.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 40 L per acre. Ensure thorough coverage of all wheat heads. Avoid excessive water volumes (maximum 80 L per acre) at flowering time because this can increase the risk of infection.
  - **Aerial:** minimum 19 L per acre.

## How it Works:

The active ingredient tebuconazole is a triazole demethylation inhibitor (DMI) fungicide with systemic broad-spectrum activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Herbicides:** In spring wheat and barley, *Palliser* or *Hornet 432 F* may be tank-mixed with *Refine Extra* for leaf diseases and respective weeds controlled (consult labels). In spring wheat only, *Palliser* or *Hornet 432 F* may be tank-mixed with *Buctril M* for leaf diseases and respective weeds controlled (consult labels).

**Insecticides:** For control of orange wheat blossom midge (*Sitodiplosis mosellana*) in wheat, *Palliser* or *Hornet 432 F* may be tank mixed with *Lorsban 4E* labeled rates. See respective labels for directions and use precautions.

**Fungicides:** None registered.

Bayer also supports the following mixes that are not on the *Folicur 250EW* label. Apply mixes according to the most restrictive use limitations for either product:

- **Insecticides:** *Decis*, *Lorsban*, *Sevin XLR*

Nufarm Agriculture Inc. also supports the following mixes that are not on the *Hornet 432F* label. Apply mixes according to the most restrictive use limitations for either product:

- **Insecticides:** *Decis*, *Matador*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed one application of this product per season.
- **Grazing:** DO NOT allow livestock to graze or feed green forage to livestock prior to 6 days after treatment. Straw cut after harvest may be fed or used for bedding.
- **Preharvest interval:**
  - *Soybean* – 20 days
  - *Barley, oat and wheat* – 36 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** Treated areas may be replanted immediately following harvest with any crop listed on the *Folicur 250EW* and *Hornet 432 F* labels. For crops not listed on these labels, DO NOT replant treated areas for 120 days after last application.
- **Storage:** Store in a cool, dry place and prevent cross contamination with other pesticides, fertilizers, food and feed.
- **Environment:** Any products containing tebuconazole should not be used in areas treated with this product during the previous season (use only in alternate years). This product is toxic to birds, small wild animals, aquatic organisms, and non-target plants.
  - DO NOT apply directly to water, or to areas where surface water is present. Maintain a buffer zone of 30 m near aquatic areas. Do NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.



**Hazard Rating:**

Danger – Skin irritant



Caution – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Topnotch

**Fungicide Group****3, 11**

Refer to page 427

**Company:**

ADAMA Canada – PCP#31126

**Formulation:**

143 g per L of azoxystrobin and 124 g per L of propiconazole as suspension concentrate.

**Crops, Diseases, Rates and Timing:**

Crops:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Wheat	Septoria leaf spot ( <i>Septoria</i> spp.), tan spot ( <i>Pyrenophora tritici-repentis</i> ), stripe rust ( <i>Puccinia striiformis</i> ), wheat leaf rust ( <i>Puccinia triticina</i> )	214 mL	Apply once between stem elongation and half- head emergence.
Barley	Septoria leaf spot ( <i>Septoria</i> spp.), net blotch ( <i>Pyrenophora teres</i> ), scald ( <i>Rhynchosporium secalis</i> ), barley leaf rust ( <i>Puccinia hordei</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), stripe rust ( <i>Puccinia striiformis</i> )		
Oat	Septoria leaf spot ( <i>Septoria</i> spp.), net blotch ( <i>Pyrenophora teres</i> ), crown rust ( <i>Puccinia coronata</i> var. <i>avenae</i> )		
Rye	Septoria leaf spot ( <i>Septoria</i> spp.), scald ( <i>Rhynchosporium secalis</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> )		
Triticale	Septoria leaf spot ( <i>Septoria</i> spp.), tan spot ( <i>Pyrenophora tritici-repentis</i> )		

**Application Information:**

- **Water Volume:**
  - **Ground:** minimum 40 L per acre.
  - **Aerial:** minimum 18 L per acre.
- DO NOT apply during periods of dead calm.
- DO NOT apply aerially when wind speed is greater than 16 km per hour.

**How it Works:**

Topnotch is composed of two active ingredients; azoxystrobin and propiconazole. Both active ingredients have systemic activity and this mixture can be used for broad spectrum coverage and preventative purpose. For more information refer to “Fungicide Modes of Action” on page 426.

**Tank Mixes:**

None registered.

**Note:** ADAMA Canada supports the following mixes that are not on the *Topnotch* label. Apply mixed according to the most restrictive use limitations for either product:

- **Herbicides:** *Axial*, *Broadband*, *Clodinafop (Ladder, Ladder All-In)*, *Sierra 2*
- **Insecticides:** *Silencer 120 EC*

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed one application of this product per year.
- **Preharvest interval:**
  - *Cereals and straw* – 45 days
  - *Forage and hay* – 30 days
- **Re-entry:** DO NOT re-enter treated areas within 12 hours of application.
- **Re-cropping:** A plant back interval of 105 days is required for all crops not listed in this label. Oat and rye may be planted 45 days after application.
- **Storage:** Store in original tightly closed container in a cool dry, well ventilated area away from feed and foodstuffs. DO NOT store below 0°C.
- **Environment:** Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, certain beneficial insects and may leach to ground water. Avoid application when heavy rain in forecast.

## Hazard Rating:



Caution Poison – Eye and Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Trivapro

*Trivapro is a co-pack of Trivapro A and Trivapro B. At the rates of application for Trivapro, not all diseases listed in the labels of the individual component (Trivapro A and Trivapro B) will be controlled. Please refer to the table below.*

**Fungicide Group**

**3, 7, 11**

*Refer to page 427*

## Company:

Syngenta Canada – *Trivapro A* PCP#32184; *Trivapro B* PCP#32185

## Formulations:

*Trivapro A:* 75 g per L azoxystrobin and 125 g per L propiconazole formulated as a suspension.

- Container size - 2 x 8.1 L (case), 320 L (bulk)

*Trivapro B:* 100 g per L benzovindiflupyr formulated as an emulsifiable concentrate.

- Container size - 2 x 2.43 L (case), 4 x 2 x 12 L (bulk)

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate	Application Timing
Barley, wheat (all types), oat, rye, triticale	Barley net blotch ( <i>Pyrenophora teres</i> ), tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf spot ( <i>Septoria</i> spp.), barley scald ( <i>Rhynchosporium secalis</i> ), barley leaf rust ( <i>Puccinia hordei</i> ), wheat leaf rust ( <i>Puccinia triticina</i> ), stripe rust ( <i>Puccinia striiformis</i> ), crown Rust ( <i>Puccinia coronata</i> var. <i>avenae</i> ), stem rust ( <i>Puccinia graminis</i> ), leaf rust ( <i>Puccinia recondita</i> )	40 acres per case or 800 acres per bulk pack  This delivers 0.4 L per acre of <i>Trivapro A</i> and 0.12 L per acre of <i>Trivapro B</i>	Apply between stem elongation and head half emergence up until the flag leaf stage
Corn	Control of rust ( <i>Puccinia sorghi</i> ), Northern corn leaf blight ( <i>Setosphaeria turcicum</i> ), grey leaf spot ( <i>Cercospora zeae-maydis</i> )	40 acres per case or 800 acres per bulk pack  This delivers 0.4 L per acre of <i>Trivapro A</i> and 0.12 L per acre of <i>Trivapro B</i>	Begin application prior to disease onset when conditions are conducive for disease development.  Make applications no closer than 7 days apart.

## Crops, Diseases, Rates and Timing *continued*:

Crop	Diseases	Application Rate	Application Timing
Soybean	Powdery mildew ( <i>Microsphaera diffusa</i> , <i>Erysiphe pisi</i> , <i>E. polygoni</i> ), anthracnose ( <i>Colletotrichum truncatum</i> )	40 acres per case or 800 acres per bulk pack  This delivers 0.4 L per acre of <i>Trivapro A</i> and 0.12 L per acre of <i>Trivapro B</i>	Make the first application prior to disease establishment.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 76 L per acre.
  - **Aerial:** minimum 17.5 L per acre.
- Do NOT apply during periods of dead calm.

## How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) with broad spectrum contact and systemic activity. The active ingredient propiconazole is a triazole fungicide with broad spectrum systemic activity. The active ingredient benzovindiflupyr is a succinate dehydrogenase inhibitor (SDHI) fungicide with broad spectrum activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 2 application per season and DO NOT exceed for than one application per season in forage and hay cereal crops.
  - Azoxystrobin is persistent and will carryover. It is recommended that this product not be used in areas treated with azoxystrobin during the previous season.
  - Benzovindiflupyr is persistent and may carryover. It is recommended that any products containing benzovindiflupyr not be used in areas treated with this product during the previous season.
- **Grazing:** Do NOT graze treated fields or feed treated forage to livestock.
- **Preharvest interval:**
  - **Corn:** 14 days for grain and sweet corn, and 30 days for forage
  - **Cereals:** 45 days for grain and straw, 30 days for forage and hay
  - **Soybean:** 30 days, 15 days for edible podded legume vegetables (Crop subgroup 6A), and 14 days for soybean hay
- **Re-entry:** DO NOT re-enter treated area within 12 hours after application.
- **Re-cropping:** Azoxystrobin is persistent and can carryover. Oat and rye should not be planted within 40 days of application. All other crops intended for food and feed should not be planted within 105 days of application of *Tribvapro*.
- **Storage:** DO NOT freeze.
- **Environment:** This product is toxic to fish and aquatic organisms. Observe buffer zones outlined in the label.

## Hazard Rating:



Poison

Warning: Eye and skin irritant

Danger: Corrosive to eyes and skin

For an explanation of the symbols used here see pages 7 and 8.

# Twinline

Fungicide Group

3, 11

Refer to page 427

## Company:

BASF Canada – PCP#30337

## Formulation:

130 g per L pyraclostrobin and 80 g per L metconazole formulated as a liquid.

- Container size - Case (2 x 8.1L); 64 L drum; 128 L Shuttle; or 400 L tote

## Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate (per acre)	Timing and Application Information
Wheat, triticale	Control of tan spot ( <i>Pyrenophora tritici-repentis</i> ), septoria leaf blotch ( <i>Septoria tritici</i> or <i>Stagonospora nodorum</i> ), leaf rust ( <i>Puccinia recondita</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), stripe rust ( <i>Puccinia striiformis</i> ), powdery mildew ( <i>Erysiphe graminis</i> f. sp. <i>tritici</i> )	150 to 200 mL	Prior to disease development or at onset of disease. Optimal application timing is at the flag leaf stage. Use the 202 mL per acre rate to obtain extended protection with maximum yield benefits.
Barley	Control of net blotch ( <i>Pyrenophora teres</i> ), spot blotch ( <i>Cochliobolus sativus</i> ), scald ( <i>Rhynchosporium secalis</i> ), stripe rust ( <i>Puccinia striiformis</i> )		
Oat	Control of crown rust ( <i>Puccinia coronata</i> )		
Rye	Control of leaf rust ( <i>Puccinia recondita</i> ), powdery mildew ( <i>Erysiphe graminis</i> )		
Barley, rye, wheat (all types), triticale	Suppression of fusarium head blight ( <i>Fusarium graminearum</i> ) and control of all leaf diseases controlled by lower application rates.	456 mL	When weather is warm and wet at head emergence and flowering. For wheat and rye apply at 20% flowering, for barley apply between full head emergence to up to 3 days after full emergence of the main stem.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum of 40 L per acre.
  - **Aerial:** minimum of 20 L per acre.

## How it Works:

The active ingredient metconazole is a broad spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. Best utilized as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 2 applications of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** Apply no later than end of flowering.

- **Re-entry:** DO NOT re-enter treated areas within 6 days.
- **Re-cropping:** A plant back interval of 35 days is required for all crops not listed on the label.
- **Storage:** Store in original tightly closed container. Protect from freezing.
- **Environment:** Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.
  - For ground application, buffer zones must be 1 m for protection of terrestrial habitats and aquatic habitats greater than 1 m deep and buffer zones must be 5 m from aquatic habitats less than 1 m deep.
  - For aerial application, buffer zones must be 10 m for protection of terrestrial habitats and aquatic habitats greater than 1 m deep and buffer zones must be 250 m from aquatic habitats less than 1 m deep.

### Hazard Rating:



Danger – Poison

Eye and skin irritant

For an explanation of the symbols used here see pages 7 and 8.

## Vertisan\*

Fungicide Group  
7

Refer to page 427

### Company:

Corteva Agriscience Agriculture Division of DowDuPont – PCP #30332

### Formulation:

200 g per L penthiopyrad formulated as an emulsifiable concentrate.

\* **NOTE:** This product is no longer manufactured but product still remains in the distribution system. This product may be removed from future editions.

### Crops, Diseases, Rates and Timing:

Crop	Diseases	Application Rate* (per acre)	Application Timing
Canola	Control of sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	500 to 600 mL	Apply at 20 to 50% bloom stage prior to disease development. Under high disease pressure, make a second application 7 to 14 days later.
Chickpea, lentil, field pea, dry bean, faba bean	Control of ascochyta blight ( <i>Ascochyta</i> spp.)	400 to 600 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval.
	Grey mould ( <i>Botrytis cinerea</i> )	500 to 600 mL	
Wheat	Suppression of septoria leaf blotch ( <i>Septoria tritici</i> ); control of stem rust ( <i>Puccinia graminis</i> ), leaf rust ( <i>P. recondita</i> f.sp. <i>tritici</i> )	485 to 700 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. For optimizing yield and flag leaf control, apply at Feeke's 9, 'flag leaf out'.
Barley	Suppression of septoria leaf blotch ( <i>Septoria tritici</i> ); control of stem rust ( <i>Puccinia graminis</i> )		
Triticale	Suppression of septoria leaf blotch ( <i>Septoria tritici</i> ); control of stem rust ( <i>Puccinia graminis</i> ), leaf rust ( <i>P. recondita</i> f.sp. <i>tritici</i> )		
Oat	Control of stem rust ( <i>Puccinia graminis</i> )		
Rye	Control of leaf rust ( <i>Puccinia recondita</i> f.sp. <i>tritici</i> )		
Corn	Control of common rust ( <i>Puccinia sorghi</i> )	400 to 700 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval. For suppression of grey leaf spot, add a non-ionic surfactant.

## Crops, Diseases, Rates and Timing *continued*:

Crop	Diseases	Application Rate* (per acre)	Application Timing
Soybean	Suppression of brown spot ( <i>Septoria glycines</i> )	400 to 700 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval.
Sunflower	Suppression of rust ( <i>Puccinia helianthi</i> ) and sclerotinia head rot ( <i>Sclerotinia sclerotiorum</i> )	700 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval.
Potato	Suppression of early blight ( <i>Alternaria solani</i> )	400 to 700 mL	Begin applications prior to disease development and continue on a 7 to 14 day interval.
	Grey mould ( <i>Botrytis cinerea</i> )	500 to 600 mL	
	Suppression of stem rot ( <i>Rhizoctonia solani</i> )	15.5 to 31 mL per 100 m row	In-furrow at planting, using 1.4 to 1.75 L water per 100 row metres. Do not exceed 0.7 L per acre.

\* Use higher rate and shorter interval when disease pressure is high.

## Application Information:

- **Water Volume:**
  - **Ground:** 45 L per acre.
  - **Aerial:** 16 L per acre. Use sufficient water to obtain thorough coverage of plants. DO NOT apply under periods of dead calm. Avoid application of this product when winds are gusty.

## How it Works:

The active ingredient penthiopyrad is a carboxamide fungicide with broad spectrum, locally systemic and curative properties recommended for foliar and soil borne plant diseases. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426. Make no more than 2 sequential applications before switching to a fungicide with a different mode of action.
- **Maximum seasonal use rate:**
  - **Canola, dry legumes, soybean** – 1.2 L per acre
  - **Cereal grains, corn** – 1.4 L per acre
  - **Sunflower** – 1.8 L per acre
  - **Potato** – 2 L per acre
- **Grazing:** Cereals, corn and soybean may be used for grazing or forage 0 days after the last application.
- **Pre-harvest interval:** DO NOT apply within the following number of days prior to harvest:
  - **Canola and dry legumes** – 21
  - **Soybean and sunflower** – 14
  - **Corn and potato** – 7
  - **Cereal grains** – no restriction
- **Re-Entry:** DO NOT re-enter treated areas until 12 hours after application. For corn detasselling do not enter treated areas for 3 days.
- **Re-cropping:** Crops and crop groups on the *Vertisan* label as well as the following crops may be planted immediately after harvest: alfalfa, low growing berries (strawberries), Brassica (cole) leafy vegetable, bulb vegetable (onion), cucurbit vegetables (cucumber, melons, squash), fruiting vegetables (tomato, pepper), leafy vegetables (lettuce, celery, spinach), legume vegetables (succulent), root vegetables (carrot, radish, turnip). All other crops cannot be planted until 12 months after last application.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.
- **Environment:** This product is toxic to aquatic organisms. When using *Vertisan* consult the product label for buffer zones.

## Hazard Rating:



Danger – Eye irritant and skin irritant  
Potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Zampro

Fungicide Group

40, 45

Refer to page 427

## Company:

BASF Canada – PCP#30321

## Formulation:

225 g per L dimethomorph and 300 g per L ametoctradin formulated as a suspension concentrate.

- Container size - 4 x 4.14 L

## Crops, Diseases, Rates and Timing:

Crop	Diseases Controlled	Application Rate (per acre)	Application Timing
Potato	Late blight ( <i>Phytophthora infestans</i> )	320 to 400 mL	Begin applications prior to disease development and continue on a 5 to 10 day interval. Use the higher rate and shorter interval when disease pressure is high. The addition of a spreading/penetrating adjuvant is recommended to improve disease control performance.
	Tuber blight ( <i>Phytophthora infestans</i> )	400 mL	When used in accordance to label recommendations, <i>Zampro</i> also reduces tuber blight when applied immediately prior to or after vine kill.

## Application Information:

- **Water Volume:**
  - **Ground:** minimum 80 L per acre.
  - **Aerial:** minimum 20 L per acre.

## How it Works:

The active ingredient dimethomorph is a carboxylic acid amide fungicide with contact, systemic and antispore activity. The active ingredient ametoctradin is a quinone x inhibitor fungicide with contact and antispore activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

- **Resistance management:** Refer to page 426.
- **Maximum number of applications:** DO NOT exceed 3 applications of this product per season
- **Grazing:** No restrictions listed.
- **Preharvest Interval:** 4 days
- **Re-entry:** Re-entry interval after application is 12 hours.
- **Re-cropping:** A plant back interval of 30 days is required for all crops not listed on the label
- **Storage:** Store in original tightly closed container. Protect from freezing.
- **Environmental Hazards:** Avoid run-off from treated areas into aquatic areas. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.
- **Toxicity:** Toxic to aquatic organisms.

## Hazard Rating:



Warning Poison – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

## Table 6. Seed Treatment Products for Barley, Oats, and Wheat

1. suppression only
2. winter wheat only
3. control of seed-borne *Aspergillus* spp. and suppression of seed-borne *Penicillium* spp.
4. and *Alternaria* spp.
5. and suppression of net blotch (*Pyrenophora teres*)





Table 7. Seed Treatment Products for Buckwheat, Grasses, Millet, Rye, Sorghum, and Triticale

PRODUCTS	BUCKWHEAT		GRASSES		MILLET		RYE						SORGHUM			TRITICALE								INSECTS
	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	INSECTS	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	INSECTS	
	Fusarium spp., Pythium spp., Rhizoctonia spp.	Common root rot ( <i>Cochliobolus sativus</i> )																						
Page																								
Allegiance FL																								
565																								
Belmont 2.7 FS																								
565																								
Cover 2																								
558																								
Cruiser 5FS																								
535																								
Cruiser																								
Vibrance																								
541																								
Quattro																								
Insure Cereal																								
553																								
Insure Cereal																								
554																								
FX4																								
INTEGO Solo Fungicide																								
557																								
Metlock CT																								
567																								
Rancona Pinnacle																								
558																								
Rancona Trio																								
572																								
Raxil Pro																								
575																								
Vibrance Quattro																								
590																								
Vitalfo Brands																								
594																								

1. suppression only
2. Pythium only
3. Fusarium and Rhizoctonia only
4. product does not specify causal pathogen
5. and Alternaria spp.
6. Penicillium only

Table 8. Seed Treatment Products for Oilseed Crops

PRODUCTS	Page	CANOLA						MUSTARD <sup>1</sup>						FLAX	SUNFLOWERS	SAFFLOWER						
		DISEASES					INSECTS	DISEASES					INSECTS	DISEASES	DISEASES	DISEASES						
		Alternaria spp.	Blackleg (seed-borne) ( <i>Leptosphaeria maculans</i> )	Fusarium spp.	Pythium spp.	Rhizoctonia spp.	Cutworm	Flea beetles	Alternaria spp.	Blackleg (seed-borne) ( <i>Leptosphaeria maculans</i> )	Fusarium spp.	Pythium spp.	Rhizoctonia spp.	Seed decay, seedling blight, damping off	Cutworm	Flea beetles	Fusarium spp.	Pythium spp.	Rhizoctonia solani	Downy mildew ( <i>Plasmopora haldstedii</i> )	Pythium spp.	Seed decay, seedling blight, damping off
Allegiance FL	565				•															•	•	
Belmont 2.7 FS	565				•															•	•	
Fortenza	543						•	•						•	•							
Gaucha CS FL	547	•	•		•	•		•	•		•	•				•						
Helix Vibrance	550	•	•	•	•	•		•	•	•	•	•			•							
Insure Pulse	555								•	•	•	•	•				•		•			
INTEGO Solo Fungicide	557				•						•							•		•		• <sup>3</sup>
Lumiderm	543						•	•														
Lumisena	559																		•			
NipsIt INSIDE 600 Insecticide	534							•							•							
Rancona V RS	571		•	•		•			•	•		•										
Sombrero 600 FS	551							•							•							
Poncho 600 FS	534							•														
Prosper EverGol	570	•	•	•	•	•		•	•	•	•	•			•							
Visivio	592	•	•	•	•	•		•	•	•	•	•			•							
VitaFlo Brands	594															•		•				

1. refer to product pages and labels for specific information on mustard type

2. product does not specify causal pathogen

3. *Pythium* spp. only

Table 9. Seed Treatment Products for Dry Bean, Field Pea, and Lentil

PRODUCTS	Page	DRY BEAN										FIELD PEA										LENTIL													
		DISEASES								INSECTS		DISEASES								INSECTS		DISEASES								INSECTS					
		General seed rot/root rot/damping-off/seedling blight	Anthracnose (seed-borne) ( <i>Colletotrichum</i> spp.)	Aphanomyces root rot (early-season ( <i>Aphanomyces euteiches</i> ))	Ascochyta blight ( <i>Ascochyta</i> spp.)	<i>Botrytis</i> spp. (seed-borne)	<i>Fusarium</i> spp. (seed- and/or soil-borne)	<i>Pythium</i> spp. (soil-borne)	<i>Rhizoctonia</i> spp. (soil-borne)	White mould ( <i>Sclerotinia sclerotiorum</i> )	Seed corn maggot	Wireworms	General seed rot/root rot/damping-off/seedling blight	Anthracnose (seed-borne) ( <i>Colletotrichum</i> spp.)	Ascochyta blight ( <i>Ascochyta pinodes</i> )	Aphanomyces root rot (early-season ( <i>Aphanomyces euteiches</i> ))	<i>Botrytis</i> spp. (seed-borne)	Downy mildew ( <i>Peronospora viciae</i> )	<i>Fusarium</i> spp. (seed- and/or soil-borne)	<i>Pythium</i> spp. (soil-borne)	<i>Rhizoctonia</i> spp. (soil-borne)	<i>Sclerotinia sclerotiorum</i> (seed-borne)	Pea leaf weevil	Wireworms	General seed rot/root rot/damping-off/seedling blight	Anthracnose (seed-borne) ( <i>Colletotrichum</i> spp.)	Aphanomyces root rot (early-season ( <i>Aphanomyces euteiches</i> ))	Ascochyta blight ( <i>Ascochyta lentis</i> )	<i>Botrytis</i> spp. (seed-borne)	<i>Fusarium</i> spp. (seed- and/or soil-borne)	<i>Pythium</i> spp. (soil-borne)	<i>Rhizoctonia</i> spp. (soil-borne)	<i>Sclerotinia sclerotiorum</i> (seed-borne)	Wireworms	
Agrox FL	531	• <sup>1</sup>										• <sup>1</sup>												• <sup>1</sup>											
Allegiance FL	565																																		
Apron Advance	532		•										•					•	•	•															
Apron Maxx RTA + Vibrance 500FS (co-pack)	532		•										•					•	•	•															
Belmont 2.7 FS	565																•		•																
Cruiser 5FS	535										•	•											•	•										•	
Cruiser Maxx Vibrance Beans	539		•								•	•																							
Cruiser Maxx Vibrance Pulses	540												•					•	•	•			•	•										•	
Heads Up Plant Protectant	549																																		
Insure Pulse	555		• <sup>2</sup>		•	• <sup>2</sup>	•	•	•				• <sup>2</sup>	•		• <sup>2</sup>		•	•	•						• <sup>2</sup>		•	• <sup>2</sup>	•	•	•	•		
INTEGO Solo Fungicide	557			• <sup>2</sup>				•							• <sup>2</sup>				•							• <sup>2</sup>					•				
Stress Shield 600	551										•												•	•										•	
Trilex EverGol	583				• <sup>2</sup>	•	•	•	•				• <sup>2</sup>		•			•	•	•								• <sup>2</sup>	•	•	•	•	•		
Trilex EverGol Shield	585				• <sup>2</sup>	•	•	•	•		•		• <sup>2</sup>		•			•	•	•			•	•				• <sup>2</sup>	•	•	•	•	•		•
Vibrance Maxx RFC	587		•					•	•	•			•					•	•	•	•							•	•	•	•	•	•		
Vibrance Maxx RFC with Intego Seed Treatment	589		•	• <sup>2</sup>				•	•	•			•	• <sup>2</sup>				•	•	•	•	•				• <sup>2</sup>	•	•	•	•	•	•	•		
Vibrance Maxx RTA	587		•					•	•	•			•					•	•	•								•	•	•	•	•			
VitaFlo Brands	594		•					•					•					•	•	•	•								•	•	•	•	•		

1. product does not specify causal pathogen

2. suppression

3. low tannin lentils destined for export or seed production only



Table 10. Seed Treatment Products for Chickpea and Faba Bean

PRODUCTS	Page	CHICKPEA				FABA BEAN																
		DISEASES			INSECTS	DISEASES			INSECTS													
		General seed rot/root rot/damping-off/seedling blight	Anthracnose (seed-borne) ( <i>Colletotrichum</i> spp.)	Ascochyta blight ( <i>Ascochyta rabiei</i> )	<i>Botrytis</i> spp. (seed-borne)	<i>Fusarium</i> spp. (seed- and/or soil-borne)	<i>Pythium</i> spp. (soil-borne)	<i>Rhizoctonia</i> spp. (soil-borne)	<i>Sclerotinia sclerotiorum</i> (seed-borne)	Wireworms		General seed rot/root rot/damping-off/seedling blight	Anthracnose (seed-borne) ( <i>Colletotrichum</i> spp.)	Aphanomyces root rot (early-season ( <i>Aphanomyces euteiches</i> )	Ascochyta blight ( <i>Ascochyta</i> spp.)	<i>Botrytis</i> spp. (seed-borne)	<i>Fusarium</i> spp. (seed- and/or soil-borne)	<i>Pythium</i> spp. (soil-borne)	<i>Rhizoctonia</i> spp. (soil-borne)	Pea leaf weevil	Wireworms	
Agrox FL	531	1										1										
Allegiance FL	565																					
Apron Advance	532																					
Apron Maxx RTA + Vibrance 500 FS (co-pack)	532																					
Belmont 2.7 FS	565																					
Cruiser 5FS	535																					
Cruiser Maxx Vibrance Pulses	540																					
Insure Pulse	555																					
INTEGO Solo Fungicide	557																					
Stress Shield 600	551																					
Trilex EverGol	583																					
Trilex EverGol Shield	585																					
Vibrance Maxx RFC	587																					
Vibrance Maxx RFC with Intego Seed Treatment	589																					
Vibrance Maxx RTA	587																					

1. product does not specify causal pathogen

2. suppression

Table 11. Seed Treatment Products for Legumes

PRODUCTS	Page	ALFALFA		BIRDS-FOOT TREFOIL		CLOVER		SAINFOIN		VETCH	
		DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES	DISEASES
		General seed rot/root rot/damping-off/seedling blight	<i>Pythium</i> spp. (soil-borne)		<i>Pythium</i> spp. (soil-borne)		<i>Pythium</i> spp. (soil-borne)		<i>Pythium</i> spp. (soil-borne)		<i>Pythium</i> spp. (soil-borne)
Allegiance FL	565		•	•	•	•	•	•	•	•	•
Belmont 2.7 FS	565		•	•	•	•	•	•	•	•	•

1. product does not specify causal pathogen



Table 12. Seed Treatment Products for Soybean

PRODUCTS	Page	DISEASES								INSECTS			
		General Seed/Root/Seedling Rots/Blights	Ascochyta blight ( <i>Ascochyta</i> spp.)	<i>Botrytis</i> spp. (seed- and/or soil-borne)	<i>Fusarium</i> spp. (seed- and/ or soil-borne)	<i>Phomopsis</i> spp. (seed- or soil-borne)	<i>Phytophthora</i> spp. (soil-borne)	<i>Pythium</i> spp. (soil-borne)	<i>Rhizoctonia solani</i> (soil-borne)	White mould ( <i>Sclerotinia sclerotiorum</i> )	Seedcorn maggot	Wireworms	Seed corn maggot
Agrox FL	531	• <sup>1</sup>											
Alias 240	551											•	
Allegiance FL	565						•	•					
Apron Maxx + Vibrance 500 FS (co-pack)	532				•		•	•	•				
Belmont 2.7 FS	565						•	•					
Cruiser 5FS	535										•		
Cruiser Maxx Vibrance Beans	539				•		•	•	•		•	•	
EverGol Energy	546			•	•			•	•				
Fortenza	543												•
Heads Up Plant Protectant	549								•				
Insure Pulse	555		•	• <sup>2</sup>	•			•	•				
INTEGO Solo Fungicide	557						• <sup>2</sup>	•					
Lumisena	559						•						
Sombrero 600 FS	551										•	•	•
Stress Shield 600	551										•	•	•
Vibrance 500FS	586										•	•	
Vibrance Maxx RFC	587				•		•	•	•				
Vibrance Maxx RFC with INTEGO Seed Treatment	589				•		•	•	•				
Vibrance Maxx RTA	587				•		•	•	•				
Vitaflor Brands	594				•		•	•	•				

1. Product does not specify causal pathogen  
2. Suppression only

Table 13. Seed Treatment Products for Corn

PRODUCTS	Page	DISEASES						INSECTS			
		General Seed/Root/Seedling Rots/Blights	<i>Aspergillus</i> spp., <i>Penicillium</i> spp.	Downy mildew ( <i>Sclerophthora macrospora</i> )	<i>Fusarium</i> spp. (seed- and/ or soil-borne)	Head smut (seed-borne) ( <i>Sporisorium holci-sorghii</i> )	<i>Pythium</i> spp. (soil-borne)	<i>Rhizoctonia</i> spp.	Corn rootworm	Cutworms	Seedcorn maggot
Agrox FL	531	• <sup>1</sup>									
Allegiance FL	565			•			•				
Belmont 2.7 FS	565			•			•				
Cruiser 5FS	535								•		•
Cruiser Maxx Corn	537		•		•		•	•			•
Fortenza	543									•	
INTEGO Solo Fungicide	557						•				
Maxim Quattro	563		•		•		•	•			
Metlock CT	567				•		•	•			
NipsIt INSIDE 600 Insecticide	534								•		•
Poncho 600 FS	534								•		•
Sombrero 600 FS	551										•
Vitaflor Brands	594	• <sup>3</sup>			•						

1. Product does not specify causal pathogen  
2. Some products include black cutworms and white grubs  
3. *Penicillium* only



Table 14. Seed Treatment Products for Potato

PRODUCTS	DISEASES						INSECTS					
	Blackleg	<i>Fusarium</i> spp. <sup>1</sup>	Late blight (seed-borne) ( <i>Phytophthora infestans</i> )	Pink rot ( <i>Phytophthora erythroseptica</i> )	<i>Rhizoctonia solani</i> <sup>2</sup>	Silver Scurf ( <i>Helminthosporium solani</i> )	Verticillium Wilt	Aphids	Colorado Potato Beetle	Potato Flea Beetle	Potato Leafhopper	Wireworms
<i>Actara</i>								•	•	•	•	
<i>Admire SPT</i>								•	•	•	•	
<i>Alias 240 SC</i>								•	•	•	•	
<i>Cruiser Maxx Potato Extreme</i>		•			•	•		•	•	•	•	
<i>Emesto Silver</i>		•			•	•						
<i>Fortenza</i>									•			
<i>Heads Up Plant Protectant</i>					•							
<i>Maxim D/Maxim PSP/Maxim MZ PSP</i>		•			•	•		•	•	•	•	•
<i>NipsIt INSIDE 600 Insecticide</i>												
<i>Potato ST 16</i>		•										
<i>Reason 500SC</i>			•									
<i>Revus</i>			•	•								
<i>Senator PSPT</i>		•				•	•					
<i>Solan MZ</i>		•										
<i>Titan ST</i>								•	•	•	•	•
<i>Titan Emesto</i>		•			•	•		•	•	•	•	
<i>Tuberseal</i>		•										
<i>Verimark</i>											•	
<i>Vibrance Ultra Potato</i>		•	•	•	•	•						

Refer to product pages and labels for specific information on pathogens and insects listed as well as expectations for control vs suppression.

Before using any pesticide on potatoes, consult the list of Agricultural Pesticide Approved for Use from Simplot Canada and McCain Foods (Canada)

1. May include seed piece decay and/or dry rot.
2. May include black scurf and/or stem and stolon canker.

Table 15. Seed Treatment Products for Potato Post-harvest Diseases

PRODUCTS	Page	DISEASES						
		Silver Scurf ( <i>Helminthosporium solani</i> )	<i>Fusarium</i> spp. <sup>2</sup>	<i>Rhizoctonia</i> spp.	Other Storage Rots (Phoma, Oospora)	Bacterial Soft Rot	Bacterial Ring Rot	<i>Phytophthora</i> spp. <sup>3</sup>
Confine Extra	569	•						•
General Storage Disinfectant <sup>1</sup>	548						•	
Mertect SC	564	•	•	•	•			
Rampart	569							•
Serenade OPTI	580	•						
Stadium	581	•	•					
StorOx	582	•	•					

Refer to product pages and labels for specific information on pathogens

and insects listed as well as expectations for control vs suppression.

Before using any pesticide on potatoes, consult the list of Agricultural Pesticide

Approved for Use from Simplot Canada and McCain Foods (Canada)

1. Not for use on potatoes. Use for disinfecting potato storages and equipment.
2. May include storage rot, tuber rot, and/or dry rot (refer to product page/label).
3. May include *Phytophthora infestans* (late blight) and/or *Phytophthora erythroseptica* (pink rot).

## Seed Treatment Product Pages

# Agrox FL

Fungicide Group  
M4

Refer to page 428

## Company:

Norac Concepts Inc. – PCP#12028

## Formulation:

30% captan formulated as a flowable suspension seed treatment.

- Container sizes - 20 L, 415 L, 1000 L returnable container

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)
Dry bean	Storage rot, seed decay, root rot, damping off, seedling blights	280 mL
Chickpea		280 mL
Faba bean		280 mL
Lentil		280 mL
Field pea		280 mL
Soybean		280 mL
Corn (field)		120* to 200 mL
Corn (sweet)		240* to 340 mL

\* Product is to be applied at this rate only by a professional applicator using equipment which will assure complete and uniform coverage.

## Application Information:

For use prior to storage or as a seed treatment. Mix the recommended amount of *Agrox FL* with the amount of water required for the slurry treater equipment to be used. Seed treated by the slurry method should not be bagged or stacked until it has dried. A colourant must be added to this product to colour the treated seed.

## How it Works:

The active ingredient captan is a phthalimide fungicide with multi-site protective activity. For more information refer to “Fungicide Modes of Action” on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled, “This seed has been treated with *Agrox FL*. Poisonous to man and animals. DO NOT use for food or feed. DO NOT sell to oil mills.”
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** DO NOT freeze. Product must be stored at ambient temperatures above 0°C and must not be stored with herbicides, feed, food or fertilizer.
- **Environment:** DO NOT contaminate food, feed, or any body of water.
- **Compatibility with *Rhizobia*-based inoculants:** No information listed.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Apron Advance/Apron Maxx RTA + Vibrance 500FS (Co-pack)

Apron Maxx RTA is only available as part of a co-pack with Vibrance 500FS (sedaxane fungicide, page 586), Cruiser Maxx Vibrance Pulses (thiamethoxam, fludioxonil, metalaxyl-M and S-isomer, sedaxane, page 540), Vibrance Maxx RTA (fludioxonil, metalaxyl-M and S-isomer, Page 587)

**Fungicide Group**

**1, 4, 12**

*Apron Advance*

**Fungicide Group**

**4, 7, 12**

*Apron Maxx RTA*

*Refer to pages 427 and 428*

## Company:

Syngenta Canada Inc. (Apron Advance – PCP#30627, Apron Maxx RTA – PCP#27577); Vibrance 500FS – PCP#30438))

## Formulation:

Active ingredient	Formulation		
	Apron Advance	Apron Maxx RTA	Vibrance 500FS
Fludioxonil	25 g/L	0.73%	
Metalaxyl-M and S-isomer	20 g/L	1.10%	
Thiabendazole	150 g/L	-	
Sedaxane	-	-	500g/L
Rates:	100 mL per 100 kg of seed	325 mL per 100 kg of seed	10 mL per 100 kg of seed

## Crops, Diseases and Rates:

Crop	Diseases Controlled by <i>Apron Advance</i>	Diseases Controlled by <i>Apron Maxx RTA + Vibrance 500 FS</i>	Rate (per 100 kg of seed)	
			<i>Apron Advance</i>	<i>Apron Maxx RTA</i> + <i>Vibrance 500 FS</i>
Chickpea	Seed-borne ascochyta blight ( <i>Ascochyta rabiei</i> ); seed rot/pre-emergence damping-off and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)		100 mL	325 mL + 10mL
Dry bean	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Pythium</i> spp.); anthracnose ( <i>Colletotrichum</i> spp.)		100 mL	325 mL + 10mL
Faba bean	Seed rot/premergence damping-off and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Pythium</i> spp.); anthracnose ( <i>Colletotrichum</i> spp.)	Seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.)	100 mL	325 mL + 10mL
Field pea	Seed-borne ascochyta blight and foot rot ( <i>Ascochyta pinodes</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.)		100 mL	325 mL + 10mL
Lentil	Seed-borne ascochyta blight ( <i>Aschochyta lentis</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)		100 mL	325 mL + 10mL



## Crops, Diseases and Rates *continued*:

Crop	Diseases Controlled by <i>Apron Advance</i>	Diseases Controlled by <i>Apron Maxx RTA + Vibrance 500 FS</i>	Rate (per 100 kg of seed)	
			<i>Apron Advance</i>	<i>Apron Maxx RTA</i> + <i>Vibrance 500 FS</i>
Soybean*	–	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight ( <i>Phomopsis</i> spp.); early season root rot ( <i>Phytophthora megasperma</i> var. <i>sojae</i> )	–	325 mL + 10mL

\* Soybean is a registered crop for treatment with *Apron Maxx RTA* only.

## Application Information:

*Apron Advance* is a seed treatment formulation for use in commercial seed treatment plants, and for on-farm treatment using auger treating only; do not use in hopper box or seed drill. *Apron Maxx RTA* is a ready-to-apply seed treatment formulation for use in commercial seed treatment plants and for on-farm treatment using standard gravity flow or mist type seed treatment equipment. Also used in treat-on-the-go air seeders.

These products contain a pigment which will colour the treated seed. However, users are responsible for ensuring that the treated seed, when dried and ready for bagging, storage or seeding has an unnatural colour. If the pigment contained in the formulation does not colour the seed adequately, additional colourant must be added to the mixture while treating the seed. Ensure uniform coverage of the seed, as uneven seed coverage may not give the desired level of disease control. Treatment of highly damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Allow the seed to dry before bagging, storing or seeding.

## How it Works:

Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including *Pythium* damping-off. Thiabendazole is a benzimidazole fungicide with both contact and systemic activity. Sedaxane is a succinate dehydrogenase inhibitor fungicide with preventative and systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. For more information refer to “Fungicide Modes of Action” on page 426.

## Tank Mixes:

*Apron Maxx RTA* is available in a co-pack with *Vibrance 500FS* (*Vibrance Maxx*). Follow the label directions for each product and use the most restrictive precautions and limitations.

No other tank mixes listed.

## Restrictions:

Resistance management: Refer to page 426. Experience has shown that strains of fungus resistant to metalaxyl-M may develop. Failure to control the disease will likely result in crop damage and/or yield losses. If disease appears in a treated field, consult the government extension specialist immediately.

- **Labelling:** All seed treated with *Apron Maxx RTA + Vibrance 500FS* must be labelled “This seed has been treated with fludioxonil metalaxyl-M and sedaxane fungicides. DO NOT use for food, feed or oil purposes”. All seed treated with *Apron Advance* must be labelled “This seed has been treated with thiabendazole, fludioxonil and metalaxyl-M and S-isomer fungicides. Do not use for food, feed or oil purposes”.
- **Grazing:** No restrictions listed.
- **Re-cropping:** DO NOT plant any crop other than soybean, dry bean, chickpea, lentil or dry pea within 30 days to fields in which treated seed was planted.
- **Storage:** Store away from feeds and feedstuffs. Store between 0 and 30°C. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up.
- **Environment:** This product is toxic to fish and other aquatic organisms. Do not apply directly to aquatic habitats; do not contaminate water by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up.

- **Compatibility with *Rhizobia*-based inoculants:** These products are compatible with *Rhizobia*-based inoculants. Check with inoculant manufacturer for details and refer to product labels prior to use. Mixing with inoculants may increase drying time while treating. Recalibrate the seed drill before planting treated seed.

## Hazard Rating:

None listed.

# Clothianidin

## Insecticide Group

4

*NipsIt INSIDE 600 Insecticide/Poncho 600 FS/Titan*

*Poncho 600 FS is available to commercial seed treaters only. NipsIt INSIDE 600 Insecticide is available for on-farm seed treatment for wheat and potato only. Titan is available for on-farm seed treatment.*

Refer to page 600

## Company:

Valent Canada Inc. distributed by Nufarm Agriculture (*NipsIt INSIDE 600 Insecticide* – PCP#28975)

Bayer (*Poncho 600 FS* – PCP#27453; *Titan* – PCP#27449)

## Formulation:

600 g per L clothianidin formulated as a suspension.

- *NipsIt INSIDE 600 Insecticide* container size – 3.78 L
- *Poncho 600 FS* container size – 56.8 L, 100 L, 113 L, 200 L, 1000 L
- *Titan* container size – 1 L, 3.8 L, 10 L, 200 L, 1000 L

## Crops, Insects and Rates:

Product	Crop	Insects Controlled	Rate per 100 kg of seed
<i>NipsIt INSIDE 600 Insecticide</i> <i>Poncho 600 FS</i>	Canola, rapeseed	Flea beetles	250, 333 or 666 mL <sup>1</sup>
	Corn	Wireworm, seed corn maggot, black cutworm <sup>3</sup>	33.3 to 66.6 mL per 80,000 units of seed
		Corn rootworm	166.7 mL per 80,000 units of seed
<i>NipsIt INSIDE 600 Insecticide</i> <i>Titan</i>	Potatoes	Wireworms	20.8 mL
		Aphid (potato, green peach, foxglove and buckthorn aphids), Colorado potato beetle, potato leafhopper, potato flea beetle (overwintered adults and suppression of second generation)	10.4 to 20.8 mL
<i>NipsIt INSIDE 600 Insecticide</i>	Wheat	Wireworm	17 to 100 mL <sup>2</sup>

<sup>1</sup> Increasing rates for low, moderate and severe flea beetle pressure.

<sup>2</sup> Rate of 17 mL per 100 kg of seed provides wireworm suppression only. Use higher rates of 33 to 100 mL per 100 kg of seed on wheat seed to be planted into fields known to have a history of severe wireworm infestations.

<sup>3</sup> *NipsIt INSIDE 600 insecticide* and *Poncho 600FS* only.

## Application Information:

*Poncho 600 FS* is for use in commercial seed treatment facilities with closed transfer systems only. *Poncho 600 FS* DOES NOT contain a colourant. An appropriate colour must be added when this product is applied. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

*Titan* is a seed piece treatment. Apply specified rate as a diluted spray onto seed pieces using a well contained, shielded spray system to prevent the loss of any liquid. Apply only in areas with adequate ventilation or in areas equipped to remove spray mist or dust. Agitate or stir spray solution as needed. For optimal insect control good coverage of seed pieces is required. DO NOT dilute with any more than 6 parts water to 1 part *Titan*. Plant seed pieces as soon as possible after cutting and treating.

In canola, rapeseed, Ethiopian mustard (*Brassica carinata*) and corn *NipsIt INSIDE 600 Insecticide* is for use with commercial seed treaters (facilities and mobile treaters) with closed transfer including closed mixing, loading, calibrating and closed treatment equipment only. No open transfer of *NipsIt INSIDE 600 Insecticide*.

In wheat, *NipsIt INSIDE 600 Insecticide* is for use in commercial seed treatment facilities (with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only) and for use on-farm (open transfer including open mixing, loading, calibrating, and open treatment equipment is allowed).

*NipsIt INSIDE 600 Insecticide* contains no colourant. An appropriate colourant must be added when this product is applied.

## How it Works:

Clothianidin is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600.

## Tank Mixes:

None listed for *Poncho 600 FS* or *Titan*.

Nufarm Agriculture supports the following seed treatment mixes that are not on the *NipsIt INSIDE 600 Insecticide* label:

- **Wheat** – For enhanced wireworm protection, an additional 17 to 83 mL of *NipsIt INSIDE 600* can be tank-mixed with *NipsIt SUITE Cereals OF Seed Protectant*.
- Follow the label directions for each product and use the most restrictive precautions and limitations.

## Restrictions:

Resistance management: Refer to page 599. DO NOT make any subsequent application of a group 4 insecticide (in-furrow or foliar application) following treatment with any of these products.

**NOTE:** When using a seed flow lubricant for planting corn and soybean seed treated with neonicotinoid insecticides (containing the active ingredients clothianidin, imidacloprid or thiamethoxam), use only a dust-reducing fluency agent. Talc and graphite are not permitted.

- **Labelling:** Treated seed must be labelled as follows: "This seed has been treated with clothianidin. DO NOT use for food, feed or oil processing. Store away from feeds and other foodstuffs."
- **Grazing:** None listed.
- **Re-cropping:**
  - For *Poncho 600 FS*, corn and canola may be replanted at any time.
  - For *Titan*, corn, and canola and potatoes may be replanted at any time.
  - For all products, a one year plant back interval is required for leafy, root and tuber vegetables.
  - A 30-day plant back is required for cereals, grasses, nongrass animal feeds, soybeans and dry beans.
  - For *NipsIt INSIDE 600 Insecticide* registered crops may be replanted at any time. A 30-day plant-back interval is required on cereals (except wheat), grasses, non-grass animal feeds, soybeans and dry beans.
- **Storage:** Protect products from freezing. DO NOT contaminate water, food or feed by storage, disposal or by cleaning of equipment. Store in a cool place. DO NOT store in direct sunlight. Store away from food or feed. DO NOT store treated seed above 25°C or in direct sunlight. Treated seed stored for periods in excess of 9 months should be tested for germination before planting.
- **Environment:** These products are toxic to aquatic invertebrates. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate water when disposing of equipment wash waters. These products are toxic to birds and mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface.

## Hazard Rating:



Warning – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Cruiser 5FS

Insecticide Group

4

Contains insecticide only. On-farm use for cereals and pulses up to a maximum application rate of 30 g per 100 kg seed. Higher application rates for commercial seed treaters only.

Refer to page 600

## Company:

Syngenta Canada Inc. – PCP#27045

## Formulation:

47.6% thiamethoxam formulated as a suspension.

- Container sizes - 23.4L and 56.78 L

## Crops, Insects and Rates:

Crops	Insects Controlled	Rate (per 100 kg of seed)
Wheat Barley	Wireworms (suppression) <sup>2</sup>	17 mL
	Wireworms (control) <sup>2</sup>	33 to 50 mL
Corn	Seed corn maggot	83 to 166 mL
	Wireworms	83 mL
	Corn rootworm (including Western and Northern)	830 mL
Soybean	Seed corn maggot	50 to 83 mL <sup>1</sup>
	Wireworms	83 mL
Dry bean	Seed corn maggot	50 to 83 mL
	Wireworms	83 mL
Chickpea Lentil	Wireworms (suppression) <sup>2</sup>	17 mL
	Wireworms (control) <sup>2</sup>	33 to 50 mL
Faba bean	Wireworms (suppression) <sup>2</sup>	17 mL
	Wireworms (control) <sup>2</sup>	33 to 50 mL
	Pea leaf weevil	50 mL
Field pea	Wireworms (suppression) <sup>2</sup>	17 mL
	Wireworms (control) <sup>2</sup>	33 to 50 mL
	Pea leaf weevil	50 to 83 mL <sup>3</sup>
Rye Millet Sorghum Triticale	Wireworms (suppression) <sup>2</sup>	17 mL
	Wireworms (control) <sup>2</sup>	33 to 50 mL

<sup>1</sup> Use the higher rate for fields that have a history of moderate to severe insect pressure or when insect populations are high

<sup>2</sup> Use lower rate for early season suppression of wireworms. For control and/or moderate to high pressure, treat crops at higher rate.

<sup>3</sup> The higher rate must be applied by commercial treaters using closed transfer

## Application Information:

For small-grain cereals (except oats) and pulse crops, *Cruiser 5FS* may be applied on-farm or by commercial seed treaters. For all other crops, application must be performed in commercial seed treatment facilities. A red colourant **MUST** be added when *Cruiser 5FS* is applied to grain. Allow the seed to dry before bagging or storing in bulk containers.

## How it Works:

Thiamethoxam is a seed treatment insecticide in the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. Refer to "Insecticide Groups Based on Modes of Action" on page 600.

## Tank Mixes:

For control of seed and soil-borne diseases, *Cruiser 5FS* can be mixed with fungicide seed treatments in a closed transfer system. Refer to label for details. Follow the label directions for each product and use the most restrictive precautions and limitations.

## Restrictions:

Resistance management: Refer to page 599.

**NOTE:** When using a seed flow lubricant for planting corn and soybean seed treated with neonicotinoid insecticides (containing the active ingredients clothianidin, imidacloprid or thiamethoxam), use only a dust-reducing fluency agent.

Talc and graphite are not permitted.

- **Labelling:** All seed must be labelled "Seed treated with thiamethoxam insecticide. DO NOT use for food, feed or oil processing." Consult label for additional labelling requirements.
- **Grazing:** DO NOT graze or feed livestock on treated areas for 45 days after planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. If product should freeze, bring to room temperature, then ensure the contents are mixed well prior to application.
- **Environment:** Products are toxic to aquatic invertebrates and fish. DO NOT apply directly to water or areas where surface water is present. DO NOT contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is accessible to birds or spilled outdoors, promptly clean up or bury to prevent ingestion.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Cruiser Maxx Corn

Available to commercial seed treaters only.

Cruiser Maxx Corn is a co-pack containing Maxim Quattro (thiabendazole, azoxystrobin, metalaxyl-M and S-isomer and fludioxonil fungicides, page 563) and Cruiser 5FS (thiamethoxam insecticide, page 535). For more detailed information on component products, consult product pages listed above.

**Insecticide Group**  
**4**

**Fungicide Group**  
**1, 4, 11, 12**  
Refer to pages 427,  
428 and 598

## Company:

Syngenta Canada Inc. (Maxim Quattro – PCP#29871, Cruiser 5FS – PCP#27045)

## Formulations:

*Maxim Quattro:* 26.5% thiabendazole, 3.32% fludioxonil, 2.65% metalaxyl-M and S-isomer, and 1.33% azoxystrobin formulated as a liquid suspension treatment.

- Container sizes - 5 L to bulk

*Cruiser 5FS:* 47.6% thiamethoxam formulated as a suspension.

- Container sizes - 23.4L and 56.78 L

## Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Insects Controlled	Rate (per 100 kg of seed)	
			Maxim Quattro	Cruiser 5FS
Corn	Seed- and soil-borne <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> (including <i>F. graminearum</i> and <i>F. verticillioides</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight (weakly pathogenic <i>Aspergillus</i> and <i>Penicillium</i> )	Seed corn maggot, wireworm	67 mL	83 mL

## Hazard Rating:



Caution – Potential skin sensitizer (*Maxim Quattro*)



Caution – Poison (*Cruiser 5FS*)

For an explanation of the symbols used here see pages 7 and 8.

# Cruiser Maxx Potato Extreme

Insecticide Group  
4A

Fungicide Group  
3, 12

## Company:

Syngenta Canada Inc. – PCP#31024

Refer to pages 428 and 598

## Formulation:

250 g per L of thiamethoxam, 62.5 g per L of fludioxonil, and 123 g per L of difenoconazole formulated as a suspension.

- Container sizes - 2 x 9.6 L

## Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Insects Controlled	Rate (per 100 kg of seed)
Potato	Stem and stolon canker ( <i>Rhizoctonia solani</i> ), fusarium dry rot ( <i>Fusarium</i> spp.), silver scurf ( <i>Helminthosporium solani</i> )	Black scurf ( <i>Rhizoctonia solani</i> )	Colorado potato beetle, aphids, and potato leafhopper	20 mL

## Application Information:

Apply as a water-based slurry utilizing standard slurry seed treatment equipment. Thoroughly mix the specified amount of product into the required amount of water or tank mix partner for slurry treater and dilution rate to be used. Apply only in areas with adequate ventilation or in areas that are equipped to remove mist or dust.

## How it Works:

Thiamethoxam is a systemic chloronicotinyl insecticide, fludioxonil is a phenylpyrrole fungicide with contact activity, and difenoconazole is a triazole fungicide with broad-spectrum systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to pages 426 and 597.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** Treated areas may be replanted immediately following harvest or as soon as practical following the last application with any crop listed on this label or to sorghum, wheat, barley, canola and pome fruit. Any cover crop planted for erosion control or soil improvement may be planted as soon as practical following the last application. However, the cover crop may not be grazed or harvested for food or feed. For all other crops, a 120 day plant-back interval must be observed.
- **Storage:** If soil conditions are ideal, plant potatoes immediately after application; however, if soil is predicted to be cold and wet for 3 days following application, either a) wait to cut, treat, plant until conditions are favorable or b) cut, treat and store. If cutting, treating and storing, potatoes can be treated with an inert dust to improve suberization. Store properly until conditions improve by making sure that there is adequate cool air (7-10°C) movement through the pile of cut seed potatoes and a relative humidity of 85 to 90%. Temperatures above 10°C promote soft rot in seed. Cut and treated seed should not be piled above 1.8 m in height. Avoid storing treated potatoes for over 2 weeks. When transporting cut and treated seed make sure the seed is covered.
- **Environment:** DO NOT apply any subsequent application of thiamethoxam in-furrow or foliar application or other Group 4 insecticide following seed piece treatment with *Cruiser Maxx Potato Extreme*. DO NOT plant more than 128,700 kg of treated potato seed pieces per day. As this product is not registered for the control of pests in aquatic systems, DO NOT use to control aquatic pests. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Hazard Rating:

None listed.

# Cruiser Maxx Vibrance Beans

Insecticide Group  
4

Fungicide Group  
4, 7, 12

Refer to pages 427,  
428 and 598

Available to commercial seed treaters only.

Cruiser Maxx Vibrance Beans is a co-pack containing Cruiser Maxx Beans (thiamethoxam insecticide, metalaxyl-M and S-isomer and fludioxonil fungicides, available only as part of this co-pack) and Vibrance 500FS (sedaxane fungicide, page 586). For more detailed information on Vibrance 500FS, consult product page listed above.

## Company:

Syngenta Canada Inc. (Cruiser Maxx Beans – PCP#28821, Vibrance 500FS – PCP#30438)

## Formulations:

Cruiser Maxx Beans: 22.6% thiamethoxam, 1.12% fludioxonil, and 1.70% metalaxyl-M and S-isomer formulated as a suspension.

- Container size - 56.78 L

Vibrance 500FS: 500 g per L sedaxane formulated as a suspension.

- Container sizes - 1.45 L

## Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Insects Controlled	Rate (per 100 kg of seed)	
			Cruiser Maxx Beans	Vibrance 500FS
Soybean	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp. and <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., and <i>Pythium</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight (seed-borne <i>Phomopsis</i> spp.); early season root rot ( <i>Phytophthora megasperma</i> var. <i>sojae</i> )	Wireworm, seed corn maggot, early season soybean aphid protection	195 mL	5 mL
Dry bean	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp. and <i>Rhizoctonia</i> spp.); seedling blight ( <i>Pythium</i> spp.); anthracnose (seed-borne <i>Colletotrichum</i> spp.)	Wireworm, seed corn maggot, potato leafhopper <sup>1</sup>	195 mL	5 mL

Product information provided below for Cruiser Maxx Beans. For detailed information on Vibrance 500FS, please consult product page.

<sup>1</sup> Replaces one application of foliar insecticide spray.

## Application Information:

For use only in commercial seed treatment facilities with closed transfer. All seed treated with this product must be conspicuously coloured at the time of treatment.

## How it Works:

Thiamethoxam is a seed treatment insecticide in the neo- nicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. For more information refer to "Insecticide Groups Based on modes of Action" on page 600.

Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including pythium damping-off. The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Pea:** At the low rate (117 mL per 100 kg of seed), Cruiser Maxx Beans must be tank-mixed with 130 mL of Apron Maxx RTA for equivalent disease protection as provided by the high rate of Cruiser Maxx Beans. Follow the label directions for each product and use the most restrictive precautions and limitations.



## Restrictions:

Resistance management: Refer to pages 426 and 597.

**NOTE:** When using a seed flow lubricant for planting corn and soybean seed treated with neonicotinoid insecticides (containing the active ingredients clothianidin, imidacloprid or thiamethoxam), use only a dust-reducing fluency agent.

Talc and graphite are not permitted.

- **Labelling:** All seed must be labelled "This seed has been treated with thiamethoxam insecticide and metalaxyl-M (including S-isomer) and fludioxonil fungicides. Wear long-sleeved shirt, long pants, and chemical-resistant gloves when handling treated seed. Do not graze or feed livestock on seeded area for 45 days after planting. Do not use for food, feed or oil processing. Store away from food and feed. Do not plant any crop other than soybeans, dry bean, chickpeas, lentils, edible-podded and succulent-shelled peas, and dry peas (including field peas) within 45 days to fields in which treated seeds were planted. This product is toxic to fish and other aquatic organisms. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up." Additionally, all treated soybean seed for sale or use in Canada must be labelled with the following, "Thiamethoxam is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize dust generated during planting, refer to the "Pollinator Protection and Responsible Use of Treated Seed – Best Management Practices" on the Health Canada webpage on pollinator protection at [www.healthcanada.gc.ca/pollinators](http://www.healthcanada.gc.ca/pollinators). When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for soybean seed treated with this insecticide. Carefully follow use directions for the seed flow lubricant. Do not load or clean planting equipment near bee colonies, and avoid places where bees may be foraging, such as flowering crops or weeds. When turning on the planter, avoid engaging the system where emitted dust may contact honey bee colonies. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface."
- **Grazing:** DO NOT graze or feed livestock on treated areas for 45 days after planting.
- **Re-cropping:** DO NOT plant any crop other than soybeans, dry beans, chickpeas, lentils and dry peas (including field peas) within 45 days in which treated seeds were planted.
- **Storage:** Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. Repeated freeze-thawing of *Cruiser Maxx Beans* will not affect the physical integrity of the product. If product should freeze, bring to room temperature and ensure the contents are mixed well prior to application.
- **Environment:** This product is toxic to fish and aquatic invertebrates. DO NOT apply this product directly to water or areas where surface water is present. Toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen, and/or nectar resulting from seed treatment applications. Dust generated during planting of treated seed may be harmful to bees and other pollinators. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil or other surfaces.
- **Compatibility with *Rhizobia*-based inoculants:** *Cruiser Maxx Beans* is compatible with *Rhizobium*-based inoculants. Please check with inoculant manufacturers for details prior to use.

## Hazard Rating:



Caution – Poison (*Vibrance 500 FS*)



Caution – Eye and skin irritant (*Cruiser Maxx Beans*)

For an explanation of the symbols used here see pages 7 and 8.

# Cruiser Maxx Vibrance Pulses

*Cruiser Maxx Vibrance Pulses is a co-pack containing Cruiser 5FS (thiamethoxam insecticide, page 535), Apron Maxx RTA (fludioxonil and metalaxyl-M and S-isomer fungicides, page 532), Vibrance 500FS (sedaxane fungicide, page 586) and Vibrance Maxx RFC (sedaxane, L Metalaxyl-M and S-isomer and fludioxonil, page 587). For more detailed information on the component products, consult product pages listed above.*

Insecticide Group  
4

Fungicide Group  
1, 4, 7, 12

Refer to pages 427,  
428 and 598

## Company:

Syngenta Canada Inc. (*Cruiser 5FS* – PCP#27045, *Apron Maxx RTA* – PCP#27577, *Vibrance 500FS* – PCP#30438);  
*Vibrance Maxx RFC* – PCP#32272)

## Formulations:

*Cruiser 5FS*: 47.6% thiamethoxam formulated as a suspension.

- Container size - 23.4 to 56.78 L



*Apron Maxx RTA*: 0.73% fludioxonil, 1.10% metalaxyl-M and S-isomer.

- Container size - 56.78 L

*Vibrance 500FS*: 500 g per L sedaxane formulated as a suspension.

- Container sizes - 1 to 1050 L

*Vibrance Max RFC*: 50 g per L sedaxane, 37.5 g per L metalaxyl-M and S-isomer and 25 g per L fludioxonil formulated as a suspension.

- Container sizes - 56.76 L

## Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Insects Controlled	Rate (per 100 kg of seed)			
			<i>Cruiser 5FS</i> <sup>1</sup>	<i>Apron Maxx RTA</i>	<i>Vibrance 500FS</i> <sup>2</sup>	<i>Vibrance Maxx RFC</i>
Field pea	Seed-borne ascochyta blight and foot rot ( <i>Ascochyta pinodes</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.)	Wireworms	50 mL	325 mL	10 mL	100 mL
		Pea leaf weevil	50 to 83 mL <sup>2</sup>			
Lentil	Seed-borne ascochyta blight ( <i>Aschochyta lentis</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)	Wireworms	50 mL	325 mL	10 mL	100 mL
Chickpea	Seed-borne ascochyta blight ( <i>Ascochyta rabiei</i> ); seed rot/pre-emergence damping-off and post-emergence damping-off, ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)	Wireworms	50 mL	325 mL	10 mL	100 mL

<sup>1</sup>Use the higher rate for fields that have a history of moderate to severe insect pressure.

<sup>2</sup>On-farm application at the lower rate only.

## Hazard Rating:



Caution – Poison (*Cruiser 5FS*, *Vibrance 500 FS*)

For an explanation of the symbols used here see pages 7 and 8.

# Cruiser Vibrance Quattro

Insecticide Group  
4

Fungicide Group  
3, 4, 7, 12

## Company:

Syngenta Canada Inc. – PCP#31453

Refer to pages 427,  
428 and 598

## Formulation:

61.5 g per L thiamethoxam, 36.9 g per L difenoconazole, 15.4 g per L sedaxane, 9.2 g per L metalaxyl-M (and S-isomer), and 7.7 g per L fludioxonil formulated as a suspension.

- Container sizes - 1 to 1050 L

## Crops, Diseases, Insects and Rates:

Crops:	Diseases Controlled	Diseases Suppressed	Insects Controlled	Rate (per 100 kg of seed)
Barley	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); covered smut ( <i>Ustilago hordei</i> ); false loose smut ( <i>U. nigra</i> ); true loose smut ( <i>U. nuda</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	Wireworms	325 mL
Oat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); covered smut ( <i>Ustilago hordei</i> ); loose smut ( <i>U. avenae</i> )	Common root rot ( <i>Cochliobolus sativus</i> )	Wireworms	325 mL
Rye	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); common bunt ( <i>Tilletia tritici</i> ); dwarf bunt ( <i>T. controversa</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	Wireworms	325 mL
Triticale	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); loose smut ( <i>Ustilago tritici</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	Wireworms	325 mL
Spring wheat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); common bunt ( <i>Tilletia tritici</i> ); loose smut ( <i>Ustilago tritici</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	Wireworms	325 mL
Winter wheat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); common bunt ( <i>Tilletia tritici</i> ); dwarf bunt ( <i>T. controversa</i> ); loose smut ( <i>Ustilago tritici</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	Wireworms	325 mL

## Application Information:

Cruiser Vibrance Quattro is for use on-farm. This product can also be applied by commercial seed treaters using closed system transfer. Treat seed in a well-ventilated area. When treating seeds, all workers must wear coveralls over a long sleeved shirt, long pants, chemical-resistant gloves, work boots, sock and a NIOSH-approved dust mask.

## How it Works:

Thiamethoxam is a seed treatment insecticide in the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum, systemic activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including pythium damping-off. Sedaxane is a succinate dehydrogenase inhibitor fungicide with systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. Fludioxonil is phenylpyrrole fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426 and 598.

- **Labelling:** Treated seed must be labelled (listing only the applicable active ingredients) as follows: "This seed has been treated with the insecticide, thiamethoxam and the fungicides, difenoconazole, metalaxyl-M (and S-isomer), sedaxane and fludioxonil. Wear coveralls over a long-sleeved shirt, long pants, chemical-resistant gloves, work boots, socks and NIOSH-approved dust mask when handling treated seed, and during planting (including loading, sowing, maintenance, and clean-up). When using closed-cab planting equipment, chemical-resistant gloves and NIOSH-approved dust mask are not required inside cab. Do not graze or feed livestock on seeded area for 45 days after planting. Do not use for food, feed or oil processing. Store away from food and feed. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface." Store away from food and feed."
- **Grazing:** DO NOT graze or feed livestock on treated areas for 45 days after planting.
- **Re-cropping:** DO NOT plant any crop other than cereals, corn, soybeans, members of Crop Subgroup 6C (dried, shelled peas and beans), members of Crop Subgroup 20A (canola and rapeseed subgroup) or potatoes within 60 days to fields in which treated seed were planted.
- **Storage:** Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. If product should freeze, bring to room temperature, and then ensure the contents are mixed well prior to application.
- **Environment:** Toxic to aquatic organisms. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to bees. Bees can be exposed to product residues in flower, leaves, pollen and/or nectar resulting from seed treatment applications.

## Hazard Rating:

⚠ Warning – Contains the allergen soy

For an explanation of the symbols used here see pages 7 and 8.

# Cyantraniliprole

Fortenza/Lumiderm/Verimark

Insecticide Group

28

Refer to page 600

## Company:

Corteva Agrisciences Agriculture Division of DowDuPont – (Lumiderm – PCP#30894; Verimark – PCP#30892)

Syngenta Canada Inc. – (Fortenza – PCP#30899)

## Formulations:

Fortenza: 600 g per L cyantraniliprole formulated as a suspension.

- Container sizes - 1 to 1050 L

Lumiderm: 625 g per L cyantraniliprole formulated as a suspension.

- Container sizes - 100 L, 1000 L, Bulk

Verimark: 200 g per L cyantraniliprole formulated as a suspension.

## Crops, Insects and Rates:

Product	Crop	Insects	Rate (per 100 kg of seed)
Verimark	Potato	Colorado potato beetle, potato flea beetle <sup>1</sup>	Seed piece treatment: 45 mL In-furrow application: 6.75 to 9 mL per 100 m of row
Fortenza	Potato	Colorado potato beetle <sup>1</sup>	10 to 22.5 mL
	Corn – field, pop and sweet	Cutworm	83 to 167 mL
		Wireworm	167 mL
	Canola, rapeseed, mustard (oilseed and condiment mustard including <i>Brassica carinata</i> )	Cutworm	500 mL
		Flea beetles	1333 mL

Product	Crop	Insects	Rate (per 100 kg of seed)
<i>Fortenza</i> continued	Soybean	Seed corn maggot	41.5 to 83 mL
<i>Lumiderm</i>	Canola, rapeseed	Cutworms <sup>2</sup>	480 to 960 mL
		Flea beetle	960 to 1600 mL

<sup>1</sup> Protection provided during early to mid-season growth and development of potatoes only.

<sup>2</sup> The *Lumiderm* application rate for cutworms will also provide some early season protection from flea beetle damage.

## Application Information:

For corn and registered oilseed crops *Fortenza* and *Lumiderm* must be applied in a commercial seed treatment facility using closed transfer equipment. These products contain no colourant. An appropriate seed colourant must be added when this product is applied. *Fortenza* is designed for on-farm treating for potato seed pieces only using a closed-treatment system. *Verimark*: In-furrow application: apply as a narrow band in-furrow. For best results, direct spray on the seed pieces in the furrow. Potato seed-piece treatment: Apply only in areas with adequate ventilation or areas equipped to remove spray mist or dust.

## How it Works:

The active ingredient cyantraniliprole is a systemic insecticide from the diamides chemical class. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600.

## Tank Mixes:

*Lumiderm*: registered oilseed crops - *Prosper EverGol*, *Helix Vibrance*

*Fortenza*: registered oilseed crops - *Vibrance 500 FS*; Corn - *Cruiser 5FS*, *Maxim Quattro* and/or *Vibrance 500 FS*

Follow the label directions for each product and use the most restrictive precautions and limitations.

## Restrictions:

Resistance management: Refer to page 599. DO NOT apply any subsequent application of a Group 28 insecticide (in-furrow, soil or foliar) within 60 days of treatment with any of these products.

- **Labelling:** Seed treated with *Lumiderm* must be labeled "This seed has been treated with *Lumiderm Insecticide Seed Treatment* which contain cyantraniliprole. DO NOT use for feed, food or oil processing. Store away from feeds and other foodstuffs. Wear long-sleeved shirt, long pants and chemical-resistant gloves when handling treated seed. This product is toxic to aquatic organisms. Dispose of all excess treated seed. Left over treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. Dispose of seed packaging in accordance with local requirements. Cover or incorporate spilled treated seeds."
  - Seed treated with *Fortenza* must be labeled "These seeds have been treated with the insecticide cyantraniliprole. When handling and planting treated seed, workers must wear a long sleeved shirt and long pants, chemical-resistant gloves, and work boots. For good hygiene practice, it is also recommended that a NIOSH-approved dust mask be worn during all job activities. Plant treated seed only with closed cab planting equipment. Do not use for food, feed or oil processing. Toxic to bees. Follow best management practices to help minimize dust exposure to pollinators during planting of treated seed; refer to the complete guidance "Pollinator Protection: reducing risk of planting treated seed" on the Health Canada website."
- **Grazing:** No restrictions listed.
- **Re-cropping:** Registered crops, as well as flax, sunflower, and safflower, may be replanted at any time. For all other crops, do not plant-back within 30 days of seeding with cyantraniliprole treated seed.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed. To prevent contamination store this product away from food or feed.
  - *Fortenza*: Ideal storage temperature for the products is above freezing and below 30°C. Repeated freeze-thawing of *Fortenza* will not affect the physical integrity of the product. If the product should freeze, bring the product back to room temperature and ensure the contents are mixed well prior to application.
- **Environment:** Toxic to aquatic organisms and bees. When this product is applied and used according to label directions, risk to bees is expected to be negligible. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable and/or the depth to the water table is shallow.

## Hazard Rating:



Caution – Eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Emesto Silver

Fungicide Group

3, 7

Refer to pages 427 and 428

## Company:

Bayer – PCP#30361

## Formulation:

100 g per L penflufen, 18 g per L prothioconazole formulated as a suspension.

- Container sizes - 1 L – 200 L

## Crops, Diseases and Rates

Crop	Diseases Controlled	Rate (per 100 kg of seed)
Potato	Seed-borne black scurf and stem and stolon canker ( <i>Rhizoctonia solani</i> ), silver scurf ( <i>Helminthosporium solani</i> ), fusarium tuber rot ( <i>Fusarium</i> spp.)	20 mL

## Application Information:

*Emesto Silver* is designed to be applied as a diluted spray using equipment that ensures uniform coverage of each seed piece. Apply no more than 150 mL of slurry per 100 kg of seed pieces. Agitate or stir the slurry solution as needed. Apply only in areas with adequate ventilation or in areas that are equipped to remove spray mist or dust. Seed pieces should be treated immediately after cutting. Plant seed-pieces as soon as possible after cutting and treating.

## How it Works:

The active ingredient penflufen is a carboxamide (SDHI) fungicide with systemic activity. The active ingredient prothioconazole is a demethylation inhibitor with broad-spectrum systemic activity. For more information refer to “Fungicide Modes of Action” on page 426.

## Tank Mixes:

Insecticide Seed Treatments: *Titan ST*

Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** Potatoes, corn, cereals, legumes, soybean, canola, mustard, rapeseed, borage, flax and crambe may be replanted at any time. For all other crops, DO NOT plant back within 30 days of planting with *Emesto Silver*-treated seed pieces.
- **Storage:** If cut seed needs to be stored or held for a few days, make sure that there is adequate cool air movement through the pile of cut seed potatoes at relative humidity of 85 to 90%. Store cut seed at or below 7°C. Temperatures above 10°C promote soft rot in seed. Cut and treated seed should be piled above 1.8 m in height.
- **Environment:** DO NOT apply this product or treated seed pieces directly to freshwater habitats, estuaries, or marine habitats. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Hazard Rating:

None listed.

# EverGol Energy

Fungicide Group

3, 4, 7

Refer to pages 427 and 428

## Company:

Bayer – PCP#30364

## Formulation:

38.4 g per L penflufen, 76.8 g per L prothioconazole, 61.4 g per L metalaxyl formulated as a suspension.

- Container sizes - 33.75 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)
Soybean	Seed rot/pre-emergence damping off ( <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Phomopsis longicolla</i> ); post-emergence damping off ( <i>R. solani</i> , <i>Fusarium</i> spp., <i>Pythium</i> spp.); early-season root rot and seedling blight ( <i>R. solani</i> , <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Botrytis cinerea</i> )	65 mL

## Application Information:

*EverGol Energy* is designed for commercial seed treating equipment which can accurately control application rates and provide a good distribution of the chemical into the seed in the mixing chamber. Uniform application to seed is necessary to ensure optimum product performance. This product contains no dye and an appropriate seed colourant must be applied.

## How it Works:

The active ingredient penflufen is a carboxamide (SDHI) fungicide with systemic activity. The active ingredient prothioconazole is a demethylation inhibitor with broad-spectrum systemic activity. The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Insecticide Seed Treatments:** *Stress Shield 600*

**Fungicide Seed Treatment:** *Allegiance FL* for control of early-season Phytophthora in soybean.

Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labeled "This seed has been treated with *EverGol Energy*, which contains penflufen, prothioconazole and metalaxyl. When handling treated seed wear a long-sleeved shirt, long pants and chemical-resistant gloves. DO NOT use for feed, food or oil processing. Store away from feeds and other foodstuffs."
- **Grazing:** No restrictions listed.
- **Re-cropping:** Registered crops for *EverGol Energy*, as well as canola, mustard, rapeseed, borage, flax, crambe and potato, may be replanted at any time. For all other crops, do not plant-back within 30 days of seeding with *EverGol Energy*-treated seed.
- **Storage:** To prevent contamination store this product away from food or feed. Store in cool, dry area. DO NOT store in direct sunlight. DO NOT allow prolonged storage in temperatures that exceed 40°C or go below -10°C.
- **Environment:** Toxic to aquatic organisms and non-target terrestrial plants. DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other water. Dispose of all excess treated seed. Left over seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. DO NOT leave exposed treated seed on soil surface. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or depth to the water is shallow.

## Hazard Rating:

None listed.

# Gaucha CS FL

Available to commercial seed treaters only.

Fungicide Group

7, M3

Insecticide Group

4A

Refer to pages 427,  
428 and 598

## Company:

Bayer – PCP#27174

## Formulation:

285.7 g per L imidacloprid, 47.6 g per L carbathiin, 95.3 g per L thiram formulated as a suspension.

- Container sizes - 10, 100, 1000 L

## Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Insects Controlled <sup>2</sup>	Rate (per 100 kg of seed <sup>3</sup> )
Canola, rapeseed, and mustard (including oilseed mustard)	Seed rot, damping off, seedling blight and early season root rot ( <i>Rhizoctonia</i> spp., <i>Pythium</i> spp., and <i>Alternaria</i> spp.); seed-borne blackleg ( <i>Leptosphaeria maculans</i> ) <sup>1</sup>	Flea beetles (early-season)	1400 to 2100 mL

<sup>1</sup> Seed-borne blackleg controlled in canola and rapeseed only.

<sup>2</sup> Under high insect pressure, a foliar insecticide may also be required. Monitor crop regularly for insect infestation levels.

<sup>3</sup> In areas where flea beetle populations are often high, use the higher rates.

## Application Information:

For use in commercial seed treaters only. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. DO NOT apply direct heat to container. These products DO NOT contain colourant. A blue colourant must be added when products are applied to oilseeds. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

## How it Works:

Imidacloprid is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600. Carbathiin is a carboximide fungicide with systemic activity and thiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to pages 426 and 597.

- **Labelling:** Treated seed must be labelled as follows: "This seed has been treated with *Gaucha CS FL* seed protectant, which contains imidacloprid, carbathiin and thiram. Do not use for food, feed or oil processing. Store away from feeds and other foodstuffs. Wear a long-sleeved shirt, long pants and chemical-resistant gloves when handling treated seeds."
- **Grazing:** DO NOT graze or feed livestock on treated areas for 4 weeks after planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** Protect products from freezing. Keep above 10°C prior to and during application. DO NOT store in direct sunlight or above 35°C. Treated seed stored for periods in excess of 9 months should be tested for germination before planting. DO NOT store treated seed above 25°C or in direct sunlight.
- **Environment:** These products are highly toxic to birds and aquatic invertebrates. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate water when disposing of equipment wash water. Cover or incorporate spilled treated seeds. Leftover treated seed should be double sown around the headlands, or buried away from water sources.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.



# General Storage Disinfectant

## Company:

Ag-Services Inc –PCP#14957

Distributed by JEM Holdings Inc. in Saskatchewan and by White Potato Services Ltd. in Manitoba

## Formulation:

10% dimethyl benzyl ammonium chloride, formulated as a liquid.

- Container size - 20 L

## Crops:

Use for disinfecting storage areas and equipment. Not for direct use on potatoes.

## Diseases:

Control of bacterial ring rot and other decay organisms in potato storage.

## Rate:

60 mL per 10 L water.

## Application Information:

Apply only when storage areas are empty. To disinfect walls and floors of potato storages, clean surfaces thoroughly with a broom or vacuum to remove all dirt and debris. Wash with detergent prior to disinfecting. Then, wash, mop or spray thoroughly with disinfectant solution (60 mL disinfectant in 10 L of water). Allow treated surfaces to remain wet for at least 20 minutes. The same strength solution can be used to disinfect used bags, potato planters and other machinery after all dirt has been removed. Soak bags for at least 1 hour.

**Equipment:** All handling and planting equipment should be cleaned and treated on a regular basis (daily when preparing seed and seed pieces). Dirt should be removed through washing with detergent prior to disinfection. Treat equipment by mopping and brushing methods.

**Storage walls and ceilings:** Use 600 mL of disinfectant in 100 L of water. Wash areas with detergent prior to disinfecting. Spray areas using a high pressure jet (up to 4250 kPa pressure) to penetrate cracks, etc. in floors. Spray storage air ducts with a solution of 1.2 L of disinfectant in 100 L of water. Sub-surface air ducts, flumes and plenums should be thoroughly cleaned prior to disinfection.

## Tank Mixes:

DO NOT mix with soaps, detergents, foaming agents or surfactants.

## Hazard Rating:

Caution – Corrosive

**Other precaution:** Corrosive, causes severe eye and skin damage. DO NOT get in eyes, on skin or on clothing. Avoid contamination of food. DO NOT breathe mist of diluted chemical created from pressure washer applications. Wear gloves, goggles, rubber boots, a wet suit, and mist respirator when using pressure washer system.

For an explanation of the symbols used here see pages 7 and 8.



# Heads Up Plant Protectant

Fungicide Group  
NC

Refer to page 428

## Company:

Heads Up Plant Protectants, Inc. – PCP#29827

## Formulation:

63.02% saponins of *Chenopodium quinoa* formulated as a soluble powder.

- Container sizes - 50 g pouches

## Crops and Diseases:

Crop	Diseases Suppressed
Potato (cut or whole tubers)	Rhizoctonia canker and black scurf ( <i>Rhizoctonia solani</i> )
Soybean	Root rot and post-emergence damping-off ( <i>Rhizoctonia solani</i> ), white mould ( <i>Sclerotinia sclerotiorum</i> )
Dry bean	White mould ( <i>Sclerotinia sclerotiorum</i> ), root rot and post-emergence damping-off ( <i>Rhizoctonia solani</i> )

## Rate Information:

Mix 1 gram of product per 1 L of water. Apply 1 L of solution for every 100 to 264 kg of potato seed or for every 163 kg of soybean or dry bean seed.

## Application Information:

Treat soybean or dry bean seed by dipping, spraying or dribbling the solution into a rotation auger conveyor or some other approved seed treatment device. Spray application to seeds within an enclosed spray device to ensure thorough coverage.

For seed potatoes, product must be applied to germination seed potatoes, as indicated by obvious sprouting activity coming from potato eyes. This sprouting activity can be from peeking to full sprout length, but before green leaves appear.

## How it Works:

The active ingredient saponins of *Chenopodium quinoa* is made from plant sources. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store this product away from food or feed. Store above -12°C.
- **Environment:** DO NOT contaminate irrigation or drinking water supplies or aquatic habitats. This product is toxic to aquatic organisms.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Helix Vibrance

Available to commercial seed treaters only.

Fungicide Group

3, 4, 12, 7

Insecticide Group

4A

Refer to pages 427,  
428 and 598

## Company:

Syngenta Canada Inc. - PCP#31454

## Formulation:

269 g per L thiamethoxam, 16 g per L difenoconazole, 5 g per L metalaxyl-M and S isomer, 1.7 g per L fludioxonil, and 3.4 g per L sedaxane formulated as a suspension.

- Container sizes - 105 L to Bulk

## Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Insects Controlled	Rate (per 100 kg of seed)
Canola, rapeseed, and mustard (both oilseed and condiment types, including <i>Brassica carinata</i> )	Seed-borne blackleg ( <i>Leptosphaeria maculans</i> ), seed-borne Alternaria ( <i>Alternaria</i> spp.), seedling disease complex (damping-off, seedling blight, seed rot, root rot) ( <i>Pythium</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp.)	Flea beetles (early-season)	1500 mL

## Application Information:

For use only in commercial seed treatment facilities with closed transfer systems. *Helix Vibrance* is a premix formulation that includes a pigment. However, users are responsible for ensuring that the treated seed, when dried and ready for bagging, has an unnatural colour. If the pigment contained in the formulation does not colour the seed adequately, or to optimize seed coverage, water, additional colourant and polymers can be added to facilitate application. Use standard commercial seed treatment equipment that provides uniform seed coverage to ensure desired level of insect or disease control. Maintain constant product agitation during the seed treatment process. Allow the seed to dry before bagging. Treatment of highly mechanically scarred or damaged seed, or seed known to be of low vigour and poor quality, may result in reduced germination and/or reduction of seed and seedling vigour.

## How it Works:

The active ingredient thiamethoxam is a systemic insecticide from the neonicotinoid chemical class. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum systemic activity. The active ingredient metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including *Pythium* damping off. The active ingredient fludioxonil is a phenylpyrrole chemistry and has contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to pages 426 and 597. DO NOT make any subsequent application of a Group 4 insecticide (i.e. in-furrow or foliar application) following treatment with *Helix Vibrance*.

- **Labelling:** Treated seed must be labelled "This seed has been treated with *Helix Vibrance* which contains insecticide (thiamethoxam) and fungicides (difenoconazole, metalaxyl-M and S-isomer, fludioxonil, and sedaxane). Wear long- sleeve shirt, long pants, and chemical-resistant gloves when handling treated seed. Do not use for food, feed or oil processing. Store away from food and feed.
- **Grazing:** DO NOT graze or feed livestock on treated areas.
- **Re-cropping:** DO NOT plant any crop other than those on the *Helix Vibrance* or *Vibrance 500FS* labels within 60 days to fields in which seed treated with *Helix Vibrance* were planted.
- **Storage:** Store in a well-ventilated, secure area. Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. Repeated freeze-thawing will not affect the physical integrity of the product. If the product should freeze, bring the product back to room temperature and ensure the contents are mixed well prior to application. Lab and field studies have shown that *Helix Vibrance* treated canola and mustard can be safely stored for 18 months without loss in germination or insect and disease performance. However, due to seed quality and seed storage conditions beyond the control of Syngenta Canada Inc., no claims are made to guarantee the germination of carry-over seed or propagating materials for all crop seed.

- **Environment:** TOXIC to bees, aquatic organisms, birds, and small mammals. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. Any spilled or exposed seeds must be incorporated into the soil or cleaned up. DO NOT apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, DO NOT contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes. If treated seed is spilled outdoors, promptly clean up.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Imidacloprid

Admire SPT / Alias 240 SC / Sombrero 600 FS / Stress Shield 600

## Insecticide Group 4A

Refer to page 600

## Company:

Bayer (Admire SPT – PCP#27702; Stress Shield 600 – PCP#30668)

ADAMA Canada (Alias 240 SC – PCP#28475; Sombrero 600FS – PCP#30505)

## Formulations:

Admire SPT and Alias 240 SC: 240 g per L imidacloprid.

- Container sizes - 1 L, 3.78 L. Contains insecticide only.

Sombrero 600 FS and Stress Shield 600: 600 g per L imidacloprid. Contains insecticide only.

## Crops, Insects and Rates:

Product	Crop	Insects Controlled	Rate
Admire SPT Alias 240 SC	Potato	Colorado potato beetle, potato flea beetle, potato leafhopper and aphids (including green peach, buckthorn, foxglove and potato aphid)	26 to 39 ml per 100 kg of potato seed tubers. The higher rate is recommended when extended length of control is needed. DO NOT apply more than 0.47 L per acre per year.
Alias 240 SC	Wheat (durum, spring, winter), barley, and oats	Wireworm	42 to 125 mL per 100 kg seed
	Soybean	Wireworm, seed corn maggot	260 to 520 mL per 100 kg
Sombrero 600 FS <sup>1</sup> Stress shield 600 <sup>1</sup>	Wheat, barley, oat <sup>2</sup>	Wireworm	17 to 50 ml per 100 kg of seed
	Soybean <sup>3</sup>	Seedcorn maggot, wireworm, soybean aphid	104 to 208 mL per 100 kg seed
Sombrero 600 FS <sup>1</sup>	Canola, mustard (condiment-type only) and rapeseed	Flea beetles	667 ml per 100 kg seed to 1333 mL per 100 kg seed
	Corn	Wireworm	21.3 mL product per 80,000 seeds
Stress shield 600 <sup>1</sup>	Dry bean	Wireworm	104 mL per 100 kg seed
	Field pea	Wireworm	104 mL per 100 kg seed
		Pea leaf weevil	104 to 208 mL per 100 kg seed
	Faba bean	Pea leaf weevil, wireworm	104 mL per 100 kg seed
	Chickpea, lentil	Wireworm	104 mL per 100 kg seed

<sup>1</sup> DO NOT apply any subsequent applications of Group 4 Insecticide (i.e. in-furrow or foliar application) following treatment with Sombrero 600 FS or Stress Shield 600.

<sup>2</sup> For fields with a history of moderate to high wireworm pressure, treat crops 34 to 50 mL per 100 kg seed. Use the higher rate when infestation pressures are expected to be heavy.

<sup>3</sup> Use the higher rate for earlier seeding or when insect populations are expected to be high in soybean and peas and for extended control period for aphids in soybean.

## Application Information:

May be applied when potato pieces are being cut. Apply specified dosage as a diluted spray onto seed-pieces using a shielded spray system that is well contained and will prevent the loss of any liquid. DO NOT dilute with any more than 3 parts water to 1 part *Admire SPT/ Alias 240 SC*. DO NOT dilute *Sombrero 600 FS* beyond 6%. Agitate or stir spray solution as needed. Complete coverage of the seed piece is required for optimal insect control. As part of the seed cutting and treating process, application of a fungicide registered for potato seed treatment or an inert absorbent ingredient is recommended. Apply *Stress Shield 600* through a slurry applicator seed treater for uniform seed coverage. Allow seeds to dry before bagging or storing in bulk containers.

**NOTE:** A colourant must be added to *Sombrero 600 FS* and *Stress Shield 600* to colour seed in accordance with the *Pest Control Products Act* and the *Seeds Act Regulations*. A blue colourant must be added when this product is applied to an oilseed.

## How it Works:

Imidacloprid is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600.

## Tank Mixes:

*Alias 240 SC* may be tank mixed with *Raxil MD* (300 mL per 100 kg seed) for control of certain seed and soil-borne pathogens in wheat, barley, and oat. *Alias 240 SC* may be tank mixed with *Apron Maxx RTA* (325 mL per 100 kg seed) for control of certain seed and soil-borne pathogens in soybeans.

*Stress Shield 600* is registered for tank mix with the fungicide seed treatments *Raxil MD*, *Raxil PRO*, or *EverGol Energy* in cereals. *Stress Shield 600* is registered for tank mix with fungicide seed treatments *Allegiance*, *EverGol Energy*, or *Apron Maxx RTA* in pulses.

Bayer also supports the tank-mix of *Trilex EverGol* with *Stress Shield 600*.

*Sombrero 600 FS* is registered for tank mix with the fungicide seed treatments *Raxil MD* in cereals.

ADAMA also supports the following tank-mixes with *Sombrero 600 FS* – metalaxyl, *EverGol Energy*, *Trilex EverGol*, *Vibrance Maxx*, *Apron Maxx RTA*, and *Proseed*.

Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

## Restrictions:

Resistance management: Refer to page 599. DO NOT apply any subsequent application of imidacloprid in furrow or foliar application, or any other Group 4 insecticide following *Admire SPT/ Alias 240 SC* treatment.

**NOTE:** When using a seed flow lubricant for planting corn and soybean seed treated with neonicotinoid insecticides (containing the active ingredients clothianidin, imidacloprid or thiamethoxam), use only a dust-reducing fluency agent.

Talc and graphite are not permitted.

- **Labelling:** All bags containing *Sombrero 600 FS/ Stress Shield 600*-treated seed must be labeled or tagged as followed: "This seed has been treated with *Sombrero 600 FS/ Stress Shield 600*, which contains imidacloprid. Do not use for feed, food, or oil processing. Store away from feeds and other foodstuffs."
- **Grazing:** Cover crops that are used as a rotational crop without a plant-back interval following treatment should not be grazed or harvested for food or feed. Do not graze or feed livestock on areas treated with *Sombrero 600 FS* and *Stress Shield 600* for four weeks after planting. Mustard greens grown or harvested from *Sombrero 600 FS*-treated seed must not be used for human consumption.
- **Re-cropping:** Use a minimum plant-back interval of 30 days for cereals, 9 months for peas and beans, and 12 months for all other food and feed crops. Green manure and other cover crops not intended for human or animal consumption do not require a plant-back interval following treatment. DO NOT graze or harvest cover crops for food or feed. It is not recommended that this product be used in fields treated with imidacloprid during the previous season.
- **Storage:** Store product in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children. Carry-over of *Sombrero 600 FS*-treated seed is not recommended (treated canola, rapeseed or mustard (condiment-type only) seed stored for periods in excess of 6 months may decrease at a faster rate than untreated seed). Test seed germination if stored for more than 6 months. Do not store *Sombrero 600 FS*-treated seed above 25°C or in direct sunlight. Do not store *Stress Shield 600* in direct sunlight or above 35° C.
- **Environment:** DO NOT plant treated seed pieces when rainfall is forecast for the next 48 hours. DO NOT plant treated seed pieces within 15 metres of well-head or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. This product is toxic to wildlife. Keep out of lakes, streams, ponds, or other aquatic systems. DO NOT contaminate water when disposing of equipment wash waters. Leftover treated seed should be double sown around the headland, or buried away from water sources such as lakes, streams, ponds or other aquatic systems. *Stress Shield 600* spillage and exposed treated seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Insure Cereal

Fungicide Group

3, 4, 11

Refer to pages 427 and 428

## Company:

BASF Canada – PCP#30685

## Formulation:

17 g per L pyraclostrobin, 17 g per L triticonazole, 10 g per L metalaxyl formulated as a liquid suspension.

- Container sizes - 2 x 9.8 L jug, 120 L Drum, 450 L Tote

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate per 100 kg of seed
Barley	Seed rots and pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>Pythium</i> spp.); seedling blight and root rot ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); true loose smut ( <i>Ustilago nuda</i> ); covered smut ( <i>U. hordei</i> ); false loose smut ( <i>U. nigra</i> )	Seedling blight, root rot ( <i>Cochliobolus sativus</i> )	300 mL
Oat	Seed rots and pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>Pythium</i> spp.); seedling blight and root rot ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); loose smut ( <i>Ustilago avenae</i> ); covered smut ( <i>U. kolleri</i> )	Seedling blight, root rot ( <i>Cochliobolus sativus</i> )	300 mL
Wheat Rye Triticale	Seed rots and pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>Pythium</i> spp.); seedling blight and root rot ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); loose smut ( <i>Ustilago tritici</i> ); common bunt ( <i>Tilletia tritici</i> , <i>T. lavies</i> )	Seedling blight, root rot ( <i>Cochliobolus sativus</i> )	300 mL

## Application Information:

*Insure Cereal* is a ready to use seed treatment formulation. This product is for use in commercial seed plant, in on-farm standard gravity flow or mist type treatment machines, and in on-the-go air seeder treatment systems. Agitate or shake well prior to usage. Uneven seed coverage may result in poor levels of disease control. Seed should be well conditioned and cleaned prior to treating. Treated seed should not require drying after treatment.

## How it Works:

The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum activity. The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labeled "This seed has been treated with *Insure Cereal* containing fungicides pyraclostrobin, triticonazole and metalaxyl. Workers handling or planting treated seed must wear long-sleeved shirt, long pants, chemical-resistant gloves, shoes and socks, and respiratory protection (i.e. NIOSH/MSHA/BHSE approved respirator or fresh air hood). Respiratory protection is not required when workers are in a closed cab tractor. A closed cab is a chemical resistant barrier that completely surrounds the occupant of the cab and prevents contact with the pesticide or treated surfaces outside the cab. DO NOT use for food, feed or oil processing. Store away from feed or food stuff. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface."
- **Grazing:** No restrictions listed.

- **Re-cropping:** No restrictions listed.
- **Storage:** Store in original containers with lid tightly closed. Store away from children, animals, feed stuffs, fertilizers and seed. Protect from frost and freezing. DO NOT store treated seed for more than 18 months. Store treated seed in cool, dry conditions.
- **Environment:** Ensure proper soil incorporation of the seeds. DO NOT feed treated seed to, or otherwise expose, wildlife or domestic birds. DO NOT contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water with the chemical, used containers, treated seed or bags. DO NOT contaminate water by cleaning of equipment or disposal of wastes.

### Hazard Rating:



Caution – Poison



Caution – Eye irritant and potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

## Insure Cereal FX4

Fungicide Group

3, 4, 7, 11

Refer to pages 427 and 428

### Company:

BASF Canada – PCP#33210

### Formulation:

16.7 g per L pyraclostrobin, 8.35 g per L Fluxapyroxad, 16.7 g per L triticonazole, 10 g per L metalaxyl formulated as a liquid suspension.

- Container sizes - 2 x 9.8 L jug, 120 L Drum, 450 L Tote

### Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate per 100 kg of seed
Barley	Seed rots and pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Cochliobolus sativus</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>Fusarium</i> spp, <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.); seedling blight and root rot ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.), true loose smut ( <i>Ustilago nuda</i> ); covered smut ( <i>Ustilago hordei</i> ), false loose smut ( <i>Ustilago nigra</i> )	Seedling blight and root rot ( <i>Cochliobolus sativus</i> ); fusarium crown and root rot ( <i>Fusarium</i> spp.)	300 mL
Canaryseed, annual canarygrass grown for human consumption)	Seed rots and pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Cochliobolus sativus</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>Fusarium</i> spp, <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.); seedling blight and root rot ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.)		
Oat	Seed rots and pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>Pythium</i> spp.); seedling blight and root rot ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); loose smut ( <i>Ustilago avenae</i> ); covered smut ( <i>U. kolleri</i> )		
Wheat, rye, triticale	Seed rots and pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>Pythium</i> spp.); seedling blight and root rot ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); loose smut ( <i>Ustilago tritici</i> ); common bunt ( <i>Tilletia tritici</i> , <i>T. lavie</i> )		

### Application Information:

*Insure Cereal FX4* is a ready-to-use broad spectrum fungicide seed treatment in a waterbased formulation that provides preventive seed and seedling protection. For use on farm and on closed transfer commercial seed treatment facilities. Closed transfer includes closed mixing, loading, calibrating and closed treatment equipment.

Apply *Insure Cereal FX4* using standard slurry, gravity flow or mist-type seed treatment application equipment. Agitate or shake well prior to use. Thorough seed coverage will offer the best protection of the seed from seed-, soil-borne, and seedling diseases. When used at the recommended rate of 300 mL/100 kg seed, no additional dyes or dilutions with water are needed unless recommended by the

manufacturer of the seed treatment application equipment/machines. If so, increase the use rate proportionally to the dilution rate (e.g. add 100 mL of water to 300 mL of *Insure Cereal FX4*, then apply at 400 mL/100 kg seed). Please consult the seed treatment application equipment manufacturer in question for further directions.

## How it Works:

Pyraclostrobin is a strobilurin fungicide with systemic broad spectrum activity against seed and soil borne diseases. It inhibits fungal metabolism by blocking mitochondrial respiration. Fluxapyroxad is a carboximide fungicide that provides systemic broad-spectrum protection against seed- and soil-borne diseases. Triticonazole is a triazole based fungicide that provides systemic broad spectrum protection against seed and soil borne diseases. Metalaxyl is an acylanine fungicide with systemic activity against diseases caused by Oomycete fungi, most commonly known as *Pythium*.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled as follows "This seed has been treated with *Insure Cereal FX4* containing fungicides pyraclostrobin, fluxapyroxad, triticonazole and metalaxyl. Workers handling or planting treated seed must wear long-sleeved shirt, long pants, chemical-resistant gloves, shoes and socks. Workers handling treated seed should wear suitable dust mask. DO NOT use for food, feed or oil processing. Store away from feed and food stuff. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface."
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in original tightly closed container and the ideal storage temperature is above freezing and below 30°C. If *Insure Cereal FX4* freezes, bring to room temperature and agitate prior to use. To prevent contamination, store this product away from food and feed. Store in cool, dry, locked, well-ventilated area without floor drain.
- **Environment:** Ensure proper soil incorporation of the seeds. DO NOT feed treated seed to, or otherwise expose, wildlife or domestic birds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion. Ensure proper disposal of any surplus treated seed not intended for later planting. DO NOT contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water with the chemical, used containers, treated seed or bags, which have held treated seed. DO NOT contaminate water by cleaning of equipment or disposal of wastes. Unused or leftover treated seed should not be stored where there is a chance of it becoming mixed with untreated seed.

Toxic to aquatic organisms. The use of this product may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) or the water table is shallow. To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g. compacted or fine-textured soils such as clay). Avoid application of this product when heavy rain is forecast.

## Hazard Rating:



Caution – Poison



Caution – Eye irritant and potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Insure Pulse

Fungicide Group

4, 7, 11

Refer to page 427

## Company:

BASF Canada – PCP#32011

## Formulation:

17 g/L pyraclostrobin, 17 g/L fluxapyroxad and 10 g/L metalaxyl formulated as a liquid flowable.

- Container sizes - 9.8L, 120 L Drum, 450 L Tote



## Crops, Diseases and Rates:

Crops	Diseases controlled	Diseases suppressed	Rates per 100 kg of seed
Chickpea Dry bean Faba bean Field pea Lentil, Soybean	Seed rot and seedling blight (soil-borne <i>Fusarium</i> spp.); seed rot, seedling blight and root rot (soil-borne <i>Rhizoctonia solani</i> ); seed rot and seedling blight (soil-borne <i>Pythium</i> spp.); seedling blight (seed-borne <i>Ascochyta</i> spp.)	Anthrachnose seedling blight (seed-borne <i>Colletotrichum lindemuthianum</i> ), root rot (soil-borne <i>Fusarium</i> spp.), seed rot and seedling blight (seed-borne <i>Botrytis cinerea</i> )	300 ml
Flax	Seed rot, seedling blight and root rot (soil-borne <i>Fusarium</i> spp., soil-borne <i>Rhizoctonia solani</i> )	-	300 to 600* mL
Mustard	Seed rot, seedling blight and root rot (soil-borne <i>Fusarium</i> spp., soil-borne <i>Rhizoctonia solani</i> ); seed rot and seedling blight (soil-borne <i>Pythium</i> spp., <i>Alternaria brassicae</i> ), blackleg ( <i>Leptosphaeria maculans</i> )	-	600 mL

\* Use the lower rate under normal field conditions. Use the higher rate if there is a history of high disease pressures in the field OR where field conditions favour seed and soil-borne pathogens.

## Application Information:

A ready-to-use seed treatment formulation for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. Can also be used in "On the Go" air seeder treatment systems. When used at the recommended rate of 300 mL/100 kg seed, no additional dyes or dilutions with water are needed unless recommended by the manufacturer of the seed treatment application equipment.

**NOTE:** If using the 600 mL per 100 kg rate (flax), it is highly recommended that the seed be treated into a bin or truck box to allow the treated seed to dry prior to placing into the seeder hopper. This will prevent clumping and bridging in the seeder.

## How it Works:

The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. Fluzapyroxad is a carboximide fungicide that provides systemic broad spectrum protection. Metalaxyl is an acylalanines fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labeled "This seed has been treated with *Insure Pulse* containing pyraclostrobin, fluzapyroxad and metalaxyl. DO NOT use for food, feed or oil processing."
- **Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store treated seed in cool, dry, locked, well-ventilated area without a floor drain. Store in original tightly closed container and prevent freezing.
- **Environment:** Toxic to birds and wildlife. Ensure proper soil incorporation of the seeds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion. Ensure proper disposal of any surplus treated seed not intended for later planting. DO NOT contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water with the chemical, used containers, treated seed or bags that have held treated seed. DO NOT contaminate water by cleaning of equipment or disposal of wastes. The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

## Hazard Rating:

Warning – Contains the allergen soy.

For an explanation of the symbols used here see pages 7 and 8.



# INTEGO Solo Fungicide

Fungicide Group

22

Refer to page 427

## Company:

Valent Canada Inc. distributed by Nufarm Agriculture – PCP#31324

## Formulation:

383 g per L ethaboxam formulated as a suspension.

- Container sizes - 3.78 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed):
Barley Oat Rye Triticale Wheat Buckwheat Millet (pearl, proso)	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.)	-	13 to 17 mL
Corn (sweet, field, popcorn)	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.)	-	13 to 19.6 mL
Chickpea	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.)	-	19.6 to 39.1 mL
Dry bean Faba bean Lentil Field pea	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.)	Early-season root rot ( <i>Aphanomyces euteiches</i> )	19.6 to 39.1 mL
Soybean	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.), early-season root rot ( <i>Phytophthora sojae</i> )	-	19.6 to 39.1 mL
Canola Rapeseed Ethiopian mustard ( <i>Brassica carinata</i> ) Flax Mustard (all types) Camelina Borage	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.)	-	13 to 19.6 mL
Sunflower	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.), seed-borne downy mildew ( <i>Plasmopora halstedii</i> )	-	402 to 603 mL
Safflower	Seed rot/pre-emergence damping-off ( <i>Pythium</i> spp.)	-	402 to 603 mL

## Application Information:

For use with closed transfer commercial seed treaters (facilities and mobile treaters). Closed transfer includes closed mixing, loading, calibrating, and closed treatment equipment. Also for use in on-farm treatment of cereal grains (except corn) and pulse crops only with open or closed transfer equipment. This product contains no colourant. An appropriate colourant must be added when the product is applied to the seed.

## How it Works:

The active ingredient ethaboxam is a benzamide fungicide with activity against diseases caused by oomycetes. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

Nufarm Agriculture supports the following seed treatment mixes that are not on the *INTEGO Solo* label: *NipsIt SUITE Cereals OF Seed Protectant*, *Metlock CT*, *Vitaflo 280*, *Apron Advance*, *Apron Maxx RTA*, *Cruiser Maxx Vibrance Beans*, *Vibrance 500FS*, *Vibrance Maxx RTA*, *Trilex EverGol*.

Follow the label directions for each product and use the most restriction precautions and limitations.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labeled "This seed has been treated with a product containing the active ingredient ethaboxam. Do not use treated seed for feed, food or oil processing. Store away from feeds and other foodstuffs. Wear long-sleeved shirt, long pants and chemical-resistant gloves when handling treated seed. This product is toxic to aquatic invertebrates, oysters and shrimp. Dispose of all excess treated seed. Left over treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. Dispose of seed packaging in accordance with local requirements. Cover or incorporate spilled treated seeds."
- **Grazing:** DO NOT graze field pea grown from treated seeds, or feed field pea forage or hay from such fields to livestock.
- **Re-cropping:** No restrictions listed.
- **Storage:** To prevent contamination store this product away from food or feed. Store in a cool place. DO NOT store in direct sunlight. Protect from freezing temperatures.
- **Environment:** Toxic to aquatic organisms.

## Hazard Rating:

None listed.

# Ipconazole + Metalaxyl

*Rancona Pinnacle/Cover2*

Fungicide Group  
**3, 4**

Refer to page 427

## Company:

Arysta LifeScience Canada (*Rancona Pinnacle* - PCP#30769)

Loveland Products Canada Inc. (*Cover 2* – PCP#32950)

## Formulation:

*Rancona Pinnacle* - 4.61 g per L ipconazole and 6.15 per L metalaxyl formulated as a suspension.

- Container sizes - 10 L, 200 L

*Cover 2* - 4.61 g per L ipconazole and 6.15 per L metalaxyl formulated as a suspension.

- Container sizes – 2 x 10 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed):
Wheat	General seed rots (including those caused by saprophytic organisms such as <i>Penicillium</i> spp. and <i>Aspergillus</i> spp.); seed rot, damping off and seedling blight ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., seed- and soil-borne <i>Cochliobolus sativus</i> ); seed rot, pre-emergence damping off and seedling blight ( <i>Pythium</i> spp.); loose smut ( <i>Ustilago tritici</i> ); common bunt ( <i>Tilletia tritici</i> , <i>T. laevis</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); crown and foot rot ( <i>Fusarium</i> spp.)	325 mL
Barley	General seed rots (including those caused by saprophytic organisms such as <i>Penicillium</i> spp. and <i>Aspergillus</i> spp.); seed rot, damping off and seedling blight ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., seed- and soil-borne <i>Cochliobolus sativus</i> ); seed rot, pre-emergence damping off and seedling blight ( <i>Pythium</i> spp.); covered smut ( <i>Ustilago hordei</i> ); false loose smut ( <i>U. nigra</i> ); leaf stripe ( <i>Pyrenophora graminea</i> )		
	True loose smut ( <i>Ustilago nuda</i> )		325 to 433 mL*

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed):
Oat	Loose smut ( <i>Ustilago avenae</i> ); covered smut ( <i>U. kollerii</i> ); seed rot and seedling blight ( <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Aspergillus</i> spp., <i>Penicillium</i> spp., <i>Rhizoctonia</i> spp.); seed rot, pre-emergence damping off and seedling blight ( <i>Pythium</i> spp.).	Common root rot ( <i>Cochliobolus sativus</i> ); crown and foot rot ( <i>Fusarium</i> spp.)	325 mL
Rye	Seed rot and seedling blight ( <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Aspergillus</i> spp., <i>Penicillium</i> spp., <i>Rhizoctonia</i> spp.); seed rot, pre-emergence damping off and seedling blight ( <i>Pythium</i> spp.).		
Triticale			

\*Use the higher rate for highly infected seed lots only.

## Application Information:

*Rancona Pinnacle* and *Cover 2* are for both commercial and for on farm application. Products may be applied utilizing mechanical, slurry or mist-type seed treating equipment provided that the equipment can be calibrated to accurately and uniformly apply the product to seed. Uniform application to seed is necessary to assure best disease protection and optimum performance.

Closed mix/load equipment must be used in commercial seed treatment facilities. In most cases, *Rancona Pinnacle* and *Cover 2* are ready to use and can be applied undiluted. However, dilution with water or container rinsate may be appropriate for some types of treaters and/or treating under dry and/or hot conditions to achieve more uniform product to seed coverage. Contact your local representative or supplier for specific recommendations.

## How it Works:

The active ingredient ipconazole is a demethylation inhibitor with systemic and contact activity and metalaxyl is an acylalane fungicide with systemic activity. For more information refer to "Fungicide Mode of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** All bags containing treated seed for sale or use in Canada must be labeled as follows: "This package or bag contains seed treated with ipconazole and metalaxyl. DO NOT use treated seed for food, feed or oil processing. Store away from food and feed. Handlers of treated seed must wear long sleeved coveralls over normal work clothing, chemical resistant gloves, and shoes plus socks. Treated seed is toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface."
- **Grazing:** DO NOT graze or feed livestock on treated areas for 30 days after planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in original container only, away from other pesticides, fertilizer, food or feed. Store in a secure place that is temperate, dry and out of direct sunlight. Avoid excess heat. DO NOT freeze.
- **Environment:** DO NOT contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

## Hazard Rating:

None listed.

# Lumisena

## Fungicide Group

### 49

Refer to page 427

## Company:

Corteva Agriscience Division of DowDuPont – PCP#33001

## Formulation:

200 g/l of oxathiapiprolin formulated as a flowable suspension.

- Container sizes - 28.4 L and 2 x 5.4 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)
Soybean	Control of phytophthora seed rot/pre-emergence damping off and post emergence damping off ( <i>Phytophthora sojae</i> )	37 mL
Sunflower	Control of systemic downy mildew ( <i>Plasmopara halstedii</i> )	72 mL

## Application Information:

*Lumisena* is for use in commercial seed treatment facilities only. It is not for use in on-farm treating systems such as hopper-box or slurry-box applications just prior to planting. Closed transfer includes closed mixing, loading, calibrating, and closed treatment equipment. No open transfer of *Lumisena* is permitted.

This product contains no colourant. An appropriate colourant must be added when this product is applied. Regulations pertaining to *The Seeds Act* must be strictly adhered to when using this product. Treatment of damaged seed, or seed known to be of low vigour and poor quality, may result in poor germination and/or seed and seedling vigour. In cases where seed quality is unknown, treat a small portion of the seed with *Lumisena* and confirm acceptable germination, prior to treating the entire seed lot.

**Mixing instructions:** Before transferring *Lumisena* from its container, thoroughly mix the contents to insure the product is homogenous. Dilute in a sufficient volume to obtain thorough, uniform coverage. Polymers, colourants, and other additives should be tested for compatibility and seed prior to use in combination with *Lumisena*.

## How it Works:

The active ingredient oxathiapiprolin is an oxysterol binding protein homologue inhibitor with activity against diseases caused by oomycete fungi including phytophthora seed rot and downy mildew.

## Tank Mixes:

None registered.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** All bags containing treated seed must be labelled or tagged as follows: This seed has been treated with *Lumisena* which contains oxathiapiprolin.
- **Re-cropping:** Crops and crop groups that are on this label may be planted immediately after harvest. For all legume crops except succulent peas and soybeans, a plant back interval of 180 days is required. All other crops may be planted immediately following the planting of seed treated with *Lumisena*. Seed treated with *Lumisena* may be replanted if an emergency replanting is required due to an early season crop failure.
- **Storage:** Storage product in original container away from fertilizer, food or feed. Field and laboratory tests have demonstrated that application of *Lumisena* to soybean and sunflower will not negatively affect germination. However, due to seed quality and seed storage conditions beyond the control of Corteva Agriscience, no claims are made to guarantee the germination of carry-over seed.
- **Environment:** DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of waste. Dispose of all access treated seed. Left over treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. Dispose of seed packaging in accordance local requirements. DO NOT contaminate water bodies when disposing of plant equipment washwaters. Cover or incorporate spilled treated seed.

## Hazard Rating:

None listed.

# Mancozeb

Potato ST 16 / Solan MZ / Tuberseal

Fungicide Group

M3

Refer to page 428

## Company:

Norac Concepts Inc. (*Solan MZ* – PCP#29377, *Tuberseal* – PCP#17042)

Wilbur-Ellis Co., distributed by Loveland Products Canada (*Potato ST 16* – PCP#24734)

## Formulation:

16% mancozeb formulated as a powder.

- Container sizes - 10 kg (*Tuberseal*); 20 kg (*Solan MZ* and *Potato ST 16*)

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)
Potatoes	Fusarium seed piece decay	500 g

## Application Information:

Apply product before planting; thoroughly coat surface of whole or cut seed with dust. If treated whole seed is cut, make a second application to protect cut surfaces. Plant as soon as possible after treating. If cut seed is not planted within two days of treating, store in a ventilated location to allow cut surfaces to dry.

## How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed pieces should be labelled "Poisonous to man and animals. This seed has been treated with mancozeb for the control of fusarium decay. Do not use for food or feed purposes."
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store product in a cool, dry, well-ventilated place. Keep away from fire and sparks.
- **Environment:** DO NOT contaminate feed or food. DO NOT contaminate any body of water.

## Hazard Rating:

None listed.

# Maxim D/Maxim PSP/ Maxim MZ PSP

Fungicide Group

12, 3

Maxim D

12

Maxim PSP

12, M3

Maxim MZ PSP

Refer to page 428

## Company:

Syngenta Canada Inc. (Maxim D – PCP #30599; Maxim PSP – PCP#26647; Maxim MZ PSP – PCP#27965)

## Formulation:

*Maxim D*: 19.4 g per L fludioxonil and 19.4 g per L difenoconazole formulated as a suspension.

- Container sizes - 2 x 9.2 L

*Maxim PSP*: 0.5% fludioxonil formulated as a dry powder.

- Container sizes - 10 kg

*Maxim MZ PSP*: 0.5% fludioxonil and 5.7% mancozeb formulated as a dry powder.

- Container sizes - 10 kg, 20 kg, 22.7 kg

## Crops, Diseases and Rates:

Product	Crop	Diseases Controlled	Rate (per 100 kg of seed)
<i>Maxim D</i>	Potato	Silver scurf ( <i>Helminthosporium solani</i> )	130 mL
		Fusarium dry rot ( <i>Fusarium</i> spp.), black scurf* and stem/stolon canker ( <i>Rhizoctonia solani</i> )	65 to 130 mL
<i>Maxim PSP</i> <i>Maxim MZ PSP</i>	Potato	Silver scurf ( <i>Helminthosporium solani</i> ), Fusarium dry rot ( <i>Fusarium</i> spp.), black scurf and stem/stolon canker ( <i>Rhizoctonia solani</i> )	500 g

\* *Maxim D* will provide suppression of black scurf at 65 mL per 100 kg of seed. When *R. solani* pressure is high or control of black scurf is desired, used the 130 mL per 100 kg of seed rate.

## Application Information:

**Maxim D:** Shake or mix well before using. Apply using standard seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. When applying at a rate of 130 mL per 100 kg seed, *Maxim D* may be applied undiluted or as a water-based slurry. DO NOT exceed a maximum slurry volume of 260 mL per 100 kg seed. When applying at rates lower than 130 mL of *Maxim D* per 100 kg seed, add sufficient water to allow for a slurry volume of at least 130 mL per 100 kg seed. Follow manufacturer's application instructions for the seed treatment equipment used.

**Maxim PSP, Maxim MZ PSP:** Apply using appropriate treater designed for treating potatoes or by dust attachment over belt. Cut pieces should be treated immediately after cutting. If treated seed pieces are bagged, they should be stored for 2 to 3 days in open crates before bagging. For optimum protection against silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential.

## How it Works:

Fludioxonil is a phenylpyrrole fungicide with contact activity. Mancozeb is a dithiocarbamate fungicide with contact activity. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

*Maxim D* can be tank-mixed with *Actara 240SC* for control of Colorado potato beetle, aphids and potato leafhopper.

*Maxim D* may be tank-mixed with *Maxim Liquid PSP* when *R. solani* pressure is high or control of black scurf is desired.

Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Ideal storage temperature for the product is above freezing and below 30°C. Store in a dry place. Avoid contamination of feed.
- **Environment:** This product is toxic to fish and aquatic invertebrates. DO NOT apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, DO NOT contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Maxim Quattro

Available to commercial seed treaters only.

Fungicide Group

1, 4, 11, 12

Refer to pages 427 and 428

## Company:

Syngenta Canada Inc. – PCP#29871

## Formulation:

26.5% thiabendazole, 3.32% fludioxonil, 2.65% metalaxyl-M and S-isomer, 1.33% azoxystrobin formulated as a liquid suspension seed treatment.

- Container sizes - 5 L to Bulk

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)
Corn – field, pop, sweet	Seed- and soil-borne <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Fusarium</i> spp. (including <i>F. graminearum</i> and <i>F. verticillioides</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight (weakly pathogenic <i>Aspergillus</i> spp. and <i>Penicillium</i> spp.)	67 mL

## Application Information:

For use by a commercial seed treater only. Mix with water to form a slurry seed treatment. Contains no colourant; an appropriate colourant must be added to slurry before treating seed. Maintain constant agitation of slurry. Allow seed to dry before bagging. Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and / or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test prior to treating.

## How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with contact and systemic activity. The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity. The active ingredient metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including pythium damping off. The active ingredient azoxystrobin is a methoxyacrylate (strobilurin) fungicide with broad spectrum activity to be used as a preventative and curative fungicide. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

Maxim Quattro may be tank-mixed with Cruiser 5FS.

Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled "This seed has been treated with thiabendazole, fludioxonil, metalaxy-M and S-isomer, and azoxystrobin. Use chemical resistant-gloves when handling treated seed. DO NOT use for food, feed or oil processing. Store away from feed and foodstuffs. DO NOT graze corn or cut for forage within 30 days of planting."
- **Grazing:** DO NOT graze or feed livestock on treated areas within 30 days of planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store product between 0°C and 30°C. Repeated freeze-thawing of the product will not compromise its integrity. If the product should freeze, bring the product back to room temperature and ensure thorough mixing before use. Store away from food and feed. DO NOT carry over treated sweet corn to the following year.
- **Environment:** DO NOT apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, DO NOT contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes. If treated seed is spilled outdoors, promptly clean up.

## Hazard Rating:



Caution – Potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Mertect SC

Fungicide Group

1

Refer to page 427

## Company:

Syngenta Canada Inc. – PCP#13975

## Formulation:

500 g per L thiabendazole formulated as a water dispersible suspension.

- Container sizes - 4 x 5 L

## Crops and Diseases:

Post-harvest control of storage rots caused by *Fusarium*, *Phoma*, *Helminthosporium*, *Oospora* and *Rhizoctonia* spp. on potato.

## Rate and Water Volume:

7.5 L per 170 L of water. Spray 2 L of this suspension per 1 metric tonne of potatoes.

## Application Information:

Post-harvest treatment. Shake well before using. DO NOT allow suspension to stand without continuous agitation. Potatoes must rotate along conveyor line to ensure complete coverage. Prior to treating potatoes destined for export, confirm with authorities that treated potatoes will be allowed to enter importing country.

## How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.



## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Minimum storage temperature 0°C.
- **Environment:** Toxic to aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not discharge effluent containing this product into sewer systems, lake, streams, ponds, estuaries, oceans, and other waters.

## Hazard Rating:

None listed.

# Metalaxyl

*Allegiance FL/Belmont 2.7FS*

## Fungicide Group

4

Refer to page 427

## Company:

Bayer (*Allegiance FL* – PCP#26674)

Arysta LifeScience Canada Inc. (*Belmont 2.7 FS* – PCP#30246)

## Formulation:

317 g per L metalaxyl formulated as a liquid seed treatment.

- *Allegiance FL* container size – 4 X 3.79 L
- *Belmont 2.7 FS* container size – 500 mL, 10 L and 200 L

## Crops, Diseases and Rates (for crops processed in Canada):

Crop	Disease Controlled	Application Rates <sup>1</sup> (per 100 kg of seed)	Water Volume (required to make up a total volume of 500 mL)
Chickpea, field pea	Seed rots and seedling blights ( <i>Pythium</i> spp.)	16 to 110 mL	484 to 390 mL
Canola (rapeseed)	Seed rots and seedling blights ( <i>Pythium</i> spp.)	32 to 110 mL	468 to 390 mL
Alfalfa, dry bean, clover, corn, sainfoin, vetch	Seed rots and seedling blights ( <i>Pythium</i> spp.)	46 to 110 mL	454 to 390 mL
Grasses (forage)	Seed rots and seedling blights ( <i>Pythium</i> spp.)	46 to 93 mL	454 to 407 mL
Soybean	Seed rots and seedling blights ( <i>Pythium</i> spp.), early season Phytophthora ( <i>Phytophthora sojae</i> )	46 to 93 mL	454 to 407 mL
Sunflower	Seed rots and seedling blights ( <i>Pythium</i> spp.), downy mildew ( <i>Plasmopara halstedii</i> )	110 to 189 mL <sup>2</sup>	390 to 311 mL
Low tannin lentil <sup>3</sup>	Seed rots and seedling blights ( <i>Pythium</i> spp.)	16 mL	484 mL

<sup>1</sup> Use the high rate if planting into cold, wet soils, if the seed is of poor quality, or if disease pressure is expected to be high.

<sup>2</sup> High rate is for downy mildew control.

<sup>3</sup> For use on low tannin lentils destined export or seed production only.

## Crops, Diseases and Rates (for crops intended for export):

Crop	Disease Controlled	Application Rates <sup>1</sup> (per 100 kg of seed)	Water Volume (required to make up a total volume of 500 mL)
Corn	Seed rots and seedling blights ( <i>Pythium</i> spp.), downy mildew ( <i>Sclerophthora macrospora</i> )	189 to 620 mL	311 to 0 mL
Pea	Seed rots and seedling blights ( <i>Pythium</i> spp.), downy mildew ( <i>Peronospora viciae</i> )	146 mL	354 mL
Sunflower	Seed rots and seedling blights ( <i>Pythium</i> spp.), downy mildew ( <i>Plasmopora halstedii</i> )	620 mL	0 mL
Wheat, barley, oats, rye, triticale <sup>2</sup>	Seed rots and seedling blights ( <i>Pythium</i> spp.)	46 to 110 mL	454 to 390 mL
Sorghum	Seed rots and seedling blights ( <i>Pythium</i> spp.)	93 to 110 mL	407 to 390 mL
	Downy mildew ( <i>Perenosclerospora sorghi</i> )	189 mL	311 mL
Bird's-foot trefoil	Seed rots and seedling blights ( <i>Pythium</i> spp.)	46 to 110 mL	454 to 390 mL
Low-tannin lentil	Seed rots and seedling blights ( <i>Pythium</i> spp.)	16 mL	484 mL

<sup>1</sup> Use the high rate if planting into cold, wet soils, if the seed is of poor quality, or if disease pressure is expected to be high.

<sup>2</sup> Triticale is a registered crop for treatment with *Belmont 2.7 FS* only

## Application Information:

Mix with water to form a slurry seed treatment. Contains no colourant; an appropriate colourant must be added to slurry before treating seed. Maintain constant agitation of slurry. Allow seed to dry before bagging. Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and/or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test prior to treating.

## How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled as follows; "This seed has been treated with *Allegiance FL* or *Belmont 2.7 FS* seed protectant which contains metalaxyl. DO NOT use for feed, food or oil processing." All bags containing seed for export must be labelled "FOR EXPORT ONLY"
- **Grazing:** DO NOT graze or feed livestock on treated areas for 4 weeks after planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** DO NOT store above 35°C or below 0°C. Store in original container, away from pesticides, food or feed.
- **Environment:** Treated seed may be toxic to birds and other wildlife. Clean up any spilled seeds and ensure seed is properly incorporated at planting.

## Hazard Rating:



Warning – Skin and eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Metlock CT

Fungicide Group

3, 4

Refer to pages 427 and 428

## Company:

Valent Canada Inc. distributed by Nufarm Agriculture – PCP#32371

## Formulation:

23.2 g per L metconazole, 46.5 g per L metalaxyl formulated as a solution.

- Container sizes - 2 x 10 L, 100 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)
Wheat (spring, durum, winter)	Early season seed rot/pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.); post-emergence damping-off, seedling blight, seedling root rot ( <i>Pythium</i> spp.); common bunt ( <i>Tilletia laevis</i> ); loose smut ( <i>Ustilago tritici</i> )	Common root rot ( <i>Cochliobolus sativus</i> )	65.2 mL
Barley	Early season seed rot/pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.); post-emergence damping-off, seedling blight, seedling root rot ( <i>Pythium</i> spp.); covered smut ( <i>Ustilago hordei</i> ); true loose smut ( <i>U. nuda</i> )	Common root rot ( <i>Cochliobolus sativus</i> )	65.2 mL
Corn (field, sweet)	Seed rot/pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.); post-emergence damping-off ( <i>R. solani</i> , <i>Pythium</i> spp.); seedling blight, seedling root rot ( <i>Pythium</i> spp.)	-	65.2 mL
Oat Buckwheat Millet (pearl, proso) Rye Triticale	Early season seed rot/pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> , <i>Pythium</i> spp.); post-emergence damping-off, seedling blight, seedling root rot ( <i>Pythium</i> spp.)	Common root rot ( <i>Cochliobolus sativus</i> )	65.2 mL

## Application Information:

*Metlock CT* does not contain a colourant, any seed treated with *Metlock CT* must be conspicuously coloured (red).

*Metlock CT* is a concentrated formulation and should be mixed with water at a ratio of 5 parts water to 1 part *Metlock CT* to ensure sufficient seed coverage. More water can be used if necessary. For all seed types, commercial seed treatment (facilities and mobile treaters, with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only) is permitted. For cereal grain seeds (excluding corn), on-farm treatment (open transfer including open mixing, loading, calibrating, and open treatment equipment) is permitted.

## How it Works:

The active ingredient metconazole is a broad-spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. The active ingredient metalaxyl is an acylalanine fungicide with systemic activity against diseases caused by oomycetes, including *Pythium* damping-off. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

Nufarm Agriculture supports the following seed treatment mixes that are not on the *Metlock CT* label:

- **Wheat** – *NipsIT Inside 600 Insecticide* at a rate of 17 to 100 mL per 100 kg of seed.
- **Wheat, barley, corn, oat, buckwheat, millet, rye, triticale** – *INTEGO Solo Fungicide* at a rate of 13 to 17 mL per 100 kg of seed.

Follow the label directions for each product and use the most restrictive precautions and limitations.

Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labeled “This seed was treated with a product containing the active ingredients metalaxyl and metconazole. Do not use treated seed for feed, food or oil processing. Store away from feeds and other foodstuffs. When planning, workers must wear a long-sleeved shirt, long pants, socks and shoes, as well as chemical-resistance gloves when handling treated seeds. Dispose of all excess treated seed. Left over treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. Do not contaminate water bodies when disposing of planting equipment washwaters. Dispose of seed packaging in accordance with local requirements. Treated seeds exposed on soil surface may be hazardous to wildlife. Cover or incorporate spilled treated seeds. A closed-cab planted is required when planting treated cereal grain seeds. An open-cab planter may be used with planting corn seeds.”
- **Re-cropping:** Barley, corn, canola, oats, rye, wheat, soybeans, and sugarbeet may be replanted at any time. A 35-day plant back interval for all other crops.
- **Storage:** Store in a cool place. DO NOT store in direct sunlight. Protect from freezing temperatures.
- **Environment:** Toxic to aquatic organisms and non-target terrestrial plants. This product demonstrates the properties and characteristics associated with chemicals detected in ground water. The use of *Metlock CT* in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination.

Hazard Rating:

None listed.

# NipsIt INSIDE 600 Insecticide

See clothianidin on page 534.

# NipsIt SUITE Cereals OF Seed Protectant

Fungicide Group  
3, 4

Insecticide Group  
4

Refer to pages 427,  
428 and 598

Company:  
Valent Canada Inc. distributed by Nufarm Agriculture – PCP#31357

Formulation:

- 30.7 g/L clothianidin, 9.24 g/L metalaxyl and 4.92 g/L metconazole formulated as a ready to use suspension.
- Container sizes - 2x10 L, 110L drums

Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Insects Suppressed	Rate (per 100 kg of seed)
Wheat	Early season seed rot/pre-emergence damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia solani</i> ); early season seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight and seedling root rot ( <i>Pythium</i> spp.); common bunt ( <i>Tilletia laevis</i> ); loose smut ( <i>Ustilago tritici</i> )	Common root rot ( <i>Cochliobolus sativus</i> )	Wireworm*	326 mL

\* Under moderate to high wireworm pressure or in situations where control is required tank mix with *NipsIt INSIDE 600 Insecticide*.

## Application Information:

For use in commercial seed treatment facilities (with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only) and for use on-farm (open transfer including open mixing, loading, calibrating, and open treatment equipment is allowed).

## How it Works:

The active ingredient clothianidin is a chloronicotinyl insecticide with systemic activity. For more information refer “Insecticide Groups Based on Modes of Action” on page 600.

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity against diseases caused by oomycetes, including Pythium damping-off. Metconazole is a broad-spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. For more information refer to “Fungicide Modes of Action” on page 426.

## Tank Mixes:

Valent Canada supports the following seed treatment mixes that are not on the *NipsIt SUITE Cereals OF Seed Protectant* label:

- *NipsIt INSIDE 600 Insecticide* at rates of 17-83 mL per 100 kg of seed.
- *Intego SOLO Fungicide* for control of metalaxyl resistant populations of *Pythium* spp.

Follow the label directions for each product and use the most restrictive precautions and limitations.

## Restrictions:

Resistance management: Refer to page 426 and 598. DO NOT apply any subsequent application of a Group 4 insecticide (in-furrow or foliar) following treatment with *NipsIt SUITE Cereals OF Seed Protectant*.

- **Labelling:** Treated seed must be labeled “This seed was treated with *NipsIt SUITE Cereals OF Seed Protectant*, which contains clothianidin, metalaxyl, and metconazole. Do not use treated seed for feed, food or oil processing. Store away from feeds and other foodstuffs. Wear long-sleeved shirt, long pants and chemical-resistant gloves when handling treated seed. This product is toxic to aquatic invertebrates. Dispose of all excess treated seed. Left over treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. Cover or incorporate spilled treated seeds. A closed cab planter is required when planting treated wheat seeds.”
- **Grazing:** DO NOT graze or feed livestock on treated areas for four weeks after planting.
- **Re-cropping:** Corn, canola, rapeseed, and wheat may be replanted at any time. A 35-day plant-back interval on cereal grains (except wheat), grasses, non-grass animal feeds, potato, soybeans and dry beans is required.
- **Storage:** Store in a cool place. DO NOT store in direct sunlight. Protect from freezing temperatures.
- **Environment:** Toxic to aquatic organisms. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatments. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination. DO NOT use to control aquatic pests. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Hazard Rating:

None listed.

# Phosphorous acid

*Confine Extra / Rampart*

Fungicide Group

33

Refer to page 428

## Company:

Winfield Solutions (*Confine Extra* – PCP#30648)

Loveland Products Canada (*Rampart*– PCP#30654)

## Formulation:

53% mono and di-potassium salts of phosphorous acid.

- Container sizes - 9.46 L - 946.35 L (*Confine Extra*)
- Container sizes - 9.46 L (*Rampart*)

Crops Diseases and Rates:

**Confine Extra:** Post-harvest treatment of potatoes for the suppression of late blight (*Phytophthora infestans*), pink rot (*P. erythroseptica*), and silver scurf (*Helminthosporium solani*) storage infection.

**Rampart:** Post-harvest treatment of potatoes for control of late blight (*Phytophthora infestans*) and pink rot (*P. erythroseptica*).

Rate and Application Information:

For application prior to storage:

- Dilute *Confine Extra* at a 1:5.13 ratio with water (326 mL *Confine Extra* + 1674 mL water). Apply 2 L of solution as a spray to 1000 kg of potatoes.
- Dilute *Rampart* at a 1:5.26 ratio with water (190 mL *Rampart* + 1 L water). Apply 2 L of solution per 100 kg of harvested potatoes as a spray or rinse.

For application to stored potatoes (*Rampart* only):

- Dilute *Rampart* at a 1:5.26 ratio with water (190mL *Rampart* + 1 L water). Apply 2 L of solution per 100 kg of stored potatoes into water used for post-harvest storage.

How it Works:

The active ingredient mono- and di-potassium salts of phosphorous acid is a phosphonate fungicide with systemic activity to suppress pathogen inoculum. To be used as a preventative fungicide application on harvested tubers.

For more information refer to “Fungicide Modes of Action” on page 426.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store this product away from food or feed.
- **Environment:** DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of waste. DO NOT apply by air.

Hazard Rating:

None listed.

Prosper EverGol

Available to commercial seed treaters only.

Fungicide Group

4, 7, 11

Insecticide Group

4

Refer to pages 427 and 598

Company:

Bayer – PCP#30363

Formulation:

Active ingredient:	Prosper EverGol
Clothianidin	290 g per L
Carbathiin	-
Penflufen	10.7 g per L
Trifloxystrobin	7.15 g per L
Metalaxyl	7.15 g per L
Container size:	3.8 L to 1000 L, bulk

## Crops, Insects, Diseases and Rates:

Product	Crop	Diseases Controlled	Insects Controlled	Rate (per 100 kg of seed)
<i>Prosper EverGol</i>	Canola, rapeseed, mustard (oilseed and condiment)	Seed rot, damping off, seedling blight and early season root rot ( <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Fusarium</i> spp., seed-borne <i>Alternaria</i> spp.); seed-borne blackleg ( <i>Leptosphaeria maculans</i> )	Flea beetles	1400 mL

## Application Information:

*Prosper EverGol* is for use in commercial seed treatment facilities with closed transfer systems only. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

## How it Works:

Clothianidin is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600. Carbothiin is a carboxamide fungicide with systemic activity; penflufen is a carboxamide (SDHI) fungicide with systemic activity; trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity; and metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426 and 598. DO NOT make any subsequent application of a group 4 insecticide (in-furrow or foliar application) following treatment with any of these products.

**NOTE:** When using a seed flow lubricant for planting corn and soybean seed treated with neonicotinoid insecticides (containing the active ingredients clothianidin, imidacloprid or thiamethoxam), use only a dust-reducing fluency agent.

Talc and graphite are not permitted.

- **Labelling:** Treated seed must be labelled as follows: "This seed has been treated with clothianidin and/or carbothiin, penflufen and metalaxyl. DO NOT use for food, feed or oil processing. Store away from feeds and other foodstuffs."
- **Grazing:** No restrictions listed.
- **Re-cropping:** For *Prosper EverGol*, corn and canola may be replanted at any time. A 1-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back is required for cereals, grasses, nongrass animal feeds, soybeans and dry beans.
- **Storage:** Protect products from freezing. DO NOT contaminate water, food or feed by storage, disposal or by cleaning of equipment. Store in a cool place. DO NOT store in direct sunlight. Store away from food or feed. DO NOT store treated seed above 25°C or in direct sunlight. Treated seed stored for periods in excess of 9 months should be tested for germination before planting.
- **Environment:** These products are toxic to aquatic invertebrates. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate water when disposing of equipment wash waters. These products are toxic to birds and mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface.

## Hazard Rating:



Warning – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Rancona V RS

Fungicide Group

3, 7

Refer to pages 427 and 428

## Company:

Arysta LifeScience Canada – PCP#30217

## Formulation:

9.38 g per L ipconazole and 87.5 g per L carbathiin formulated as a liquid suspension seed treatment.

- Container sizes - 10 L, 200 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)
Canola Rapeseed Mustard	Seed rot, damping off, and seedling blight ( <i>Rhizoctonia</i> spp., <i>Fusarium</i> spp.); seed-borne blackleg ( <i>Leptosphaeria maculans</i> )	Root rot ( <i>Rhizoctonia</i> spp., <i>Fusarium</i> spp.)	800 mL

## Application Information:

*Rancona V RS* is ready to use and may be applied to seed as purchased. However, dilution with water may help to achieve more uniform seed coverage when using some types of treaters and/or when treating under dry and/or hot conditions.

## How it Works:

The active ingredient ipconazole is a demethylation inhibitor with systemic and contact activity and carbathiin is a carboximide fungicide with systemic activity. For more information refer to “Fungicide Modes of Action” on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled as follows “This seed has been treated with carbathiin and ipconazole. Do not use treated seed for feed, food, or oil processing.”
- **Grazing:** DO NOT graze or feed livestock on treated area for four weeks after planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store this product away from food or feed.
- **Environment:** DO NOT contaminate ponds, lakes or streams.

## Hazard Rating:

None listed.

# Rancona Trio

Fungicide Group

3, 4, 7

Refer to pages 427 and 428

## Company:

Arysta LifeScience Canada – PCP#32668

## Formulation:

5.0 g per L ipconazole, 133.33 g per L carbathiin, and 13.33 g per L metalaxyl formulated as a liquid suspension seed treatment.

- Container sizes - 500 mL to bulk



## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)
Barley	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia solani</i> , <i>Penicillium</i> spp., <i>Aspergillus</i> spp., <i>Cochliobolus sativus</i> ); seedling blight, damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>R. solani</i> , <i>C. sativus</i> ); true loose smut ( <i>Ustilago nuda</i> ); covered smut ( <i>U. hordei</i> ); false loose smut ( <i>U. nigra</i> ); leaf stripe ( <i>Pyrenophora graminea</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); <i>Fusarium</i> crown and foot rot ( <i>Fusarium</i> spp.)	300 mL
Oat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia solani</i> , <i>Penicillium</i> spp., <i>Aspergillus</i> spp., <i>Cochliobolus sativus</i> ); seedling blight, damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>R. solani</i> , <i>C. sativus</i> ); loose smut ( <i>Ustilago avenae</i> ); covered smut ( <i>U. kollerii</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); <i>Fusarium</i> crown and foot rot ( <i>Fusarium</i> spp.)	300 mL
Rye Triticale	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia solani</i> , <i>Penicillium</i> spp., <i>Aspergillus</i> spp., <i>Cochliobolus sativus</i> ); seedling blight, damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>R. solani</i> , <i>C. sativus</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); <i>Fusarium</i> crown and foot rot ( <i>Fusarium</i> spp.)	300 mL
Spring wheat Winter wheat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia solani</i> , <i>Penicillium</i> spp., <i>Aspergillus</i> spp., <i>Cochliobolus sativus</i> ); seedling blight, damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>R. solani</i> , <i>C. sativus</i> ); loose smut ( <i>Ustilago tritici</i> ); common bunt ( <i>Tilletia tritici</i> )	Common root rot ( <i>Cochliobolus sativus</i> ); <i>Fusarium</i> crown and foot rot ( <i>Fusarium</i> spp.)	300 mL

## Application Information:

*Rancona Trio* is ready to use and does not need dilution prior to application. The optimum treating process and slurry composition depends on the crop, the treating process and application conditions.

## How it Works:

The active ingredient ipconazole is a demethylation inhibitor with systemic and contact activity, carbathiin is a carboximide fungicide with systemic activity, and metalaxyl is an acylalanine fungicide systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled as follows "This seed has been treated with *Rancona Trio Fungicide*, which contains ipconazole, carbathiin, and metalaxyl. DO NOT use for feed, food, or oil processing. Store away from feeds and other food stuffs. When planting or handling treated seeds, workers must wear a long-sleeved shirt, long pants, socks and shoes, and chemical-resistant gloves. Gloves are not required while driving the tractor. A closed-cab tractor is required when planting more than 2200 kg of treated seeds per day."
- **Grazing:** DO NOT graze or feed livestock on treated area for six weeks after planting barley, oats, or wheat. DO NOT graze or feed livestock on treated area for four weeks after planting all other crops.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store this product away from food or feed. Store in original container only, away from other pesticides, fertilizer, food, or feed. DO NOT freeze. DO NOT store treated seed above 25°C or in direct sunlight.
- **Environment:** DO NOT contaminate ponds, lakes or streams. Treated seed is toxic to birds and small wild mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface.

## Hazard Rating:

None listed.

# Raxil MD

Fungicide Group

3, 4

Refer to pages 427 and 428

## Company:

Bayer – PCP#27692

## Formulation:

5.0 g per L tebuconazole and 6.6 g per L metalaxyl formulated as a flowable seed treatment.

- Container sizes - 10 L, 200 L, 1,000 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Undiluted Use Rate	
			Rate (per 100 kg of seed)	Amount of seed per 10 L jug
Wheat	Loose smut ( <i>Ustilago tritici</i> ); common bunt or stinking smut ( <i>Tilletia tritici</i> , <i>T. laevis</i> ); seed rot and pre-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Fusarium</i> spp.); damping-off ( <i>Pythium</i> spp.); seed-borne <i>Septoria nodorum</i>	Root and crown rot (seed- and soil-borne <i>Fusarium</i> spp.); common root rot (seed- and soil-borne <i>Cochliobolus sativus</i> ); seed rot and pre-emergent damping-off (seed- and soil-borne <i>C. sativus</i> ); seedling blight (seed-borne <i>C. sativus</i> )	300 mL	3320 kg
Barley	True loose smut ( <i>Ustilago nuda</i> ); covered smut ( <i>U. hordei</i> ); false loose smut ( <i>U. nigra</i> ); seed rot and pre-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Fusarium</i> spp.); damping-off ( <i>Pythium</i> spp.); barley leaf stripe ( <i>Pyrenophora graminis</i> )	Root and crown rot (seed- and soil-borne <i>Fusarium</i> spp.); common root rot (seed- and soil-borne <i>Cochliobolus sativus</i> ); seed rot and pre-emergent damping-off (seed- and soil-borne <i>C. sativus</i> ); seedling blight (seed-borne <i>C. sativus</i> )	300 mL	3320 kg
Oat	Covered smut ( <i>Ustilago kollerii</i> ); loose smut ( <i>U. avenae</i> ); seed rot and pre-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Fusarium</i> spp.); damping-off ( <i>Pythium</i> spp.)		300 mL	3320 kg

## Application Information:

*Raxil MD* is a ready to use formulation designed for commercial or on-farm treatment with conventional seed treating equipment which can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure seed safety and best disease control. See manufacturer's instructions supplied with the treater system for information on proper application technique.

Uniform coverage at the correct rate is important for satisfactory results. Under-treatment may lead to loss of efficacy and over-treatment could reduce germination. Seed may be planted immediately after treating.

## How it Works:

The active ingredient tebuconazole is a systemic triazole fungicide with broad-spectrum activity. The active ingredient metalaxyl is an acylalaine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled "This seed has been treated with *Raxil MD* which contains tebuconazole and matalaxyl; DO NOT use for food, feed or oil processing."
- **Grazing:** DO NOT graze or feed livestock on treated areas for 4 weeks after planting.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Store in a cool, dry place and avoid excessive heat.
- **Environment:** DO NOT contaminate water, food, or feed by storage, disposal, or by cleaning of equipment.

## Hazard Rating:

⚠ Danger – Skin and eye irritant

For an explanation of the symbols used here see pages 7 and 8.

# Raxil PRO

Fungicide Group  
3, 4

Refer to pages 427 and 428

## Company and Formulation:

Bayer – PCP#30102

## Formulation:

3.0 g per L tebuconazole, 15.4 g per L prothioconazole and 6.2 g per L metalaxyl formulated as a micro-dispersion formulation.

- Container sizes - 10 L, 58.5 L, 175.5 L, 1000 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)
Barley	Seed rot/pre-emergent damping-off, seedling blight (seed- and soil-borne <i>Fusarium</i> spp., soil-borne <i>Pythium</i> spp., <i>Cochliobolus sativus</i> , seed-borne <i>Aspergillus</i> spp.); post-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp., <i>C. sativus</i> , seed-borne <i>Aspergillus</i> spp.); true loose smut ( <i>Ustilago nuda</i> ); covered smut ( <i>U. hordei</i> ); false loose smut ( <i>U. nigra</i> ); barley leaf stripe ( <i>Pyrenophora graminis</i> )	Root rot (seed- and soil-borne <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Rhizoctonia solani</i> ); crown rot ( <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Penicillium</i> spp.); seed rot, pre-emergent damping off ( <i>R. solani</i> )	325 mL
Oat	Seed rot/pre-emergent damping-off, seedling blight (seed- and soil-borne <i>Fusarium</i> spp., soil-borne <i>Pythium</i> spp., <i>Cochliobolus sativus</i> , seed-borne <i>Aspergillus</i> spp.); post-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp., <i>C. sativus</i> , seed-borne <i>Aspergillus</i> spp.); Covered smut ( <i>Ustilago kollerii</i> ); loose smut ( <i>U. avenae</i> )	Root rot (seed- and soil-borne <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Rhizoctonia solani</i> ); crown rot ( <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Penicillium</i> spp.); seed rot, pre-emergent damping off ( <i>R. solani</i> )	325 mL
Wheat, Rye and Triticale	Seed rot/pre-emergent damping-off, seedling blight (seed- and soil-borne <i>Fusarium</i> spp., soil-borne <i>Pythium</i> spp., <i>Cochliobolus sativus</i> , seed-borne <i>Aspergillus</i> spp.); post-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp., <i>C. sativus</i> , seed-borne <i>Aspergillus</i> spp.); loose smut ( <i>Ustilago tritici</i> ); common bunt ( <i>Tilletia tritici</i> , <i>T. laevis</i> )	Root rot (seed- and soil-borne <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Rhizoctonia solani</i> ); crown rot ( <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Penicillium</i> spp.); seed rot, pre-emergent damping off ( <i>R. solani</i> )	325 mL

## Application Information:

*Raxil PRO* is a ready-to-use treatment formulation for use in commercial seed treatment operations and for on-farm treatment with conventional seed treating which can accurately meter, mix and apply flowable seed treatment formulations.

## How it Works:

The active ingredient tebuconazole is a triazole demethylation inhibitor (DMI) fungicide with systemic activity. The active ingredient prothioconazole is a demethylation inhibitor with broad-spectrum systemic activity. The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Insecticide Seed Treatment:** May be mixed with *Stress Shield 600*.

Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labeled "This seed has been treated with *Raxil PRO*, which contains tebuconazole, prothioconazole and metalaxyl. When handling treated seed wear chemical-resistant gloves. DO NOT use for feed, food or oil processing. Store away from feeds and other foodstuffs."
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed. Store in a cool, dry area and avoid excessive heat.
- **Environment:** Toxic to aquatic organisms. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Dispose of all excess treated seed. Left over seed may be double-sown around the headland or buried away from water sources. DO NOT leave exposed treated seed on soil surface. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable and/or the depth to the water is shallow.

## Hazard Rating:



Caution – Skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Raxil PRO Shield

*Raxil PRO Shield is a co-pack of Raxil PRO (tebuconazole, prothioconazole and metalaxyl fungicides, page 575) and Stress Shield 600 (imidacloprid insecticide, page 551). For other detailed information on the component products see the product pages listed above.*

**Fungicide Group**  
**3, 4**  
**Insecticide Group**  
**4**

*Refer to pages 427,  
428 and 598*

## Company:

Bayer (*Raxil PRO* – PCP#30102; *Stress Shield 600* – PCP#30668)

## Formulation:

**Raxil PRO:** 3.0 g per L tebuconazole, 15.4 g per L prothioconazole and 6.2 g per L metalaxyl formulated as a suspension.


**Stress Shield 600:** 600 g per L imidacloprid formulated as a suspension.

- Container sizes - 10 L *Raxil PRO* and 1.54 L *Stress Shield 600*; 175.5 L *Raxil PRO* and 27 L *Stress Shield 600*

## Crops, Diseases, Insects and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Insects Controlled	Rate (per 100 kg of seed)*	
				Raxil Pro	Stress Shield 600
Barley	Seed rot/pre-emergent damping-off, seedling blight (seed- and soil-borne <i>Fusarium</i> spp., soil-borne <i>Pythium</i> spp., <i>Cochliobolus sativus</i> , seed-borne <i>Aspergillus</i> spp.); post-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp., <i>C. sativus</i> , seed-borne <i>Aspergillus</i> spp.); true loose smut ( <i>Ustilago nuda</i> ); covered smut ( <i>U. hordei</i> ); false loose smut ( <i>U. nigra</i> ); barley leaf stripe ( <i>Pyrenophora graminis</i> )	Root rot (seed- and soil-borne <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Rhizoctonia solani</i> ); crown rot ( <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Penicillium</i> spp.); seed rot, pre-emergent damping off ( <i>R. solani</i> )	Wireworm	325 mL	50 mL
Oat	Seed rot/pre-emergent damping-off, seedling blight (seed- and soil-borne <i>Fusarium</i> spp., soil-borne <i>Pythium</i> spp., <i>Cochliobolus sativus</i> , seed-borne <i>Aspergillus</i> spp.); post-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp., <i>C. sativus</i> , seed-borne <i>Aspergillus</i> spp.); Covered smut ( <i>Ustilago kolleri</i> ); loose smut ( <i>U. avenae</i> )	Root rot (seed- and soil-borne <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Rhizoctonia solani</i> ); crown rot ( <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Penicillium</i> spp.); seed rot, pre-emergent damping off ( <i>R. solani</i> )	Wireworm	325 mL	50 mL
Wheat, Rye and Triticale	Seed rot/pre-emergent damping-off, seedling blight (seed- and soil-borne <i>Fusarium</i> spp., soil-borne <i>Pythium</i> spp., <i>Cochliobolus sativus</i> , seed-borne <i>Aspergillus</i> spp.); post-emergent damping-off (seed- and soil-borne <i>Fusarium</i> spp., <i>C. sativus</i> , seed-borne <i>Aspergillus</i> spp.); loose smut ( <i>Ustilago tritici</i> ); common bunt ( <i>Tilletia tritici</i> , <i>T. laevis</i> )	Root rot (seed- and soil-borne <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> , <i>Rhizoctonia solani</i> ); crown rot ( <i>Fusarium</i> spp.); seedling blight (seed-borne <i>Penicillium</i> spp.); seed rot, pre-emergent damping off ( <i>R. solani</i> )	Wireworm	325 mL	50 mL

## Hazard Rating:

 Warning – Poison (*Stress Shield 600*)

 Caution – Skin irritant (*Raxil PRO*)

For an explanation of the symbols used here see pages 7 and 8.

# Reason 500SC

## Fungicide Group

### 11

Refer to page 428

## Company:

Bayer – PCP#27462

## Formulation:

500 g per L fenamidone formulated as a suspension concentrate.

- Container size - 2 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)*
Potato	Seed-borne late blight ( <i>Phytophthora infestans</i> )	10 mL

## Application Information:

For optimal disease control, good coverage of the seed piece is required. Apply specified dosage as a diluted spray using equipment that ensures uniform coverage of each seed piece.

Agitate or stir the slurry solution as needed. Apply only in areas with adequate ventilation or in areas that are equipped to remove spray mist or dust. It is recommended to periodically clean and sanitize all surfaces which may come in contact with cut seed-pieces (i. e. cutting machines, tables, knives, planting equipment etc.). Seed pieces must be treated immediately after cutting. Do not use treated seed pieces for food, feed, or fodder. As part of the seed cutting and treating process, application of an absorbent ingredient is recommended to improve suberization.

## How it Works:

The active ingredient fenamidone is a strobilurin fungicide with contact activity. To be used as a preventative and inhibitive (spore germination and antisporeulant) fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

*Reason 500 SC* can be tank mixed with *Titan* and *Emesto Silver Titan* or *Emesto Silver* for application as a seed-piece treatment of potato when additional disease control and/or insect control is required. Refer to the registered label of each tank mix partner for application rate, precautions and directions for use associated with those products. Follow the most restrictive label precautions and limitations.

## Restrictions:

Resistance management: Refer to page 426. If following a seed treatment application of *Revus* with foliar applications of this product, apply a fungicide belonging to a group other than Group 40 as the first foliar application of the season. DO NOT apply more than 243 g mandipropamid per acre per year.

- **Maximum number of applications:** DO NOT exceed 6 applications or 0.48 L per acre of this product per season.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** 14 days.
- **Re-entry:** DO NOT re-enter treated areas until residues have dried.
- **Re-cropping:** A 30 day plant-back interval is required for potato and all other crops.
- **Storage:** DO NOT allow product to freeze. If stored more than 1 year, shake well before using. Keep away from fire, open flame or other sources of heat. Store in tightly closed container away from fertilizer, seeds, feed or food
- **Environment:** For ground application, maintain an 8 m buffer zone between areas sprayed and aquatic systems. For aerial application, allow a 10 m buffer. Toxic to fish and other aquatic organisms; DO NOT apply where runoff is likely to occur.

## Hazard Rating:



Caution Poison – Eye Irritant

For an explanation of the symbols used here see pages 7 and 8.

# Revus

## Fungicide Group

### 40

Refer to page 428

## Company:

Syngenta Canada Inc. – PCP#29074

## Formulation:

250 g per L mandipropamid formulated as a suspension.

- Container size - 10 kg

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)*
Potato	Seed-borne late blight ( <i>Phytophthora infestans</i> )	Pink rot ( <i>Phytophthora erythrospectica</i> )	13 to 26 mL

\* Use the higher rate when conditions favour heavy infection pressure.

## Application Information:

Apply using standard seed treating equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not get the desired level of disease control. Add sufficient water to allow for a slurry volume that will allow for sufficient coverage. Wear coveralls over long-sleeved shirt, long pants, chemical-resistant gloves, socks and boots during mixing, loading, application, clean-up and repair. When handling or planting treated potato seed pieces, workers must wear a long-sleeved shirt, long pants, gloves, socks and boots. DO NOT use open treating equipment when treating potato seed pieces. This product must be applied using a closed treatment system.

## How it Works:

The active ingredient mandipropamid is a carboxylic acid amid (CAA) with contact and systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426. If following a seed treatment application of *Revus* with foliar applications of this product, apply a fungicide belonging to a group other than Group 40 as the first foliar application of the season. DO NOT apply more than 243 g mandipropamid per acre per year.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store in a cool, dry place away from food, beverages, and tobacco products. To prevent contamination store this product away from food and feed.
- **Environment:** DO NOT apply this product directly to freshwater habitats, estuarine/marine habitats. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Hazard Rating:



Warning – Poison



Caution – Skin irritant

Potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Senator PSPT

Fungicide Group  
1

Refer to page 427

## Company:

Nippon Soda Company Ltd. – PCP#26236 Distributed by Engage Agro Corporation

## Formulation:

10% thiophanate-methyl formulated as dust.

- Container size - 10 kg

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)
Potato	Verticillium wilt ( <i>Verticillium dahliae</i> ), fusarium rot ( <i>Fusarium</i> spp.), silver scurf ( <i>Helminthosporium solani</i> ) Aids in control of: seed piece decay and blackleg infections	500 g

## Application Information:

Seed piece treatment. Apply in a convenient container or by dust attachment over belt. Cut pieces should be treated within 6 hours of cutting. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential. If planting is to be delayed more than 1 to 2 days, the treated pieces should be stored for 2 to 3 days in open crates before bagging. This product contains no colourant; an appropriate colourant must be added when this product is applied.

## How it Works:

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Store product in a dry place. Avoid contamination of feed or food stuffs.
- **Environment:** DO NOT contaminate domestic or irrigation water supplies, lakes, streams and ponds

## Hazard Rating:

None listed.

# Serenade OPTI

Fungicide Group

44

Refer to pages 427 and 428

## Company:

Bayer – PCP#31666

## Formulation:

*Serenade OPTI*: 26.2% *Bacillus subtilis* (QST 713 strain) formulated as a wettable powder

- Container size – 2.72 kg

## Crops and Diseases:

Post-harvest suppression of silver scurf (*Helminthosporium solani*) on potato.

## Rate and Application Information:

Use at a rate of 7 to 14 g per tonne. Sanitation and other cultural control practices should also be employed to aid in control and minimize the potential for disease.

**Conveyer Line Application:** Prepare the equivalent of 350 – 700 grams of *Serenade Opti* in 100 liters of water. Apply 2 liters of the *Serenade Opti*/water suspension per tonne of potatoes. Potatoes must rotate along the conveyer line into the storage area to ensure complete coverage. The rate of the spray solution can be adjusted to ensure thorough coverage while maintaining recommended rate of *Serenade OPTI* per tonne of potatoes.



## How it Works:

*Bacillus subtilis* is a bacterium that works as a bio-fungicide to prevent infection of labeled diseases by multi-site biochemical activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None registered.

## Restrictions:

Resistance management: Refer to page 426.

- **Maximum number of applications:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Preharvest interval:** Can be applied up to and including the day of harvest.
- **Re-entry:** No restrictions listed.
- **Re-cropping:** No restrictions listed.
- **Storage:** Maximum storage period of two years at room temperatures up to 25°C. Store in a dry area inaccessible to children. Store in original container.
- **Environment:** DO NOT contaminate water, food, or feed by storage and disposal.

## Hazard Rating:

None listed.

Potential skin sensitizer.

# Stadium

Fungicide Group

11, 3, 12

Refer to pages 427 and 428

## Company:

Syngenta Canada Inc. – PCP#31050

## Formulation:

143 g per L azoxystrobin, 112 g per L difenoconazole and 143 g per L fludioxonil formulated as a suspension concentrate seed treatment.

## Crops and Diseases:

For use in post-harvest treatment of potatoes to control fusarium dry rot (*Fusarium* spp.) and to suppress silver scurf (*Helminthosporium solani*).

## Rate and Application Information:

*Stadium* is a suspension concentrate that must be diluted with water and applied at the rate of 32.5 mL per tonne of potatoes. Finally spray solution should deliver an application rate of 2 L (*Stadium* + water) per metric tonne of potatoes. Application is for in-line as an aqueous spray. Tubers should be rotating along a conveyor line in a single layer to ensure proper coverage. DO NOT make more than one post-harvest application to the tubers.

## How it Works:

The active ingredient azoxystrobin is a methoxyacrylate (strobilurin) fungicide with broad spectrum activity to be used as a preventative and curative fungicide, difenoconazole is a triazole fungicide with broad-spectrum systemic activity and fludioxonil is phenylpyrrole fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.


## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** This product is restricted to table and processing potatoes.

- **Storage:** Store in a cool dry place. Do not store food, beverages or tobacco products in storage area.
- **Environment:** This product is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. DO NOT allow contaminated waste water from the processing areas to enter lakes, streams, ponds or other waters. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

### Hazard Rating:

 Warning – Poison

For an explanation of the symbols used here see pages 7 and 8.

## StorOx

Fungicide Group  
NC

Refer to page 428

### Company:

Manufactured by BioSafe Systems Inc. – PCP#27432 Distributed in Western Canada by Brenntag Canada

### Formulation:

27% hydrogen peroxide.

- Container sizes - 10-220 L

### Crops and Diseases:

Control of fusarium tuber rot (*Fusarium* spp.), bacterial soft rot and silver scurf (*Helminthosporium solani*) in potato.

### Rate and Application Information:

Prior to storage and in storage treatment for harvested potato tubers.

As a spray treatment for newly harvested potatoes before storage: 100 mL of *StorOx* per 10 L water. Spray diluted solution on tuber to runoff to achieve full and even coverage. Use 4.15 to 8.3 L water per tonne of potatoes.

As application to potatoes in storage as a direct injection into humidification water: 100 mL *StorOx* per 10 L water. Apply diluted product for at least 20 minutes per day, based on a humidification airflow rate of 0.6 cfm.

### Tank Mixes:

May be used in conjunction with a growth inhibitor during humidification. Should not be combined or mixed with pesticides or fertilizer.

### How it Works:

Hydrogen peroxide is an inorganic compound with contact activity against fungi and bacteria. For more information refer to “Fungicide Modes of Action” on page 426.

### Restrictions:

- **Storage:** Store in cool, well ventilated area away from direct sunlight. Since *StorOx* is a strong oxidizing agent, contact with combustibles may cause fire.
- **Environmental:** DO NOT discharge effluent containing *StorOx* into lakes, streams, ponds or other bodies of water. DO NOT permit this product to enter surface or ground water.

### Hazard Rating:

 Danger – Corrosive to eyes

 Warning – Skin irritant

**Other Precautions:** This product is corrosive to metal surfaces; rinse all application equipment thoroughly with water after use. Do not enter treated storage bins until the hydrogen peroxide air concentrations are below exposure levels established by occupational health and safety authorities.

For an explanation of the symbols used here see pages 7 and 8.

# Titan Emesto

Titan Emesto is a co-pack of Titan (clothianidin insecticide, page 534) and Emesto Silver (penflufen and prothioconazole fungicides, page 545). For other detailed information on the component products see the product pages or labels for the products listed.

**Fungicide Group**  
**3, 7**  
**Insecticide Group**  
**4**

Refer to pages 427,  
428 and 598

## Company:

Bayer (Titan – PCP#27449; Emesto Silver – PCP#30361)

## Formulation:

*Titan*: 600 g per L clothianidin formulated as a suspension.

- Container sizes - 3 L


*Emesto Silver*: 100 g per L penflufen, 18 g per L prothioconazole formulated as a suspension.

- Container sizes - 3.85 L

## Crops, Diseases, Insects and Rates:

Crops	Diseases Controlled	Insects Controlled	Rate (per 100 kg of seed)	
			<i>Titan</i>	<i>Emesto Silver</i>
Potato	Seed-borne black scurf and stem and stolon canker ( <i>Rhizoctonia solani</i> ), silver scurf ( <i>Helminthosporium solani</i> ), Fusarium tuber rot ( <i>Fusarium</i> spp.)	Aphid (potato, green peach, foxglove and buckthorn aphids), Colorado potato beetle, potato leafhopper, potato flea beetle (overwintered adults and suppression of second generation)	15.6 mL	20 mL
		Wireworms	20.8 mL	-

## Hazard Rating:

 Warning – Poison (*Titan*)

For an explanation of the symbols used here see pages 7 and 8.

# Trilex EverGol

Trilex EverGol is a co-pack of Trilex Component A (penflufen and trifloxystrobin fungicides) and Trilex Component B (metalaxyl fungicide). Trilex Component A and Trilex Component B are not sold individually.

**Fungicide Group**  
**4, 7, 11**

Refer to page 427

## Company:

Bayer (Trilex Component A – PCP#30644; Trilex Component B – PCP#30645)

## Formulations:

*Trilex Component A*: 154 g per L penflufen and 154 g per L trifloxystrobin formulated as a liquid based water formulation.

- Container sizes - 1.5L or in bulk package 6.49 L

*Trilex Component B*: 317 g per L metalaxyl formulated as a suspension.

- Container sizes - 0.96L or in bulk package 4.15 L

## Crops, Diseases and Rates:

Crop	Diseases		Rate (per 100 kg of seed)	
	<i>Trilex Component A</i>	<i>Trilex Component B</i>	<i>Trilex Component A</i>	<i>Trilex Component B</i>
Chickpea Dry Bean Faba bean Field pea Lentil	Control of seed decay/pre-emergence damping-off and post-emergence damping-off ( <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp., and <i>Botrytis cinerea</i> ); seedling blight ( <i>B. cinerea</i> )	Seed rots and seedling blights ( <i>Pythium</i> spp.)	25 mL	16 mL
	Suppression of seedborne Ascochyta blight ( <i>Ascochyta</i> spp.)	-	25 to 32 mL	-

\*Add 7:1 ratio of water (25 mL of component A + 16 mL of component B + 287 mL of water for a total of 328 mL per 100 kg).

## Application Information:

*Trilex Component A* is a seed treatment formulation for use in commercial seed treatment operations, and for on-farm treating with conventional seed treating equipment which can accurately meter and apply flowable seed treatment formulations. This product is recommended to be diluted with water or another suitable liquid just prior to application to ensure uniform coverage on the seed during the application process. Uniform application to seed is necessary to ensure optimum performance. Allow seeds to dry before bagging, storing or seeding.

*Trilex Component B* should be mixed with water to form a slurry seed treatment. Mix 500 mL of slurry per 100 kg of seed to be treated. The slurry should be applied as a spray into the mixing chamber of the seed treating equipment to ensure good coverage. When preparing the slurry the following procedure should be used: 1) partially fill the mixing tank with water; 2) add the required quantity of *Trilex Component B* onto the water surface; 3) allow product to disperse and then switch on agitation; 4) top up with extra water to required volume and maintain agitation during use; and 5) add colourant last.

## How it Works:

*Trilex Component A*: The active ingredient penflufen is a carboxamide (SDHI) fungicide with systemic activity. The active ingredient trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity.

*Trilex Component B*: The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

**Fungicide Seed Treatments:** In addition to *Trilex Component B*, *Trilex Component A* may be mixed with *Allegiance FL*. Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

Bayer also supports the tank-mix of *Stress Shield 600* with *Trilex EverGol*. Apply mixes according to the most restrictive use limitations.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labeled "This seed has been treated with *Trilex Component A* (containing penflufen and trifloxystrobin) and *Trilex Component B* (containing metalaxyl). Wear long-sleeved shirt, long pants and chemical-resistant gloves when handling treated seed. DO NOT use for feed, food or oil processing. Store away from feeds and other foodstuffs."
- **Grazing:** DO NOT graze or feed livestock on treated areas for four weeks after planting.
- **Re-cropping:** Registered crops for *Trilex Component A*, as well as canola, mustard, rapeseed, soybean, alfalfa, corn and cereal grains, may be replanted at any time. For all other crops, DO NOT plant back within 30 days of seeding with *Trilex Component A*-treated seed.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed. Store in a cool, dry area. DO NOT store in direct sunlight. DO NOT store *Trilex Component A* above 40°C or below -10°C. DO NOT store *Trilex Component B* above 35°C or below 0°C.
- **Environment:** Toxic to aquatic organisms. Treated seed may be toxic to birds and other wildlife. DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters. Dispose of all excess treated seed. Left over seed may be double-sown around the headland or buried away from water sources. DO NOT leave exposed treated seed on soil surface. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable and/or the depth to the water is shallow.

## Hazard Rating:



Warning – Skin and eye irritant (*Trilex Component B*)

For an explanation of the symbols used here see pages 7 and 8.

# Trilex EverGol Shield

*Trilex EverGol Shield* is a co-pack of *Trilex Component A* (penflufen and trifloxystrobin fungicides, page ???), *Trilex Component B* (metalaxyl fungicide, page 564), and *Stress Shield 600* (imidacloprid, page 551). *Trilex Component A* and *Trilex Component B* are not sold individually. For individual component information, see the product pages listed above.

**Fungicide Group**  
4, 7, 11  
**Insecticide Group**  
4

Refer to page 427 and 565

## Company:

Bayer (*Trilex Component A* – PCP#30644; *Trilex Component B* – PCP#30645; *Stress Shield 600* – PCP#30668)

## Formulations:

*Trilex Component A*: 154 g per L penflufen and 154 g per L trifloxystrobin formulated as a liquid based water formulation.

- Container sizes - 1.5L or in bulk package 6.49 L

*Trilex Component B*: 317 g per L metalaxyl formulated as a suspension.

- Container sizes - 0.96L or in bulk package 4.15 L

*Stress Shield 600*: 600 g per L imidacloprid formulated as a suspension.

## Crops, Diseases, Insects and Rates:

Crop	Diseases		Insects	Rate (per 100 kg of seed)		
	<i>Trilex Component A</i>	<i>Trilex Component B</i>	<i>Stress Shield 600</i>	<i>Trilex Component A</i>	<i>Trilex Component B</i>	<i>Stress Shield 600</i>
Chickpea Dry Bean Lentil	Control of seed decay/pre-emergence damping-off and post-emergence damping-off ( <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp., and <i>Botrytis cinerea</i> ); seedling blight ( <i>B. cinerea</i> )	Seed rots and seedling blights ( <i>Pythium</i> spp.)	Wireworm	25 mL	16 mL	104 mL
	Suppression of seedborne Ascochyta blight ( <i>Ascochyta</i> spp.)	-	-	25 to 32 mL	-	-
Faba bean Field pea	Control of seed decay/pre-emergence damping-off and post-emergence damping-off ( <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp., and <i>Botrytis cinerea</i> ); seedling blight ( <i>B. cinerea</i> )	Seed rots and seedling blights ( <i>Pythium</i> spp.)	Wireworm	25 mL	16 mL	104 mL
	Suppression of seedborne Ascochyta blight ( <i>Ascochyta</i> spp.)	-	Pea leaf weevil	25 to 32 mL	-	104 to 208 mL

## Hazard Rating:



Warning – Skin and eye irritant (*Trilex Component B*)

For an explanation of the symbols used here see pages 7 and 8.

# Vibrance 500FS

Fungicide Group

7

Vibrance 500FS is available for on-farm use on soybeans or as a co-pack for other crop uses (see Cruiser Maxx Vibrance Beans, Helix Vibrance, Vibrance Maxx RTA).

Refer to page 427

## Company:

Syngenta Canada Inc. – PCP #30438

## Formulation:

500 g per L sedaxane formulated as a suspension.

- Container sizes - 1L to 1050 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Rate (per 100 kg of seed)*
Barley	True loose smut ( <i>Ustilago nuda</i> ); seed decay, seedling blight and damping-off ( <i>Rhizoctonia solani</i> )	5 to 10 mL
Wheat	True loose smut ( <i>Ustilago tritici</i> ); seed decay, seedling blight and damping-off ( <i>Rhizoctonia solani</i> )	5 to 10 mL
Oat Rye Triticale Canola Soybean Chickpea Lentil Dry bean Faba bean Field pea	Seed decay, seedling blight and damping-off ( <i>Rhizoctonia solani</i> )	5 to 10 mL

\* Use the low rate for control of pre-emergent damping-off, seedling decay, or seedling blight. Use the high rate for extended control of post-emergent damping-off and seedling blight or high disease pressure or high levels of seed-borne infections like smut.

## Application Information:

Vibrance 500FS is for use on-farm and in closed transfer commercial seed treatment facilities. No open transfer is permitted for commercial seed treatment of barley, wheat, oats, rye, triticale and soybean. For pulse crops on farm and commercial seed treatment (using either an open or closed transfer application system) is permitted. No on-farm seed treatment is permitted for canola. Note: treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. This product contains no colourant. An appropriate colourant must be added when this product is applied to seed.

Regulations pertaining to the “Seeds Act” must be strictly adhered to when using this product. Users are responsible for ensuring that the treated seed, when dried and ready for bagging, has an unnatural colour.

## How it Works:

Sedaxane is a succinate dehydrogenase inhibitor fungicide with preventative and systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. For more information refer to “Fungicide Modes of Action” on page 426.

## Tank Mixes:

Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

**Small-grain cereals (Wheat, Barley, Oats, Rye, and Triticale).** For insect control, Cruiser 5FS (in commercial seed treatment facilities ONLY with closed transfer). This tank-mix option is only valid for those crops common to the registered labels of both products.

**Soybeans:** Apron Maxx RTA for disease control. For insect control, Vibrance 500FS may be mixed with Cruiser 5FS or Cruiser Maxx Beans (in commercial seed treatment facilities ONLY with closed transfer).

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** All seed must be labelled "This seed has been treated with sedaxane fungicide. Wear long-sleeved shirt, long pants, and chemical-resistant gloves when handling treated seed. Do not graze or feed livestock on seeded area for 45 days after planting. Do not use for food, feed or oil processing. Store away from food and feed".
- **Grazing:** DO NOT graze or feed livestock on treated areas for 45 days after planting.
- **Re-cropping:** DO NOT plant any crop other than those on the product label within 60 days to fields in which seed treated with *Vibrance 500FS* seed treatment were planted.
- **Storage:** Store away from food and feed.
- **Environment:** Toxic to aquatic organisms. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. Treated seed is toxic to small wild animals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface.
- **Compatibility with *Rhizobia*-based inoculants:** *Vibrance 500FS* is compatible with *Rhizobia*-based inoculants. Please check with inoculant manufacturers for details prior to use. Note: Mixing with inoculants may increase drying time while treating extending the processing time.

## Hazard Rating:



Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Vibrance Maxx RFC/RTA

Fungicide Group

4, 7, 12

*Vibrance Maxx RTA is a co-pack of Apron Maxx RTA (fludioxonil and metalaxyl-M and S-isomer fungicides, page 532) and Vibrance 500 FS (sedaxane fungicide, page 586). Vibrance Maxx RFC is a pre-mix formulation. For other detailed information on the component products see the product pages listed above.*

Refer to pages 427  
and 428

## Company:

Syngenta Canada Inc. (*Apron Maxx RTA* – PCP#27577; *Vibrance 500 FS* – PCP#30438; *Vibrance Maxx RFC* – PCP#32272)

## Formulations:

**Apron Maxx RTA:** 0.73% fludioxonil, 1.10% metalaxyl-M and S-isomer formulated as a suspension.

**Vibrance 500 FS:** 500 g per L sedaxane formulated as a suspension.

**Vibrance Maxx RFC:** 50 g per L sedaxane, 37.5 g per L metalaxyl-M and S-isomer and 25 g per L fludioxonil.

- Container sizes - case of 2 x 3.075 L jugs, drum of 56.78 L
- *Vibrance Maxx RTA* co-packs container size – 115 L *Apron Maxx RTA* + 3.33 L *Vibrance 500 FS*

## Crops, Diseases and Rates:

Crops	Diseases Controlled	Rate (per 100 kg of seed)		
		<i>Apron Maxx RTA</i>	<i>Vibrance 500 FS</i>	<i>Vibrance Maxx RFC</i>
Chickpea	Seed-borne <i>Ascochyta</i> blight ( <i>Ascochyta rabiei</i> ); seed rot/pre-emergence damping-off and post-emergence damping-off, ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)	325 mL	5 mL	100 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL
Dry bean	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Pythium</i> spp.); anthracnose ( <i>Colletotrichum</i> spp.)	325 mL	5 mL	100 mL
Faba bean	Seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.)	325 mL	5 mL	100 mL
Field pea	Seed-borne <i>Ascochyta</i> blight and foot rot ( <i>Ascochyta pinodes</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.)	325 mL	5 mL	100 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL



## Crops, Diseases and Rates *continued*:

Crops	Diseases Controlled	Rate (per 100 kg of seed)		
		Apron Maxx RTA	Vibrance 500 FS	Vibrance Maxx RFC
Lentil	Seed-borne <i>Ascochyta</i> blight ( <i>Ascochyta lentis</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)	325 mL	5 mL	100 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL
Soybean	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight ( <i>Phomopsis</i> spp.), early season root rot ( <i>Phytophthora megasperma</i> var. <i>sojae</i> )	325 mL	5 mL	100 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL

Product information provided below for *Vibrance Maxx RFC* (pre-mix). For detailed information on component products of *Vibrance Maxx RTA* co-pack please consult individual product pages.

## Application Information

*Vibrance Maxx RFC* is for use in commercial seed treatment and for on-farm seed treatment using seed treatment equipment that accurately metres, mixes and applies a flowable seed treatment. Thoroughly mix the recommended amount of *Vibrance Maxx RFC* with the required amount of water for the slurry treatment and dilution rate to be used. Maintain constant agitation of the slurry during the treatment. Allow the seed to dry before bagging, storing or seeding.

## How it Works:

The active ingredient sedaxane is a succinate dehydrogenase inhibitor fungicide with preventative and systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity. The active ingredient metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including *Pythium* damping-off. For more information refer to "Fungicide Modes of Action" on page 426.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** All seed treated with *Vibrance Maxx RFC* must be labelled "This seed has been treated with the fungicides metalaxyl-M and S-isomer, fludioxonil and sedaxane. When handling and planting treated seed, workers must wear cotton coveralls or long-sleeved shirt and long pants, chemical-resistant gloves, and work boots. For good hygiene practice, it is also recommended to wear a NIOSH-approved N95 filtering facepiece respirator (dust mask) that is properly fit tested during all job activities. Do not use for food, feed or oil processing. Store away from food and feed."
- **Grazing:** DO NOT graze or feed livestock on treated areas for 45 days after planting soybeans. DO NOT graze or feed livestock on treated area for 60 days after planting chickpea, dry beans, faba beans, field peas, or lentils.
- **Re-cropping:** DO NOT plant any crop other than cereals, corn, soybeans, dry beans, chickpeas, lentils, faba beans and field peas within 60 days in which treated seeds were planted.
- **Storage:** Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. If product should freeze, bring to room temperature and ensure the contents are mixed well prior to application.
- **Environment:** This product is toxic to fish and other aquatic organisms. DO NOT apply this product directly to aquatic habitats, estuaries or marine habitats. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface.
- **Compatibility with *Rhizobia*-based inoculants:** *Vibrance Maxx RFC* is compatible with *Rhizobia*-based inoculants. Please check with inoculants manufacturers for specific planting windows and methods of application prior to use.

## Hazard Rating:



Caution – Poison (*Vibrance 500 FS*)

For an explanation of the symbols used here see pages 7 and 8.



# Vibrance Maxx RFC with INTEGO Solo

Fungicide Group

4, 7, 12, 22

Refer to pages 427 and 428

Vibrance Maxx RFC with INTEGO Solo is a co-pack of Vibrance Maxx RFC (sedaxane, fludioxonil and metalaxyl-M and S-isomer fungicides, page 587) and INTEGO Solo Fungicide (ethaboxam fungicide, page 557). For more detailed information on the component products see the product pages listed above.

## Company:

Syngenta Canada Inc. (Vibrance Maxx RFC – PCP#32272)

Valent Canada Inc. distributed by Nufarm Agriculture (INTEGO Solo Fungicide – PCP#31324)

## Formulations:

**Vibrance Maxx RFC:** 50 g per L sedaxane, 37.5 g per L metalaxyl-M and S-isomer and 25 g per L fludioxonil.

- Container sizes - case of 2 x 3.075 L jugs, drum of 56.78 L

**INTEGO Solo Fungicide:** 383 g per L ethaboxam formulated as a suspension.

- Container sizes - 2 x 605 mL

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate per 100 kg of seed	
			Vibrance Maxx RFC	INTEGO Solo
Chickpea	Seed-borne <i>Ascochyta</i> blight ( <i>Ascochyta rabiei</i> ); seed rot/pre-emergence damping-off and post-emergence damping-off, ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)	-	100 mL	19.6 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL
Dry bean	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Pythium</i> spp.); anthracnose ( <i>Colletotrichum</i> spp.)	Early season root rot ( <i>Aphanomyces euteiches</i> )	100 mL	19.6 mL
Faba bean	Seed rot/pre-emergence damping-off and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Pythium</i> spp.)	Early season root rot ( <i>Aphanomyces euteiches</i> )	100 mL	19.6 mL
Field pea	Seed-borne <i>Ascochyta</i> blight and foot rot ( <i>Ascochyta pinodes</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.)	Early season root rot ( <i>Aphanomyces euteiches</i> )	100 mL	19.6 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL
Lentil	Seed-borne <i>Ascochyta</i> blight ( <i>Aschochyta lentis</i> ); seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight (seed-borne <i>Botrytis</i> spp.)	Early season root rot ( <i>Aphanomyces euteiches</i> )	100 mL	19.6 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL
Soybean	Seed rot/pre-emergence damping-off, and post-emergence damping-off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp.); seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp.); seedling root rot ( <i>Fusarium</i> spp.); seed rot and seedling blight ( <i>Phomopsis</i> spp.); early-season root rot ( <i>Phytophthora megasperma</i> var. <i>sojae</i> )	-	100 mL	19.6 mL
	Seed-borne <i>Sclerotinia sclerotiorum</i>	-	-	100mL

## Hazard Rating:

None listed.

# Vibrance Quattro

Fungicide Group

3, 4, 7, 12

Refer to pages 427 and 428

## Company:

Syngenta Canada Inc. – PCP#31408

## Formulation:

36.8 g per L difenoconazole, 15.4 g per L sedaxane, 9.2 g per L metalaxyl-M (and S-isomer), and 7.6 g per L fludioxonil formulated as a suspension.

- Container sizes - 1 to 1050 L

## Crops, Diseases and Rates:

Crops	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)
Barley	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); covered smut ( <i>Ustilago hordei</i> ); false loose smut ( <i>U. nigra</i> ); true loose smut ( <i>U. nuda</i> ); seed-borne <i>Alternaria alternata</i>	Common root rot ( <i>Cochliobolus sativus</i> ); seed-borne <i>Cochliobolus sativus</i> ; fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	325 mL
Oat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); covered smut ( <i>Ustilago hordei</i> ); loose smut ( <i>U. avenae</i> ); seed-borne <i>Alternaria alternata</i>	Common root rot ( <i>Cochliobolus sativus</i> ); seed-borne <i>Cochliobolus sativus</i>	325 mL
Rye	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); common bunt ( <i>Tilletia tritici</i> ); dwarf bunt ( <i>T. controversa</i> ); seed-borne <i>Alternaria alternata</i>	Common root rot ( <i>Cochliobolus sativus</i> ); seed-borne <i>Cochliobolus sativus</i> ; fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	325 mL
Triticale	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); loose smut ( <i>Ustilago tritici</i> ); seed-borne <i>Alternaria alternata</i>	Common root rot ( <i>Cochliobolus sativus</i> ); seed-borne <i>Cochliobolus sativus</i> ; fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	325 mL
Spring wheat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); common bunt ( <i>Tilletia tritici</i> ); loose smut ( <i>Ustilago tritici</i> ); seed-borne <i>Alternaria alternata</i>	Common root rot ( <i>Cochliobolus sativus</i> ); seed-borne <i>Cochliobolus sativus</i> ; fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	325 mL
Winter wheat	General seed rots ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Penicillium</i> spp., <i>Aspergillus</i> spp.); seedling blight, root rot, damping-off ( <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp., <i>Pythium</i> spp.); common bunt ( <i>Tilletia tritici</i> ); dwarf bunt ( <i>T. controversa</i> ); loose smut ( <i>Ustilago tritici</i> ); seed-borne <i>Alternaria alternata</i>	Common root rot ( <i>Cochliobolus sativus</i> ); seed-borne <i>Cochliobolus sativus</i> ; fusarium crown and foot rot ( <i>Fusarium</i> spp.); take-all ( <i>Gaeumannomyces graminis</i> )	325 mL

## Application Information:

*Vibrance Quattro* is for use on-farm on barley, wheat, oats, rye and triticale. This product can also be applied by commercial seed treaters using closed system transfer. Treat seed in a well-ventilated area. When treating seeds, handling and planting treated seed, workers should wear cotton coveralls or long-sleeved shirt and long pants, chemical-resistant gloves, and work boots. Wear a suitable dust mask when transferring treated seed to a storage bin. For good hygiene practice, it is also recommended to wear a NIOSH approved dust mask during all job activities.

## How it Works:

The active ingredient difenoconazole is a triazole fungicide with broad-spectrum, systemic activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including Pythium damping-off. Sedaxane is a succinate dehydrogenase inhibitor fungicide with systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. Fludioxonil is phenylpyrrole fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

*Vibrance Quattro* may be mixed with *Cruiser 5FS* for crops common to the registered labels of both products. Refer to label for details. Consult each product and follow the most restrictive label precautions and limitations.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled (listing only the applicable active ingredients) as follows: "This seed has been treated with difenoconazole, metalaxyl- M (and S-isomer), sedaxane and fludioxonil fungicides. When handling and planting treated seed, workers should wear cotton coveralls over a long-sleeved shirt, long pants, chemical-resistant gloves, and work boots. Wear a suitable dust mask when transferring seed to a storage bin. Do not graze or feed livestock on seeded area for 45 days after planting. Do not use for food, feed or oil processing. Store away from food and feed."
- **Grazing:** DO NOT graze or feed livestock on treated areas for 45 days after planting.
- **Re-cropping:** DO NOT plant any crop other than cereals within 60 days to fields in which treated seed were planted.
- **Storage:** Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. If product should freeze, bring to room temperature, and then ensure the contents are mixed well prior to application.
- **Environment:** Toxic to aquatic organisms. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface.

## Hazard Rating:



Potential skin sensitizer

For an explanation of the symbols used here see pages 7 and 8.

# Vibrance Ultra Potato

Fungicide Group  
3, 7, 40

Refer to pages 427 and 428

## Company:

Syngenta Canada Inc. – PCP#33171

## Formulation:

77.2 g per L Sedaxane, 77.2 g per L difenoconazole, 154.3 g per L mandipropamid formulated as a suspension.

- Container sizes - 1 L - Bulk

## Crops, Diseases and Rates:

Crops	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)
Potato	Seed-borne Silver Scurf ( <i>Helminthosporium solani</i> ), fusarium dry rot ( <i>Fusarium</i> spp.), Seed-borne black scurf, stem and stolon canker ( <i>Rhizoctonia solani</i> ) Preventative control of seed-borne late blight ( <i>Phytophthora infestans</i> )	Pink rot ( <i>Phytophthora erythroseptica</i> )	32mL

## Application Information:

DO NOT use open treating equipment when treating seed-pieces, *Vibrance Ultra Potato* must be applied using a closed treatment system. Treat seed in a well ventilated area and keep treated seed-pieces away from animals.

## How it Works:

Sedaxane is a succinate dehydrogenase inhibitor fungicide with preventative and systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum, systemic activity. The active ingredient mandipropamid is a carboxylic acid amide (CAA) fungicide with contact and systemic activity. To be used as a preventative and inhibitive (prevents spore germination) fungicide application. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

For control of Colorado potato beetle, aphids and potato leafhopper, *Vibrance Ultra Potato* can be tank mixed with *Actara 240 SC* insecticide. For control of Colorado potato beetle, *Vibrance Ultra Potato* can be tank mixed with *Fortenza*. Protection is provided during early to mid-season growth and development for potatoes only. Refer to to tank-mix partner labels for specific application instructions and precautions. Always use in accordance with the most restrictive label restrictions and precautions.

## Restrictions:

Resistance management: Refer to page 426.

- **Maximum number of applications:** DO NOT apply more than 243 g mandipropamid per acre per year.
- **Labelling:** No restrictions listed.
- **Grazing:** No restrictions listed.
- **Re-cropping:** DO NOT plant any crop other than corn, cereals, canola, soybean, dry beans, dry pea, chickpea, lentil and sugar beets within 60 days to fields where seed treated with *Vibrance Ultra Potato* were planted.
- **Storage:** Store away from food or feed. Ideal storage temperature is above freezing and below 30°C. repeated freeze thawing will not affect the physical integrity of the product. If the product freezes, bring it back to room temperature and ensure the contents are well mixed prior to application.
- **Environment:** TOXIC to aquatic animals. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Treated seed is toxic to small wild animals. Any spilled or exposed seed must be incorporated into the soil or cleaned-up from the soil surface.

## Hazard Rating:

None listed.

## Visivio

*Available to commercial seed treaters only.*

*Visivio is a co-pack containing Rascendo (sulfoxaflor insecticide, available only as part of this co-pack) and Helix Vibrance (thiamethoxam insecticide and difenoconazole, metalaxyl-M and S-isomer, and fludioxonil fungicides, page 550). For other detailed information on Helix Vibrance see the product page listed above.*

**Fungicide Group**  
**3, 4, 12, 7**  
**Insecticide Group**  
**4A, 4C**

*Refer to pages 427,  
428 and 598*

## Company:

Syngenta Canada Inc. (*Rascendo* – PCP#32250, *Helix Vibrance* – PCP#31454)

## Formulations:

**Rascendo** – 500 g per L sulfoxaflor formulated as a suspension.

- Container sizes - 1 to 1050 L

**Helix Vibrance** – 269 g per L thiamethoxam, 16 g per L difenoconazole, 5 g per L metalaxyl-M and S isomer, 1.7 g per L fludioxonil, and 3.4 g per L sedaxane formulated as a suspension.

- Container sizes - 105 L to Bulk

## Crops, Diseases, Insects and Rates:

Crops	Diseases Controlled	Insects Controlled	Rate (per 100 kg of seed)	
			<i>Rascendo</i>	<i>Helix Vibrance</i>
Canola, rapeseed, and mustard (both oilseed and condiment types, including <i>Brassica carinata</i> )	Seed-borne blackleg ( <i>Leptosphaeria maculans</i> ), seed-borne Alternaria ( <i>Alternaria</i> spp.), seedling disease complex including damping-off, seedling blight, seed rot, root rot ( <i>Pythium</i> spp., <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp.)	Flea beetles (early-season)	400 mL	1500 mL

Product information provided below for *Rascendo*. For detailed information on *Helix Vibrance* please consult product page.

## Application Information:

For use only in commercial seed treatment facilities with closed transfer systems. This product contains no colourant. An appropriate colourant must be added when this product is applied. Regulations pertaining to the *Seeds Act* must be strictly adhered to when using this product. Seed must be conspicuously coloured at the time of treatment.

## How it Works:

The active ingredient sulfoxaflor is a systemic insecticide that causes blockage in the insect's nervous system resulting in paralysis and eventually death, through contact or stomach action. For more information refer to "Insecticide Groups Based on Modes of Action" on page 600.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 599. DO NOT make any subsequent application of a Group 4 insecticide (i.e. in-furrow or foliar application) following treatment with *Rascendo*.

- **Labelling:** Treated seed must be labelled "This seed has been treated with sulfoxaflor insecticide. Do not use for food, feed or oil purposes. Store away from feeds and foodstuffs. When handling treated seed, including planting, wear a long-sleeved shirt, long pants, chemical-resistant gloves, work boots and socks, and used closed-cab planting equipment. Chemical-resistance gloves are not required inside cab. For good hygiene practice, it is also recommended to wear a suitable dust mask during all job activities."
- **Grazing:** No restrictions listed.
- **Re-cropping:** DO NOT plant any crop other than barley, wheat or members of Crop Group 1 (root and tuber vegetables), Crop Group 5 (Brassica leafy vegetables) or Croup Subgroup 20A (canola/rapeseed subgroup) within 30 days to fields in which treated seeds were planted.
- **Storage:** Store in a well-ventilated, secure area. Avoid contamination of feed and foodstuffs. Ideal storage temperature is above freezing and below 30°C. Repeated freeze-thawing will not affect the physical integrity of the product. If the product should freeze, bring the product back to room temperature and ensure the contents are mixed well prior to application.
- **Environment:** DO NOT apply this product directly to freshwater habitats, estuaries or marine habitats. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable and/or the depth of the water table is shallow. DO NOT contaminate irrigation or drinking water supplied or aquatic habitats by cleaning or equipment or disposal of wastes. Toxic to bees exposed to direct treatment, when used as a seed treatment according to label directions risk is not of concern. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface.

## Hazard Rating:

None listed.

# VitaFlo Brands

Fungicide Group  
7, M3

Refer to pages 427 and 428

## Company:

Manufactured by Arysta LifeScience Canada (VitaFlo 280 Fungicide – PCP#11423)

Manufactured by Interprovincial Cooperative Limited (VitaFlo SP Fungicide – PCP#30381)

Manufactured for Loveland Products by Interprovincial Cooperative Limited (VitaFlo Fungicide – PCP#30380)

## Formulation:

VitaFlo 280/VitaFlo Fungicide/VitaFlo SP Fungicide: 15.59% carbathiin and 13.25% thiram formulated as a liquid suspension.

- Container sizes - 10 L, 55L, 100 L, 200 L, 1000 L

## Crops, Diseases and Rates:

Crop	Diseases Controlled	Diseases Suppressed	Rate (per 100 kg of seed)
Barley	False loose smut ( <i>Ustilago nigra</i> ); covered smut ( <i>U. hordei</i> ); leaf stripe ( <i>Pyrenophora graminea</i> ); partial control of true loose smut ( <i>U. nuda</i> )	Root rot ( <i>Fusarium</i> spp.); net blotch ( <i>Pyrenophora teres</i> )	230 mL
	Seed rot and seedling blight ( <i>Pythium</i> spp., <i>Penicillium</i> spp., <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> ); seed rot ( <i>Aspergillus</i> spp., <i>Alternaria</i> spp.)	Root rot ( <i>Cochliobolus sativus</i> , <i>Fusarium</i> spp.)	330 mL
Wheat	Common bunt ( <i>Tilletia tritici</i> , <i>T. laevis</i> ); seed-borne dwarf bunt ( <i>T. controversa</i> ); Partial control of loose smut ( <i>Ustilago tritici</i> )	Root rot ( <i>Fusarium</i> spp.)	230 mL
	Seed-borne <i>Septoria</i> spp.; seed rot and seedling blight ( <i>Pythium</i> spp., <i>Penicillium</i> spp., <i>Fusarium</i> spp., <i>Cochliobolus sativus</i> ); seed rot ( <i>Aspergillus</i> spp., <i>Alternaria</i> spp.), soil-borne dwarf bunt ( <i>Tilletia controversa</i> )	Root rot ( <i>Cochliobolus sativus</i> )	330 mL
Oat	Loose smut ( <i>Ustilago avenae</i> ); covered smut ( <i>U. kolleri</i> ); seed rot and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Penicillium</i> spp.); seed rot ( <i>Aspergillus</i> spp., <i>Alternaria</i> spp.)	Root rot ( <i>Cochliobolus sativus</i> )	330 mL
Rye	Partial control of stem smut ( <i>Urocystis occulta</i> )	Root rot ( <i>Cochliobolus sativus</i> )	230 mL
	Damping off, seed rot and seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Penicillium</i> spp., <i>Cochliobolus sativus</i> ); seed rot ( <i>Aspergillus</i> spp., <i>Alternaria</i> spp.)	Root rot ( <i>Cochliobolus sativus</i> )	330 mL
Triticale	Seed rot, damping off, seedling blight ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Penicillium</i> spp., <i>Cochliobolus sativus</i> )	–	200 mL
Dry bean	Early season seed rot, seedling blight, root rot ( <i>Rhizoctonia solani</i> ); seed-borne anthracnose ( <i>Colletotrichum lindemuthianum</i> ) <sup>1</sup>	–	260 mL
Corn (field & sweet)	Seed rot and damping off ( <i>Fusarium</i> spp., <i>Pythium</i> spp., <i>Penicillium</i> spp.)	–	280 mL
	Seed-borne head smut ( <i>Sporisorium holci-sorghii</i> )		560 to 748 mL
Flax	Seed rot, root rot and seedling blight ( <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp.)	–	525 mL
Lentil	Seed rot, seedling blight, and early season root rot ( <i>Botrytis cinerea</i> , <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp., <i>Pythium</i> spp.)	–	330 mL
Field pea	Seed rot and seedling blight ( <i>Rhizoctonia solani</i> , <i>Fusarium</i> spp., <i>Pythium</i> spp.)	–	260
	Seed rot and seedling blight ( <i>Ascochyta pinodes</i> )		330
Soybean	Seed rot and seedling blight ( <i>Rhizoctonia solani</i> , <i>Phomopsis</i> spp., <i>Fusarium</i> spp.)	–	260 mL

<sup>1</sup> Will not control severe anthracnose infections

## Application Information:

Designed to be used undiluted in commercial seed treaters. Undiluted product can be used at temperatures down to -20°C. Centrifugal pumps are not recommended for pumping product. Centrifugal pumps are not recommended for pumping product. Peristaltic pumps (positive displacement) using polypropylene lines with a minimum inside diameter of 2 cm are recommended. If containers have been in storage, some settling may occur and require agitation.

## How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 426.

## Tank Mixes:

None listed.

## Restrictions:

Resistance management: Refer to page 426.

- **Labelling:** Treated seed must be labelled as follows "This seed has been treated with *Vitaflo 280*, *Vitaflo Fungicide*, or *Vitaflo SP Fungicide* liquid seed protectant containing carbathiin and thiram. Do not use for feed, food, or oil processing."
- **Grazing:** DO NOT graze or feed livestock on treated area for four weeks after planting except for the following crops:
  - **Soybean** - DO NOT graze or feed livestock on forage and hay on treated areas
  - **Bean** - DO NOT graze or feed on bean forage for 60 days
  - **Barley, oat, wheat** - DO NOT graze or feed on treated area for 6 weeks
- **Re-cropping:** No restrictions listed.
- **Storage:** DO NOT store product in direct sunlight or above 35°C. Will not freeze even at extreme temperatures. If containers have been stored for several months, shake well before using. DO NOT store dry beans, peas, lentils, or soybeans treated with any *Vitaflo* product. Wheat, barley, rye, oats, triticale and flax seed treated with *Vitaflo 280/Vitaflo Fungicide/Vitaflo SP Fungicide* can be stored up to 18 months and treated corn seed can be stored up to one year without reduction in germination.
- **Environment:** DO NOT contaminate ponds, lakes or streams.
- **Compatibility with *Rhizobia*-based inoculants:** *Vitaflo 280*, *Vitaflo Fungicide*, and *Vitaflo SP Fungicide* are compatible with *Rhizobia*. DO NOT tank mix *Vitaflo 280*, *Vitaflo Fungicide*, or *Vitaflo SP Fungicide* and *Rhizobia*. Always check with *Rhizobia* manufacturers on any restrictions that may exist with seed treatments.

## Hazard Rating:



Warning – Eye Irritant



Caution – Skin Irritant

For an explanation of the symbols used here see pages 7 and 8.



# Insect Control

## Additional Resources

For additional information on monitoring, economic thresholds and biological control of insects in field crops, as well as information on insect management in commodities other than those covered in this guide, see the WCCP Guide to Integrated Control of Insect Pests of Crops at <http://www.westernforum.org/wccp%20guidelines.html>.

## Insect Management Decisions

Crop rotations, cultivar selections, and seeding dates can be chosen to reduce the risk of injury from some insects that may be of higher risk to a crop. Management of insects with insecticides should only be considered when numbers or damage exceed economic thresholds. To select an insecticide, verify the registered products for the insect and field crop in the following insect management charts. Consideration should then be given to the preharvest intervals, how the product will be applied, restrictions, precautions and the hazard rating.

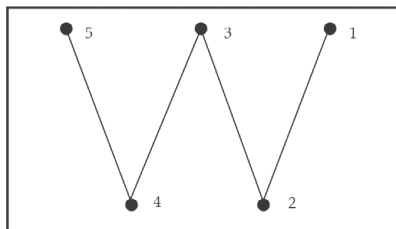
## Pre-harvest Interval

The **pre-harvest interval** is the number of days that must pass between the last application of a pesticide and harvest. Harvest is the cutting of the crop or removal of the produce from the plant. It includes direct-combining, cutting (swathing) or grazing; it does not include swath-combining or baling for hay.

## Field Scouting

Field scouting is the regular examination of fields to accurately assess the kind and the number of insects, plant pathogens and weeds present and the amount of damage being done. Scouting should be done weekly during the growing season and more frequently when infestations approach economic levels or when weather conditions favour the rapid development of specific pests.

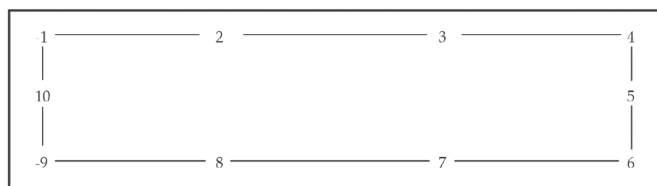
To properly scout for insect pests, you must know when they occur, where they live, what they look like, and how to find and count them. The number of locations to assess in a field will depend on the field



size, and any specific pests that may be of concern. Generally a minimum of 5 sites should be sampled, however some insects may require more sites to be sampled to accurately make management decisions.

There are several possible scouting patterns that can be used when checking fields. These options are based on pest distribution and field configuration.

- **Pattern 1:** Used when pests are uniformly distributed.
  - This scouting pattern typically looks like an X, Z or W, excluding field edges. Pests that fit this pattern include aphids, bertha armyworm and diamondback moth.



- **Pattern 2:** Used when pests are generally more abundant at the edges of fields.
  - Scout by walking along field edges, fence lines or ditches. Some examples of when you would include more focused scouting along field edges are to estimate early-season populations of flea beetles, Colorado potato beetles and grasshoppers.

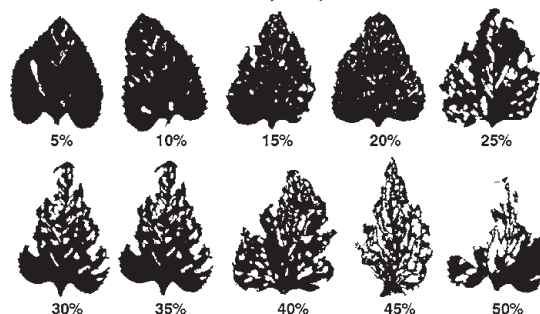
In each area examined, use of a sweep net, if possible, is a good way to determine what potential pests and beneficial insects may be present. This should be followed by examining some plants and the soil surface. More specific counts of a particular type of insect or plant damage may be necessary if they are abundant during the more general scouting.

## Economic Thresholds

Monitoring methods, typical symptoms, and economic thresholds or nominal thresholds for the more common crop pests are described in the field scouting section for each commodity. The smallest number of insects (or level of injury) that cause damage equal to the pest management costs is called the **economic injury level**. The **economic threshold** is the density of insects (or level of injury) at which control measures should be applied to prevent an increasing population from reaching the economic injury level. Note that factors such as moisture, temperature conditions and stage of crop growth, can increase or decrease the impact of insects on crop production. In some instances, nominal thresholds are presented; these decision guidelines are based on experience rather than research quantifying the impact of the insects on the crop.

## Estimating Percent Defoliation

Many economic thresholds for insects are based on percent defoliation of the plants they are feeding on. The following figure may assist in determining the percent defoliation. Although the following photo is of sunflower leaves, this figure can be used to estimate % defoliation for many crops.



*Photo courtesy of North Dakota State University Extension*



## Hazard Ratings and Residual Times of Insecticides to Bees

The following table can be used to assist in selecting an insecticide to apply to fields where either the crop or weeds may be flowering at the time of application. Residual time indicates the length of time the residue of the product remains toxic to bees after application. **These times are to be used as general guidelines only.** Environmental conditions influence the rate at which pesticides degrade.

INSECTICIDE	HAZARD RATING <sup>a</sup>		RESIDUE HAZARD (DAYS) <sup>b</sup>
	HONEY BEE	LEAFCUTTER BEE	
Least Hazardous Insecticides to Bees (no label precautions for bees)			
Dipel	3	3	none
Nolo Bait	3	3	none
Eco bran	3	3	N/A
Coragen	3	-	<3 hours
Beleaf	3	-	<1
Moderately to Highly Hazardous to Bees (see label for precautions to bees)			
Fulfill	2-3	2	<1
Assail	1-2	-	<1
Delegate	1-2	1	3 hours
Closer	-	-	3 hours
Decis/Poleci	1-2	1-2	<8 hours
Rimon	1-2	2	1
Lannate	1-2	1-2	<1 - 1.5
Success/Entrust	1-2	1	<1 - >1
Admire/Alias	1	1-2	<1 - >1
Matador/Silencer	1	1	>1
Oberon	1-2	1	-
Movento	1	-	-
Agri-mek	1-3	2	<1 - 3
Orthene	1	1	2.5 - 3
Mako/UP-Cyde/Ship	1	1	<1 - >3
Dibrom	1-2	1-2	<1 - 4.5
Ambush/Pounce/Perm-UP	1	1	<1 - 5
Imidan	1	1	1 - 5
Malathion	1-2	1	2 (Honey Bee), 6 (Leafcutter Bee)
Lorsban/Pyrinex/Nufos/Citadel/ Warhawk/MPOWER Krypton/Sharda chlorpyrifos	1	1	2-6
Sevin	1-2	1-2	>1-7
Cygon/Lagon	1	1	3 - 7

<sup>a</sup> **HAZARD RATING 1** = Very poisonous to bees; do not apply to crops or weeds in bloom unless bees are kept off for the period that residue on the crop is a hazard. **2** = Moderately poisonous to bees; avoid direct application to bees, but may be applied with minimum hazard in late evening when bees are not foraging. **3** = Not very poisonous to bees; may be applied with minimum hazard to bees.

<sup>b</sup> Residue hazard represents the average time in days that residues poisonous to honey bees will remain on foliage (may vary with formulation and weather). Unusually low temperatures following spray application may cause residues to remain toxic longer than under warmer conditions. Morning dew can also make residues more toxic to foraging bees. A more extensive list of hazard ratings of insecticides to bees and duration of toxicity can be found at the Western Committee on Crop Pests website at: <http://www.westernforum.org/WCCP%20Guidelines.html>.

## Reducing Bee Losses from Insecticides

Careless use of insecticides can kill bees and other beneficial insects such as pollinators, predatory and parasitic biological control insects. Help to reduce insecticide poisoning of bees by:

- 1. Avoid applying insecticides that are toxic to bees on crops in bloom.** Any field with even a small amount of bloom, whether it is the main crop, cover crop, or weeds will probably have foraging bees visiting the flowers. If at all possible, apply insecticides before or after the crop has gone into bloom. Control all flowering weeds prior to insecticide application.
- 2. Apply insecticides when bees are least active.** The highest level of bee activity occurs during the day. Apply insecticides in late evening or early morning when the bees are not foraging. As a general rule, evening applications are less hazardous to bees than morning applications. Do not apply insecticides if unusually low temperatures or heavy dew are forecast following application, because residuals typically remain toxic to bees longer under these conditions.
- 3. Minimize insecticide drift.** To avoid insecticides drifting into non-target locations, do not apply insecticides during windy conditions. Choose nozzles with a low drift rating. As a general rule, ground applications of insecticide are less prone to drift than aerial applications. When planting insecticide treated seeds, reduce the movement of dust from the seeding equipment to flowering crops, weeds and water sources that are in or adjacent to the field being seeded. If seeding equipment may potentially generate dust, controlling flowering weeds in the field prior to seeding may reduce pollinators being attracted to the field.
- 4. Contact the beekeeper before spraying.** Communication and cooperation between the insecticide applicator and the beekeeper can usually prevent bee losses. Notifying the beekeeper in advance (i.e. 48 hours) of applying insecticides will allow the beekeeper to move or protect the colonies from insecticide damage. The app BeeConnected (<http://www.beeconnected.ca/>) can be used to facilitate communication between farmers and beekeepers within a 5 km radius of the farm or beehives.
- 5. If possible, use insecticides and/or insecticide formulations which are the least hazardous to bees.** The following table "Hazard Ratings of Insecticides to Bees" will help in selecting the least hazardous insecticide. In general, dusts are more hazardous to bees than sprays. Wettable powders are more hazardous than emulsifiable concentrates (EC) or water-soluble formulations. Granular insecticides and spreadable bran bait insecticides are generally the least hazardous to bees.

## Insecticide Poisoning in Humans

Organophosphate (OP) and carbamate insecticides (identified on the Insecticide Groups chart page 600) can pose a serious risk to unprotected persons. Poisonings can occur while mixing, loading and/or during the application of these products without the appropriate protective equipment or measures. These pesticides are readily absorbed through the skin or the lungs, and can act as nervous system toxins. Overexposure can produce symptoms such as headache, nausea, pupil dilation and excessive sweating and salivation. Higher doses may cause breathing difficulties, muscle twitching, weakness and spasms. Very high doses have caused respiratory failure and death.

Both OP and carbamate pesticides inhibit an enzyme called cholinesterase. Measurements of cholinesterase in the blood before and during the application season can indicate harmful exposures to OPs and carbamates. **Persons who intend to mix, load and/or apply these types of pesticides repeatedly during a season, need a baseline and repeat measurements. Consult your doctor before the spraying season to arrange for these measurements.**

### Degree of Risk and Hazard Rating:

(see pages 7 and 8 for full description)

## Resistance of Insects to Insecticides

Repeated use of the same insecticide, or insecticides with the same mode of action, against a particular insect in a given area may result in the effectiveness of the insecticide being reduced. To delay or prevent resistance of insects to insecticides:

1. Integrate different control methods (cultural, biological, chemical) into insect control programs whenever possible,
2. Use insecticides only when the economic threshold for a pest has been surpassed and natural controls fail to limit economic damage,
3. Rotate between insecticides with different modes of action, particularly if several applications are made in a season, and
4. Keep accurate records of insecticides used for each of your fields.

Insecticides can be classified according to their similarity in chemical structure (chemical group in the table below), and by mode of action (the process by which the insecticide kills the insect). The "Group" column in the following table separates insecticides based on their mode of action. By selecting products with different modes of action for an insecticide rotation program, risk of insecticide resistance can be reduced.

## Insecticide Groups Based on Modes of Action

GROUP	CHEMICAL GROUP	TRADE NAME	ACTIVE INGREDIENT	MODE OF ENTRY
1A	Carbamates	Sevin XLR, Eco Bran	carbaryl	contact/ingestion (Sevin XLR) ingestion (Eco Bran)
		Lannate	methomyl	contact/ingestion
1B	Organophosphates	Malathion	malathion	contact
		Orthene	acephate	contact/ingestion
		Dibrom	naled	contact/ingestion
		Imidan	phosmet	
		Lorsban, Pyrinex, Nufos, Citadel, Warhawk, MPOWER Krypton, Pyrifos, Sharda chlorpyrifos	chlorpyrifos	contact/ingestion/inhalation
		Lagon, Cygon	dimethoate	contact/ingestion
		Thimet 20-G	phorate	ingestion
3A	Pyrethroids	Decis, Poleci	deltamethrin	contact/ingestion
		Mako, UP-Cyde, Ship	cypermethrin	contact/ingestion
		Matador, Silencer	lambda-cyhalothrin	contact/ingestion
		Ambush, Pounce, Perm-UP	permethrin	contact/ingestion
		Capture	bifenthrin	
		Tempo	cyfluthrin	
4A	Neonicotinoids	Helix, Cruiser Actara 240SC Actara 25WG	thiamethoxam	ingestion ingestion contact/ingestion
		Admire, Alias, Gaucho, Raxil ProShield, Sombraero, Stress Shield 600	imidacloprid	contact/ingestion (flowable formulations) ingestion (seed treatments)
		Assail	acetamiprid	contact/ ingestion
		Prosper, Poncho, Nipsit, Titan, Clutch	clothianidin	ingestion
4C	Sulfoximines	Closer	sulfoxaflor	contact/ingestion
4D	Butenolides	Sivanto Prime	flupyradifurone	contact/ingestion
5	Spinosyns	Success, Entrust	spinosad	contact/ingestion
		Delegate	spinetoram	contact/ingestion
6	Avermectins, Milbemycins	Agri-mek	abamectin	contact/ingestion
9B	Pyridine azomethine derivatives	Fulfill	pymetrozine	ingestion mainly, some contact activity
9D	Pyropenes	Sefina	Afidopyropen	contact
11	Microbial disruptors of insect midgut membranes	Dipel	<i>Bacillus thuringiensis</i> var. <i>Kurstaki</i>	ingestion
15	Benzoylureas	Rimon	novaluron	ingestion/ contact
23	Tetronic and tetramic acid derivatives	Movento	spirotetramat	
		Oberon	spiromesifen	contact
24A	Phosphides	Phostoxin	aluminum phosphide	inhalation (fumigant)
28	Diamides	Coragen	chlorantraniliprole	ingestion/ contact
		Lumiderm, Verimark, Fortenza, Exirel	cyantraniliprole	ingestion
29	Flonicamid	Beleaf	flonicamid	contact/ ingestion

A more detailed table showing insecticides organized by mode (site) of action, and specific information on the mode (site) of action for the different groups can be found on the Insecticide Resistance Action Committee website at: <http://www.irac-online.org/modes-of-action/>.

## Field Scouting and Insect Management Charts

### Field Scouting in Alfalfa

#### Sap Or Fluid Feeders

- **Lygus bugs/Alfalfa plant bug**
  - **Typical Damage:** Field blooms poorly or not at all. Flower buds blasted, whitish, and dry; flowers dropping off before fully open. Collapsed seed.
  - **When and How to Monitor:** Look for plant bugs when monitoring alfalfa in June through mid-August. Make five 180° sweeps with a 15-inch (40 cm) insect net through alfalfa canopy at each sampling site. Record total number of plant and lygus bugs (both nymphs and adults) captured. Calculate average number per sweep.
  - **Economic Threshold:** Hay: Control not recommended. Seed alfalfa at bud and early bloom: 8 lygus bugs/sweep; 4 alfalfa plant bugs/sweep; or 5 bugs if the plant bug population is a combination of lygus bugs and alfalfa plant bug. If insecticides are used, attempt to spray before the onset of bloom. Protecting insect pollinators in seed production fields is very important.
- **Potato Leafhopper**
  - Leafhoppers are most severe in new seedlings and in regrowth under hot dry weather.
  - **When and How to Monitor:** Take 20 180° sweeps from 5 areas of the field. Avoid field edges. Determine the average number of potato leafhoppers per sweep.
  - **Economic Threshold:** For 9 cm stem height = 0.2 adult leafhoppers per sweep; 15 cm stem height = 0.5 adults per sweep; 25 cm stem height = 1 adult or nymph per sweep; 36 cm stem height = 2 adults or nymphs per sweep.
- **Pea Aphid**
  - **Typical Damage:** Suck juices from plants; stunt growth; cause premature drying.

- **When and How to Monitor:** Look for when monitoring in July through August. Take 5 sweeps at each location. Monitor fields closely during periods of slow plant growth.
- **Economic Threshold:** 100-200 aphids/180° sweep when crop is moisture stressed, or until mid-August.

#### Defoliators

- **Alfalfa Weevil**
  - **Typical Damage:** Feed on developing buds and leaves. Stunt growth.
  - **When and How to Monitor:** Start scouting fields in mid-May. Look for shot holes initially, then clipping along the edges of leaves and pinhole damage. For determining if levels are at threshold in hay crops, collect 30 stems in an M-shaped pattern, place them inside a white pail and beat them against the side to knock off larvae. Do not include younger first and second instar larvae (3 mm or less) in the counts. Determine the average height of the crop as well.
  - **Economic Threshold:**
    - **Alfalfa Hay:** One of the best control strategies is to cut fields for hay early. If early cutting of the hay crop is not possible, treatment thresholds are based on the following measurements of plant height and levels of larvae: <30 cm – 1 larva/stem; <40 cm – 2 larvae/stem; 3 larvae per stem is generally economical to control regardless of height of crop. On regrowth for second crop, 2 or more active larvae per crown (4 to 8 larvae/ft<sup>2</sup>) will require insecticide application.
    - **Alfalfa Seed:** 20 to 30 3<sup>rd</sup> or 4<sup>th</sup> instar larvae/sweep (90° = straight sweep) or 35 to 50% of foliage tips showing damage. In some instances it may be practical to just treat hotspots and not entire fields.

### Alfalfa Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Sap or Fluid Feeders</b>					
<b>Lygus bugs</b>	Beleaf 50 SG (F)	81-121 g	7	G	>2,000
	Assail (seed production only) (N)	35-69 g	1	G	1,064
	Rimon (Seed Production only) (SB)	338 ml	14	G	>5,000
	Matador/Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G (Matador) G (Silencer)	64-110
	Decis 5EC/Poleci (seed production only) (P)	80-100 ml (Decis) 162-202 ml (Poleci)	20	G	395
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.42-0.85 L	4	A or G	345
	Cygon 480 EC/Cygon 480- AG (OP) (seed and forage production)	0.17 L	10	A or G	60-450

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Lygus bugs, continued</b>	Lagon/Cygon 480 EC/Cygon 480-AG (OP) (seed production only)	0.44 L	28	A or G	60-450
<b>Alfalfa plant bug</b>	Assail (seed production only) (N)	35-69 g	1	G	1,064
	Cygon 480 EC (OP) (seed and forage production)	0.17 L	10	A or G	60-450
	Lagon /Cygon 480 EC /Cygon 480-AG (OP) (seed production only)	0.44 L	28	A or G	60-450
<b>Potato leafhopper</b>	Sivanto Prime (B)	202-304 ml	7	G	>2,000
	Matador/Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G (Matador) G (Silencer)	64-110
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.42-0.85 L	4	A or G	345
	Lagon/Cygon 480 EC/ Cygon 480-AG (OP)	0.17 L	10	A or G	60-450
<b>Spittlebugs</b>	Malathion 85E (OP) (adults)	0.445-0.544 L	7	A or G	5,500
<b>Pea Aphid</b>	Beleaf 50 SG (F)	49-65 g	7	G	>2,000
	Sivanto Prime (B)	202-304 ml	7	G	>2,000
	Matador/Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G Matador) G (Silencer)	64-110
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.42-0.85 L	4	A or G	345
	Lagon/Cygon 480 EC/ Cygon 480-AG (OP)	0.17 L	10	A or G	60-450
<b>Spider mites</b>	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Oberon (TT)	0.202-0.405 L		A or G	>2,000
<b>Defoliators</b>					
<b>Grasshoppers</b>	<b>Spreadable Bran Baits</b>				
	Nolo Bait (M)	Minimum of 0.45 kg		A or G	
	Eco bran (C)	0.8-1.6 kg	2	G	N/A
	<b>Sprays</b>				
	Coragen	51-101 ml	0	G	>5,000
	Matador/Silencer (P)	25-34 ml (Ground) 34 ml (Aerial)	Do not apply within 3 days of livestock foraging.	A or G	64-110
	Decis 5EC (seed production only) (P)	40-61 ml	20	G	395
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Lagon/ Cygon 480 EC/Cygon 480-AG (OP)	0.22 L (nymphs) 0.34-0.36 L (adults)	10 (Lagon, Cygon 480 EC) 28 (Cygon 480-AG)	A or G	60-450

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Alfalfa weevil</b>	If alfalfa has reached the bud or early bloom stage, immediate <b>cutting</b> will kill many alfalfa weevil larvae.				
	Coragen (D) (suppression only)	152-202 ml	0	G	>5,000
	Matador/Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G (Matador) G (Silencer)	64-110
	Decis 5EC/Poleci (seed crops only) (P)	80-100 ml (Decis) 162-202 ml (Poleci)	20	G	395
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (larvae only) (OP)	0.445-0.544 L	7	A or G	5,500
	Imidan (OP)	0.65 kg	7	G	285
	Lagon/ Cygon 480 EC/Cygon 480-AG (OP) (reduction only)	0.17 L	10	A or G	60-450
<b>Alfalfa looper</b>	Dibrom (OP)	0.42-0.85 L	4	A or G	345
<b>Leafminers</b>					
<b>Alfalfa blotch leafminer</b>	Malathion 85E (OP)	0.544 L	7	A or G	5,500
	Imidan (OP)	0.65 kg	7	G	285
	Lagon/Cygon 480 EC/ Cygon 480-AG (OP)	0.22 L	10	A or G	60-450

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: M=microbials, SB=substituted benzoylurea, B=butenolides, F=flonicamid, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, TT=tetronic and tetramic acid derivatives.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Barley – See Small Grain Cereals

### Scouting for insects in Beans (Dry Beans)

#### Belowground Feeders and Cutworms

- **Seedcorn Maggot**
  - **Typical Damage:** Seedcorn maggot attacks bean seed, preventing sprouting or weakening seedlings. The yellowish white maggot is found burrowing in the seeds or emerging stem. Seedcorn maggots are usually most severe in wet, cold seasons and on high organic matter soils.
- **Cutworms**
  - **When and How to Monitor:** To find cutworms, dig in the soil to a depth of 2.5 to 5 cm at the base of recently damaged plants.
  - **Nominal Threshold:** Treatment is warranted when one cutworm or more is found per metre of row and the larvae are still small (less than 2 cm long).

#### Sap Feeders

- **Leafhoppers**
  - **Typical Damage:** Foliage becomes dwarfed, crinkled, and curled. Small triangular brown areas appear at the tips of leaves, gradually spreading around the entire leaf margin.
  - **When and How to Monitor:** Leafhopper adults are quick and can be observed by running your hand over the top of the plants as you approach them and observing adults that fly off the plants. On the same plants, turn over each leaf to determine the number of nymphs per trifoliate.
  - **Economic Threshold:** Unifoliate stage – 0.25 leafhoppers per trifoliate; second trifoliate stage – 0.5 leafhoppers per trifoliate; fourth trifoliate stage – 1.0 leafhopper per trifoliate; first bloom – 2.0 leafhoppers per trifoliate.

#### Defoliators

- **Grasshoppers**
  - **Economic Threshold:** Substantial yield loss does not occur until up to 35% defoliation occurs before bloom and 15% after bloom.

## Beans (Dry) Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Vibrance Beans (N)	A seed treatment combining Cruiser Maxx Beans and Vibrance 500FS.			
	Cruiser 5FS (N)	83 ml/100 kg seed	Must be applied in commercial seed treatment facilities.		
	Stress Shield 600 (N)	104ml/100kg of seed	Seed Treatment		
Seedcorn Maggot	Sow seeds as shallow as possible in a warm, well-prepared seedbed. If manure is used, apply and plow it under the previous fall.				
	Cruiser Maxx Vibrance Beans (N)	A seed treatment combining Cruiser Maxx Beans and Vibrance 500FS.			
	Cruiser 5FS (N)	50-83 ml/ 100 kg seed	Must be applied in commercial seed treatment facilities.		
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Sap or Fluid Feeders					
Lygus Bugs	Beleaf 50 SG (F)	81 g	7	G	>2,000
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Sevin XLR (C)	2.12-2.59 L	5	G	699
	Cygon 480-AG (OP)	0.28-0.40 L	7	A or G	450
Potato Leafhopper	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Sevin XLR (C)	1.01 L	5	G	699
	Cygon 480-AG (OP)	0.28-0.40 L	7	A or G	450
Aphids	Beleaf 50 SG (F)	49 – 65 g	7	G	>2,000
	Movento (TT)	75-111 ml	7	G	>2,000
	Matador (P)	34-94 ml	14	A or G	64-110
	Voliam Xpress (D+P)	91-223 ml	14	A or G	98
	Malathion 500 (OP)	0.56-1.21 L	1	A or G	4302
	Malathion 85E (OP)	0.297-0.544 L	3	G	5,500
	Dibrom (OP)	0.42-0.85 L	4	A or G	345
	Cygon 480-AG (OP)	0.28-0.40 L	7	A or G	450
Spider mites	Oberon (TT)	202-243 ml	10	A or G	>2,000
	Cygon 480-AG (OP)	0.28-0.40 L	7	A or G	450
Defoliators and Borers					
Grasshoppers	Spreadable Bran Baits				
	Eco bran (C)	0.8-1.6 kg	5	G	N/A
	Sprays				
	Coragen (D)	51-101 ml	1	A or G	>5,000
European Corn Borer	Coragen (D)	101-152 ml	1	A or G	>5,000
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Voliam Xpress (D+P)	202 ml	14	A or G	98



Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Alfalfa looper	Dibrom (OP)	0.42-0.85 L	4	A or G	345

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: F=fonicamid, D=diamides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, TT = tetronic and tetramic acid derivatives.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Buckwheat Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
<b>Defoliators</b>					
Grasshoppers	Coragen (D)	51-101 ml	1	A or G	>5,000

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Scouting for insects in Canaryseed

Sap Feeders

- **Aphids**
  - **When and How to Monitor:** Start checking for aphids when monitoring during the early heading stage of canaryseed. The head should be bent and closely inspected for aphids hiding along the small stem inside the canaryseed head. Also check the stems, underside of leaves, and in the canaryseed boot.
  - **Nominal Threshold:** 10 to 20 aphids on 50% of the stems prior to the soft dough stage.

## Canaryseed Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Sap Feeders</b>					
Aphids	Lagon/Cygon 480 EC/Cygon 480-AG (OP)	0.20 L	21	A or G	60-450
	Malathion 85E (OP)	0.277 L	14	A or G	5,500

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: OP=organophosphates

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Field Scouting in Canola

### Scouting Calendar

**Early-season:** Flea beetles, cutworms, red turnip beetle, diamondback moth

**Mid-season:** Diamondback moth, cabbage seedpod weevil, grasshoppers

**Late season:** Bertha armyworm, diamondback moth, Lygus bugs, grasshoppers, alfalfa looper

### • Cutworms

- **Typical Damage:** Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.
- **When and How to Monitor:** Look for cutworms, and evidence of cutworm feeding, when monitoring canola in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged.



Cutworms will sometimes be most abundant in patches or a specific area of a field.

- **Nominal Threshold:** 25-30% stand reduction. Sometimes it is most economical to just treat infested patches, and not whole fields.

#### Sap Or Fluid Feeders

##### • Lygus bugs

- **Typical Damage:** Attacked buds appear shrunken and bleached white. Damaged seeds appear dark brown and shriveled.
- **When and How to Monitor:** Monitor from when flowering is complete until seeds within the pod have become firm. Make 10 sweeps with a 38 cm diameter insect net at each of at least 5 sampling site. If while doing these samples populations appear to be of concern, take additional samples; a minimum of 15 samples is needed to accurately determine whether controls are economical. Sample canola for lygus bugs on a sunny day when the temperature is above 20°C and the crop canopy is dry.
- **Economic Threshold:** 10-18 lygus bugs/10 sweeps from when flowering is complete and seeds are enlarging in the lower pods to when seeds in the lower pods are full size and translucent; and 15-25 lygus bugs/10 sweeps when seeds in the lower pods are green. Controls are not recommended when seeds are ripening (yellow or brown). When precipitation is greater than 100 mm from

the onset of bud formation to the end of flowering, the crop may partially compensate for plant bug damage.

- A table of specific economic thresholds for various expected values of canola seed and costs of control for lygus bugs in canola can be found at: <http://www.gov.mb.ca/agriculture/crops/insects/fad12s00.html>.

##### • Aphids

- **Economic Threshold:** Control aphids in canola if densities exceed 25 aphids/10 cm shoot tip after flowering.

#### Defoliators

##### • Flea beetles

- **Typical Damage:** Shot-holes in leaves to complete destruction of seedling plants in late May through June. Holes chewed in pods in August (occasional).
- **When and How to Monitor:** Look for when monitoring in May through June when crop is in seedling stage. Examine 10 plants at random at each stop. Estimate overall percentage leaf loss.
- **Economic Threshold:** When 25 percent of leaf surface is destroyed and flea beetles are present. If damage is only along the field margins and beetles are still congregated there, then control measures should be applied to the damaged areas only.

##### • Cabbage Seedpod Weevil

- **When and How to Monitor:** Sample at 10 to 20 percent flower. Do 10 sweeps (180 degrees) at a minimum of 4 locations; field edge, 50 metres into the field, and repeat the 2 sets at the opposite end of the field. If weevil numbers are close to the threshold the estimate may be improved by taking additional samples.
- **Economic Threshold:** 25 to 40 weevils per 10 sweeps.

##### • Diamondback moth

- **Typical Damage:** Flowers clipped or chewed, outer layers of stem and pods chewed, holes chewed in pods.
- **When and How to Monitor:** Look for when monitoring in late – May through early September. Observing for adults and larvae while taking sweep net samples can determine the presence and relative abundance of diamondback moth in the field. If levels appear to be of concern, shake plants within a 50 cm x 50 cm area and count larvae on the ground or surface (such as a sweep net) that plants were shaken over. Another alternative is to clip or pull the plants and knock over a light colored surface (such as a sweep net, jacket, hood of a car, etc.). Multiply by 4 to get the number of larvae per square metre. Do this in at least 5 areas of the field.
- **Nominal Threshold:** 100 to 150 larvae/m<sup>2</sup> in immature to flowering plants. 200 to 300 larvae/m<sup>2</sup> in plants with flowers and pods.
  - Note that these threshold numbers are based on stands averaging 150-200 plants/m<sup>2</sup>. In areas where stands are thinner, the economic threshold should be lowered accordingly. A nominal threshold of 25-33% defoliation with larvae still present can be applied for canola at seedling stage.

##### • Bertha Armyworm

- **Typical Damage:** Outer layers of stems and pods chewed resulting in whitish appearance, holes chewed in pods.
- **When and How to Monitor:** Look for larvae when monitoring fields in late July through early August. At each stop, shake plants in a 1/4 m<sup>2</sup> (50 cm x 50 cm) area and carefully check soil surface for dislodged larvae. During heat of the day, larvae will often be found under leaves on soil surface.
- **Economic Threshold:** A loss of 0.058 bushels/acre for each larva/m<sup>2</sup> can be expected. Multiplying 0.058 X average number of larvae per m<sup>2</sup> X expected seed value (dollars/bushel) will determine the economic loss (in dollars/acre) due to the larvae. Only if control costs (insecticide plus application costs) can be applied for less than this economic loss will insecticide applications be economical. Yield loss may be greater for canola under moisture stress.
  - At an expected seed value of \$6.00/bushel, the economic threshold will be between about 20 and 34 larvae/m<sup>2</sup>, depending on control costs. At an expected seed value of \$8/bushel, the economic threshold will be between about 15 and 26 larvae/m<sup>2</sup>, depending on control costs. Tables showing specific economic thresholds at various expected seed values and control costs can be found at: <http://www.gov.mb.ca/agriculture/crops/insects/fad03s01.html>.

## Canola Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Belowground and Surface Feeders					
Root maggots	<ul style="list-style-type: none"><li>• <b>Increased seeding rates and increased row spacing</b> (to about 25 to 30 cm) can reduce damage to the roots by root maggots.</li><li>• <b>Cultivating</b> prior to seeding reduces adult emergence from overwintered pupae. Root maggot infestations are greater under zero-till systems than under conventional tillage, but yields under zero tillage usually still exceed those with conventional tillage.</li></ul>				
Cutworms	Seed Treatments				
	Fortenza (D)	A seed treatment that can be combined with Helix Vibrance.			
	Lumiderm (D)	A seed treatment that can be combined with either Prosper EverGol or Helix Vibrance.			
	Foliar Sprays				
	Coragen (D)	101 ml	1	A or G	>5,000
	Matador (P)	34 ml	7	A or G	64-110
	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5-leaf stage	A or G (see labels) G	1276
	Chlorpyrifos (OP)	0.354-0.486 L	21	A or G	205-418
Sap and Fluid Feeders					
Lygus Bugs	Decis 5EC/Poleci (P)	60 ml (Decis) 121 ml (Poleci)	7	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Chlorpyrifos (OP)	0.202 - 0.405 L	21	A or G	205-418
Turnip aphid	Lagon/Cygon 480-AG (OP)	0.34-0.36 L	21	A or G	60-450
Aster leafhopper	Lagon/Cygon 480-AG (OP)	0.34-0.36 L	21	A or G	60-450
Swede midge	Coragen (D)	101 ml	1	A or G	>5,000
	Decis 5EC (P)	61-81 ml	7	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110
Defoliators					
Crucifer Flea beetle and/ or striped flea beetle	Seed Treatments				
	Helix Vibrance (N)	A seed treatment containing Helix Xtra and Vibrance 500FS.			
	Prosper EverGol (N)	A seed treatment containing the insecticide clothianidin and 3 fungicides.			
	Lumiderm (D)	Applied combined with either Helix Vibrance or Prosper EverGol.			
	Fortenza (D)	Applied combined with Helix Vibrance or Visivio.			
	Visivio (N+S)	Seed treatment containing Helix Vibrance and Rascendo (sulfoxaflor). Visivio can also be combined with Fortenza if cutworm control is needed.			
	Nipsit Inside (N)	250-666 ml / 100 kg seed	Seed Treatment		3,044
	Gaucho Canola System (N)	0.833 L/ 100 kg of seed	Seed Treatment		N/A
	Gaucho Platinum (N)	1.667L/ 100 kg of seed	Seed Treatment		N/A
	Sombrero (N)	0.67-1.33 L / 100 kg seed	Seed Treatment		N/A

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Crucifer Flea beetle and/or striped flea beetle</b> <i>continued</i>	<b>Foliar Sprays</b>				
	Decis 5EC/Poleci (P)	40 -60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
	Mako (P)	20 ml	30	G	242-542
	UP-Cyde/Ship (P)	56.6 ml	30	A or G	355
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Pounce (P) Ambush (P)	36-73 ml 28-57 ml		A or G	1276
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Malathion 500 (OP)	0.44 L	7	A or G	4302
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
	Sevin XLR (C)	0.202 L	Seedling application only	A or G	699
<b>Cabbage seedpod weevil</b>	Trap crops of earlier-flowering canola can be used to concentrate cabbage seedpod weevils, which can be managed with an insecticide if needed.				
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Decis 5EC /Poleci (for control of adults only) (P)	80 ml (Decis) 162 ml (Poleci)	7	A or G	395
	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Diamondback moth</b>	Coragen (D)	51 ml	1	A or G	>5,000
	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Malathion 500 (OP)	0.22-0.34 L	7	A or G	4302
	Malathion 85E (OP)	0.109-0.168 L	7	A or G	5,500
	Chlorpyrifos (OP)	0.405-0.607L	21	A or G	205-418
<b>Bertha Armyworm</b>	<b>Seeding as early as possible</b> and choosing <b>early maturing varieties of canola</b> may help minimize damage in years when outbreaks are forecasted.				
	Coragen (D)	51 - 152 ml	1	A or G	>5,000
	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
	Mako (P)	28 ml (ground) 36 ml (air)	30	A or G	242-542
	UP-Cyde/Ship (P)	81-113 ml	30	A or G	355
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Lannate (C)	87.4-206.4 g	8	A or G	30-34
	Chlorpyrifos (OP)	0.304-0.405 L	21	A or G	205-418
<b>Alfalfa looper</b>	Lannate (C)	87-206 g	8	A or G	30-34
	Chlorpyrifos (OP)	0.304-0.405 L	21	A or G	205-418
<b>Cabbage looper</b>	Coragen (D)	101 ml	1	A or G	>5,000
<b>Beet webworm</b>	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	G	395
	Lannate (C)	87.4-206.4 g	8	A or G	30-34

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Clover cutworm	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
	Lannate (C)	87.4-206.4 g	8	A or G	30-34
True armyworm	Chlorpyrifos (OP)	0.304-0.405 L	21	A or G	205-418
Imported Cabbageworm	Coragen (D)	101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
Variegated cutworm	Chlorpyrifos (OP)	0.354-0.486	21	A or G	205-418
Grasshoppers	<b>Spreadable Bran Baits</b>				
	Eco bran (C)	0.8-1.6 kg	Treat only seedlings	G	N/A
	<b>Sprays</b>				
	Coragen (D)	51 - 101 ml	1	A or G	>5,000
	Decis 5EC/Poleci (P)	Decis: 40-60 ml (Ground), 60 ml (Aerial) Poleci: 81-121 ml (ground), 121 ml (air)	7	A or G	395
	Matador /Silencer (young grasshoppers only) (P)	25-34 ml (Ground) 34 ml (Aerial)	7	A or G	64-110
	Mako (P) (young grasshoppers only)	20-28 ml	30	G	242-542
	UP-Cyde (P) (young grasshoppers only)	33-46 ml			355
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Malathion 500 (OP)	0.45-0.69 L	7	A or G	4302
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
	Chlorpyrifos (OP)	0.235-0.354 L	21	A or G	205-418
	Lagon/Cygon 480-AG/ Cygon 480 EC (OP)	0.34-0.36 L	21	A or G	60-450
Slugs	Sluggo Professional	10-20 kg		G	>5,000

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides, N=neonicotinoids, S=sulfoximines, P=pyrethroids, C=carbamates, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Chickpea Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
Wireworms	Cruiser Maxx Vibrance Pulses (N)	A seed treatment containing Cruiser 5FS and Vibrance Maxx RFC.			
	Cruiser 5FS (N)	17-50 ml / 100 kg seed	May be applied on-farm or by commercial seed treaters.		
	Stress Shield 600 (N)	104ml/100kg of seed	Seed Treatment		

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
<b>Sap Feeders</b>					
Pea Aphid	Beleaf 50 SG (F)	49 – 65 g	7	G	>2,000
	Movento (TT)	75-111 ml	7	G	>2,000
	Matador/Silencer (P)	34-94 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Voliam Xpress (D+P)	91-202 ml	14	A or G	98
Potato Leafhopper	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
<b>Defoliators</b>					
Grasshoppers	Coragen (D)	51-101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides, F=flonicamid, P=pyrethroids, N=neonicotinoids, TT = tetrone and tetramic acid derivatives.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Field Scouting in Clovers

### Defoliators

- **Sweetclover Weevil**

- **Typical Damage:** Adults chew crescent-shaped and jagged notches in leaves and can completely defoliate plants.
- **When and How to Monitor:** Inspect clover seedlings for weevil damage in spring as the seedlings emerge. In midsummer and throughout August, inspect first-year clover stands for damage along crop margins. Invading

weevils move into these stands only as far as necessary to satisfy their food requirements, so an insecticide application to affected field margins is usually all that is required. Visually estimating the number of weevils per plant must be done carefully because weevils fall from plants easily and are difficult to see on the ground.

- **Economic Threshold:** 1<sup>st</sup> year stands: 1 weevil adult/3 seedlings (1/5 seedlings under dry conditions). 2<sup>nd</sup> year stands: 9-12 weevil adults/plant.

## Clovers (sweet, red, alsike) Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Defoliators</b>					
Grasshoppers	<b>Spreadable Bran Baits</b>				
	Eco bran (C)	0.8-1.6kg	2	G	N/A
	<b>Sprays</b>				
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Lagon (OP)	172-405 ml	2-28 (see label)	A or G	425
Sweetclover Weevil	Locate new seedlings as far as possible from 2nd-year clover. Cultivating second-year stands of sweet clover silage and hay as soon as possible after the crop is taken kills the new- generation weevil larvae in the soil.				
	Malathion 500 (OP) (sweet clover only)	0.56-1.01 L	7-Cattle may be returned immediately after spraying.	A or G	4302
	Malathion 85E (OP) (sweet clover only)	0.445-0.544 L			5,500

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Sweetclover Weevil <i>continued</i>	Lagon /Cygon 480 EC / Cygon 480-AG (OP)	0.34-0.45 L	28	A or G	60-450
Alfalfa weevil	Coragen (D) (suppression only)	152-202 ml	0	G	>5,000
Lesser clover leaf weevil	Decis 5 EC /Poleci (P) (suppression only/ red clover seed production only)	101 ml (Decis) 202 ml (Poleci)		G	395
<b>Sap or Fluid Feeders</b>					
Lygus Bugs	Beleaf 50SG (F)	80-121 g	7	G	>2,000
	Dibrom (OP)	0.42-0.85 L	4	A or G	345
Leafhoppers	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.42-0.85 L	4	A or G	345
Aphids	Beleaf 50SG (F)	49-65 g	7	G	>2,000
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.42-0.85 L	4	A or G	345

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

<sup>1</sup> Insecticide Group: D=diamides, F=flonicamid, P=pyrethroids, C=carbamates, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Field Scouting in Corn (Field Corn)

### • Cutworms

- **Typical Damage:** Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.
- **When and How to Monitor:** Look for cutworms, and evidence of cutworm feeding, when monitoring corn in late – May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. At each stop, examine 100 plants in a row. Calculate percentage of plants cut off or showing leaf feeding.
- **Economic Threshold:** When 3-6% of plants are cut and small larvae less than 1 inch present. Sometimes it is most economical to just treat infested patches, and not whole fields.

### • European corn borer

- **Typical Damage:** Shot-holes in leaves. Holes in stalk, tassels and ears. Damage may cause stalk breakage prior to harvest or cobs to fall to the ground. Nutrient flow in the plant may be restricted, resulting in smaller cobs.

- **When and How to Monitor:** Begin looking for European corn borer when field scouting in early July. At 5 locations, examine 10 plants for young larvae and egg masses. Calculate percentage of plants infested. Scout every 5 to 7 days until the end of July or larvae start to tunnel into the stalks.
- **Economic Threshold:** The level of European corn borer where control becomes economical depends on the value of the crop, and cost of control. Information on determining specific economic thresholds for European corn borer in corn can be found at <http://www.gov.mb.ca/agriculture/crops/insects/european-corn-borer.html>, or from your local agriculture office. These thresholds are based on a 5% yield loss per corn borer per plant on average. If the majority of larvae have bored into the stalk, do not apply insecticide, as they are ineffective once the larvae have entered the stalk.

### • Armyworms

- **Economic Threshold:** For corn past the 6-leaf stage, if 50% of the plants are showing damage and have larvae smaller than 2.5 cm (1 in.), insecticide treatment may be warranted. As long as the growing point of the plant is not damaged, the corn plant is usually able to recover from moderate feeding.

## Corn (Field Corn) Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
<b>Cutworms</b>	<b>Seed Treatments</b>				
	Fortenza (D)	83-167 ml / 100 kg seed			
	<b>Foliar Sprays</b>				
	Coragen	101 ml	14 (field corn) 1 (seed corn or sweet corn)	A or G	>5,000
	Matador/Silencer (P)	34 ml	14	A or G	64-110
	Mako (P) UP-Cyde (P)	71 ml 115 ml	21	G	242-542 355
	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5 leaf stage	A or G (see labels) G	1030
	Chlorpyrifos (darksided, black, redbacked) (OP)	0.971 L (Pre-plant treatment), 0.486-0.971 L (seedling treatment)	70	G	205-418
	Pyrifos 15G (OP)	75 g per / 100 m of row	70	G	2250
<b>Wireworms</b>	Fortenza (D)	Seed Treatment			
	Cruiser Maxx Corn (N)	83 ml Cruiser 5FS / 100 kg seed	A seed treatment containing Cruiser 5 FS and Maxim Quattro.		>5,000
	Poncho 600 FS (N)	33.3-66.6 ml of Poncho 600 per 80,000 unit of seed	Seed Treatment	Seed Treatment	2,000
	Nipsit Inside (N)	33.3-66.6 ml per 80,000 unit of seed	Seed Treatment	Seed Treatment	3,044
	Sombrero (N)	0.16 mg per kernel	Seed Treatment	Seed Treatment	N/A
<b>Seedcorn maggot</b>	Cruiser Maxx Corn (N)	83-166 ml Cruiser 5FS/100 kg seed	A seed treatment containing Cruiser 5 FS and Maxim Quattro.		>5,000
	Poncho 600 FS (N)	33.3-66.6 ml of Poncho 600 per 80,000 unit of seed	Seed Treatment	Seed Treatment	2,000
	Nipsit Inside (N)	33.3-66.6 ml per 80,000 unit of seed	Seed Treatment	Seed Treatment	3,044
<b>Corn rootworm</b>	<b>Crop rotation</b> is an effective management strategy.				
	<b>Resistant Cultivars:</b> Some cultivars of Bt corn are resistant to feeding by corn rootworm. A table of registered Bt corn products in Canada (as of May 2018) is available at: <a href="http://www.cornpest.ca/bt-corn/">http://www.cornpest.ca/bt-corn/</a> .				
	Cruiser Maxx Corn (N)	830 ml Cruiser 5FS/ 100 kg seed	A seed treatment containing Cruiser 5 FS and Maxim Quattro.		>5,000
	Poncho 600 FS (N)	166.7 ml of Poncho 600 per 80,000 unit of seed	Seed Treatment	Seed Treatment	2,000
	Nipsit Inside (N)	166.7 ml per 80,000 unit of seed	Seed Treatment	Seed Treatment	3,044
	Pyrifos 15G (OP)	75 g/100 m of row	70	G	2250



Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Sap Feeders</b>					
<b>Aphids</b>	Sivanto Prime (B)	202-304 ml	7 (silage, forage, sweet corn) 21 (grain)	A or G	>2,000
	Closer (S)	30 – 61 ml	7 (forage) 14 (grain)	A or G	>5,000
<b>Spider mites</b>	Oberon (TT)	162-243 ml	Green forage – 5 Grain or stover – 30	A or G	>2,000
<b>Defoliators and Borers</b>					
<b>Grasshoppers</b>	<b>Spreadable Bran Baits</b>				
	Eco bran (C)	0.8-1.6 kg	1	G	N/A
<b>European Corn Borer</b>	<b>Stalk Management:</b> Primary tillage such as chisel plowing or moldboard plowing in the fall can reduce overwintering populations. Mowing corn stalks after harvest can reduce overwintering populations up to 85%. <b>Resistant Cultivars:</b> Some cultivars of Bt corn are resistant to feeding by European corn borer. A table of registered Bt corn products in Canada (as of May 2018) is available at: <a href="http://www.cornpest.ca/bt-corn/">http://www.cornpest.ca/bt-corn/</a> .				
	Dipel 2X DF (M)	0.23-0.45 kg	0	G	>4,000
	Coragen (D)	101 – 152 ml	14 (field corn) 1 (seed corn or sweet corn)	A or G	>5,000
	Delegate (Sp)	49 – 85 g	28	A or G	>5,000
	Matador/ Silencer (P)	34-76 ml	14 (silage) 21 (field corn)	A or G	64-110
	Decis 5EC /Poleci (P)	0 101-121 ml (Decis); 202-243 ml (Poleci)	N/A	G	395
	Mako (P)	71 ml	5	A or G	242-542
	UP-Cyde/Ship (P)	113 ml	5	A or G	355
	Voliam Xpress (D+P)	202 ml	14 (silage) 21 (field corn)	A or G	98
	Malathion 85E (OP)	0.445-0.544 L	5	A or G	5,500
	Orthene (seed and sweet corn only) (OP)	228-334 g	21	G	1,494
<b>Corn Earworm</b>	Some cultivars of Bt corn are resistant to feeding by corn earworm.				
	Coragen (D)	101-152 ml	14 (field corn) 1 (seed corn or sweet corn)	A or G	>5,000
	Matador/Silencer (P)	34-76 ml	14 (silage) 21 (field corn)	A or G	64-110
	Mako (P) UP-Cyde (P)	71 ml 113 ml	5	A or G, see product label	242-542 355
	Voliam Xpress (D+P)	202 ml	14 (silage) 21 (field corn)	A or G	98
	Malathion 85E (OP)	0.445-0.544 L	5	A or G	5,500
<b>Armyworm</b>	Coragen (D)	101-152 ml	14 (field corn) 1 (seed corn or sweet corn)	A or G	>5,000



Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Armyworm</b> <i>continued</i>	Matador/Silencer (P)	34 ml	14 (silage) 21 (field corn)	A or G	64-110
	Voliam Xpress (D+P)	202 ml	14 (silage) 21 (field corn)	A or G	98
<b>Fall armyworm</b>	Some cultivars of Bt corn are resistant to feeding by fall armyworm.				
	Coragen (D)	101-152 ml	14 (field corn) 1 (seed corn or sweet corn)	A or G	>5,000
	Matador/Silencer (P)	34 ml	14	A or G	64-110

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: M=microbials, D=diamides, B=butenolides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, TT = tetronic and tetramic acid derivatives.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Faba Bean Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Belowground Feeders					
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
Wireworms	Cruiser Maxx Vibrance Pulses	A seed treatment containing Cruiser 5FS and Vibrance Maxx RFC.			
	Cruiser 5FS (N)	17-50 ml/ 100 kg seed	May be applied on-farm or by commercial seed treaters.		
	Stress Shield 600 (N)	104 ml / 100 kg seed	Seed Treatment		
Pea Leaf Weevil	Stress Shield 600 (N)	104 ml / 100 kg seed	Seed Treatment		
	Cruiser Maxx Vibrance Pulses	A seed treatment combining Cruiser 5FS and Vibrance Maxx RFC.			
	Cruiser 5FS (N)	50 ml/ 100 kg seed	May be applied on-farm or by commercial seed treaters.		
Sap and Fluid Feeders					
Lygus Bugs	Beleaf 50 SG (F)	81 g	7	G	>2,000
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Potato Leafhopper	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Pea Aphid	Beleaf 50 SG (F)	49 - 65 g	7	G	>2,000
	Matador/Silencer (P)	34 - 94 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Voliam Xpress (D+P)	91 - 223 ml	14	A or G	98
Defoliators					
Grasshoppers	Coragen (D)	51-101 ml	1	A or G	>5,000

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides, F=flonicamid, N=neonicotinoids, P=pyrethroids.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Field Scouting in Flax

### • Cutworms

- **Typical Damage:** Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.
- **When and How to Monitor:** Look for cutworms, and evidence of cutworm feeding, when monitoring in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of the field where cutworm damage is noticeable, check around damaged plants in a 0.25 m<sup>2</sup> (50cm x 50cm) area. Use trowel or shovel to carefully search through top 5 cm of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per m<sup>2</sup>. Repeat in several locations to get an accurate assessment of what cutworm levels are.
- **Economic Threshold:** 4-5 larvae/m<sup>2</sup>. Sometimes it is most economical to just treat infested patches, and not whole fields.

### • Aphids

- **Typical Damage:** Extract plant fluids from the stems, leaves and developing bolls. Can cause fewer seeds to be produced.
- **When and How to Monitor:** The easiest way to detect aphids in flax is to sample the upper portions of the plant with an insect sweep net when the crop is in full

bloom, or tap plants over a white tray or bucket. If aphids are found, fields need to be more closely inspected by randomly sampling plants. To inspect plants, lightly tap the plants on a white surface, such as a tray or the canvas of a sweep net, to dislodge the insects. Plants can be severed at the base prior to tapping if desired. Inspect a minimum of 25 plants at full bloom and 20 plants at early green boll randomly in the field to provide an accurate estimate of aphid density. Record total number of aphids and calculate average per plant.

- If control is not warranted at full bloom, aphid densities should be assessed again at the green boll stage.
  - **Economic Threshold:** Varies with crop value and control costs, but generally about 3 aphids per main stem at full bloom or 8 aphids per main stem at the green boll stage.
  - The yield loss of flax is 0.3346 bushels/acre per aphid per plant for crops sampled at full bloom and 0.1275 bushels/acre per aphid per plant for crops sampled at the green boll stage.
  - The potato aphid is highly susceptible to attack by fungi (especially in years of high rainfall and humidity in late June and July). Aphid populations sampled at full bloom that have many diseased insects should be sampled again at the early green boll stage to determine the effect of the disease on aphid densities.
- **Beet webworm**
    - **Nominal Threshold:** >10 larvae/m<sup>2</sup>

## Flax Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
<b>Wireworms</b>	No insecticides registered for the control of wireworms in flax.				
<b>Cutworms</b>	Coragen (D)	101 ml	1	A or G	>5,000
	Decis 5EC /Poleci (P)	80 ml (Decis) 162 ml (Poleci)	40	A or G	395
	Matador (P)	34 ml	7	A or G	64-110
	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5 leaf stage	A or G (see labels) G	1030
	Chlorpyrifos (OP)	0.354-0.486 L	21	A or G	205-418
<b>Sap Feeders</b>					
<b>Potato Aphid</b>	Lagon/Cygon 480 EC/ Cygon 480-AG (OP)	0.18 L	21	A or G	60-450
<b>Lygus bugs</b>	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Defoliators</b>					
<b>Grasshoppers</b>	Coragen (D)	51 - 101 ml	1	A or G	>5,000
	Decis 5EC/Poleci (P)	Decis: 40-60 ml (Ground), 60 ml (Aerial) Poleci: 81-121 ml (ground), 121 ml (air)	40	A or G	395

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Grasshoppers <i>continued</i></b>	Matador/Silencer (young grasshoppers only) (P)	25-34 ml (Ground) 34 ml (Aerial)	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Malathion 500 (OP)	0.44-0.68 L	7	A or G	4302
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
<b>Bertha Armyworm</b>	Coragen (D)	51-152 ml	1	A or G	>5,000
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Lannate (C)	89-109 g	8	A or G	30-34
	Chlorpyrifos (OP)	0.304-0.405 L	21	A or G	205-418
<b>Armyworm</b>	Chlorpyrifos (OP)	0.354-0.486 L	21	A or G	205-418
<b>Clover Cutworm</b>	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	40	A or G	395
<b>Variegated cutworm</b>	Chlorpyrifos (OP)	0.354-0.486 L	21	A or G	205-418
<b>Beet Webworm</b>	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	40	G	395

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

<sup>1</sup> Insecticide Group: D=diamides, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Forage Grasses (Timothy, etc.) Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Sap and Fluid Feeders</b>					
<b>Plant bugs</b>	Lagon/Cygon 480-AG (OP)	0.17 L	2	A or G	60-450
<b>Defoliators</b>					
<b>Grasshoppers</b>	<b>Spreadable Bran Baits</b>				
	Eco bran (C)	0.8-1.6 kg	1-2	G	N/A
	<b>Sprays</b>				
	Coragen (D) (for feed)	51-101 ml	0	G	>5,000
	Matador/Silencer (P) (on timothy)	25-34 ml	14	G	64-110
	Malathion 500 (OP)	0.69 L	7	A or G	4302
	Sevin XLR (C)	0.49-1.42 L	1-2	G	699
	Lagon/Cygon 480-AG (OP)	0.17-0.22 L (nymphs) 0.34-0.40 L (adults)	2-28	A or G	60-450
<b>European skipper (on timothy)</b>	Dipel 2X DF (M)	57-111 g	N/A	A or G	>4,000
<b>Armyworm</b>	Coragen (D)	101-152 ml	0	G	>5,000

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

<sup>1</sup> Insecticide Group: M=microbials, D=diamides, P= pyrethroids, C=carbamates, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Field Scouting in Lentils

### • Grasshoppers

- **When and How to Monitor:** Look for when monitoring fields from the early bud stage through pod development.
- **Economic Threshold:** 2 grasshoppers/m<sup>2</sup> during the flowering and podding stages, especially if two-striped grasshopper is the dominant species.

### • Lygus Bugs

- **When and How to Monitor:** Look for lygus bugs when monitoring lentils during blooming and podding by using a sweep net, making 25 180° sweeps in at least

5 randomly selected places in a field. Afternoon sampling provides more accurate estimates than morning sampling.

- **Threshold:** As a nominal threshold, insecticide treatment is recommended when 7 to 10 Lygus bugs are collected per 25 sweeps.

### • Pea aphid

- **Economic Threshold:** 30-40 aphids per 180° sweep of a 38 cm (15 inch) diameter insect net, and few natural enemies are present, and when aphid numbers do not decline over a 2-day period.

## Lentil Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Vibrance Pulses (N)	A seed treatment containing Cruiser 5FS and Vibrance Maxx RFC.			
	Cruiser 5FS (N)	17-50 ml / 100 kg seed	May be applied on-farm or by commercial seed treaters.		
	Stress Shield 600 (N)	Seed Treatment			
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
	Decis 5EC/Poleci (P)	80 ml (Decis) 162 ml (Poleci)	30	A or G	395
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5-leaf stage	A or G (see labels) G	1030
	Chlorpyrifos (for pale western cutworm only) (OP)	0.354-0.486 L	21-60	A or G	205-418
Sap and Fluid Feeders					
Lygus Bugs	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Potato Leafhopper	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Pea Aphid	Movento (TT)	75-111 ml	7	G	>2,000
	Matador/Silencer (P)	34-94 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Voliam Xpress (D+P)	91-223 ml	14	A or G	98
Defoliators					
Grasshoppers	Coragen (D)	51-101 ml	1	A or G	>5,000
	Decis 5E /Poleci (P)	Decis: 40-60 ml (ground), 60 ml (air) Poleci: 81-121 ml (ground), 121 ml (air)	30	A or G	395

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Grasshoppers continued</b>	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Malathion 500 (OP)	0.68 L	30	A or G	4302
	Malathion 85E (OP)	0.336 L	14	A or G	5,500
	Chlorpyrifos (OP)	0.235-0.486 L	21-60	A or G	205-418

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides, N=neonicotinoids, P= pyrethroids, OP=organophosphates, TT = tetronic and tetramic acid derivatives.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Mustard Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Belowground and Surface Feeders					
Root Maggots	No insecticides registered.				
Cutworms	Seed Treatments				
	Fortenza (D)	Applied combined with Helix Vibrance.			
	Foliar Sprays				
	Coragen (D)	101 ml	1	A or G	>5,000
	Matador (P)	34 ml	7	A or G	64-110
Sap Feeders					
Lygus Bugs	Decis 5EC /Poleci (P)	60 ml (Decis) 121 ml (Poleci)	7	A or G	395
	Voliam Xpress (D+P)	91 ml	7	A or G	98
Swede midge	Coragen (D)	101 ml	1	A or G	>5,000
Defoliators					
Flea beetles	Seed Treatments				
	Fortenza (D)	Applied combined with Helix Vibrance.			
	Helix Vibrance (N)	A seed treatment containing Helix Xtra and Vibrance 500FS.			
	Prosper (N)		Seed Treatment	Seed Treatment	N/A
	Visivio (N+S)	Seed treatment containing Helix Vibrance and sulfoxaflor. Visivio can also be combined with Fortenza if cutworm control is needed.			
	Gaucho Canola System (N)	0.833 L/ 100 kg of seed	N/A	Seed Treatment	N/A
	Gaucho Platinum (N)	1.667 L/ 100 kg of seed	N/A	Seed Treatment	N/A
	Sombrero (N)	0.67 – 1.33 L /100 kg seed	Seed Treatment	Seed Treatment	N/A
	Sprays				
	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
	UP-Cyde/Ship (P)	56.7 ml	30	A or G	355
	Matador/Silencer (P)	34 ml	7	A or G	64-110

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Flea beetles</b> <i>continued</i>	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
<b>Cabbage seedpod weevil</b>	Note: Yellow mustard ( <i>Sinapis alba</i> ) is resistant to cabbage seedpod weevil; oriental and brown mustards ( <i>Brassica juncea</i> ) are susceptible to feeding by cabbage seedpod weevil.				
	Matador/Silencer (adults) (P)	34 ml	7	A or G	64-110
	Decis 5 EC/Poleci (for control of adults only) (P)	80 ml (Decis) 162 ml (Poleci)	7	A or G	395
	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Diamondback Moth</b>	Coragen (D)	51 ml	1	A or G	>5,000
	Decis 5 EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Malathion 85E (OP)	0.109-0.168 L	7	A or G	5,500
<b>Bertha Armyworm</b>	Coragen (D)	51-152 ml	1	A or G	>5,000
	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Clover Cutworm</b>	Decis 5EC /Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	7	A or G	395
<b>Imported cabbageworm</b>	Coragen (D)	101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Beet webworm</b>	Decis 5EC /Poleci (P)	40-60 ml (Decis) 81-121 (Poleci)	7	G	395
<b>Cabbage looper</b>	Coragen (D)	101 ml	1	A or G	>5,000
<b>Grasshopper</b>	Coragen (D)	51-101 ml	1	A or G	>5,000
	Decis 5EC /Poleci (P)	Decis: 40-60 ml (Ground), 60 ml (Aerial) Poleci: 81-121 ml (ground), 121 ml (air)	7	A or G	395
	Matador/Silencer (young grasshoppers only) (P)	25-34 ml(Ground) 34 ml (Aerial)	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides, N= neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

**Oats – See small grain cereals**

## Grasshopper Management on Pastures, Rangelands, Hay, Headlands, and Roadsides

**Note:** Insects for biological control of weeds such as leafy spurge may be introduced and established in some areas of Manitoba and Saskatchewan. If grasshopper numbers become high, consider using control strategies and insecticides that will minimize harm to these biological control agents.

Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Reduced Agent and Area Treatments (RAATs):</b> Grasshoppers on rangelands may be managed by applying certain insecticides in treated swaths, which alternate with untreated swaths. This can reduce the cost of control and amount of insecticide used by more than 50 percent, while resulting in effective control. For more information on managing grasshoppers by this method see: <a href="http://www.grasshoppercontrol.com/_pdf/articles/raat.pdf">http://www.grasshoppercontrol.com/_pdf/articles/raat.pdf</a> .				
<b>Spreadable Bran Baits</b>				
Nolo Bait (Pastures, Rangelands)	Minimum of 0.45 kg		A or G	
Eco bran (pastures, rangelands, field borders, headlands, right-of-way, roadsides, wastelands) (C)	0.8-1.6 kg	0-2 (see label)	G	N/A
<b>Sprays</b>				
Coragen (D) (Pastures and Rangeland)	51-101 ml	0	G	>5,000
Decis 5EC /Poleci (P) (Rangeland, pastures, roadside)	40-60 ml (Decis) 81-121 ml (Poleci)	N/A	A or G (Rangeland, pastures) G (Roadsides)	395
Mako (P) (Roadsides, headlands, and summerfallow) (young grasshoppers only)	20-28 ml	Treated areas must not be grazed or cut for hay.	G	242-542
UP-Cyde (P) (Roadsides, headlands, and summerfallow) (young grasshoppers only)	33-46 ml			355
Matador (P) (Unimproved pasture, summerfallow ) (young grasshoppers only)	25-34 ml (Ground) 34 ml (Aerial)	3	A or G	64-110
Silencer (P) (Unimproved pasture) (young grasshoppers only)	25-34 ml (Ground) 34 ml (Aerial)	3	A or G	64-110
Sevin XLR (C) (Pastures, rangelands, ditchbanks, headlands)	0.49-1.42 L	0-2 (see label)	G	699
Malathion 500 (OP) (hay only)	0.69 L	7	A or G	4302
Malathion 85E (OP) (pastures, rangelands)	0.336 L	Do not apply to fields occupied by dairy animals, but may be grazed or harvested on the day of application.	G	5,500
Dibrom (OP) (Rangeland, pastures, dairy and horse paddocks)	0.21-0.33 L (young grasshoppers) 0.27-0.39 L (adult grasshoppers)	4	A or G	345
Lagon /Cygon 480 EC /Cygon 480-AG (OP) (pasture, wasteland)	0.22 L (nymphs) 0.34-0.41 L (adults)	2 days – 0.22L rate 7-28 days – 0.34-0.41L rates (see labels)	A or G	60-450
Lagon (OP) (Hay)	0.17-0.22 L	2	A or G	60-450
Chlorpyrifos (OP)	Ungrazed and unoccupied areas such as roadsides, right of way, and fence lines adjacent to barley, wheat, oats, or canola, and lentils.		A or G	205- 418

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Field Scouting in Peas (Field Peas)

- Cutworms
  - Nominal Threshold:** 2 to 3 cutworms per square metre.

### Sap Feeders

- Aphids
  - When and How to Monitor:** Look for when monitoring field peas at the beginning of flowering. Take 180° sweeps or check 10 8-inch (20 cm) plant tips at each stop.

Record total number of aphids and calculate average per sweep or plant tip.

- Economic Threshold:** If, at the beginning of flowering, there are 9 to 12 aphids per sweep or 2-3 aphids per 8-inch (20 cm) plant tip, an insecticide application when 50 percent of plants have produced some young pods will be cost-effective.

## Peas (Field Peas) Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
<b>Wireworms</b>	Cruiser Maxx Vibrance Pulses (N)	A seed treatment containing Cruiser 5FS and Vibrance Maxx RFC.			
	Cruiser 5FS (N)	17-50 ml/ 100 kg seed	May be applied on-farm or by commercial seed treaters.		
	Stress Shield 600 (N)	104ml/100kg of seed	Seed Treatment		
<b>Cutworms</b>	Coragen (D)	101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5 leaf stage	A or G (see labels) G	1030
<b>Sap and Fluid Feeders</b>					
<b>Leafhoppers</b>	Malathion 85E (OP)	0.445 L	3	A or G	5,500
<b>Pea Aphid</b>	Movento (TT)	75-111 ml	7	G	>2,000
	Matador/Silencer (P)	34-94 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Voliam Xpress (D+P)	91-223 ml	14	A or G	98
	Lannate (C)	0.206 kg	1	G	30-34
	Malathion 85E (OP)	0.445 L	3	A or G	5,500
	Lagon/Cygon 480 EC (OP)	0.11-0.15 L	3-21 (see labels)	A or G	60-450
<b>Defoliator</b>					
<b>Grasshoppers</b>	Coragen (D)	51-101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
<b>Alfalfa Looper</b>	Lannate (C)	0.206 kg	1	G	30-34
	Sevin XLR (C)	1.90 L	3	G	699
<b>Pea leaf weevil</b>	Cruiser Maxx Vibrance Pulses (N)	A seed treatment combining Cruiser 5FS and Vibrance Maxx RFC.			
	Cruiser 5FS (N)	50 or 83 ml/ 100 kg seed	On-farm application at the lower rate only.		
	Stress Shield 600 (N)	104-208 ml/ 100kg of seed	Seed Treatment		
	Matador/Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110



Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Armyworm	Coragen (D)	101-152 ml	1	A or G	>5,000

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, TT = tetrionic and tetramic acid derivatives.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Scouting and Thresholds for Insects in Potatoes

### • Aphids

- **Typical damage:** Several species of aphids are sap feeders on potato leaves. At very high numbers this sap feeding may cause plants to wilt in small localized areas of the field as “aphid holes”. The greatest injury is due to transmission of viruses. Identification and control of aphids is critical in potato seed production to prevent virus spread. In commercial production tuber quality may be reduced by net necrosis of tubers.
- **When and How to Monitor:** Aphid identification and scouting should start in early July when aphids begin to be observed in fields. Sample 25 lower canopy leaves from each of 4 areas in the field (100 leaves in total). Count potato aphids and green peach aphids on each compound leaf, using a magnifying device to identify the species.
- **Economic threshold:** For seed potatoes = 3-10 green peach aphids/100 leaves. For processing potatoes = 30-100 green peach aphids/100 leaves. There are no economic thresholds for buckthorn and potato aphids. These thresholds relate to transmission of potato leafroll virus and are not useful in determining infectivity relative to potato virus Y. No economic thresholds have been established for aphids that relate to potato virus Y transmission.

### • Leafhoppers

- **Typical damage:** the potato leafhopper injects a toxin into the plant which results in hopper burn, a yellowing and curling of the tips and margins of the leaflets, which ultimately turn brown and brittle. Damaged plants die prematurely and yield may be reduced.

- **When and How to Monitor:** Nymphs are scouted by visual inspection; sample 100 plants from 3-5 areas of the field. Count the wingless nymphs on compound leaves taken from mid canopy. Adults are sampled with a sweep net (20 sweeps per location at 5 locations for a total of 100 sweeps).
- **Economic threshold:** Nymphs-1 nymph per 10 leaves. Adults-1 leafhopper per sweep.

### • Colorado potato beetle

- **Typical damage:** Larvae feeding may cause extensive defoliation of leaves and is capable of transmitting spindle tuber virus and bacterial ring rot.
- **When and How to Monitor:** Start scouting for larvae 2 weeks after crop emergence. On field edges, count number of beetles on 20 separate plants. Record % defoliation of leaves. Repeated scouting is required since beetles have developed resistance to many insecticides and 2 generations may occur during the year.
- **Economic threshold:** Economic threshold based on beetle numbers may vary by cost of treatment, expected returns and variety. Typical thresholds are 18 larvae/ 20 plants for Russet Burbank vs 6 larvae/20 plants for Norland. Treat when defoliation exceeds 10%.

### • Potato flea beetle

- **Typical damage:** Beetle feeding causes “shot holes” in the leaves. Two generations may attack the foliage.
- **When and How to Monitor:** Estimate feeding damage on the leaf or numbers of beetles on plants.
- **Economic threshold:** Early in the season treat if greater than 10% defoliation. Later in the season (August) treat if greater than 25% defoliation or with greater than 65 beetles per plant for Norland or 300 beetles per plant for Russet Burbank.

## Potatoes\* Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
Wireworms	Titan (N)	20.8 ml per 100 kg potato seed pieces			2,000
	Nipsit Inside (N)	20.8 ml per 100 kg potato seed pieces	Seed Treatment	Seed Treatment	3,044
	Capture (P)	8.3-14.1 ml per 100 metres of row	21	G	262

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Wireworms</b> <i>continued</i>	Pyrifos 15G (OP)	0.1 kg per 100 metres of row	70	G	2,250
	Pyrinex 480 EC (OP)	0.97 L (based on 90 cm row spacing)	70	G	409
	Thimet 20-G (OP)	105g/100m in sandy or light soil 161g/100m in silt or heavy soils	Do not harvest potatoes before 90 days after planting time.	G	5.1-13.5
<b>Cutworms</b>	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5-leaf stage	A or G (see labels) G	1276
	Mako (P) UP-Cyde (P)	71 ml 115 ml	21	G	242-542 355
	Chlorpyrifos (Redbacked, black, and darksided cutworms only) (OP)	0.971 L (pre-plant) 0.486-0.971 L (seedling)	7	G	205-418
<b>Sap or Fluid Feeders</b>					
<b>Aphids</b>	<b>Seed Piece Treatments</b>				
	Actara 240SC (N)	See chart on label	N/A	Seed Treatment	>5,000
	Alias 240 SC (N)	11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Cruiser Maxx Potato Extreme (N)	20 ml /100 kg seed	NA	Seed Treatment	
	Titan (N)	10.4-20.8 ml per 100 kg potato seed pieces	N/A	Seed Treatment	2,000
	Nipsit Inside (N)	10.4-20.8 ml per 100 kg potato seed pieces	Seed Treatment	Seed Treatment	3,044
	<b>In-Furrow Application</b>				
	Minecto Duo (N, D)	178-283 g		G	>5,000
	Actara 240SC (N)	0.15-0.20 L (based on 90 cm row spacing)		G	>5,000
	Admire 240 F/ Alias 240 SC (N)	0.344-0.526 L (based on 90 cm row spacing)		G	4143-4870
	<b>Foliar Sprays</b>				
	Fulfill (PAD)	78.1 g	14	A or G	>5,000
	Beleaf 50 SG (F)	49-65 g	7	G	>2,000
	Sefina	81 ml	7	A or G	>2,000
	Superior 70 Oil	4 L	14	G	>5,000
	Movento	89-148 ml	7	A or G	>2,000
	Exirel (D)	202-607 ml	7	A or G	>5,000
	Sivanto Prime (B)	202-304 ml	7	A or G	>2,000
	Closer (S)	20-61 ml	7	A or G	>5,000
	Actara 240SC (N)	44.1 ml	7	A or G	
	Actara 25WG (N)	42.5 g	7	A or G	>5,000

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Aphids</b> <i>continued</i>	Admire 240 F/ Alias 240 SC (N)	81 ml	7	G	4143-4870
	Assail (N)	22.7-34.8 g	7	G	1,064
	Clutch (N)	28-43 g	14	A or G	4,300
	Concept (N + P)	263 ml	7	G	
	Lannate (C)	0.2185 kg	3	G	30-34
	Malathion 500 (OP)	0.56-0.80 L	3	A or G	4302
	Malathion 85E (OP)	0.297-0.445 L	3	G	5,500
	Lagon/Cygon 480 EC/ Cygon 480-AG (OP)	0.22-0.41 L	7	G	60-450
	Imidan (OP)	0.65 kg	7	G	285
	Orthene (OP)	228-334 g	21	G	1,494
<b>Potato psyllid</b>	Agri-mek	91 ml	14	G	300
	Minecto Pro (A + D)	150-271 ml	14	G	451
	Movento (TT)	89-148 ml	7	A or G	>2,000
	Voliam Xpress (D+P)	202 ml	7	A or G	98
<b>Leafhoppers</b>	<b>Seed Piece Treatments</b>				
	Actara 240SC (N)	See chart on label	N/A	Seed Treatment	>5,000
	Alias 240 SC (N)	11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Cruiser Maxx Potato Extreme (N)	20 ml/100 kg seed	NA	Seed Treatment	
	Titan (N)	10.4-20.8 ml per 100 kg potato seed pieces	N/A	Seed Treatment	2,000
	Nipsit Inside (N)	10.4-20.8 ml per 100 kg potato seed pieces	Seed Treatment	Seed Treatment	3,044
	<b>In-Furrow Application</b>				
	Minecto Duo (N, D)	178 – 283 g		G	>5,000
	Actara 240SC (N)	0.15-0.20 L (based on 90 cm row spacing)		G	>5,000
	Admire 240F/ Alias 240 SC (N)	0.344-0.526 L (based on 90 cm row spacing)	N/A	G	4143-4870
	<b>Foliar Sprays</b>				
	Sivanto Prime (B)	202-304 ml	7	A or G	>2,000
	Closer (S)	121 ml	7	A or G	>5,000
	Actara 240SC (N)	44.1 ml	7	A or G	
	Actara 25WG (N)	42.5 g	7	A or G	
	Clutch (N)	28-43 g	14	A or G	4,300
	Pounce/Perm-UP (P)	73-105 ml	1	A or G	1276
	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	1	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Leafhoppers</b> <i>continued</i>	Mako (P)	25-50 ml	7	A or G	242-542
	UP-Cyde/Ship (P)	57 ml	7	A or G	355
	Concept (N + P)	263 ml	7	G	2,500
	Lannate (C)	0.2185 kg	3	G	30-34
	Sevin XLR (C)	1.01 L	7	G	699
	Malathion 500 (OP)	0.56-0.80 L	3	A or G	1375-2800
	Malathion 85E (OP)	0.297-0.445 L	3	G	5,500
	Lagon/Cygon 480 EC/ Cygon 480-AG (OP)	0.22-0.41 L	7	G	60-450
	Dibrom (OP)	0.42 L	4	A or G	345
	Imidan (OP)	0.65 kg	7	G	285
	Orthene (OP)	228-334 g	21	G	1,494
<b>Lygus bugs</b>	Pounce/Perm-UP (P) Ambush (P)	73-105 ml 57-81 ml	1	A or G	1276
	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	1	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Mako (P)	50 ml	7	A or G	242-542
	UP-Cyde/Ship (P)	81 ml	7	A or G	355
	Sevin XLR (C)	2.12-2.59 L	7	G	699
	Concept (N + P)	263 ml	7	G	2,500
	Lagon/Cygon 480 EC (OP)	0.22-0.41 L	7	G	60-450
	Chlorpyrifos (nymphs only) (OP)	0.405 L	7	G	205-418
	Orthene (OP)	228-334 g	21	G	1,494
<b>Defoliators</b>					
<b>Colorado potato beetle</b>	Note: Colorado potato beetles have been found to be resistant to several families of insecticides in localized areas of Manitoba. Rotation between different families of insecticides is essential.				
	<b>Seed Piece Treatments</b>				
	Fortenza (D)	10-22.5 ml/ 100 kg seed	N/A	Seed Treatment	>5,000
	Verimark (D)	45 ml/100 kg of seed pieces	N/A	Seed Treatment	>5,000
	Actara 240SC (N)	See chart on label	N/A	Seed Treatment	>5,000
	Alias 240 SC (N)	11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Cruiser Maxx Potato Extreme (N)	20 ml /100 kg seed	NA	Seed Treatment	
	Titan (N)	10.4-20.8 ml per 100 kg potato seed pieces	N/A	Seed Treatment	2,000
	Nipsit Inside (N)	10.4-20.8 ml/100 kg potato seed pieces	Seed Treatment	Seed Treatment	3,044

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Colorado potato beetle <i>continued</i>	<b>In-Furrow Application</b>				
	Verimark (D)	304-405 ml (based on 90 cm row spacing)	N/A	G	>5,000
	Minecto Duo (N, D)	178-283 g		G	>5,000
	Actara 240SC (N)	0.15-0.20 L (based on 90 cm row spacing)		G	>5,000
	Admire/Alias 240 SC (N)	0.345 -0.525 L	7	G	4143-4870
	Clutch (N)	108-181 g (based on 90 cm row spacing)	14	G	4,300
	<b>Foliar Sprays</b>				
	Rimon (SB)	0.17-0.33 L	14	G	>5,000
	Entrust (Sp)	20-40 g	7	G	>5,000
	Success (Sp)	34-67 ml	7	G	>5,000
	Delegate (Sp)	65-97 g	7	A or G	>5,000
	Coragen (D)	101-202 ml	14	A or G	>5,000
	Exirel (D)	304 – 405 ml	7	A or G	>5,000
	Sivanto Prime (B)	304-405 ml	7	A or G	>2,000
	Minecto Pro (A + D)	225-271 ml	14	G	451
	Actara 240SC (N)	44.1 ml	7	A or G	
	Actara 25WG (N)	42.5 g	7	A or G	>5,000
	Admire/Alias 240 SC (N)	81 ml	7	G	4143-4870
	Assail (N)	16.2-32.4 g	7	G	1,064
	Clutch (N)	28-43 g	14	A or G	
	Pounce/Perm-UP (P) Ambush (P)	73-105 ml 57-81 ml	1	A or G	1276
	Decis 5EC/Poleci (P)	40 -60 ml (Decis) 81-121 ml (Poleci)	1	A or G	395
	Matador/Silencer (P)	34-50 ml	7	A or G	64-110
	Mako (P)	25-50 ml	7	A or G	242-542
	Up-Cyde/Ship (P)	57 ml	7	A or G	355
	Concept (N + P)	263 ml	7	G	
	Sevin XLR (C)	0.51 L	7	G	699
	Malathion 500 (OP)	0.56-0.80 L	3	A or G	4302
	Malathion 85E (OP)	0.297-0.445 L	3	G	5,500
	Dibrom (OP)	0.42 L	4	A or G	345
	Imidan (OP)	0.65 kg	7	G	285
	Chlorpyrifos (larvae only) (OP)	0.405 L	7	G	205-418
<b>Potato Flea Beetle</b>	Verimark (D)	In-furrow application: 304-405 ml (based on 90 cm row spacing)  Seed-piece treatment: 45 ml/ 100 kg of seed pieces	N/A	In-furrow application or seed-piece treatment	>5,000

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Potato Flea Beetle</b> <i>continued</i>	Admire SPT/Alias 240 SC (N)	11.79-17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Titan (N)	10.4-20.8 ml/100 kg potato seed pieces			2,000
	Nipsit Inside (N)	10.4-20.8 ml per 100 kg potato seed pieces	Seed Treatment	Seed Treatment	3,044
	Exirel (D)	202 – 405 ml	7	A or G	>5,000
	Minecto Pro (A + D)	150-271 ml	14	G	451
	Minecto Duo (N + D)	178-283 g		G	>5,000
	Admire 240 F/ Alias 240 SC(N)	Soil Application: 0.344-0.526 L (based on 90 cm row spacing)	N/A	G	4143-4870
	Pounce/Perm-UP (P) Ambush (P)	73-105 ml 57-81 ml	1	A or G	1276
	Decis 5EC/Poleci (P)	40-60 ml (Decis) 81-121 ml (Poleci)	3	A or G	395
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Mako (P)	25-50 ml	7	A or G	242-542
	UP-Cyde/Ship (P)	57 ml	7	A or G	355
	Concept (N + P)	263 ml	7	G	
	Lannate (C)	0.2185 kg	3	G	30-34
	Sevin XLR (C)	1.01 L	7	G	699
	Dibrom (OP)	0.42 L	4	A or G	345
	Imidan (OP)	0.65 kg	7	G	285
	Chlorpyrifos (OP)	0.405 L	7	G	205-418
	Orthene (OP)	228-334 g	21	G	1,494
<b>Variegated cutworm</b>	Coragen (D)	101-152 ml	1	A or G	>5,000
	Exirel (D)	202-304 ml	7	A or G	>5,000
	Minecto Pro (A + D)	150-225 ml	14	G	451
	Pounce/Perm-UP (P) Ambush (P)	73 ml 57 ml	1	G	1276
	Mako (P) UP-Cyde (P)	71 ml 115 ml	7	G	242-542 355
	Voliam Xpress (D+P)	202 ml	7	A or G	98
	Lannate (C)	0.11-0.22 kg	3	G	30-34
	Sevin XLR (C)	45 mL / 100 m of row	7	G	699
<b>Armyworm</b>	Coragen (D)	101-152 ml	1	A or G	>5,000
	Exirel (D)	202 ml	7	A or G	>5,000
	Minecto Pro (A + D)	150 ml	14	G	451
	Matador/Silencer (P)	34 ml	7	A or G	64-110

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Stem Borers</b>					
<b>European Corn Borer</b>	Rimon (SB)	0.17-0.33 L	14	G	>5,000
	Entrust (Sp)	35.4 g/acre	7	G	>5,000
	Success (Sp)	59 ml	7	G	>5,000
	Delegate (Sp)	65 g	7	A or G	>5,000
	Coragen (D)	101-152 ml	1	A or G	>5,000
	Exirel (D)	202-304 ml	7	A or G	>5,000
	Minecto Pro (A + D)	150-225 ml	14	G	451
	Matador/Silencer (P)	34 ml	7	A or G	64-110
	Pounce/Perm-UP (P) Ambush (P)	73 ml 57 ml	1	A or G	1276
	Concept (N + P)	263 ml	7	G	2,500
	Sevin XLR (C)	1.01-2.12 L	7	G	699

\*Before using any pesticide on potatoes, consult the list of **Agricultural Pesticides Approved for Use**, available from Simplot Canada and McCain Foods (Canada).

#### ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

<sup>1</sup> Insecticide Group: A = Avermectins, F=flonicamid, SB=substituted benzoylurea, Sp=spinosyns, D=diamides, S=sulfoxamines, B=butenolides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, PAD= Pyridine azomethine derivatives

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

### Quinoa Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Stem borers</b>					
<b>European Corn Borer</b>	Dipel (M)	227-453 g	N/A	A or G	>4,000

#### ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

<sup>1</sup> Insecticide Group: M=microbial

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

### Field Scouting in Rye

Information on typical damage, when and how to monitor, and economic thresholds for cutworms, aphids and armyworms in rye can be found in the section on field scouting in small grain cereals (wheat, barley, oats).

### Rye Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
<b>Wireworms</b>	Cruiser Vibrance Quattro (N)	325 ml/100 kg seed		Seed Treatment	>5,000
	Cruiser 5FS (N)	17-50 ml/100 kg seed	May be applied on-farm or by commercial seed treaters.		
<b>Cutworms</b>	Coragen (D)	101 ml	1	A or G	>5,000
	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5 leaf stage	A or G (see labels) G	1030

Sap Feeders					
Aphids	Malathion 500 (OP)	0.60-0.80 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
Defoliators					
Grasshoppers	Spreadable Bran Baits				
	Nolo Bait	Minimum of 0.45 kg		A or G	
	Eco bran (C)	0.8-1.6 kg	14	G	N/A
	Sprays				
	Coragen (D)	51-101 ml	1	A or G	>5,000
	Malathion 500 (OP)	0.69 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Lagon 480 E (OP)	0.22 L (nymphs) 0.34-0.41 L (adults)	35	A or G	60
Armyworm	Coragen (D)	101-152 ml	1	A or G	>5,000
	Delegate (Sp)	40-81 g	21	G	>5,000
	Malathion 500 (OP)	0.60-0.80 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

<sup>1</sup> Insecticide Group: N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, Sp=spinosyns

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Safflower Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Belowground and Surface Feeders					
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
Defoliators					
Grasshoppers	Coragen (D)	51-101 ml	1	A or G	>5,000
	Voliam Xpress (D+P)	91 ml	7	A or G	98
	Lagon 480 E/Cygon 480 EC/ Cygon 480-AG (OP)	0.22-0.40 L	21	A or G	60-450

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

<sup>1</sup> Insecticide Group: D=diamides, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Field Scouting in Small Grain Cereals (wheat, barley, oats)

### Belowground and Surface Feeders

#### • Cutworms

- **Typical Damage:** Notched, wilted, dead, or cut-off plants. Plants missing from rows, bare patches appearing in field.
- **When and How to Monitor:** Look for cutworms, and evidence of cutworm feeding, when monitoring in late May to mid-July. Often cutworms will be close to the cut or shriveled plants they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of the field where cutworm

damage is noticeable, check around damaged plants in a 0.25 m<sup>2</sup> (50cm x 50cm) area. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per m<sup>2</sup>. Repeat in several locations to get an accurate assessment of what the cutworm levels are.



- **Economic Threshold:** Pale western cutworm – 3-4/m<sup>2</sup>; Redbacked and army cutworm – 5-6/m<sup>2</sup>. Well established fall-seeded crops or spring seeded crops with good moisture conditions can tolerate higher numbers. Sometimes it is most economical to just treat infested patches, and not whole fields.

#### Sap Feeders

##### • Aphids

- **Typical Damage:** Visible wilting of plants, yellow patches in fields, plants are sticky.
- **When and How to Monitor:** Look for aphids when monitoring prior to the soft dough stage. While monitoring the field, using a sweep net or tapping plants over a white tray or bucket can alert you to the presence and relative abundance of aphids. If aphid levels appear concerning, a more thorough examination is needed. Count aphids on 20 randomly selected stems in each of 5 areas. Counts should be at least 50 paces apart, and observations should be made well into the center of the field. Too frequently farmers become alarmed after checking a few plants along the margins, especially near shelterbelts, where populations are high. Record the total number of aphids and calculate the average per plant.
- **Economic Threshold:** 12-15 aphids/stem prior to the soft dough stage.
  - **Cereal Aphid Manager** is a mobile app that helps growers determine aphid populations by predicting what the aphid population will be in seven days along with beneficial insect pressure on the population and suggests if insecticide application is necessary. <https://open.canada.ca/en/app/cereal-aphid-manager-mobile-app>

##### • Barley Thrips

- **When and How to Monitor:** Sampling should begin when the flag leaf is first visible and continue until the head is completely emerged from the boot. Barley thrips exhibit an edge effect; there are usually more thrips near protected field margins than other areas of the field. Most thrips can be found under the top 2 leaf sheaths. Unroll the leaf sheaths away from the stem to find the thrips.
- **Economic Threshold:** Insecticide treatments are only effective when applied before heading is complete. Treat when thrips are equal to or greater than the number calculated by: Threshold (Thrips/stem) = (Cost of Control ÷ expected \$ value per bushel)/0.4

#### Defoliators

##### • Grasshoppers

- **Typical Damage:** Black strips along margins of newly emerging crops, head clipping later in season.
- **When and How to Monitor:** Look for grasshoppers when monitoring fields from late – May through to harvest. Check along edges of crop, particularly areas adjacent to hayland, pastures and roadsides. Estimate number of hoppers/yard<sup>2</sup> (m<sup>2</sup>).
- **Economic Threshold:** 8-13 grasshoppers/m<sup>2</sup>. Early in the season, when grasshoppers are small, 18 grasshoppers/m<sup>2</sup> and visible crop damage may be a more appropriate threshold.
  - A rough estimate for an economic threshold for grasshoppers in crops to be used as greenfeed has been suggested at 20 grasshoppers/m<sup>2</sup> or higher.

##### • Armyworms

- **Typical Damage:** Leaves stripped from plants, awns chewed from heads, heads clipped.
- **When and How to Monitor:** Check the soil surface for armyworms, and the plants for feeding, when monitoring in mid- June through early-August. At each stop shake plants and carefully check soil surface for dislodged larvae. During the day larvae may be under plant trash, soil clods or in soil cracks. Check the backs of armyworms for parasite eggs.
- **Economic Threshold:** Four unparasitized larvae, smaller than 2.5 cm (1 inch) per square foot. If heads are being clipped, treat when two or more armyworms per square foot are present. For migrating Armyworms: Treat a couple of swaths ahead of the infestation in the direction of movement to form a barrier strip.

#### Seed Feeders Only

##### • Wheat Midge (wheat only)

- **When and How to Monitor:** Monitor wheat in July when crop emerges from boot stage until flowering. Check crop canopy at dusk for signs of wheat midge adult activity. At each stop, examine 10 heads. Record the number of midge adults observed on or near heads. Calculate average number of midge per head.
  - Sticky traps may be used to capture adult midge activity in wheat fields.
- **Economic Threshold:** *For yield only:* 1 adult midge per 4 to 5 heads. At this level of infestation, wheat yields will be reduced by approximately 15% if the midge is not controlled. *To maintain optimum grade:* 1 adult midge per 8 to 10 wheat heads during the susceptible stage.

## Small Grain Cereals (wheat, barley, oats) Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
<b>Wireworms</b>	Cruiser Vibrance Quattro (N)	325 ml/100 kg seed		Seed Treatment	>5,000
	Cruiser 5FS (N) (Wheat and barley only)	17-50 ml/100 kg seed	May be applied on-farm or by commercial seed treaters.		
	Nipsit Suite Cereals (N) (Wheat only)	326 ml per 100 kg seed	Seed Treatment	Seed Treatment	>5,000
	Nipsit Inside (N)	17-100 ml per 100 kg seed	Seed Treatment	Seed Treatment	3,044
	Alias 240 SC (N)	42-125 ml/ 100 kg seed		Seed Treatment	
	Sombrero 600 FS (N)	17-50 ml/100 kg seed	Seed Treatment	Seed Treatment	
	Raxil ProShield (N)	A co-pack of Raxil Pro and StressShield 600			
<b>Cutworms</b>	Coragen (D)	101 ml	1	A or G	>5,000
	Decis 5EC /Poleci (P)	80 ml (Decis) 162 ml (Poleci)	31 (oats) 40 (barley, wheat)	A or G	395
	Mako (P) (barley and wheat only)	71 ml	21	G	242-542
	UP-Cyde (P) (barley and wheat only)	115 ml			355
	Pounce/Perm-UP (P) Ambush (P)	73-158 ml 57-121 ml	Treat prior to 5-leaf stage	A or G (see labels) G	1030
	Chlorpyrifos (OP)	0.354-0.486 L	60	A or G	205-418
<b>Sap and Fluid Feeders</b>					
<b>Aphids</b>	Malathion 500 (OP)	0.60-0.8 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Cygon 480 EC/ Cygon 480-AG (OP)	0.17 L	35	A or G	60-450
<b>Thrips</b>	Lannate (C)	0.1214kg	20	A or G	30-34
	Lagon 480 E/Cygon 480 EC/ Cygon 480-AG (OP)	0.40 L	35	A or G	60-450
<b>Brown Wheat Mite</b>	Chlorpyrifos (OP)	0.253 L	60	A or G	205-418
<b>Defoliators</b>					
<b>Grasshoppers</b>	<b>Spreadable Bran Baits</b>				
	Nolo Bait	Minimum of 0.45 kg		A or G	
	Eco bran (C)	0.8-1.6kg	14 (oats, wheat) 28 (barley)	G	
	<b>Sprays</b>				
	Coragen (D)	51-101 ml	1	A or G	>5,000
	Decis 5EC/Poleci (P)	Decis: 40-60 ml (ground), 60 ml (air) Poleci: 81-121 ml (ground), 121 ml (air)	31 (oats) 40 (wheat, barley)	A or G	395

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Grasshoppers continued</b>	Mako (P) (young grasshoppers only) (wheat and barley only)	20-28 ml	30 (wheat) 45 (barley)	G	242-542
	UP-Cyde (P) (young grasshoppers only) (wheat and barley only)	33-46 ml	30 (wheat) 45 (barley)	G	355
	Matador/Silencer (P) (young grasshoppers only)	25-34 ml (ground) 34 ml (aerial)	Do not apply within 28 days of harvest or 14 days of livestock foraging	A or G	64-110
	Malathion 500 (OP)	0.68 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Chlorpyrifos (OP)	0.235-0.354 L	60	A or G	205-418
	Lagon 480 E/Cygon 480EC (OP)	nymphs-0.22 L adults-0.34-0.40 L	35	A or G	60-450
<b>Cereal Leaf Beetle</b>	A parasitoid of cereal leaf beetle, <i>Tetrastichus julis</i> , has been released and established in many areas.				
	Malathion 500 (OP)	0.22-0.45 L	7	A or G	4302
	Malathion 85E (OP)	0.435 L	7	A or G	5,500
<b>Armyworm</b>	Coragen (D)	101-152 ml	1	A or G	>5,000
	Delegate (Sp)	40-81 g	21	G	>5,000
	Matador /Silencer (P)	34 ml	Do not apply within 28 days of harvest or 14 days of livestock foraging	A or G	64-110
	Lannate (C)	0.1093-0.2185kg	20	A or G	30-34
	Malathion 500 (OP)	0.60-0.80 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Chlorpyrifos (OP)	0.354-0.486 L	60	A or G	205-418
<b>Slugs</b>	Sluggo Professional	10-20 kg		G	>5,000
<b>Pests of Seed Only</b>					
<b>Wheat Midge (a pest of wheat only)</b>	Rotate Crops – Continuous wheat cropping encourages higher wheat midge populations.				
	<b>Resistant Varieties</b> – there are many varieties of wheat resistant to feeding by wheat midge. For an updated list of varieties and information on them see: <a href="http://www.midgetolerantwheat.ca/farmers/">http://www.midgetolerantwheat.ca/farmers/</a>				
	Biological Control - A parasitoid, <i>Macroglenes penetrans</i> , was found to control an average of 32% of the wheat midge in Saskatchewan.				
	Chlorpyrifos (OP)	0.336-0.405 L	60	A or G	205-418
	Lagon 480 E/Cygon 480 EC /Cygon 480-AG (OP)	0.40 L	35	A or G	60-450
<b>Stem-Borers</b>					
<b>Hessian Fly</b>	<ul style="list-style-type: none"> <li>Never plant wheat in the same field 2 years in a row in areas where Hessian flies are a problem.</li> <li>The spring wheat cultivar Superb is partially resistant to the Hessian fly.</li> <li>Early seeded spring wheat is less susceptible to stem breakage caused by Hessian fly than later seeded wheat.</li> <li>Winter wheat planted in September will likely be free of Hessian flies.</li> </ul>				
<b>Wheat Stem Maggot</b>	Crop rotation and stubble cultivation may reduce populations.				

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Wheat stem sawfly</b>	<ul style="list-style-type: none"> <li>Solid-stem wheat varieties (such as the hard red spring wheat varieties AC Lillian, AC Abbey and AC Eatonia, and the durum varieties AAC Raymore and CDC Fortitude) can reduce damage by wheat stem sawfly larvae compared to susceptible varieties, however the level of control can vary depending on environmental conditions.</li> <li>The parasitoid <i>Bracon cephi</i> can reduce population of wheat stem sawfly in localized areas. Parasitoids of wheat stem sawfly can be conserved by increasing stubble height at harvest.</li> <li>Early swathing can reduce losses.</li> </ul>				

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: Sp=spinosyns, N= neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Scouting for insects in Soybeans

### • Cutworms

- A nominal threshold that may be used for cutworms in soybeans is 1 or more larvae per three feet of row and larvae are small (less than 2 cm), or 20% of plants cut.

### • Soybean Aphid

- Typical Damage:** Soybean aphids suck sap from soybean plants. Infested leaves may wilt or curl when infestations are large. Other symptoms may include plant stunting, reduced pod and seed count, and yellowing of leaves.
- When and How to Monitor:** Check 30 plants (6 plants in 5 areas) per field. Examine the entire plant and estimate populations of soybean aphids (counting exact numbers will not be possible or practical with higher populations). Once soybean aphid numbers reach 250 aphids per plant, scout the field frequently to determine if soybean aphid numbers are increasing. A population can stay at 250-300 aphids per plant and not cause economical yield loss. If the aphid levels are not rising above 250-300 per plant, there is a good indication that field conditions are

favouring natural enemies (such as beneficial insects and fungi) that are helping control the aphids. An app called Aphid Advisor can be used to integrate common natural enemies of soybean aphids into the management decision (<http://www.aphidapp.com/>).

- Economic Threshold:** When there are on average at least 250 aphids per plant and the population is increasing, and the plants are in the R1 (beginning bloom) to R5 (beginning seed) growth stages, treatment would be economical. This threshold gives an approximate 7-day lead time before aphid populations are expected to exceed the economic injury level (670 aphids per plant), where cost of control is equal to yield loss. When soybean aphid populations are not actively increasing above 250 aphids per plant, natural enemies are keeping up with the aphid population. Do not use an insecticide in this case, as it will kill the natural enemies which may enable the aphid population to increase above the economic injury level.

## Soybean Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
Belowground and Surface Feeders					
Wireworms	Fortenza (D)	83 ml/100 kg seed			
	Cruiser Maxx Vibrance Beans (N)	A seed treatment combining Cruiser Maxx Beans and Vibrance 500FS.			
	Cruiser 5FS (N)	83 ml/100 kg seed	May only be applied by commercial seed treaters.		
	Alias 240 SC (N)	Apply 260-520 ml per 100 kg seed			
	Sombrero 600 FS (N)	Apply 104-208 ml/100 kg seed			
	Stress Shield 600 (N)	Apply 104-208 ml/ 100 kg seed			
Seedcorn Maggot	Fortenza (D)	41.5-83 ml/100 kg seed			
	Cruiser Maxx Vibrance Beans (N)	A seed treatment combining Cruiser Maxx Beans and Vibrance 500FS.			
	Cruiser 5FS (N)	50-83 ml/ 100 kg seed	May only be applied by commercial seed treaters.		
	Alias 240 SC (N)	Apply 260-520 ml per 100 kg seed			

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Seedcorn Maggot <i>continued</i></b>	Sombrero 600 FS (N)	Apply 104-208 ml/100 kg seed			
	Stress Shield 600 (N)	Apply 104-208 ml / 100 kg seed			
<b>Cutworms</b>	Coragen (D)	101 ml	1	A or G	>5,000
	Matador/Silencer (P)	34 ml	21	A or G	64-110
<b>Sap or Fluid Feeders</b>					
<b>Soybean Aphid</b>	Sefina	81 ml	7	A or G	>2,000
	Movento (TT)	75-111 ml	21	A or G	>2,000
	Matador/Silencer (P)	34-94 ml	21	A or G	64-110
	Voliam Xpress (D+P)	91-223 ml	21	A or G	98
	Concept (N + P)	132-263 ml	20	G	
	Lagon 480 E/Cygon 480 EC/ Cygon 480-AG (OP)	0.28-0.40 L	30	A or G (Lagon 480 E, Cygon 480 EC) G only (Cygon 480-AG)	60-450
<b>Leafhoppers</b>	Lagon 480 E/Cygon 480 EC/ Cygon 480-AG (OP)	0.28-0.40 L	30	A or G (Lagon 480 E, Cygon 480 EC) G only (Cygon 480-AG)	60-450
<b>Lygus bugs</b>	Matador /Silencer (P)	34 ml	21	A or G	64-110
	Lagon 480 E/Cygon 480 EC / Cygon 480-AG (OP)	0.28-0.40 L	30	A or G (Lagon 480 E, Cygon 480 EC) G only (Cygon 480-AG)	60-450
<b>Spider mites</b>	Lagon 480 E/Cygon 480 EC / Cygon 480-AG (OP)	0.40 L	30	A or G (Lagon 480 E, Cygon 480 EC) G only (Cygon 480-AG)	60-450
<b>Defoliators</b>					
<b>Armyworms</b>	Coragen (D)	101-152 ml	1	A or G	>5,000
	Delegate (Sp)	40-81 g	28	G	>5,000
<b>Corn Earworm</b>	Coragen (D)	101-152 ml	1	A or G	>5,000
	Voliam Xpress (D+P)	202 ml	21	A or G	98
<b>Grasshoppers</b>	Coragen (D)	51-101 ml	1	A or G	>5,000
	Matador /Silencer (P)	34 ml	21	A or G	64-110

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: D=diamides, Sp=spinosyns, N= neonicotinoids, P=pyrethroids, OP=organophosphates, TT = tetronic and tetramic acid derivatives.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

## Stored Grain Insect Control-

See Insect Control in Stored Grain; after Insect Management Charts (pages 636-638).

## Summerfallow-

See grasshopper management on Pastures, etc.

## Scouting for insects in Sunflowers

### Belowground and Surface Feeders

#### • Cutworms

- **Typical Damage:** Notched, wilted, dead, and cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.
- **When and How to Monitor:** Look for cutworms, and evidence of cutworm feeding, when monitoring sunflowers in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of a field where cutworm damage is noticeable, check around damaged plants in a 0.25 m<sup>2</sup> (50 cm x 50 cm) area. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per m<sup>2</sup>. Repeat in several locations to get an accurate assessment of what the cutworm levels are.
- **Nominal Threshold:** 1 cutworm or more per square foot (30 by 30 cm) or if there is a 25 to 30% stand reduction. Sometimes it is most economical to just treat infested patches, and not whole fields.

### Defoliators

#### • Sunflower Beetle

- **Typical Damage:** Adults: Leaves of seedling plants chewed or completely destroyed late May through June, shot-holes or large areas of leaves chewed July through August. Larvae: Leaves of plants chewed or completely destroyed.
- **When and How to Monitor:** Adults: Look for when monitoring sunflower seedlings in May through June. Examine 10 plants at random at each stop. Larvae: Look for when monitoring sunflowers in July through mid-August. Examine 10 plants at random at each sampling site. Peel back leaves around growing tip and record total number of larvae found. Calculate average number per plant.
- **Economic Threshold:** Adults: 1-2/seedling; Larvae: 10 to 15/plant or 25-30% defoliation.

## Insects affecting the seeds

### Pests of Seed Only

#### • Red Sunflower Seed Weevil

- **Typical Damage:** Seeds partly or completely destroyed, exit hole in hull. Shriveled kernels, kernels completely destroyed.

- **When and How to Monitor:** Monitor fields when ray petals being to form and continue every 2 to 3 days until pollination is complete. When scouting, use the X pattern and begin counts at least 70 to 100 feet into the field to avoid margin effects. Examine 5 plants at each site for a total of 25 plants. For checking individual sunflower heads, brush the face of the head vigorously to bring the weevils to the surface, or use a commercial preparation of mosquito repellent containing diethyl toluamide (DEET) to spray the heads. This will cause the weevils to move out of hiding spots. Record total number of weevils and calculate average per head.
- **Economic Threshold:**
  - Confection Sunflowers: 1-2 weevils/plant. Control is based on a need to keep seed damage below 3 or 4% because of industry standards.
  - Oilseed sunflowers: 12-14 weevils/head.
  - The ideal plant stage to treat is when most plants in the field are at 40% pollen shed (R5.4).

#### • Banded Sunflower Moth

- **When and How to Monitor:** Look for banded sunflower moth adults when monitoring fields in the late bud (R-4) to early bloom (R5.1) plant growth stage. Count moths on 20 plants from 5 different sites for a total of 100 plants. Sampling in early evening or early morning when the moths are most active gives the most accurate counts.
- Sampling strategies based on scouting for adult moths during daylight hours, and counting eggs, have also been developed.
- **Economic Threshold:** 1 moth per 2 plants when monitoring in the early evening or early morning.
- If monitoring for eggs or adult moths during daylight hours, tables for determining economic thresholds can be found at: <http://www.ag.ndsu.edu/extensionentomology/field-crops-insect-pests/Documents/sunflower/e-823-banded-sunflower-moth>. If treatment is warranted, it should be applied at the R5.1 sunflower plant growth stage.

#### • Lygus bugs

- **Economic Threshold:** Confection - One adult lygus bug per 9 heads can result in economic losses through the reduction in seed quality. Lygus bug management should be initiated between when the inflorescence begins to open (R4) to early bloom (R5.1) stages if adult densities reach economic levels. No control is needed in oilseed sunflowers not used for human consumption.



## Sunflowers Insect Management Chart

Insect	Insecticide (and insecticide group <sup>1</sup> )	Rate/Acre	Pre-harvest interval (days)	Application (A=aerial; G=ground)	LD <sub>50</sub> (Mammalian Toxicity) <sup>2</sup>
<b>Belowground and Surface Feeders</b>					
<b>Wireworms</b>	Wireworms may sometimes damage sunflowers. Seeding sunflowers when the soil temperature is at least 8 to 10° C at 1 to 1.5 inches depth may minimize damage by wireworms.				
	Cruiser Maxx Sunflowers (N)	A seed treatment combining Cruiser 5FS with Maxim 480FS and Apron XL. Sunflower Seeds can not be treated with Cruiser Maxx Sunflowers in Canada.			
<b>Cutworms</b>	Coragen (D)	101 ml	1	A or G	>5,000
	Pounce/Perm-UP (P)	73-158 ml	Treat prior to 5-leaf stage	A or G (see labels) G	1030
	Ambush (P)	57-121 ml			
	Chlorpyrifos (OP)	0.486 L	42	G	205-418
<b>Defoliators</b>					
<b>Sunflower Beetle</b>	Cruiser Maxx Sunflowers (N)	A seed treatment combining Cruiser 5FS with Maxim 480FS and Apron XL. Sunflower Seeds cannot be treated with Cruiser Maxx Sunflowers in Canada.			
	Decis 5EC/Poleci (P)	40 ml (Decis) 81 ml (Poleci)	70	A or G	395
	Matador/Silencer (P)	17-25 ml (Ground) 34 ml (Aerial)	7	A or G	64-110
	Mako (P)	28 ml	70	A or G	242-542
	UP-Cyde/Ship (P)	40 ml	70	A or G	355
	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Grasshoppers</b>	Coragen (D)	51-101 ml	1	A or G	>5,000
	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Pests of Head and Seeds</b>					
<b>Lygus bugs</b>	<b>Note:</b> Because the most appropriate timing of insecticides to control Lygus bugs in sunflowers includes flowering stages, steps to minimize harm to pollinators should be taken (see page 597-598) and insecticides should only be used when economic thresholds are exceeded.				
	Matador	34 ml	7	A or G	64-110
	Voliam Xpress (D+P)	91 ml	7	A or G	98
<b>Sunflower Seed Weevil</b>	Early planting helps to reduce seed damage by sunflower seed weevils.				
	<b>Note:</b> Because the most appropriate timing of insecticides to control sunflower seed weevils is during the flowering stage, steps to minimize harm to pollinators should be taken (see page 597-598) and insecticides should only be used when economic thresholds are exceeded.				
	Mako (P)	28 ml	70	A or G	242-542
	UP-Cyde/Ship (P)	40 ml	70	A or G	355
	Chlorpyrifos (OP)	0.486 L	42	A or G	272/205
<b>Banded sunflower moth</b>	Late planting may provide some control.				
	<b>Note:</b> Because the most appropriate timing of insecticides to control banded sunflower moth includes flowering stages, steps to minimize harm to pollinators should be taken (see page 597-598) and insecticides should only be used when economic thresholds are exceeded.				
	Coragen (D)	101-152 ml	1	A or G	>5,000
<b>Sunflower Moth</b>	Dipel 2X DF (young larvae) (M)	127-253 g	N/A	A or G	> 4,000
<b>Sunflower Midge</b>	Crop rotation: If a sunflower midge infestation is anticipated, new fields should be established away from fields damaged the previous season.				

**ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.**

<sup>1</sup> Insecticide Group: M=microbial, D=diamides, N=Neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates.

<sup>2</sup> LD<sub>50</sub> values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD<sub>50</sub>.

**Sweet Clover-** See clovers (sweet, red, alsike)

**Timothy-**

See forage grasses

**Wheat-**

See small grain cereals

## Insect Control in Stored Grain

### Prevention

**Clean in and around storage facilities.** Grain storage facilities, and the area around storage facilities, should be cleaned thoroughly prior to storing grain.

**Clean equipment used to move grain.** Grain left in equipment throughout the summer months can result in new grain that is being placed into storage becoming infested. Combines, truck beds, grain wagons, augers and other equipment used to move grain should be cleaned of grain residue. Other potential sources of grain infesting insects include livestock feeds, old seed bags, spilled grain, etc.

**Inspect grain storage facilities** for signs of deterioration, especially for leaks or holes through which insects or rodents can gain access to the stored grain. Moving and storing the grain in clean facilities will eliminate one source of infestation. However, grain stored for long periods of time still has the potential for renewed infestations.

**Treating storage facilities.** Depending on the commodity to be stored, storage facilities may additionally be sprayed or dusted, if needed, with a recommended insecticide before storing grain in the bin (e.g. malathion, diatomaceous earth or cyfluthrin – refer to product labels for details). **Note:** some commodities, such as canola, flax and sunflowers, should not be stored in facilities recently treated with malathion or cyfluthrin (*Tempo*).

**Dry and Cool Grain.** Ideally, the grain should be dry before being put into storage, and cooled as quickly as possible. For long-term storage, producers are urged to lower the grain temperature below 15°C as soon as possible after the grain is placed in storage. At 15°C the stored product insects stop laying eggs and development stops. Aeration systems used during the night immediately after harvest should have the grain below 15°C in about 2 weeks. Grain that is not moved or aerated after harvest can remain warm enough to allow insects to survive the winter. Convection currents arising from this warm air can also promote condensation, sprouting (heating) and mould growth in unmanaged grain. These conditions are very attractive to stored product pests and support their development.

Once the grain mass is cooled to the desired temperature, fans should be sealed to prevent unwanted air migration through the mass that could result in early grain mass warm-up. Cold grain has a longer storage life than warm grain.

Note, however, that under cool grain temperatures, insect movement is reduced to the point that some insecticides may not be effective.

### Monitoring for Insects

**Bin probe and Sieves:** Stored grain insects can be monitored by taking grain samples with a bin probe, sieving the grain, and looking in the dockage for insects.

**Probe Traps:** Another means of detecting insects in stored grain is through placing probe traps (such as the WB PROBE II Trap from Trece) in the grain and monitoring them. Often the first indication of an infestation will be found near the top centre of a storage bin, and therefore, this is where traps should be placed. Monitoring should take place once every 7-10 days during the onset of storage (first 60 days) and then the frequency of monitoring may be adjusted.

### Identifying insects in stored grain

Correct identification of insects found in stored grain is important in determining the most appropriate control methods. Some of the insects found in stored grain feed directly on the grain, referred to as primary pests, while others feed on grain that is damaged or going out of condition, referred to as secondary pests.

### Primary insect pests

Insects that feed directly on the grain include rusty grain beetles, red flour beetles, and sawtoothed grain beetles.

The **rusty grain beetle** is the most common stored product insect. Heavy infestations of this insect cause grain to heat and spoil.

The **red flour beetle** is another common insect pest of stored grain in the prairies. Red flour beetles cannot feed on undamaged, dry seed with less than 12% moisture content. They prefer grain dust, broken grain and milled stocks.

**Sawtoothed grain beetles** are more common in stored oats than in stored wheat and barley.

### Secondary insect pests:

Insects that feed on fungus in the grain bin or stored grain that is damaged include the foreign grain beetle, hairy fungus beetle, psocids, and grain mites.

**Foreign grain beetles** resemble the rusty grain beetle, but can be distinguished from it by club-shaped antennae. Also, when placed in a glass jar, foreign grain beetles will climb up the sides, while rusty grain beetles cannot. While foreign grain beetle is considered a fungus feeder, they will feed on grain if the moisture content is in the high end of the acceptable range (eg. 14.5% mc wheat).

**Grain mites** are whitish, about 0.2 to 0.5 mm long, and can be hard to see with the naked eye. About eight kinds of mites are common in farm granaries and elevators.



**Psocids** are soft-bodied insects, about 1 mm long, with long antennae relative to the body size.

Fungus feeding insects and mites cannot survive in dry grain. Chemical control is not necessary for fungus feeding pests in stored grain. Practices that result in the grain drying may be all that is needed to control such pests.

Information to help identify insect pests of stored grain can be found at: <http://www.grainscanada.gc.ca/storage-entrepose/keys-cles/sgp-irg/sgp-irg-eng.htm>.

## Control Techniques:

*The Canada Grain Act* states that an elevator operator may reject any grain if the operator has reason to believe it is infested or contaminated. Outlined below are some control techniques and when and how these techniques can be best used.

## Cold Temperatures

Rusty grain beetles are cold hardy and can survive subzero temperatures. Rusty grain beetles and other stored grain insects can be killed by reducing core grain temperatures as follows:

## Phostoxin

**Company:** Degesch America Inc. (Phostoxin); PCP#15736 (Round tablets).

**Formulation:** 55% aluminum phosphide.

Formulation	Primary Use	Container Size
Phostoxin tablets (3g each)	On the farm or country elevator	500 tablets
Phostoxin pellets (0.6g each)	In terminals	2500 pellets
Phostoxin tablets prepac	Containers	4 strips of 33 tablets to a pouch

**Insects and other pests controlled:** Rusty grain beetle, red flour beetle, saw-toothed grain beetle, granary weevil, Indian meal moth, yellow mealworm, lesser grain borer, nematodes, mice and rodents.

**Approved for use on the following stored grains:** Barley, corn, dried peas, lentils, oats, rice, rye, soybeans, sunflower seeds, triticale and wheat.

**Restricted Product:** The use and sale of Aluminum Phosphide (Phostoxin) is restricted to licensed pesticide applicators possessing a valid fumigation license (Saskatchewan) or stored agricultural products license (Manitoba).

Phostoxin can only be used in conjunction with a detailed fumigation management plan.

**Rate and Minimum Exposure Period:** Refer to labels to determine rate. For grain bins a dosage of 250-500 tablets (or 880-2560 pellets) per 100 m<sup>3</sup> of bin space being treated (not volume of grain) is recommended. It is important to ensure that bins are relatively secure. It is not advisable to use phosphine products in bins that are leaky or not well sealed.

## Time Required to Kill Insects at Various Grain Temperatures

Grain Temperature	Time required to kill insects
-5°C	12 weeks
-10°C	8 weeks
-15°C	4 weeks
-20°C	1 week

Cooling the grain, through aeration or moving the grain several times during mid-winter, should provide effective control of rusty grain beetles.

## Moving Grain

Moving grain using cyclone-based pneumatic conveyors (grain vacs) at about 200 bushels per hour has been shown to be an effective means of controlling insects in stored grain. However, moving too large a volume of grain at a time using a pneumatic conveyor results in the grain protecting the insects and reduces kill of stored grain insects. Loading the grain using a pneumatic grain conveyor removes insects from grain being delivered to elevators.

The following table may be used as a guide to determine the minimum length of exposure period to phostoxin at the indicated temperatures:

Temperature	Exposure Period
Below 5°C (40°F)	Do not fumigate
5°C-12°C (40°-53°F)	10 days
13°-15°C (54°-59°F)	5 days
16°-20°C (60°-68°F)	4 days
above 20°C (68°F)	3 days

Phostoxin can not be used when the grain temperature is below 5°C as the tablets release the gas too slowly. Very dry grain will also slow the release of the gas from the pellets. A shortened exposure period cannot be compensated for by increased dosage. Also ensure that storage is well ventilated for at least 24 hours after the required time for fumigation.

## Protect-It, Insecto

**Company:** Hedley Technologies Ltd. (Protect-It) PCP#24259; Natural Insecto Products Inc. (Insecto) PCP#22489

**Formulation:** *Protect-It:* 74% Silicon dioxide, 10% Silica aerogel; *Insecto:* 90 percent Silicon dioxide

**Insects controlled:** *Beetles* - Rusty grain beetle, red flour beetle, rice weevil, granary weevil. *Moths* - Angoumois grain moth, Mediterranean flour moth, Indian meal moth.

**Approved for use on the following stored products:** Feed grains, seed, stored grains, wheat, barley, buckwheat, corn, oats, rye, flax, peas, soybeans and sorghum. Also registered for structural treatment of empty grain storage and transportation containers.

**How it works:** Diatomaceous earth damages the cuticle of the insect, reducing the insect's ability to retain moisture. The insect eventually dies from dehydration.

**Rate, for empty storage structures:** Use a dust blower or aeration fan to get diatomaceous earth into the cracks, crevices and void spaces of the structure being treated. Dust areas at a rate of 1 kg per 200 square metres (5 g/m<sup>2</sup>).

### Rate, while grain is being placed into storage:

- **Protect-It:** The application rate for Protect-It varies by crop and insect species, ranging from 100 g/tonne for control of rusty grain beetle in wheat to 1000 g/tonne for red flour beetle in corn. Refer to the label for details.
- **Insecto:** Apply to grain at the time of storage at a rate of 0.5 to 1 kg per metric ton of grain (500-1000 ppm).

**Precautions:** The application of DE will lower the test weight measurement of the grain, but usually not to the point of downgrading. If test weight loss is excessive, the grain can be diluted with untreated grain. DE is non-toxic to humans and animals.

## Malathion 500 (IPCO)

Insect	Rate	Note
Rusty grain beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer (empty grain bins)	250-300 ml/5 L of water on 100 m <sup>2</sup>	May be used within 1 day of grain storage

## Malathion 85E (Loveland Products Canada)

Insect	Rate	Note
Rusty grain beetle, red flour beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer, flat grain beetles, rice weevils (empty grain storage facilities)	Mix 490 ml in 15 L of water. Apply 5 L of mixture on 100 m <sup>2</sup>	Wait until spray has thoroughly dried before storing grain in treated areas.

## Tempo 20 WP

**Company:** Bayer PCP#25673

**Formulation:** 20% cyfluthrin. Tempo is a group 3 (pyrethroid) insecticide.

## Malathion Grain Protector Dust

**Company:** Loveland Products Canada (PCP#15896)

**Formulation:** 2% malathion

**Insects controlled:** confused flour beetles, flat grain beetles, granary weevil, Indian meal moth, lesser grain borer, rusty grain beetle and sawtoothed grain beetle.

**Approved for use on the following stored grains:** Wheat, rye, barley and oats as stored grains.

Malathion Grain Dust can be applied to grain as it is being loaded into a bin or being turned by adding gradually at the grain auger. It can also be used to control surface infestations by applying to the grain surface and raking in to 15 cm depth of the grain. Malathion controls insects by ingestion and contact and insects must be active for it to be effective.

### Rate:

Crop	Rate-g/1000 kg (tonne) grain
Wheat	415
Rye	450
Barley	520
Oats	735

Do not apply to grain within 7 days of sale.

Be aware that the Canadian Grain Commission allows only 8 ppm of malathion residues in stored grains.

## Malathion 500, Malathion 85E

Refer to labels for these products for insect and mite control in empty grain bins, grain elevators, grain box cars and flour mills.

**Note** – Some commodities, such as canola, should not be stored in facilities recently treated with malathion.

**Application:** Tempo can be used to control insects in grain storage facilities, truck beds and other areas where grain is stored *before filling these areas with grain*. Cleaning of all areas prior to use of Tempo 20 WP insecticide will increase levels of control. See the insecticide label for specific mixing instructions.

# Insecticide Product Pages

For rates and pre-harvest intervals for insecticides, see the insect management charts on pp. 599-634.

## Actara

## Insecticide Group 4A

Refer to page 600

### Company:

Syngenta Canada

### Formulations:

*Actara 240SC* (PCP#28407): 240 g/L thiamethoxam formulated as a soluble concentrate.

- Container size - 2 X 2.04 L

*Actara 25WG* (PCP#28408): 25% thiamethoxam formulated as a water dispersible granule.

- Container size - 4 X 850 g

### Insects Controlled and Registered Crops:

Crop	Insect
Potato	Colorado potato beetle, aphids, potato leafhopper

### Application:

#### *Actara 240SC*

- **Soil application:** Apply as an in-furrow spray during planting to allow the insecticide to be absorbed by plant roots. For 90 cm row spacing, apply 151 to 196 mL/acre. Use the higher rate for extended control. DO NOT follow a soil application with a foliar application.
- **Potato seed piece treatment:** Choose the appropriate rate from the chart on label, based on seeding rate. Apply only in areas with adequate ventilation or in areas that are equipped to remove mist or dust. Best results are obtained if potatoes are planted immediately after *Actara 240SC* is applied to seed. When transporting cut and treated seed ensure the seed is covered. DO NOT apply a subsequent treatment of in-furrow or foliar application of thiamethoxam or other Group 4 insecticide following seed piece treatment with *Actara 240SC*.
- **Foliar application:** *Actara* may be applied by ground or air. For ground application use a minimum of 40 L / ac unless otherwise indicated on label. A maximum of 2 foliar applications of *Actara* may be made per season. DO NOT exceed a total of 88 g/acre. Allow at least 7 days between applications. DO NOT use a foliar application of *Actara* following in-furrow or soil application of *Actara*.

### How it Works:

*Actara* is a systemic (taken up into the plant foliage after application), neonicotinoid insecticide.

### Restrictions:

- **Rainfastness:** *Actara* is rainfast once spray has dried on treated plants.
- **Pre-harvest Interval:** DO NOT harvest within 7 days of application.
- **Re-Entry:** DO NOT re-enter treated areas for 12 hours after foliar application.
- **Re-cropping:** No restrictions following the harvest of sorghum, wheat, barley, canola, potatoes or cover crops. For all other crops 120 day plant-back interval is required.
- **Tank mix:** Potatoes - *Actara 240SC* can be mixed with *Quadris® Flowable* fungicide and *Ridomil® Gold 480SL* fungicide (or *Ridomil Gold 480EC* fungicide).
- **Buffer Zones:** Buffer zones are required for the protection of terrestrial and freshwater habitats. Refer to specific label for buffer zones required.

### Environmental Hazards:

**Bees:** *Actara* is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. To minimize exposure to bees from foliar application, DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic Organisms:** Toxic to aquatic organisms. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecasted.

**Others:** Toxic to certain beneficial insects.

### Hazard Rating:



*Actara 240SC:* Caution – Poison

*Actara 25WG:* Caution – Eye and skin irritant

For an explanation of the symbols used here see pages 7 and 8.

# Agri-Mek SC

Insecticide Group

6

Refer to page 600

## Company:

Syngenta Canada (PCP#31607)

## Formulation:

84 g/L abamectin formulated as a suspension concentrate.

- Container sizes - 2 L containers

## Insects Controlled and Registered Crops:

Crop	Insect
Potatoes	Potato psyllid and spider mites

## Application:

### Agri-Mek

- Can be applied by ground only. Apply when potato psyllids and spider mites first appear. Make first application after approximately 50 per cent of the egg masses of Colorado potato beetle have hatched and larvae are present. If two applications are required, limit them to a single Colorado potato beetle generation per crop. Apply in sufficient solution to ensure thorough coverage of plant foliage. Avoid application when heavy rain is forecast.

## How it Works:

*Agri-Mek* interferes with neuro-transmission in insects and mites resulting in paralysis, cessation of feeding and eventually death of the pest.

## Restrictions:

- DO NOT apply by air.
- **Buffer zone:** DO NOT apply within 30 metres of freshwater habitats.
- Allow 7 days between application.
- DO NOT make more than 2 applications per growing season. DO NOT apply more than 800 mL / acre of Agri-Mek per season. DO NOT graze treated crop.
- DO NOT enter or allow entry into treated areas for 12 hours following application.
- **Pre-harvest interval** - 14 days.
- **Storage:** Store product in original container only, away from food or feed. Keep container closed.

## Precautions:

DO NOT contaminate water, food or feed by storage or disposal.

If *Agri-Mek* is to be used on a commodity that may be exported to the U.S. and you require information on acceptable residue levels in the U.S., visit CropLife Canada's website at [www.croplife.ca](http://www.croplife.ca) or contact Syngenta Canada Inc. at 1-877-964-3682.

## Environmental Hazards:

**Bees:** *Agri-Mek* is highly toxic to bees exposed to direct treatment or residues on flowering crops and weeds. DO NOT apply this product or allow drift to flowering crops and weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms and wildlife. A buffer zone of 30 metres is required between the last point of direct application and the closest downwind end of sensitive freshwater habitats. Avoid application when heavy rain is forecast.

## Hazard Rating:



Warning – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Assail

Insecticide Group  
4A

Refer to page 600

## Company:

Nippon Soda Company Ltd. (PCP#27128)  
Distributed by Engage Agro Corp.

## Formulation:

Acetamiprid formulated as a wettable powder-70% by weight

## Insects Controlled and Registered Crops:

Crop	Insect
Alfalfa (seed production only)	Alfalfa plant bug, Lygus bugs (suppression only)
Potato	Colorado potato beetle, aphids

## Application:

### Assail

- Ground application only. DO NOT apply by air.
- Apply with a minimum finished spray volume of 80 litres per acre. For best results uniform spray coverage of the host plants is important.
- Begin application when insect levels reach economic thresholds. Use higher rates for heavy infestations, dense foliage or for adult stages of the Colorado potato beetle. Residual control will depend on environmental factors, plant growth, application rate and level of insect infestation.

## How it Works:

*Assail* is a neonicotinoid insecticide that works by contact or ingestion. It has an anti-feedant effect that can prevent pest damage to host plants prior to the death of the insect. This product rapidly degrades in the soil with no carryover effects.

## Restrictions:

- DO NOT make more than 2 applications per year per crop. DO NOT apply more than once every 7 days.
- DO NOT exceed a total of 48 g active ingredient (68.8 g product) per acre per season. DO NOT apply less than 7 days prior to harvest (Pre-harvest interval).
- **Buffer Zones:** An untreated buffer zone between the last spray swath and the edge of aquatic systems (such as rivers, streams, lakes, and other water bodies) must be established. For groundboom sprayers – 20 metres. DO NOT apply acetamiprid directly to water or to areas where surface water is present. Buffer zone required for sensitive terrestrial areas (grasslands, forested areas, shelterbelts, woodlots, hedgerow, rangelands) – 2 metres.
- **Re-entry Interval:** DO NOT re-enter treated areas for a period of 12 hours after application.

## Precautions:

If this product is to be applied to a product destined for export to the United States, information on acceptable residue levels are available at [www.croplife.ca](http://www.croplife.ca).

**Storage:** DO NOT store in or around the home. Store unused product in a cool, ventilated, dry, locked area. DO NOT allow prolonged storage in areas where temperatures frequently exceed 46 degrees C.

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment, drift, or residues in flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application when heavy rain is forecast.

## Hazard Rating:



Warning – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Beleaf 50 SG

Insecticide Group

29

Refer to page 600

## Company:

FMC Corporation (PCP#29796)

## Formulation:

50% flonicamid formulated as a water soluble granule.

- Container size - 1 to 100 kg

## Insects Controlled and Registered Crops:

Crop	Insect
Dry beans, chickpeas, faba beans	Aphids, Lygus bugs
Alfalfa, clover, vetch	Aphids, Lygus bugs
Potato	Aphids

## Application:

### *Beleaf*

- DO NOT apply by air.
- Ensure the spray system is clean and free of residues from previous applications. Fill the tank half full with clean water. Ensure agitation system is operating and sufficient to provide uniform spray mixing during application and until the spray tank has been emptied. Complete filling to the desired solution volume.
- Thorough spray coverage of plant foliage is essential for optimum control. Apply in sufficient water volumes to ensure good coverage - Use a minimum of 38 litres per acre of water. Rates and finished spray volumes should be increased under extreme pest populations or dense plant foliage.
- Scout fields and reapply if necessary.

## How it Works:

Flonicamid insecticide is a member of Insecticide Group 29 and controls target pests by contact and ingestion provoking rapid and irreversible feeding cessation.

## Restrictions:

- Allow a minimum of 7 days between applications. DO NOT make more than 3 applications per year.
- **Pre-harvest Interval:** Forage, fodder, straw and hay; peas and beans – DO NOT apply within 7 days of harvest.
- DO NOT apply more than apply more than 64 grams per acre of *Beleaf* per application. DO NOT apply more than 192 grams per acre of *Beleaf* per season.
- DO NOT use *Beleaf* in home gardens.
- **Re-cropping:** There are no plant-back restrictions for potatoes. All other crops may be planted 30 days after the last application of *Beleaf*.

## Precautions:

Avoid overnight storage of spray mixture. Prepare only enough spray mixture required for immediate application. DO NOT use liquid fertilizer as a carrier for *Beleaf* insecticide.

*Beleaf* insecticide should not be used with spray adjuvants. Avoid application when heavy rain is forecast.

DO NOT enter or allow entry into treated areas for 12 hours after application.

**Storage:** Store product in original container, in a secured, dry place separate from other pesticides, fertilizer, food or feed.

If this product is to be applied to a commodity destined for export to the United States, visit Crop Life Canada's website [www.croplife.ca](http://www.croplife.ca) for information on acceptable residue limits.

## Environmental Hazards:

Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.

**Hazard Rating:**

Caution – Eye irritant

For an explanation of the symbol used here see pages 7 and 8.

# Capture 240 EC

**Insecticide Group  
3A***Refer to page 600***Company:**

FMC Corporation (PCP#31396)

**Formulation:**

240 g/L bifenthrin formulated as an emulsifiable concentrate.

- Container size - 3.78 L jug

**Insects Controlled and Registered Crops:**

Crop	Insect
Potato	Wireworms (at plant)

**Application:*****Capture 240 EC***

- Ground application only. *Capture 240EC* may be applied once per year in potato as an in-furrow planting time treatment for the control of wireworms. Apply *Capture 240EC* as an in-furrow spray or T-band spray at seeding time. Avoid application when heavy rain is forecast.

**How it Works:**

Bifenthrin is a non-systemic, synthetic pyrethroid which works by contact and ingestion.

**Restrictions:**

- DO NOT apply by air.
- **Re-entry interval (REI):** DO NOT enter or allow worker entry into treated areas for 12 hours.
- **Pre-harvest Interval:** Potato – Do not apply within 21 days of harvest.
- **Storage:** Store in original container in cool, dry, locked, well-ventilated location.

**Precautions:**

Avoid spraying during conditions of low humidity and/or high temperature. DO NOT make applications during temperature inversions.

**Environmental Hazards:****Bees:** Toxic to bees. Bees may be exposed through direct spray, spray drift, and residues on leaves, pollen and nectar in flowering crops and weeds.**Aquatic organisms:** Toxic to aquatic organisms.**Others:** Toxic to small wild mammals. Toxic to certain beneficial insects.**Hazard Rating:**

Danger – Poison, Potential skin sensitizer

For an explanation of the symbol used here see pages 7 and 8.

# Chlorpyrifos

Insecticide Group  
1B

Refer to page 600

## Company:

Corteva Agriscience (*Lorsban 4E* – PCP#14879; *Lorsban NT* – PCP#29650)

ADAMA Canada (*Pyrinex 480EC* – PCP#23705)

FMC Corporation (*Nufos 4E* – PCP#25831)

IPCO (*Citadel 480EC* – PCP#27479)

Loveland Products Canada (*Pyrifos 15G* – PCP#24648; *Warhawk 480EC* – PCP#29984)

Sharda CropChem Canada (*Sharda Chlorpyrifos 480 EC* – PCP#32768)

Farmers of North America (*MPOWER Krypton* – PCP#30985)

Different trade names refer to different companies. Note that products may have different label recommendations.

Check your label for more information.

## Formulations:

*Citadel*, *Nufos 4E*, *Lorsban 4E*, *MPOWER Krypton*, *Pyrinex*, *Warhawk*, and *Sharda chlorpyrifos 480 EC* – 480 g/L chlorpyrifos and *Lorsban NT* – 452 g/L formulated as an emulsifiable concentrate.

- Container sizes (Note that container sizes may vary between products) – 10 L jug, 115 L returnable container, 208 L drum.

*Pyrifos* – 15% chlorpyrifos formulated as a granule

## Insects Controlled and Registered Crops:

Crop	Insect
Barley, Oats, Wheat	Army, darksided, pale western and red-backed cutworms, armyworms, grasshoppers, brown wheat mite
Wheat only	Wheat midge
Canola	Darksided, redbacked, variegated, pale western, and army cutworms; bertha armyworm, alfalfa looper, armyworm, diamondback moth larvae, grasshoppers, lygus bug
Flax	Darksided, redbacked, variegated, pale western, and army cutworms, armyworm, bertha armyworm
Lentils	Pale western cutworm, grasshoppers
Sunflowers	Redbacked, pale western and army cutworms, sunflower seed weevil (except for <i>Pyrinex</i> and <i>Citadel</i> )
Corn	Darksided, black and redbacked cutworms
Potato	Wireworms (in-furrow at planting – <i>Pyrinex</i> and <i>Pyrifos</i> only), Colorado potato beetle (larvae), potato flea beetle, tarnished plant bug, redbacked cutworm, black cutworm, darksided cutworm

## Application:

### *Chlorpyrifos*

- May be applied by air or ground equipment **except** for the following. Ground application only for redbacked cutworm control in corn and sunflower. Ground application only for potatoes.
- *Pyrifos 15G* may be applied by ground only and is to be applied in furrow at planting. Refer to label for specific rates with respect to row spacing.
- Uniform coverage of the crop is essential in aerial applications. Apply when insects exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for heavy infestations, mature insects, heavy crop canopy, or under dry soil conditions.

## How it Works:

*Chlorpyrifos* is a broad spectrum, non-systemic insecticide and works by contact, ingestion and vapour action (inhalation).

## Effects of Weather:

Avoid application under hot temperatures. Best results will be obtained for wheat midge and cutworms when application is made in evening (after 7 p.m.) or morning (before 8 a.m.). DO NOT apply to plants under extreme drought stress or crop injury may occur.



## Tank mixes:

Various chlorpyrifos labels differ. Contact the specific company for supported tank mixes.

## Restrictions:

- **Grazing:** Treated cereals grown for cover crop should not be used for human or animal consumption if treated within 60 days of harvest.
- **Storage:** Combustible. DO NOT store near heat or flame. DO NOT store with food, feed, drugs or clothing.
- **Wheat, barley, oats, canola, corn, flax, lentil, sunflower, potatoes** – DO NOT make more than 1 application per season.
- **Buffer zones around sensitive areas:** For all aerial applications, a buffer zone of 100 metres is required for the protection of aquatic habitats.
  - DO NOT apply directly to water or where runoff could occur to adjacent aquatic sites.

## Precautions:

May be fatal if swallowed. Causes substantial but temporary eye injury. Harmful if absorbed through skin. May cause skin or eye irritation. Wear protective clothing, impervious gloves and goggles. Wash thoroughly with soap and water after handling and applying. Immediately remove contaminated clothing and wash before re-use. DO NOT apply or allow to drift on to workers or other persons.

In lentil, if applied according to label rates early in the crop year at vegetative stage or during flowering there is no need for MRL concerns. In cases of later application during pod development or seed fill to maturity (e.g. late season grasshopper control), consult with your exporter / processor.

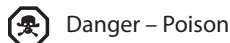
## Environmental Hazards:

Chlorpyrifos has a high acute mammalian toxicity. Very toxic to bees, fish, birds, aquatic organisms and other wildlife.

**Bees:** Toxic to bees exposed to direct treatment, drift, or residues on blooming plants. Do not use on flowering crops or weeds. Applicators should inform local bee keepers prior to application if hives are in adjacent fields.

**Aquatic organisms:** Very toxic to fish and aquatic organisms. Drift and runoff from treated areas may be hazardous to aquatic organisms in adjacent aquatic sites. Avoid application of this product when heavy rain is forecast.

## Hazard Rating:



Danger – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Closer

Insecticide Group  
4C

Refer to page 600

## Company:

Corteva Agriscience (PCP#30826)

## Formulation:

240 g/L sulfoxaflor formulated as a suspension concentrate.

- Container sizes - case contains 12 X 1L containers

## Insects Controlled and Registered Crops:

Crop	Insect
Corn	Aphids
Potato	Aphids

## Application:

*Closer*

- May be applied by ground or air in corn and potatoes. Use low rates for light infestations of target pests and higher rates for moderate to heavy infestations. Apply in sufficient in sufficient solution to ensure thorough coverage of plant foliage. For ground application use a minimum spray volume of 40 L/acre. For aerial application use a minimum spray volume of 12 L/acre.

## How it Works:

*Closer* is a systemic (within the plant) insecticide that causes blockage in the insect's nervous system resulting in paralysis and eventually death, through contact or stomach action.

## Restrictions:

- DO NOT make more than 2 applications per growing season. DO NOT apply more than 121 mL/acre per growing season. DO NOT make applications less than 7 days apart. DO NOT apply within 7 days of harvest.
- DO NOT apply through any irrigation system.
- Plant back interval – A period of 30 days must elapse between treatment of primary crops and the planting of secondary crops not on the *Closer* label.
- **Re-entry Interval:** 12 hours.
- **Storage:** Store product in original container only, away from food or feed. Keep container closed.

## Precautions:

DO NOT store or ship with food, feeds, drugs or clothing.

DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

If *Closer* is to be used on a commodity that may be exported to the U.S. and you require information on acceptable residue levels in the U.S., visit CropLife Canada's website at [www.croplife.ca](http://www.croplife.ca).

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. Apply early in the morning or late in the evening when bees are not active.

**Aquatic organisms:** The use of this chemical may result in contamination of groundwater, particularly in areas where soil is permeable (e.g. sandy soil) and/or the depth to the water table is shallow. Avoid application of *Closer* if heavy rain is forecast.

**Others:** Toxic to certain beneficial insects.

## Hazard Rating:

None specified

# Clutch

## Insecticide Group 4A

Refer to page 600

## Company:

Valent Canada Inc. (PCP#29382)

Distributed by Nufarm Agriculture Inc.

## Formulation:

50% clothianidin formulated as a water dispersible granule

## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Colorado potato beetle, aphids, leafhoppers

## Application:

### *Clutch*

- **In-furrow application:** Apply as a narrow band in-furrow at planting. For best results, direct spray on the seed pieces or seed potatoes. Use sufficient water volume to ensure uniform coverage and optimal uptake. Use higher rate when extended control is needed. DO NOT apply *Clutch* more than once per season as an in furrow treatment.
- **Foliar application:** May be applied by air or ground. Maximum of 3 foliar applications may be made per crop per season. Application intervals must be at least 10 days apart and must be rotated with an insecticide from a different chemical family. Use sufficient water volume to ensure uniform coverage. Use higher rate when insect populations are high.

## How it Works:

Clothianidin is in the neonicotinoid class of insecticides and works by contact or ingestion, with systemic properties that provide residual control. Residual control will depend on environmental factors, plant growth, dosage rate and level of insect infestation.

## Restrictions:

- DO NOT follow a soil or in furrow application of *Clutch* with a foliar application of *Clutch* or any Group 4 or 4A insecticide.
- DO NOT make a foliar application of *Clutch* following a seed piece treatment or in furrow application of *Clutch*, any product containing clothianidin or other neonicotinoid class (Group 4 or 4A) insecticides.
- **Re-cropping:** Acceptable plant-back intervals for: Canola, corn, potato - no restrictions; Soybeans - 30 days.

## Precautions:

Clothianidin is persistent and may carry over. It is recommended that any products containing clothianidin not be used in areas treated with this product during the previous season.

DO NOT enter or allow entry into treated areas for 12 hours after application. DO NOT graze treated fields or feed treated forage or hay to livestock.

**Storage:** DO NOT store in or around the home. Store unused product in a cool, ventilated, dry, secure area, away from food and feed.

DO NOT use treated seed pieces for food, feed or fodder.

Clothianidin is toxic to beneficial insects, aquatic organisms, birds, small wild mammals and non-target terrestrial plants. Observe buffer zones for sensitive areas (e.g. aquatic habitats, forested areas) as specified on label directions.

If this product is to be applied to a commodity destined for export to the United States, visit Crop Life Canada's website [www.croplife.ca](http://www.croplife.ca) for information on acceptable residue limits.

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecast. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

**Others:** Toxic to birds and small wild mammals. Toxic to certain beneficial insects.

## Hazard Rating:



Caution – Poison  
Eye irritant

For an explanation of the symbol used here see pages 7 and 8.

# Concept

Insecticide Group  
3A, 4A

Refer to page 600

## Company:

Bayer (PCP#29611)

## Formulation:

75 g/L imidacloprid and 10 g/L deltamethrin formulated as a suspension concentrate.

- Container sizes - 5.26 L jug

## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Colorado potato beetle, aphids, leafhoppers, potato flea beetle, tarnished plant bug, European corn borer (suppression only)
Soybean	Soybean aphid

## Application:

### Concept

- Ground application only.
- Apply when target pest has reached economic threshold levels. Repeat application if pest populations reach economic thresholds.
- Use sufficient water volumes for thorough coverage (i.e. minimum of 40-80 litres of water per acre)
- For control of tarnished plant bug it is recommended to use *Concept* insecticide only when timing of application coincides with the timing for another pest on the label for potatoes.

## How it Works:

*Concept* insecticide works through contact and systemic activity. Insecticide components: Imidacloprid is a neonicotinoid, systemic (within the plant) insecticide that works by contact or ingestion. Deltamethrin is a non-systemic pyrethroid insecticide that works through contact and ingestion.

## Restrictions:

- Allow a minimum of 5 days between applications.
- DO NOT make more than 3 applications of *Concept* in a year.
- DO NOT apply *Concept* through any type of irrigation equipment.
- DO NOT apply *Concept* following a seed treatment or soil application of any Group 4 (neonicotinoid class) insecticide.
- A buffer zone of 8 metres is required between the downwind point of application and the closest edge of aquatic habitats.
- **Re-cropping:** Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application.
- **Acceptable plant-back intervals for:**
  - *Cereal grains (wheat, barley, oats)* – 30 days
  - *Pea and bean (including faba bean, soybean and dry common bean)* – 9 months All other food and feed crops – 12 months
  - *Green manure and other cover crops not intended for human or animal consumption* – no plant-back interval required following treatment.
- DO NOT graze or harvest cover crops for food or feed.

## Precautions:

DO NOT enter or allow entry into treated areas for a period of 24 hours after application of *Concept*.

DO NOT apply *Concept* within 15 metres of well-heads or aquatic systems. DO NOT mix, load or clean equipment within 30 metres of well-heads or aquatic systems.

If this product is to be applied to a commodity destined for export to the United States, visit Crop Life Canada's website [www.croplife.ca](http://www.croplife.ca) for information on acceptable residue limits.

**Storage:** DO NOT use or store in or around the home. Store unused product away from feeds, seeds, fertilizer, plants and foodstuffs.

*Concept* cannot be stored below freezing.

If stored for one year or longer, shake well before using.

## Environmental Hazards:

**Bees:** This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Highly toxic to fish and other aquatic organisms. DO NOT apply where runoff is likely to occur. Runoff from treated areas may be hazardous to aquatic organisms in neighbouring areas. Avoid application when heavy rain is forecast.

## Hazard Rating:

Warning – Eye Irritant



deltamethrin: Danger – Poison



imidacloprid: Caution – Poison

For an explanation of the symbols used here see pages 7 and 8.

# Coragen

Insecticide Group

28

Refer to page 600

## Company:

FMC Corporation (PCP#28982)

## Formulation:

200 g/L chlorantraniliprole formulated as a suspension.

- Container sizes - 6.0 L

## Insects Controlled and Registered Crops:

Crop	Insect
Alfalfa, sweet clover	Alfalfa weevil (suppression only), grasshoppers
Bean, chickpea, lentil, pea, soybean	Armyworms, corn earworm, cutworms, European corn borer, grasshoppers
Borage	Grasshoppers
Buckwheat	Cutworms, grasshoppers
Canola, mustard, rapeseed	Bertha armyworm, cutworms, diamondback moth, grasshoppers, swede midge, cabbage looper
Corn	Armyworms, fall armyworm, cutworms, corn earworm, European corn borer
Flax	Bertha armyworm, cutworms, grasshoppers
Forage grasses (for feed)	Armyworms, grasshoppers
Millet	Armyworms, cutworms, European corn borer, grasshoppers
Pastures	Grasshoppers
Potato	Armyworms, Colorado potato beetle, corn earworm, variegated cutworm, European corn borer, cabbage looper
Sunflower (seed)	Cutworms, banded sunflower moth, grasshoppers
Safflower	Grasshoppers, cutworms
Wheat, barley, oats, rye	Armyworms, cutworms, grasshoppers

## Application:

### Coragen

- May be applied by air or ground equipment.
- Begin application when treatment thresholds have been reached. Thorough coverage is essential for optimal control. Use the high rate under heavy pest pressure and/or when larger larvae are present.
- **Spray Volume for Potatoes:** Apply in a minimum finished spray volume of 40 L/acre by ground. Apply in a minimum finished spray volume of 20 L/acre by air.

## How it Works:

Chlorantraniliprole disrupts muscle activity in the insects, resulting in paralysis. Treated pests stop feeding quickly after ingestion, become lethargic and lose mobility.

## Tank Mixes:

FMC Corporation supports the following mixes that are not on the *Coragen* label. Apply mixes according to the most restrictive use limitations for either product.

- **Herbicides:** *Assure II*, *Barricade II*, *Refine M*, *Refine SG*, *Travallas*, 2,4-D Ester, 2, 4-Amine, glyphosate, *Liberty 150 SN*, MCPA Ester, MCPA Amine, *Muster Toss-N-Go*
- **Fungicides:** *Acapela*

## Restrictions:

- DO NOT make more than 4 applications per season on alfalfa (seed production), bean, chickpea, lentil, pea, soybean, potatoes, corn, and forage grasses.
- DO NOT make more than 1 application per cutting on alfalfa and sweet clover.
- Potatoes, bean, chickpea, lentil, pea, soybean - DO NOT apply more than once every 3 days.
- Canola, rapeseed, mustard, flax, sunflower – DO NOT make more than 3 applications per season. DO NOT apply more than once every 5 days.
- Corn – DO NOT apply more than once every 7 days.
- Wheat, barley, oats, buckwheat, millet – DO NOT make more than 3 applications per season. DO NOT exceed a total of 455 ml of *Coragen* per acre per season.
- Forage (grass), fodder or hay may be fed to livestock.
- DO NOT make a foliar application of FMC *Coragen* insecticide for a minimum of 60 days following an in-furrow or soil application or planting of seed or seed pieces treated with any Group 28 insecticide.
- **Re-entry Interval:** 12 hours.
- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.

## Precautions:

DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Environmental Hazards:

**Aquatic organisms:** Toxic to aquatic organisms. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecast.

**Beneficial insects:** May cause harm to some generalist predators, but not harmful to some beneficial insects such as parasitic Hymenoptera.

## Hazard Rating:

Very low toxicity to mammals. Keep out of reach of children.

# Cypermethrin

**Insecticide Group  
3A**

*Refer to page 600*

## Company:

Engage Agro corporation (*Mako Insecticide* – PCP#30316)

United Phosphorous, Inc. (*UP-Cyde 2.5 EC* – PCP#28795)

Sharda CropChem Canada (*Ship 250 EC* – PCP#32563)

## Formulation:

cypermethrin formulated as an emulsifiable concentrate. (*Mako Insecticide* – 407 g/L; *UP-Cyde 2.5 EC* – 250 g/L; *Ship 250 EC* – 250 g/L)

- Container sizes - 1, 3.79, 5, 10 L

## Insects Controlled and Registered Crops\*:

Crop	Insect
Wheat, barley ( <i>Up-Cyde</i> and <i>Mako</i> only)	Grasshoppers, cutworms
Canola, rapeseed, mustard	Grasshoppers, flea beetles, bertha armyworm
Roadsides, headlands, summerfallow ( <i>Up-Cyde</i> and <i>Mako</i> only)	Grasshoppers
Sunflower	Sunflower beetle, Sunflower seed weevils
Corn	European corn borer, cutworms, corn earworm
Potato	Colorado potato beetle, flea beetle, leafhoppers, tarnished plant bug, cutworms

\*Refer to labels: *Ship* is not registered in wheat, barley, roadsides, headlands, summerfallow, or for grasshoppers or cutworms in any of the crops listed.

## Application:

### Cypermethrin

- May be applied by ground application only for control of immature (up to 4th instar) grasshoppers on wheat, barley, roadsides, headlands and canola; for flea beetle control on canola and mustard; and for control of cutworms. After application for cutworms leave soil surface undisturbed for 5 days.
- May be applied by ground or air for bertha armyworm in canola, sunflower beetle, sunflower seed weevil in sunflower, corn earworm, European corn borer in corn and Colorado potato beetle, flea beetle, leafhoppers and tarnished plant bug on potatoes.
- Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for mature insect stages (grasshoppers) or severe infestations.

## How it Works:

*Mako*, *UP-Cyde*, and *Ship* are pyrethroid insecticides that work as a contact and stomach poison.

## Effects of Weather:

Activity of cypermethrin on grasshoppers is reduced as soil temperature increases. Application for grasshopper control should be made at temperatures below 25°C. Spraying for grasshoppers should be delayed until evening if daytime temperatures are above 25°C.

## Restrictions:

- **Grazing:** Treated crops must not be grazed or cut for hay except field corn silage derived from corn treated with *Up-Cyde* at the recommended rate and pre-harvest interval may be fed to lactating dairy cattle and beef cattle.
- **Storage:** Keep in original container during storage. DO NOT contaminate or store near foodstuffs.
- **Re-entry Interval (REI):** 12 hours.
- **Buffer zones:** DO NOT apply by ground equipment within 15 m of water or waterfowl habitats. For aerial application a buffer zone of 100 metres must be left around environmentally sensitive areas such as ponds, stream, rivers, dugouts and wetlands.
  - **Canola, Rapeseed, Mustard** - *Mako* may only be applied by ground for flea beetles. Cypermethrin must be applied by ground for grasshoppers.
  - DO NOT apply cypermethrin more than once per season by air. DO NOT apply *Up-Cyde* to mustard by air.
  - **Pre-harvest interval** - 30 days
  - **Corn** - DO NOT apply more than a maximum of 3 applications by ground. DO NOT make more than 2 aerial applications per season. Repeat as necessary with 4 to 7 day intervals between applications.
  - **Pre-harvest interval** - 5 days
  - **Potatoes** - Ground - Apply as required with 10 to 12 day intervals up to a maximum of 3 applications per season. Air - up to 2 applications per season.
  - **Pre-harvest interval** - 7 days
  - **Sunflower** - Ground - Apply when required with a 5 day interval between applications. A maximum of 2 applications per season. Air - 1 aerial application is permitted per season.
  - **Pre-harvest interval** - 70 days
  - **Pre-harvest intervals** - Wheat - 30 days; Barley - 45 days

## Precautions:

Harmful or fatal if swallowed. May be harmful if absorbed through skin. Severely irritating to eyes. Causes skin irritation and sensitization. Wear longsleeved protective clothing and gloves when handling or applying. Wear face shield or goggles when mixing.

## Environmental Hazards:

**Bees:** Very toxic to bees. Avoid spraying when bees are foraging. Spray deposit should be dry before bees commence foraging in treated crop.

**Aquatic organisms:** Very toxic to aquatic organisms and fish, and overspray or drift into sensitive areas such as sloughs, streams, rivers, dugouts and wetlands must be avoided.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Delegate

Insecticide Group

5

Refer to page 600

## Company:

Corteva Agriscience (PCP#28778)

## Formulation:

25% spinetoram formulated as wettable granules.

- Container sizes - 840 g

## Insects Controlled and Registered Crops:

Crop	Insect
Corn	European corn borer
Potato*	Colorado potato beetle (time for egg hatch or small larvae), European corn borer (time to coincide with peak egg hatch)
Wheat, barley, oats, rye**	Armyworm (when economic thresholds dictate)
Soybean	Armyworms

\* Maximum 3 applications per year with a minimum retreatment interval of 7 days.

\*\* Maximum 3 applications per year with a minimum retreatment interval of 5 days.

## Application:

Aerial application in potatoes only. Apply in sufficient water volume to cover the entire plant using a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE fine classification** droplets. DO NOT apply through irrigation systems.

## How it Works:

*Delegate* is derived from the fermentation of the bacterium *Saccharopolyspora spinosa*, which is then chemically modified to create the active ingredient. Spinetoram affects the insect nervous system. It does not interact with the known binding sites of other classes of insecticides. It works through ingestion or contact with the target insects. Target insects cease feeding within a few minutes, although death may take a few days.

## Tank Mixes:

DO NOT mix this product with any other pesticide or fertilizer.

## Restrictions:

- **Re-entry:** DO NOT enter treated field for 12 hours.
- **Pre-harvest:** DO NOT harvest within 21 days of application for wheat (spring and durum, barley, oats and rye ) or within 7 days for potato.
- **Grazing:** No restrictions indicated.
- **Aerial Application:**
  - **Potatoes and Corn (field, sweet, seed and popcorn):** Use a minimum spray volume of 12.1 L/ac. Recommended spray volume is 12.1-20.2 L/ac.
- **Storage:** Store in a cool, dry place. Keep from freezing.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	10	5	1

See page 36 for an explanation of the different habitats.

\* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.



## Tank Cleaning:

Refer to page 12.

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Avoid application when heavy rain is forecast to reduce runoff into aquatic habitats.

**Others:** Toxic to small wild mammals. May be toxic to certain beneficial insects.

## Hazard Rating:

No specific hazard rating specified.

# Deltamethrin

Insecticide Group  
**3A**

Refer to page 600

## Company:

Bayer (*Decis 5 EC* - PCP#17734)

Sharda Cropchem Limited (*Poleci 2.5 EC Western* - PCP#32447)

## Formulations:

deltamethrin formulated as an emulsifiable concentrate.

(*Decis* - 50 g/L; *Poleci* – 25 g/L)

- Container sizes - *Decis 5EC* - 2.4 L and 9.6 L jugs; *Poleci 2.5 EC* – 4.8 L jugs

## Insects Controlled and Registered Crops:

Crops	Insect
Alfalfa (seed crops only)	Alfalfa weevil, Lygus bugs, grasshoppers ( <i>Decis</i> only)
Field corn	European corn borer
Potato	Colorado potato beetle, potato flea beetle, Lygus bugs, leafhoppers
Canola, rapeseed, mustard (condiment and oilseed quality <i>Brassica juncea</i> varieties)	Beet webworm, bertha armyworm, cabbage seedpod weevil (adults only), clover cutworm, diamondback moth, flea beetles, grasshoppers, Lygus bugs, swede midge
Sunflower	Sunflower beetle
Wheat, barley, oats, lentils	Cutworms, grasshoppers
Rangeland, pastures, roadside, fence row	Grasshoppers
Flax	Cutworms, beet webworm, grasshoppers
Red clover (seed production only)	Lesser clover leaf weevil (suppression only)

## Application:

### Deltamethrin

- May be applied by air or ground equipment to all crops with the exception of alfalfa, red clover and corn, which require ground application only. Apply when insects exceed economic threshold numbers with sufficient water for good coverage. Use higher rates for severe infestations, on dense foliage or when a number of insect growth stages are present.
- Alfalfa (seed production) - Use higher rates if alfalfa weevil present.

## Tank Mixes:

When in a tank-mix the spray mixture must be constantly agitated throughout application. Do not allow the spray mixture to stand in the spray tank for more than 4 hours after mixing.

*Deltamethrin* may be tank mixed with the following herbicides: *Pardner*, *Buctril M*, *Banvel*, MCPA, 2,4-D, *Puma Advance*. **Tank mixes with *Puma Advance* and *Buctril M* are for use in spring and durum wheat only.**

Bayer also supports the following mixes that are not on the *Decis* label. Apply mixes according to the most restrictive use limitations for either product:

- **Herbicides** – *Glyphosate*, *Odyssey* and *Solo*
- **Fungicides** – *Headline*, *Lance*, *Tilt*

When a tank mix is used the labels of the tank mix partners are to be consulted.

## How it Works:

*Deltamethrin* is a non-systemic, synthetic pyrethroid which works by contact and ingestion.

## Effects of Weather:

DO NOT spray under a strong temperature inversion, or when temperature exceeds 25°C as this will result in a reduction in control. Best control will be achieved when *deltamethrin* is applied during cooler periods of the day. DO NOT apply within 1 hour of rain.

## Restrictions:

- Alfalfa seed production – DO NOT apply more than once per year.
- Canola – *Decis*: Maximum application of 3 applications per season with maximum seasonal load of 500 mL/ha (202 ml/ac) or 25 g ai/ha. If 3 applications are used, only the first or second application can be at 200 mL/ha. Allow a 7 day interval between treatments by ground application. Maximum of ONE (1) APPLICATION/YEAR via aerial application.
- Corn – DO NOT apply more than 3 times per year
- Potato – (Ground) DO NOT apply more than 3 times per year. (Aerial) DO NOT apply more than 2 times per year. May be used only once per season on high organic (muck) soils.
- Red clover – DO NOT apply by air. DO NOT make more than 2 applications per year. DO NOT use treated crop for feed or forage. Restricted entry interval – 12 hours
- Wheat, barley, oats, flax, lentil – (Ground) DO NOT apply more than 3 times per year. (Aerial) DO NOT apply more than 2 times per year.
- **Pre-harvest Intervals (Days)**: alfalfa (20), barley (40), canola (7), flax (40), lentils (30), mustard (7), oats (31), potatoes (3), sunflower (70), wheat (40), sugar beets (100).
- **Storage**: DO NOT store below freezing. DO NOT store near feed, food, seeds or fertilizer. Keep away from heat, sparks and open flames. If stored for 1 year or longer, shake well before using.
- **Others**:
  - **Ground application** - Observe a 16 yard (15 m) buffer zone from environmentally sensitive areas (for example, wetlands, sloughs, rivers, houses, farm buildings).
  - **Aerial application** – Leave a 110 yard (100m) buffer zone. DO NOT apply *deltamethrin* by air when the wind speed exceeds 8 kph. In soils with high organic content (muck soils), *deltamethrin* should be applied only once during each crop year, prior to August 1, and at rates of no more than 80 mL/acre.

## Precautions:

*Deltamethrin* is of high mammalian toxicity and is a severe eye and skin irritant. Avoid contacting or breathing spray mist. Wear protective clothing, including goggles and respirator, when handling or spraying. DO NOT contaminate or store near feed or foodstuffs. Wash thoroughly after using *deltamethrin*.

## Environmental Hazards:

**Bees:** Toxic to bees. Avoid spraying when bees are foraging.

**Aquatic organisms:** Toxic to fish and aquatic organisms. Avoid contamination of aquatic systems during application.

## Hazard Rating:



Danger – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Dibrom

## Insecticide Group 1B

Refer to page 600

### Company:

Loveland Products Canada (PCP#7442)

### Formulation:

900 g/L naled formulated as an emulsifiable concentrate.

- Container sizes - 4 x 3.78 L jugs per case and 2 x 9.46 L jugs per case

### Insects Controlled and Registered Crops:

Crop	Insect
Alfalfa, clover, vetch	Aphids, loopers, leafhoppers, Lygus bugs
Beans	Alfalfa looper, aphids
Potatoes	Flea beetles, Colorado potato beetles, leafhoppers
Rangeland, field areas and pastures	Grasshoppers

### Application:

#### *Dibrom*

- Apply by ground or air. Use designated amounts in full volumes of water. For ground application use 40-120 L of water per acre. For aerial use 4-12 L of water per acre unless otherwise stated.

### How it Works:

*Dibrom* is an organophosphate insecticide. It acts as a contact and stomach poison.

### Effects of Weather:

DO NOT apply *Dibrom* when air temperature is greater than 32°C.

### Restrictions:

- **Environment:** DO NOT contaminate any body of water, waterway or water source. *Dibrom* is moderately to highly toxic to birds, aquatic animals and other wildlife.
- **Re-entry interval:** DO NOT enter or allow worker re-entry into treated area for 48 hours following application.
- DO NOT apply more than 2 times per season.

### Precautions:

Concentrate may cause skin damage. DO NOT get on skin, eyes or clothing. Use waterproof gloves and face shield or goggles when handling concentrate. Harmful if swallowed. Avoid breathing spray mist.

Avoid contamination of feed, foodstuffs and drinking water.

### Environmental Hazards:

**Bees:** Toxic to bees; avoid application during periods of bee activity.

**Aquatic organisms:** Toxic to aquatic organisms.

### Hazard Rating:



Danger – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Dimethoate

## Insecticide Group 1B

Refer to page 600

### Company:

IPCO (*Cygon 480 EC* – PCP#9807)

FMC Corporation (*Cygon 480-Ag* – PCP#25651)

Loveland Products Canada (*Lagon 480E* – PCP#9382)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

### Formulation:

*Cygon/Lagon* - 480 g/L dimethoate formulated as an emulsifiable concentrate.

- Container size - 10 L

### Insects Controlled and Registered Crops:

Crop	<i>Cygon 480-Ag</i> Insect	<i>Lagon 480E</i> Insect	<i>Cygon 480 EC</i> Insect
Peas	Aphids	Aphids	Aphids
Potatoes (ground application only)	Aphids, leafhoppers	Aphids, leafhoppers, Lygus bugs	Aphids leafhoppers, Lygus bugs
Alfalfa* (rates vary for seed and forage production)	Aphids, leafhoppers, Lygus bugs*, plant bugs*, alfalfa blotch leafminer, grasshoppers, reduction of alfalfa weevil larvae	Aphids, leafhoppers, alfalfa blotch leafminers, grasshoppers, reduction of alfalfa weevil larvae, Lygus bugs*, plant bugs*	Aphids, blotch leafminer, grasshoppers, leafhoppers, Lygus bugs,*plant bugs*, sweet clover weevil, reduction of alfalfa weevil larvae
Canaryseed	Aphids	Aphids	Aphids
Canola/rapeseed	Aphids, leafhoppers, grasshoppers	Aphids, leafhoppers, grasshoppers	Aphids, leafhoppers, grasshoppers
Dry beans	Aphids, leafhoppers, lygus bugs, spider mites		
Forage crops	Lygus bugs, plant bugs, grasshoppers	Grasshoppers, aphids (suppression only of Russian wheat aphid), Lygus bugs and plant bugs	Aphids, grasshoppers, leafhoppers, Lygus bugs, plant bugs, reduction of alfalfa weevil larvae
Sweet clover, red clover, alsike clover	Sweet clover weevil	Aphids, grasshoppers, sweet clover weevil	Sweet clover weevil
Pastures, waste areas	Grasshoppers	Grasshoppers	Grasshoppers
Wheat	Aphids (suppression only of Russian wheat aphid), wheat midge, thrips	Thrips, grasshoppers, wheat midge, Russian wheat aphid (suppression only)	Wheat midge, aphids, thrips, grasshoppers
Barley, oats	Aphids, thrips	Thrips, grasshoppers,	Aphids, thrips, grasshoppers
Flax	Aphids	Aphids	Aphids
Rye		Grasshoppers	Grasshoppers
Soybeans	Aphids, leafhoppers, lygus bugs, spider mites	Aphids, leafhoppers, Lygus bugs, spider mites	Aphids, leafhoppers, Lygus bugs, spider mites

### Application:

#### Dimethoate

- May be applied by air or ground equipment (unless otherwise specified above). Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for adult insects, heavy infestations or dense canopy.

## How it Works:

*Dimethoate* is a broad spectrum, systemic (within the plant) and contact, organophosphate insecticide and acaricide.

## Restrictions:

- **Grazing:** Remove cattle prior to spraying. Read label carefully to determine livestock re-entry period.
- **Storage:** Store at temperatures between 4°C and 30°C and in areas away from feed and food.
- **Others:** DO NOT treat when bees are foraging. For alfalfa canola, safflower and clovers, DO NOT apply during the crop blooming period or during the 5-day period before the crop blooms. Wait at least 10 days before placing leafcutter bees in treated fields. DO NOT make more than 2 applications per season. Minimum application interval is 7 days.

## Precautions:

Wear a respirator, goggles, rubber gloves, rubber boots and coveralls when handling concentrate. Avoid contact with skin and eyes. DO NOT inhale spray mist.

## Environmental Hazards:

**Bees:** Toxic to bees. Avoid applications when bees are foraging in the treatment area or in groundcover containing blooming weeds. For applications on crops that are highly attractive to pollinators (alfalfa, clovers, canola, safflower, etc.) DO NOT apply during the crop blooming period or during the 5-day period before the crop blooms.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application of this product when heavy rain is forecast.

**Others:** Toxic to birds, mammals, and certain beneficial insects.

## Hazard Rating:



Warning – Poison – *Lagon, Cygon 480 AG*



Danger – Poison – *Cygon 480 EC*

For an explanation of the symbol used here see pages 7 and 8.

# Dipel 2X DF

Insecticide Group

11

Refer to page 600

## Company:

Valent BioSciences (PCP#26508)

## Formulation:

*Bacillus thuringiensis* var. *Kurstaki* strain ABTS-351 fermentation solids, spores and insecticidal toxins - 57.0% Potency: 32,000 Cabbage Looper Units (CLU) per mg (32 billion CLU per Kg)

## Insects Controlled and Registered Crops:

Crop	Insect
Sunflower	Sunflower moth
Timothy	Essex (European) skipper
Corn	European corn borer larvae
Potato	Cabbage loopers

## Application:

### *Dipel*

- Treat when larvae are young (early instars) before the crop is damaged. A spreader sticker such as *Triton B1956* should be used to give thorough foliage coverage.

How it Works:

Dipel is a biological stomach insecticide resulting in the larvae ceasing to eat in a few hours, with death usually occurring within 1-3 days.

Restrictions:

- **Storage:** Store at temperatures between 0° and 25°C (cooler temperatures preferable).
- **Others:** DO NOT allow diluted spray to stand in tank for more than 12 hours. Use product within 24 months of date of manufacture if stored at cool temperatures. Final spray solution for *Dipel* should have a pH of 5-7.

Precautions:


Harmful if swallowed, inhaled, or absorbed through the skin. Avoid breathing dust or spray mist. Avoid contact with skin, eyes, or clothing. In case of contact with eyes or skin, immediately flush eyes or skin with plenty of water.

Environmental Hazards:

**Aquatic organisms:** Do not contaminate irrigation or drinking water supplies.

Hazard Rating:

Warning contains the allergen soy

 Caution – eye irritant, skin irritant, potential sensitizer

For an explanation of the symbol used here see pages 7 and 8.

Eco Bran

Insecticide Group

1A

Refer to page 600

Company:

Peacock Industries (PCP#25815)

Formulation:

- Wheat bran infused with carbaryl insecticide.
- Container sizes - 20 kg bag; 1kg bottle

Insects Controlled and Registered Crops:

Crop	Insect
Alfalfa, beans, clover, corn, oats, rye, wheat, barley, canola, pastures, rangelands, forage grasses, field borders, headlands, rights-of-way, roadsides, wastelands	Grasshoppers

Pre-harvest Intervals and Livestock Re-entry Periods:

Crop	Pre-harvest Interval/ Livestock re-entry period
Corn	1
Alfalfa, clover	2
Beans	5
Oats, rye, wheat	14
Barley	28
Canola	Treat only seedlings
Field borders, headlands, rights-of-way, roadsides, wastelands	0
Entry of beef cattle or other livestock to pastures, rangelands or forage grasses	1
Entry of dairy cattle to pastures or rangelands, harvest of forage crops	2

## Application:

### Eco Bran

- For ground application only. DO NOT apply by air.
- Broadcast evenly over treatment area. Use gloves and wash thoroughly following application. More information on application and applicators can be found at: <http://www.grasshoppercontrol.com>.

## Restrictions:

- DO NOT apply within 50m of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3-8 kph and do not favour drift.
- May be used in pastures while beef cattle are grazing.

## Precautions:

Harmful if inhaled or swallowed. Avoid breathing dust or vapour from bait. Use only in well-ventilated areas. May cause eye irritation. Avoid contact with eyes and skin. Wash thoroughly after handling and before eating or smoking. Avoid contamination of feed and foodstuffs. Keep away from heat, sparks and open flame.

## Environmental Hazards:

**Bees:** Presence of product on flowering crops such as alfalfa and clover will not harm foraging honey or leafcutter bees.

**Aquatic Organisms:** Toxic to aquatic organisms. Avoid application when heavy rain is forecast.

# Exirel

## Insecticide Group

28

Refer to page 600

## Company:

FMC Corporation (PCP#30895)

## Formulation:

Cyantraniliprole 100 g/L, formulated as a suspension.

- Container sizes - 0.5, 3.79, 100 L

## Insects Controlled and Registered Crops:

Crop	Insect	Rate
Potatoes	Colorado potato beetle	750-1000 ml/ha
	Aphids	500-1500 ml/ha
	European corn borer, variegated cutworm	500-750 ml/ha
	Armyworm	500 ml/ ha
	Potato flea beetle	500-1000 ml/ha

## Application:

- Applied as a foliar spray, using ground or aerial application. *Exirel* insecticide is mixed with water for application. Time applications to the most susceptible insect pest stage, typically at egg hatch and/or newly hatched larvae or nymphs, before populations reach damaging levels. When pest populations are high, use the highest listed application rate for that pest. Use the higher rate and high spray volumes for large plants or dense foliage.

## How it Works:

*Exirel* insecticide is a member of the anthranilic diamide class of insecticides which act on insect ryanodine receptors. Although *Exirel* insecticide has contact activity, it is most effective through ingestion of treated plant material.

## Effects of Weather:

Apply to foliage when rain is not expected in the next 24 hours. Avoid application when heavy rain is forecast.

## Restrictions:

- **Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed.
- **Application interval:** DO NOT apply more than once every 5 days.
  - **Ground:** minimum finished spray volume of 100 L/ha. DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty.
  - **Air:** minimum finished spray volume of 50 L/ha. DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty.
- **Pre-harvest interval:** 7 days.
- **Others:** DO NOT make more than 4 applications per season. DO NOT exceed a total of 4.5 litres *Exirel* insecticide per ha per season. DO NOT make a foliar application of *Exirel* insecticide for a minimum of 60 days following an in-furrow or soil application or planting of seed or seed pieces treated with any Group 28 insecticide.

## Precautions:

Causes skin irritation. DO NOT get on skin.

## Buffer Zones:

Application Method	Crop		Freshwater Habitat of Depths:		Terrestrial habitat
			Less than 1 m	Greater than 1 m	
Ground	Potatoes		2 m	1 m	1 m
Aerial	Potatoes	Fixed wing	5 m	1 m	15 m
		Rotary wing	2 m	1 m	15 m

## Environmental Hazards:

**Bees:** Toxic to bees. DO NOT apply this product to blooming crops or weeds while bees are actively visiting the treatment area. Apply early in the morning or late in the evening when bees are not active. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.

**Aquatic organisms:** This product is highly toxic to aquatic organisms. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

**Others:** Toxic to non-target terrestrial plants. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.

## Hazard Rating:



Warning – Skin irritant. Potential skin sensitizer.

For an explanation of the symbol used here see pages 7 and 8.

# Entrust 80 W

## Insecticide Group

### 5

Refer to page 600

## Company:

Corteva Agriscience (PCP#27825)

## Formulation:

80% spinosad.

- Container sizes - 4 x 113.4 g packets



## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Colorado potato beetle larvae and European corn borer larvae

## Application:

### *Entrust 80 W*

- Apply as a foliar spray by ground only. Apply when scouting indicates the target pest species have reached economic threshold levels. For Colorado potato beetle larvae, target eggs at hatch or small larvae. For control of European corn borer, time the application to coincide with peak egg hatch. Use higher application rate for higher pest pressure or when extended egg hatch is anticipated. If pest populations persist, a repeat application 7 to 10 days after the initial application may be necessary.

## How it Works:

*Entrust 80 W* is in the spinosine class of insecticides. It is a contact and stomach insecticide. It is derived from the fermentation of *Saccharopolyspora spinosa*.

## Effects of weather:

This product has the potential for run-off. Do not spray immediately after a rainfall or if rain is forecast within 48 hours after application.

## Restrictions:

- **Storage:** Avoid freezing. DO NOT store or ship with food, feeds, drugs or clothing.
- **Others:** DO NOT make more than 2 applications per season (maximum of 60 g/acre).

## Precautions:

**Buffer Zones:** A buffer zone of 2 metres (early season) or 1 metre (late season) is required between downwind edge of spray boom and sensitive aquatic habitats.

Avoid contact with eyes, skin, and clothing.

DO NOT enter or allow worker entry into treated areas for a period of 12 hours after application.

## Environmental Hazards:

**Bees:** Highly toxic to bees exposed to direct treatment, drift or residues on blooming plants. Do not apply this product or allow it to drift to blooming plants if bees are visiting the treatment area.

**Aquatic organisms:** This product is highly toxic to aquatic invertebrates. Avoid application of this product when heavy rain is in the forecast, or immediately after a rainfall.

**Others:** Harmful to parasitoids and predatory mites and slightly harmful to foliage-dwelling predators.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Fulfil

**Insecticide Group**  
**9B**

Refer to page 600

## Company:

Syngenta Canada (PCP#27274)

## Formulation:

50% pymetrozine formulated as a wettable granule.

- Container sizes - 6 X 780 g

## Insects Controlled and Registered Crops:

Crop	Insect
Potatoes	Aphids including: green peach, potato, foxglove, buckthorn

## Application:

### *Fulfill*

- May be applied by ground or air. Apply *Fulfill* to plant foliage. Thorough spray coverage is essential for best performance. Apply *Fulfill* with sufficient water (minimum of 40 L/acre) to ensure good coverage of all plant surfaces. Higher water volumes will generally result in better coverage, especially under adverse conditions (hot, dry), where a dense plant canopy exists and/or aphid infestations are high. One additional application may be needed to control persistent aphid populations. Allow a minimum of 7 days between applications.
- DO NOT apply *Fulfill* insecticide through chemigation.
- DO NOT use in nurseries or in plant propagation houses, or on any plants grown for use as transplants.
- The use of a non-ionic adjuvant is recommended to improve the performance of *Fulfill* insecticide under drought stress conditions.

## How it Works:

*Fulfill* is a systemic insecticide and works primarily by ingestion but has some contact activity. Affected aphids stop feeding shortly after exposure, but may remain on the plant foliage until they die, which is usually within 2-4 days. *Fulfill* insecticide has residual activity in the plant and will control aphids that move onto the plant after spraying.

*Fulfill* has shown no phytotoxicity on the varieties of potato tested when applied at the label rates.

## Effects of Weather:

*Fulfill* insecticide exhibits movement through the leaf surface into plant tissue and is rainfast as soon as the spray solution has dried.

## Restrictions:

- **Storage:** Store in a cool, dry, place away from food, drinks, and animal feeding stuffs. Keep in the original container tightly closed.
- **Others:** DO NOT apply by air. DO NOT exceed 2 applications (152 g product/acre) per crop per season. DO NOT apply directly to aquatic systems, permanent water bodies or areas where surface water is present. DO NOT contaminate water when cleaning equipment or disposing of equipment wash water.
- A re-cropping restriction of 30 days is required for all crops.

## Precautions:

May cause skin sensitization reactions. Applicators and other handlers must wear personal protective equipment including, long-sleeved shirt, long pants, waterproof gloves and shoes plus socks. DO NOT enter or allow entry into treated areas for 12 hours. DO NOT use, pour, spill, or store near heat or open flame.

## Environmental Hazards:

**Aquatic organisms:** Toxic to aquatic organisms. Do not contaminate aquatic systems when cleaning and rinsing spray equipment or containers.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Imidacloprid

## Insecticide Group 4A

Refer to page 600

### Company:

Bayer (*Admire 240* – PCP#24094)

ADAMA Canada (*Alias 240 SC* – PCP#28475)

### Formulation:

240 g/L imidacloprid formulated as a suspension concentrate.

### Insects Controlled and Registered Crops:

Crop	Insect
Potato	Colorado potato beetle, aphids, potato leafhopper, potato flea beetle

### Application:

#### *Imidacloprid*

- **Soil application:** (*Admire 240* / *Alias 240 SC*) Apply as a narrow band in-furrow. For best results, direct spray on the seed pieces in the furrow. Scout potato fields frequently, especially during warmer part of growing season. If pest populations exceed economic thresholds apply a recommended foliar insecticide with a different mode of action than imidacloprid.
- **Seed piece treatment:** (*Admire 240* / *Alias 240 SC*) Refer to Imidacloprid in the seed treatments product pages.
- **Foliar application:** (*Admire 240* / *Alias 240 SC*) Apply only if insect populations exceed recommended economic thresholds. For optimum control, good coverage of the foliage is needed. A maximum of 2 foliar applications may be made per crop per season. Scout fields and retreat if needed. For aphids, two applications at least seven days apart may be required to achieve control. DO NOT make a foliar application following a soil or seed treatment of the product in the same crop. Allow at least 7 days after the last application and before harvesting the crop.

### How it Works:

*Imidacloprid* is a neonicotinoid, systemic (within the plant) insecticide that works by contact or ingestion. Control period may vary due to climate and soil conditions

### Restrictions:

- DO NOT apply by air.
- DO NOT apply more than once per season as a soil application. DO NOT follow a soil application with a foliar application.
- **Re-cropping:** Acceptable plant-back intervals for:
  - **Cereal grains (wheat, barley, oats)** - minimum 30 days
  - **Peas and beans** - 9 months
  - **All other food and feed crops** - 12 months
  - **Green manure and other cover crops** - can be grown without plant-back intervals but cannot be grazed or harvested for food or feed.
- DO NOT apply in fields where *imidacloprid* has been used during the previous season. DO NOT apply through any irrigation system.

### Precautions:

DO NOT re-enter treated areas for 24 hours after foliar application. Avoid application when heavy rain is forecast.

DO NOT apply product or plant treated seed pieces within 15 metres of well-heads or aquatic systems, including marshes, ponds, ditches, reservoirs, streams, lakes, etc.

DO NOT mix, load or clean spray equipment within 30 metres of well-heads or freshwater habitats.

For application with air-blast equipment, DO NOT apply within 40 metres of well-heads or aquatic systems.

The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or where the water table is shallow.

**Storage:** DO NOT store in or around the home. Store unused product in a cool, ventilated, dry, locked area and avoid cross- contamination with other pesticides, fertilizers, food and feed.

DO NOT use treated seed pieces for food, feed or fodder.

If this product is to be applied to a product destined for export to the United States, contact 1-866-375-4648 or [www.croplife.ca](http://www.croplife.ca).

## Environmental Hazards:

**Bees:** This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Highly toxic to aquatic invertebrates.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Imidan

**Insecticide Group  
1B**

*Refer to page 600*

## Company:

Gowan Canada (PCP#29064)

## Formulation:

70% phosmet formulated as a wettable powder in water soluble sachets.

## Insects Controlled and Registered Crops:

Crop	Insect
Alfalfa	Alfalfa weevil, alfalfa blotch leafminer
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid

## Application:

### *Imidan*

- Apply by ground only.
- *Imidan 70-WP* instapak is packaged in water soluble sachets that are to be dropped into the spray tank unopened. DO NOT use in low-volume, gear-type spray equipment.

## How it Works:

*Imidan* is an organophosphate insecticide.

## Restrictions:

- **Storage:** Keep sachets dry and DO NOT allow sachets to contact any moist surface prior to adding to spray tank. Keep water soluble sachets in the protective container and store in a cool, dry place. DO NOT store at temperatures above 40°C.
- Buffer zones required for the protection of freshwater habitat Depth of less than 1 metre - 15 metres and for depths greater than 1 metre - 4 metres.
- DO NOT apply more than once per cutting or within 7 days of harvest. DO NOT make more than 3 applications per season.
- **Re-entry Interval (REI):** 5 days

## Precautions:

Harmful if swallowed, inhaled or absorbed through the skin. Wear protective clothing, including rubber gloves and goggles, during mixing, loading and spraying.

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application when heavy rain is forecast.

**Others:** Toxic to birds and small wild mammals. Toxic to certain beneficial insects.

## Hazard Rating:



Danger – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Lambda-cyhalothrin

Insecticide Group

3A

Refer to page 600

## Company:

Syngenta Canada (*Matador* – PCP#24984)

ADAMA Canada (*Silencer 120 EC* – PCP#29052)

## Formulation:

120g/L lambda-cyhalothrin formulated as an emulsifiable concentrate.

- Container sizes - 4 x 3.78 L

## Insects Controlled and Registered Crops:

Crop	Insect
Potatoes	Armyworm, Colorado potato beetle, European corn borer, Lygus bugs, potato flea beetle, potato leafhopper, tuber flea beetle, variegated cutworm
Canola, mustard	Crucifer flea beetle, grasshoppers, Lygus bugs, cabbage seedpod weevil (adults), cabbage looper, diamondback moth larvae, imported cabbageworm, bertha armyworm, swede midge, cutworms ( <i>Matador</i> only)
Sunflower	Lygus bugs ( <i>Matador</i> only), sunflower beetle
Wheat, barley, oats	Grasshoppers, armyworm
Alfalfa, unimproved pasture	Grasshoppers
Summerfallow ( <i>Matador</i> only)	Grasshoppers
Flax	Grasshoppers, cutworms ( <i>Matador</i> only)
Alfalfa <i>Matador</i> – Ground or Air <i>Silencer</i> – Ground only	Alfalfa weevil, Lygus bugs, pea aphid, potato leafhopper
Corn	European corn borer, corn earworm, cutworms, fall armyworm, armyworm
Beans	Cutworms, corn borer, potato leafhopper, Lygus bugs
Chickpeas	Grasshoppers, potato leafhopper, cutworms
Faba beans (broad beans)	Lygus bugs, potato leafhopper, pea aphid
Lentils	Cutworms, grasshoppers, Lygus bugs, pea aphids, potato leafhopper
Peas	Cutworms, grasshoppers, pea aphids, pea leaf weevil
Soybeans	Cutworms, grasshoppers, Lygus bugs, aphids
Timothy	Grasshoppers

## Application:

### Lambda-cyhalothrin

- **Aerial:**
  - *Matador and Silencer: Canola, mustard, sunflower, flax, alfalfa, unimproved pasture* - DO NOT make more than 1 application at the 33.2 ml/acre rate per year.
  - *Corn, wheat, barley, oats, potatoes, soybean, dry edible bean, pea, chickpea, lentil, favabean* - DO NOT make more than 2 applications at the 33.2 ml/ac rate per year.
  - *Matador: Summerfallow* - DO NOT make more than 1 application at the 33.2 ml/acre rate per year.
- **Ground:**
  - *Canola, mustard, sunflower, flax, alfalfa, unimproved pasture, summerfallow (Matador only), corn, wheat, barley, oats* - DO NOT make more than 3 applications per year at the 33.2 ml/acre rate.
  - *Potatoes* - DO NOT make more than 3 applications per year at the 33.2 ml/acre rate. DO NOT make more than 2 applications per year if using the 50 ml/acre rate. DO NOT exceed 100 ml/acre of lambda-cyhalothrin per year.
  - *Beans, chickpeas, favabeans, lentils, peas, soybeans* - DO NOT make more than 3 applications per year. DO NOT graze or harvest treated forage straw or hay for livestock feed.

## Timing:

For potato insects, timing of application should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring.

For sunflower beetles, use the high rate to control adults.

For flea beetles, to prevent migration of over-wintering adults throughout the field, spray a 15 m strip around the field at the first sign of flea beetle feeding.

For grasshoppers, apply the low rate when grasshoppers are up to the 3<sup>rd</sup> nymphal stage (up to 1 cm in length) or when insect numbers are low. Apply the high rate when insects are larger, up to but not including, winged adults or when insect numbers are high.

For corn borer control apply *Matador* before the larva bores into the plant stalk or pods.

## How it Works:

*Lambda-cyhalothrin* is a synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity.

## Effects of Weather:

For best results, apply *Lambda-cyhalothrin* during the early morning before temperatures rise, and during the evening, past the heat of the day.

## Tank Mixes:

**Herbicides:** (Ground only)

- *Horizon*
- *Tralkoxydim*<sup>Δ</sup>

**Fungicides:** (Tank mixes on legumes (bean, chickpea, lentil, pea, soybean), corn, barley, oats and wheat may be applied by ground or air).

Refer to label for other crops.

- Propiconazole<sup>Δ</sup>
- *Allegro* in dry bean
- *Quadris* (*Matador* only)
- *Quilt* (*Matador* only)
- *Headline* (*Silencer* only) on dry field pea to control insects and diseases listed on the label of each product. Read carefully and follow all use directions and use precautions on both the *Silencer 120 EC* and *Headline EC* Fungicide labels. Failure to follow the rates of use and timing of application as recommended for each product will result in unsatisfactory control of target pest.
- *Touchdown Total* and *Traxion*

<sup>Δ</sup> Manufacturers may only support specific mixes. Contact the manufacturer for more information.

## Restrictions:

- DO NOT apply to flowering crops or weeds if bees are visiting treatment area.
- **Grazing:** Timothy - DO NOT graze or feed lactating dairy animals. DO NOT apply within 3 days of non-lactating livestock foraging.
- Alfalfa seed from treated crops is not to be used for production of "alfalfa sprouts" for human consumption.
- **Storage:** Store above 0°C. Storage below 0°C will not impair the effectiveness of Lambda-cyhalothrin. However, following such storage, agitate well before use.
- **Others:** Allow a 7-day interval between applications. DO NOT apply within 15 m of productive fisheries, water or waterfowl habitat.
- **Re-entry interval (REI)** – 24 hours

• **Buffer Zones:**

Application method	Crop	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:	
		Aquatic Habitats of Depths	
		Less than 1 m	Greater than 1 m
Ground	All field crops	15	15
Fixed wing airplane	Potatoes, oilseed crops, cereal crops, alfalfa, unimproved pasture, summerfallow	100	20
	Corn	225	20
	Legume vegetables	600	25

See page 36 for an explanation of the different habitats.

- Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.
- For tank mixes, consult the labels of the tank mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture.

<sup>†</sup> Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

## Precautions:

*Lambda-cyhalothrin* has potential for skin and eye irritation. Avoid splashing in eyes or on skin, particularly the face. If hands are contaminated, wash with soap and water before touching other areas of skin.

## Environmental Hazards:

**Bees:** Toxic to bees when exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Spray deposits should be dry before bees commence foraging in treated crop.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application when heavy rain is forecast.

## Hazard Rating:



Danger – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Lannate

**Insecticide Group  
1A**

*Refer to page 600*

## Company:

Corteva Agriscience (PCP#10868)

## Formulation:

90% methomyl formulated as a water soluble powder.

- Container sizes - 24 x 225 gram water soluble bags

## Insects Controlled and Registered Crops:

Crop	Insect
Canola	Alfalfa looper, bertha armyworm, clover cutworm, beet webworm
Flax	Bertha armyworm
Peas	Alfalfa looper, pea aphid
Wheat, oats, barley	Armyworm, thrips
Potato	Aphids, leafhoppers, flea beetles, variegated cutworm

## Application:

### Lannate

- May be applied to canola, flax and cereals by air or ground equipment. Ground applications only to peas and potatoes. Apply when insects exceed threshold levels using sufficient water for good coverage.
- Suggested water volumes for ground application:
  - Potatoes - 100 to 340 L per acre
  - Canola and flax - 40 L per acre
  - Wheat, oats, barley, peas - 40 to 140 L per acre
- When applied by air, pilot should not assist in mixing and loading operations. Apply a minimum of 9 L of water per acre) for aerial application.
- Use higher rates for mature insects, dense canopy or when infestations are heavy. Apply at 5 to 7 day intervals as necessary.
- Early morning or late evening sprays are recommended.

## How it Works:

*Lannate* is a carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short term residual.

## Restrictions:

- **Storage:** DO NOT store below 0°C. Store in original container away from other pesticides, fertilizer, food or feed.
- **Others:** DO NOT handle water soluble bags with bare hands. Sprays or drift must not contact workers, other persons or animals. The area being treated must be vacated by unprotected persons.

## Precautions:

*Lannate* is of high acute mammalian toxicity. May be fatal if swallowed, inhaled or absorbed through the eyes. DO NOT breathe dust or spray mist. DO NOT get in eyes, on skin or on clothing.

When mixing, loading or applying *Lannate*, wear protective clothing, goggles and an approved respirator. Wear clean clothes daily. Wash thoroughly after handling or applying.

## Environmental Hazards:

**Bees:** This product is toxic to bees exposed to direct application. Do not apply this product when bees are actively visiting the treatment area.

**Aquatic organisms:** Toxic to fish and aquatic organisms. Keep out of any body of water. Do not apply where runoff is likely to occur. Avoid application when heavy rain is forecast.

**Others:** Toxic to birds and small wild mammals.

## Hazard Rating:



Danger – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Malathion

Insecticide Group  
1B

Refer to page 600

## Company:

Loveland Products Canada (*Malathion 85E* – PCP#8372)

IPCO (*Malathion 500* – PCP#5821)

Different companies produce malathion. Note differences in label registrations, formulations and recommendations. Check your label for more information.

## Formulations:

*Malathion 500* - 500 g/L malathion formulated as an emulsifiable concentrate.

*Malathion 85E* – 85% malathion formulated as an emulsifiable concentrate.



## Insects Controlled and Registered Crops:

Crop or Structure	Insect
Alfalfa	Grasshoppers, aphids, lygus bugs, alfalfa weevil larvae, leafhoppers, alfalfa blotch leafminer, spider mites, spittlebugs
Clover (85E only)	Aphids, grasshoppers, leafhoppers, spider mites
Canola, mustard	Flea beetles, diamondback moth, grasshoppers
Wheat, barley, oats, rye	Grasshoppers, aphids, armyworm, cereal leaf beetle
Potatoes	Colorado potato beetle, leafhoppers, aphids, spider mites
Canaryseed (for seed) (85E only)	Aphids
Sweet clover	Sweet clover weevil
Flax, lentils, hay, pasture	Grasshoppers
Corn (grain, forage)	Earworms, European corn borers
Beans, peas	Aphids, leafhoppers, spider mites
Empty bin spray (grain bins, grain elevators, grain box cars, flour mills)	Confused flour beetles, flat grain beetles, granary weevils, grain mites, Indian meal moths, lesser grain borers, red flour beetle, rice weevils, rusty grain beetles, saw-toothed grain beetle

## Application:

### Malathion

- May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for heavy infestations, dense canopy or mature stages of insects.

## How it Works:

*Malathion* is a non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic.

## Effects of Weather:

For best results apply when daytime temperatures are above 20°C.

## Restrictions:

- **Grazing:** When spraying forages and pastures, cattle should be removed and returned after spraying.
- **Storage:** DO NOT store near food or feed. Store in a cool dry place but not below -10°C. Protect from heat.
- **Others:** Maximum of 2 applications per season. DO NOT apply to any plant in bloom. Apply to crops when bees are absent from field. Avoid contact with automobile paint and wash immediately if exposure occurs.
- **Re-entry interval (REI)** – 12 hours

The Pest Management Regulatory Agency (PMRA) has advised that any malathion products over one year old should not be used and should be returned as part of provincial pesticide recycling programs.

## Precautions:

*Malathion* has a low acute mammalian toxicity. Wear protective clothing to reduce skin and eye exposure.

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application of this product when heavy rain is forecast.

**Others:** Toxic to birds. Toxic to certain beneficial insects.

## Hazard Rating:



Warning – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Minecto Duo 40WG

Insecticide Group

4 and 28

Refer to page 600

## Company:

Syngenta Canada Inc. (PCP#30900)

## Formulation:

20% thiamethoxam and 20% cyantraniliprole formulated as a wettable granule.

- Container sizes - 2 X 3.04 kg jugs

## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Aphids, Colorado potato beetle, flea beetles, potato leafhopper

## Application:

### *Minecto Duo*

- Can be applied by ground only. Apply by closed cab groundboom only.
- Apply as an in-furrow spray at seeding depth or in a narrow surface band above the seedline during planting.
- Apply in sufficient water volume to ensure uniform application and incorporation into the soil. Add ½ of the required amount of water to the mix tank. With agitator running add the *Minecto Duo* to the tank. Continue agitation while adding the remaining water. Apply once the *Minecto Duo* has completely dispersed into the water mix. Maintain agitation until all the mixture has been applied.

## How it Works:

*Minecto Duo* contains two active ingredients. Thiamethoxam is a neonicotinoid insecticide and cyantraniliprole is a diamide insecticide. Both components have systemic (within the plant) properties and interfere with neuro-transmission in insects. Mode of action is through contact or ingestion.

## Restrictions:

- DO NOT apply by air.
- DO NOT use a foliar application of a product containing a Group 4 (neonicotinoid) or Group 28 (diamide) insecticide following in-furrow or soil application of *Minecto Duo*.
- **Re-entry interval (REI):** DO NOT enter or allow worker entry into treated areas for 12 hours.
- **Storage:** Store product in original container only, in a cool, dry place and away from food or feed. Keep container closed.

## Precautions:

If *Minecto Duo* is to be used on a commodity that may be exported to the U.S. and you require information on acceptable residue levels in the U.S., visit CropLife Canada's website at [www.croplife.ca](http://www.croplife.ca).

## Environmental Hazards:

**Bees:** Toxic to bees. This product is systemic and bees can be exposed to product residues in flower, leaves, pollen and/or nectar resulting from soil applications.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application of this product when heavy rain is forecast. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

## Hazard Rating:



Warning – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Minecto Pro

Insecticide Group

6 and 28

Refer to page 600

## Company:

Syngenta Canada Inc. (PCP#33023)

## Formulation:

Abamectin and cyantraniliprole formulated as a soluble concentrate.

- Container sizes - 3.78 L

Active Ingredient(s)	Guarantee	Resistance Group
Abamectin	28.5 g/L	Group 6
Cyantraniliprole	135 g/L	Group 28

## Insects Controlled and Registered Crops:

Crop	Insects	Rate
Potatoes	European corn borer	370 – 556 mL/ha (150 – 225 mL/ac)
	Spider mites, potato psyllids, and flea beetle	370 – 670 mL/ha (150 – 271 mL/ac)
	Colorado potato beetle	556 mL/ha – 670 mL/ha (225 – 271 mL/ac)

## Application:

- **Minimum water volume:** 200L/ha, 80L/ac. Apply with 0.1-0.5% v/v non-ionic surfactant (NIS)

## How it Works:

*Minecto Pro* is a non-neonicotinoid insecticide that delivers rapid activity through two complementary active ingredients – abamectin (Group 6) and cyantraniliprole (Group 28). Both active ingredients use translaminar movement within the plant to achieve excellent coverage of the crop, providing a reservoir of activity for extended residual control of targeted pests.

## Tank Mixes:

There are no registered tank mixes for this product. Application of unlabelled tank mixes is permitted by PMRA (Pest Management Regulatory Agency) as long as both products are registered and being used within their registered use pattern (i.e. application rate, application timing, number of applications per season, pre-harvest interval, pest claim, etc.).

## Restrictions:

- **DO NOT** apply by air
- **Rainfast period:** Once dry on leaf. Avoid application if heavy rainfall is forecast
- **Re-entry interval (REI):** 12 hours.
- **Pre-harvest interval:** 14 days.
- **Storage:** Store product in original container only, in a cool, dry place and away from food or feed. Keep container closed.
- **Other Restrictions:** For European corn borer, spider mites, potato psyllids and flea beetle, **DO NOT** make a foliar application of *Minecto Pro* for a minimum of 60 days following an in-furrow or soil application or planting of seed pieces treated with any Group 28 insecticide. For Colorado potato beetle, **DO NOT** apply *Minecto Pro* for Colorado potato beetle control if any Group 28 was used at planting as an in-furrow, soil or seed-piece treatment.

## Buffer Zones:

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground	15	20	1
Aerial	N/A	N/A	N/A

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment or residues on blooming crops or weeds. DO NOT apply this product or allow drift to blooming crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

## Hazard Rating:



Danger – Poison. Hazard to humans and domestic animals. Fatal or poisonous if swallowed. Harmful if inhaled.

Avoid breathing spray mist.

For an explanation of the symbol used here see pages 7 and 8.

# Movento 240 SC

Insecticide Group

23

Refer to page 600

## Company:

Bayer (PCP#28953)

## Formulation:

Spirotetramat formulated as a suspension concentrate - 240 g/L

## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Aphids
Beans, chickpea, lentil, peas, soybean	Aphids

## Application:

### Movento 240 SC

- Ground application only in potatoes and soybeans. Ground or air application for beans, chickpea, lentil and peas. Apply in adequate water for uniform coverage, a minimum of 120 L/ac. If needed repeat application with a minimum of 7 to 10 day interval. DO NOT exceed a maximum of 292 mL / acre per season.
- For best results apply when insect populations begin to build and before a damaging population becomes established. Select the appropriate rate depending on the development stage of the insect and level of infestation.

## How it Works:

*Movento* is a systemic, tetramic acid insecticide. Following application to plant foliage *Movento* moves through phloem and xylem to all plant tissues including new shoot, leaf and root growth. Mode of action is primarily by ingestion by immature insect life stages.

Insect death occurs due to the inability to progress to the next development stage. Adults produce less offspring following exposure.

## Restrictions:

- DO NOT apply this product directly to freshwater habitats (such as lakes, rivers, sloughs, ponds, creeks, marshes, streams, reservoirs and wetlands). DO NOT apply during periods of dead calm. Avoid application when winds are gusty. DO NOT apply droplets smaller than *American Society of Agricultural Engineers (ASABE) fine* classification. Boom height must be 60 cm or less above ground.
- **Re-Entry:** DO NOT enter or allow worker entry into treated areas for a period of 12 hours.
- **Re-cropping:** A plant back interval of 30 days is required for all crops not on the label.

## Environmental Hazards:

**Bees:** Toxic to bee brood. Bee brood may be exposed to residues in/on pollen and nectar brought back to the hive by bees foraging on flowering crops and weeds. DO NOT apply this product during crop flowering period or when flowering weeds are present in the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application when heavy rain is forecast.

**Others:** Toxic to certain beneficial insects.

**Hazard Rating:**

Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Nolo Bait

**Insecticide Group  
Biological Insecticide***Refer to page 600***Company:**

M&amp;R Durango, Inc. (PCP#29197)

**Formulations:**Wheat bran coated with spores of the protozoan *Nosema locustae*.Minimum of  $2.2 \times 10^6$  spores of *Nosema (Paranosema) locustae* Canning per gram.**Insects Controlled and Registered Crops:**

Crop	Insect
Crop and Rangeland	Grasshoppers

**Rates:**

- Apply at a minimum rate of 0.45 kg per acre.
- Consumption of a higher number of spores per grasshopper will increase product efficacy and decrease the amount of time required to kill grasshoppers. Where greater efficacy or faster population reduction is required, this may be achieved through multiple applications or a higher application rate to increase the amount of bait available to each grasshopper.

**Application:****Nolo Bait**

- For best results, apply when most grasshoppers are in the 3<sup>rd</sup> instar (12 to 19 mm long).
- Apply by hand, seed spreader, turbine spreader or airplane. Concentrate the application in areas of heaviest grasshopper infestation.

**How it Works:**

*Nolo Bait* must be consumed by the target insect to be effective. It infects the fat bodies of most species of grasshoppers and some crickets. Infection and sickness of the grasshopper begins upon ingestion of the bait by the grasshopper. As the *Nosema locustae* population increases inside the grasshopper it becomes lethargic, reduces its feeding and has lowered reproductive capacity. Grasshopper death will begin in 3 to 6 weeks. The pathogen may remain in the grasshopper population for several years following treatment.

**Restrictions:**

- **Pre-harvest interval:** 0
- **Storage:** Store product in original container in a cool, dry location (preferably at or below 20°C). Use within 13 weeks from the date of manufacture.

**Precautions:**

May cause sensitization. Avoid contact with skin, eyes, or clothing. Avoid breathing dust or spray mist.

**Environmental Hazards:**

**Aquatic organisms:** DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

**Hazard Rating:**

Caution – Potential sensitizer. Wheat allergen

For an explanation of the symbol used here see pages 7 and 8.

# Oberon

Insecticide Group

23

Refer to page 600

## Company:

Bayer (PCP#28905)

## Formulation:

240 g/L spiromesifen formulated as a suspension concentrate.

- Container sizes - 2 L jug

## Insects Controlled and Registered Crops:

Crop	Insect
Alfalfa (seed production only)	Two-spotted spider mite
Corn	Banks grass mite, two-spotted spider mite
Dry beans	Spider mites

## Application:

### *Oberon*

- May be applied by ground or air.
- Apply as soon as mite populations reach threshold levels. Repeat application if pest populations recover and reach economic thresholds. A minimum interval of 7 days between applications is required.
- Thorough coverage of all plant parts is important for optimum performance. Use sufficient water volumes for thorough coverage - i.e. minimum of 40 to 80 litres of water per acre.
- Avoid application when heavy rain is forecast.

## How it Works:

Spiromesifen is in the Tetrionic acid class of insecticides and works by contact, inhibiting lipid biosynthesis in the insect. *Oberon* has strong adhesion to the leaf surface, and also some translaminar activity providing residual control through contact or ingestion. *Oberon* has activity on all mite developmental stages. Immature mite stages tend to be more susceptible to *Oberon* than adults.

## Restrictions:

- Alfalfa – DO NOT exceed 3 applications per season. Keep a minimum interval of 7 days between applications. DO NOT exceed a maximum of 1200 ml per acre of *Oberon* per season. Corn – DO NOT exceed 2 applications per season. DO NOT exceed 240 mL per acre per 14 day interval. DO NOT exceed 480 mL per acre per season.
- DO NOT enter or allow entry into treated areas for a period of 12 hours after application.
- *Oberon* is toxic to aquatic organisms and beneficial insects such as pollinators. DO NOT apply this product directly to freshwater habitats such as lakes, rivers, sloughs, ponds, creeks, marshes, streams, reservoirs, ditches and wetlands.
- **Buffer Zones:**

Application method	Buffer Zones (metres <sup>†</sup> ) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground	10	3	2
Fixed wing airplane	800	100	85

See page 36 for an explanation of the different habitats.

- Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.
- † Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.
- DO NOT mix, load or clean equipment within 30 metres of wellheads or aquatic systems.

- **Rotational plant-back intervals for:**
  - Field corn – immediate plant back
  - Wheat, barley and alfalfa – 30 days
  - All other crops – 12 months

## Precautions:

**Storage:** Store in a cool, dry place in such a manner to prevent cross contamination with other pesticides, fertilizers, food and feed. DO NOT store below freezing.

## Environmental Hazards:

**Bees:** May be toxic to bee brood. Bee brood may be exposed to residues on pollen and nectar brought back to the hive by bees foraging on flowering crops and weeds. To minimize potential exposure to bees, avoid application if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application of this product when heavy rain is forecast.

**Others:** Toxic to certain beneficial insects.

## Hazard Rating:



Caution – Poison

Eye irritant

For an explanation of the symbol used here see pages 7 and 8.

# Orthene

**Insecticide Group**  
**1B**

*Refer to page 600*

## Company:

Arysta LifeScience Canada (PCP#14225)

## Formulation:

75% acephate as a water soluble powder.

- Container sizes - case of 12 x 1.5 kg

## Insects Controlled and Registered Crops:

Crop	Insect
Corn	Corn borer
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug

## Application:

### *Orthene*

- Apply with conventional ground equipment only. DO NOT apply by air. Apply only when insects exceed economic thresholds.
- Use higher rate only for heavy infestations.

## How it Works:

Acephate is an organophosphate systemic insecticide that works through contact and as a stomach poison.

## Effects of Weather:

DO NOT apply if rainfall is expected within 48 hours after application. Treatment areas should not be irrigated for at least 48 hours after application.

## Restrictions:

- **Storage:** Store in cool, dry place, in the original container away from food or feed. Protect from excessive heat.
- **DO NOT** feed foliage to livestock or allow animals to graze on treated areas. **DO NOT** make more than 4 applications per season.
- **Others:** *Orthene* is not registered in the United States. Therefore, *Orthene* should not be used on any produce destined for markets in the United States.

## Precautions:

**First Aid:** If swallowed, call a poison control centre immediately. In case of contact with skin, wash with soap and water. If in eyes, flush with water. See a physician if eye irritation persists. Atropine is an antidote.

## Environmental Hazards:

**Bees:** Toxic to bees exposed to direct treatment, drift or residues on flowering crops or weeds. **DO NOT** apply this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. *Orthene* has the potential to leach through soils to ground water. The use of this product may result in contamination of groundwater particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

**Others:** Toxic to birds and wild mammals. Applications may adversely affect birds and wildlife visiting the treatment area.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Permethrin

Insecticide Group  
**3A**

Refer to page 600

## Company:

FMC Corporation (*Pounce 384 EC* – PCP#16688)

United Phosphorous (*Perm-UP* – PCP#28877)

Ambac Chemical Corporation (*Ambush* – PCP#14882)

## Formulations:

*Pounce 384 EC*, *Perm-UP* - 384 g/L permethrin formulated as an emulsifiable concentrate.

- Container sizes - 1 L (12 x 1L), 2 X 10L

*Ambush* - 500 g/L permethrin formulated as an emulsifiable concentrate.

- Container sizes - 1 L, 5 L

## Insects Controlled and Registered Crops:

Crop	Insect
Cereals, corn, flax, lentil, pea, potato, sunflowers	Cutworms
Canola, rapeseed	Cutworms, crucifer flea beetle
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, variegated cutworm, European corn borer

## Application:

### Permethrin

- May be applied by ground or air. Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for heavy infestations, adult insects and dense foliage. For cutworm control application should be made under warm, moist conditions in the evening or at night. Use high rates if larvae are near maturity or soil conditions are dry. Do not disturb soil surface for five days after treatment.



## How it Works:

*Permethrin* is a synthetic pyrethroid insecticide. It is a stomach and contact insecticide with no systemic or fumigant effects.

## Tanks Mixes:

None registered. FMC supports the following mixes that are not on the *Pounce 384 EC* label. Apply mixes based on the most restrictive use limitations for either label: Glyphosate (up to 5 leaf stage canola), *Liberty 150 SN Herbicide* (up to 5 leaf stage canola), *Liberty 150 SN Herbicide* + *Centurion* (up to 5 leaf stage canola).

## Restrictions:

- **Grazing:** Cover crops or crops treated with *permethrin* should not be used as a green feed for animals.
- **Storage:** Store above 0°C.
- **Others:** Observe a 16 yard (15 m) setback distance for ground and 110 yard (100 m) setback distance by air near water bodies or other sensitive areas.

## Precautions:

*Permethrin* is of low acute mammalian toxicity.

## Environmental Hazards:

**Bees:** very toxic to bees; avoid spraying when bees are foraging. Spray deposit should be dry before bees commence foraging in treated crop.

**Aquatic organisms:** Highly toxic to fish and aquatic organisms. Do not contaminate ponds, lakes, streams or rivers during sprayer filling or rinsing operations or while spraying.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Rimon 10 EC

Insecticide Group

15

Refer to page 600

## Company:

Platform Specialty Products (PCP#28881)

## Formulation:

10% novaluron formulated as an emulsifiable concentrate.

## Insects Controlled and Registered Crops:

Crop	Insect
Alfalfa (for seed)	Lygus bug nymphs
Potato	Colorado potato beetle, European corn borer

## Application:

### *Rimon 10 EC*

- For ground application only.
- A minimum spray volume of 40 L / acre should be used with ground sprayer equipment. Higher water volumes will provide better coverage and product performance.
- Use hollow cone, disc-core hollow cone or twin jet nozzles suitable for Insecticide spraying. Drop nozzles may be required to obtain uniform coverage against certain insect pests that develop down in the canopy. Use higher application rates and spray volumes for higher insect pressure.

- Colorado potato beetle - Application should be made when the majority of the population is at egg hatch to the second instar of larval development.
- European corn borer - Scout for European corn borer to monitor egg-laying and egg hatch to determine timing of application. The first application should be made just prior to egg hatch.
- Re-application on a 10 to 14 day interval will be required to protect new growth or if monitoring indicates that it is necessary to keep pest populations below economic thresholds.

## How it Works:

*Rimon 10 EC* is an insect growth regulator that must be absorbed by eggs or ingested by insect larvae to be fully effective. The primary mode of action is by disrupting cuticle formation and deposition occurring when insects change from one developmental stage to another, resulting in death at molting. Due to this mode of action, *Rimon 10 EC* does not have any effect on adult stages of insects that have completed larval development.

## Restrictions:

- DO NOT make more than 2 applications per year per crop per season. DO NOT apply more than 656 ml of *Rimon 10 EC* per acre per season. DO NOT apply within 14 days of harvest (Pre-harvest interval).

## Precautions:

- **Re-entry period (REI):** DO NOT re-enter treated areas for a period of 12 hours after application.
- **Buffer Zone:** An untreated buffer zone between the last spray swath and the edge of aquatic systems (such as rivers, streams, lakes, and other water bodies) must be established. Refer to label for specific buffer zone requirements.
- **Storage:** To prevent contamination, store this product away from food or feed.

If this product is to be applied to a product destined for export to the United States, information on acceptable residue levels are available at [www.croplife.ca](http://www.croplife.ca).

## Environmental Hazards:

**Bees:** May be toxic to bee colonies exposed to direct treatment, drift, or residues on flowering crops or weeds. Avoid applying this product to flowering crops or weeds if bees are visiting the treatment area.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application of this product when heavy rain is forecast. DO NOT apply directly to water or to areas where surface water is present.

**Others:** *Rimon 10 EC* is toxic to immature insects. Minimize spray drift in habitats next to the application site (e.g. hedgerows and woodlands) to reduce harmful effects on beneficial insects.

## Hazard Rating:



Warning - May cause substantial but temporary eye injury. Harmful if absorbed through skin.  
DO NOT get on eyes or clothing.  
Keep out of Reach of Children.

For an explanation of the symbol used here see pages 7 and 8.

# Sefina

## Insecticide Group

9

Refer to page 600

## Company:

BASF (PCP#33265)

## Formulation:

50 g/L afidopyropen formulated as a disperable concentrate.

- Container sizes - 0.1 L to 1,000 L

## Insects Controlled and Registered Crops:

Crop	Insect
Soybean	Soybean aphid
Potato	Aphids
Dry beans	Spider mites

## Application:

### *Sefina*

- May be applied by ground or air.
- Apply *Sefina* at rates listed in the crop specific application rate tables when insect thresholds are reached. Ensure adequate water volumes are used for optimum coverage.
- **Soybean and Potato:**
  - **Ground** – Apply in a minimum of 40.5-81 L of water per acre.
  - **Air** – Apply in a minimum of 20.2 L of water per acre.

## How it Works:

*Sefina* is classified as an IRAC Group 9D insecticide with no known cross resistance to other chemistries. It is a contact insecticide that stops aphid feeding quickly and can provide control for up to 21 days.

## Effects of Weather:

Apply only when meteorological conditions at the treatment site allow for complete and even crop coverage. DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty. This product has the potential for run-off. Avoid application when heavy rain is forecast.

## Restrictions:

- **Re-entry Interval (REI):** DO NOT enter or allow worker entry into treated areas for a period of 12 hours after application.
- **Storage:** Store the leftover product in original tightly closed container. DO NOT ship or store the product near food, feed, seed and fertilizers. Store the product in cool, dry, locked, well-ventilated area without floor drain.
- **Others:**
  - DO NOT apply more than a maximum seasonal rate of 1 L/ac (potato) or 0.16 L/ac (soybean). DO NOT apply within 7 days of harvest.
  - DO NOT feed or graze soybean hay or forage.

## Precautions:

A Vegetative Filter Strip (VFS) of at least 10 metres wide must be observed. The VFS is required between the field edge and adjacent, downhill aquatic habitats to reduce risk to aquatic organisms from run-off. The VFS is to be composed of grasses and may also include shrubs, trees, or other vegetation.

Allow a minimum of 7 days between applications.

- **Buffer Zones:**

Application method	Crop		Buffer Zones (metres) Required for the Protection of:	
			Freshwater Habitat of Depths:	
			Less than 1 m	Greater than 1 m
Ground*	Soybean		1	1
	Potato		3	2
Aerial	Soybean	Fixed wing	10	1
		Rotary wing	10	1
	Potato	Fixed wing	75	25
		Rotary wing	65	20

## Environmental Hazards:

**Bees:** Application during the crop blooming period may be made only in the evening when most bees are not foraging. Minimize spray drift to reduce exposure to bees in habitats close to the application site.

**Aquatic organisms:** Toxic to aquatic organisms. Observe buffer zones and vegetative filter strips specified under directions for use.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Sevin XLR

Insecticide Group

1A

Refer to page 600

## Company:

Tessenderlo Kerley, Inc. (PCP#27876)

Distributed by Univar Canada Ltd.

## Formulation:

466 g carbaryl per litre formulated as a liquid suspension.

## Insects Controlled and Registered Crops:

Crop	Insect
Beans	Leafhoppers, lygus bugs, climbing cutworms
Canola	Flea beetles
Forage grasses	Grasshoppers
Ditchbanks, field borders, headlands, pastures, rangelands, rights-of-way, wastelands	Grasshoppers
Peas	Alfalfa looper
Potato	Colorado potato beetle, flea beetle, leafhopper, European corn borer, climbing cutworms

## Application:

- Ground application only, except for canola.
- For grasshoppers, lower rates can be used for nymphs or sparse vegetation, and higher rates for adults and application to dense vegetation.
- In canola, applications can be made up to 4 weeks following plant emergence.

## How it Works:

*Sevin XLR* is a carbamate insecticide that works by contact and ingestion.

## Restrictions:

- **Storage:** DO NOT store in areas where temperatures frequently exceed 38°C. Store in original container in a cool dry area out of reach of children and animals and away from food and feed.
- **Restricted-Entry Intervals:**
  - *Beans* – 7 days for high contact activities such as scouting
  - *Canola* – 0.5 days
  - *Forage grasses and pastures* – 2 days
  - *Potatoes* – 0.5 to 6 days depending on the activity (see label).
- **Number of applications per year:** maximum of 2 applications per year in canola, beans, and potatoes.

## Environmental Hazards:

**Bees:** This product is highly toxic to honey bees exposed to direct treatment on blooming crops or weeds. For applications on crops that are highly attractive to pollinators DO NOT apply during the crop blooming period.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application of this product when heavy rain is forecast.

**Plants:** To avoid possible injury to tender foliage, do not apply to wet foliage or when rain or high humidity is expected during the next two days. *Sevin XLR* injures Boston ivy, Virginia creeper and Maidenhair fern.

**Others:** Toxic to birds and mammals.

## Hazard Rating:



Warning – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Sivanto Prime

Insecticide Group  
4D

Refer to page 600

## Company:

Bayer Inc. (PCP#31452)

## Active Ingredient:

Flupyradifurone

## Formulation:

200 g Flupyradifurone per litre formulated as a liquid suspension.

- Container size - 2 L

## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Aphids, leafhoppers, whiteflies, Colorado potato beetle
Corn	Aphids
Alfalfa (forage, silage and hay production only)	Aphids, leafhoppers

## Application:

- Apply once the target pest population has reached economic threshold according to local recommendations.
- DO NOT apply within 1 hour of rain. Avoid application when heavy rain is forecast.
- **Potato:**
  - **Application interval** – 10 days
  - **Ground** – Apply as a directed foliar spray ensuring thorough coverage. Minimum 40 L/ac.
  - **Air** – Minimum 8 L/ac. DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty.
  - **Pre-harvest interval** – 7 days
  - **Grazing interval** – DO NOT graze.
- **Corn:**
  - **Application interval** – 7 days
  - **Ground** – Apply as a directed foliar spray ensuring thorough coverage. Minimum 40 L/ac.
  - **Air** – Minimum 8 L/ac. Do not apply during periods of dead calm. Avoid application of this product when winds are gusty.
  - **Pre-harvest interval** – 7 days – sweet corn, forage, silage, hay cutting; 21 days – grain, stover
  - **Grazing interval** – 7 days
- **Alfalfa (forage, silage and hay production only):**
  - **Application interval** – 10 days
  - **Ground** – Minimum 40 L/ac
  - **Pre-harvest interval** – 7 days
  - **Grazing interval** – 7 days

How it Works:

Sivanto Prime is a broad spectrum systemic insecticide that works by contact and ingestion.

Restrictions:

- **Storage:** Store in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, and feed
- **Restricted-Entry Intervals:** 12 hours.
- **Number of applications per year:** maximum of 809 ml/ac per year.

Tank Mixes:

DO NOT tank mix with azole fungicides during bloom.

Buffer Zones:

Application method	Crop		Buffer Zones (metres) Required for the Protection of:			
			Freshwater Habitat of Depths:		Estuarine/Marine Habitats of Depths:	
			Less than 1 m	Greater than 1 m	Less than 1 m	Greater than 1 m
Ground*	Potatoes, corn, alfalfa		1	1	1	1
Aerial	Potatoes and corn	Fixed wing	10	1	5	1
		Rotary wing	5	1	1	1

For tank mixes, consult the labels of the tank-mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture and apply using the coarsest spray (ASAE) category indicated on the labels for those tank mix partners.

Environmental Hazards:

**Bees:** Toxic to adult bees in laboratory studies via oral exposure; however, not toxic to bees through contact exposure, and field studies conducted with this product have shown no effects on honeybee colony development. Minimize spray drift to reduce exposure to bees in habitats close to the application site. Application during the crop blooming period, and when flowering weeds are present may only be made in the early morning and the evening when most bees are not foraging. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.

**Aquatic organisms:** Toxic to aquatic organisms. The buffer zones for this product can be modified based on weather conditions and spray equipment configuration by accessing the Buffer Zone Calculator on the Pest Management Regulatory Agency website.

**Others:** Sivanto Prime is of low acute mammalian toxicity. Toxic to certain beneficial insects.

Hazard Rating:

 Warning – May cause an allergic skin reaction. Harmful if inhaled.

For an explanation of the symbol used here see pages 7 and 8.

Sluggo Professional

Molluscicide –  
no group  
Refer to page 600

Company:

Engage Agro Corporation (PCP#30025)

Formulation:

0.76 % ferric phosphate in a granular formulation.

- Container sizes - 5, 25 kg bags

## Insects Controlled and Registered Crops:

Crop	Insect
Field crops	Slugs and snails

## Rates:

Apply bait evenly at a rate of 4.9 to 20.2 kg / acre (1.2 to 5 g per square metre).

## Application:

### *Sluggo*

- Apply in the evening as slugs and snails travel and feed mostly at night or early morning. DO NOT place in piles. For best results the ground should be moist but with little or no standing water.
- For broadcast application, standard broadcast spreaders may be used. For row application, standard granular spreaders may be used.
- At seeding and later stages, apply the bait between rows and around the perimeter of the field. Treating around the perimeter of crop areas may intercept slugs or snails migrating from daytime refuge sites.
- Apply at the higher rate within the recommended rate range if the infestation is severe, if the area is heavily watered or after long periods of heavy rain.
- Re-apply as the bait is consumed or at least every two weeks if slugs and snails continue to be a problem.

## How it Works:

*Sluggo* must be consumed by the slugs or snails to be effective. After ingesting the bait, slugs and snails stop feeding providing immediate protection to plants. Affected slugs and snails die within 3 to 6 days.

## Precautions:

Avoid contact with eyes. May cause eye irritation.

Wear chemical resistant gloves during mixing and loading activities and when applying by hand.

## Environmental Hazards:

**Aquatic organisms:** This product may be toxic to fish and other aquatic organisms. Avoid direct application to ponds, streams and lakes.

## Hazard Rating:



Warning – contains the allergen wheat

For an explanation of the symbol used here see pages 7 and 8.

# Success 480 SC

Insecticide Group  
5

Refer to page 600

## Company:

Corteva Agriscience (PCP#26835)

## Formulation:

480 g/L spinosad formulated as a suspension concentrate.

- Container sizes - 1L jug

## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Colorado potato beetle larvae and European corn borer larvae

## Application:

### Success 480 SC

- Apply as a foliar spray by ground only. DO NOT apply by air. Apply when scouting indicates the target pest species have reached economic threshold levels. For Colorado potato beetle, target eggs at hatch or small larvae. For control of European corn borer, time the application to coincide with peak egg hatch. Use higher application rate for higher pest pressure or when extended egg hatch is anticipated. If pest populations persist, a repeat application 7 to 10 days after the initial application may be necessary.

## How it Works:

Success 480 SC is in the spinosyn class of insecticides. It is a contact and stomach insecticide. It is derived from the fermentation of *Saccharopolyspora spinosa*.

## Effects of Weather:

This product has the potential for run-off. DO NOT spray immediately after a rainfall or if rain is forecast within 48 hours after application.

## Restrictions:

- **Re-entry Interval (REI):** DO NOT enter or allow worker entry into treated areas for a period of 4 hours after application.
- **Storage:** Avoid freezing. DO NOT store or ship with food, feeds, drugs or clothing.
- **Others:**
  - Potatoes - DO NOT apply more than a maximum seasonal rate of 100 ml/acre. DO NOT apply within 7 days of harvest.

## Precautions:

**Buffer Zones:** A buffer zone of 2 metres (early season) or 1 metre (late season) is required between downwind edge of spray boom and sensitive aquatic habitats. Avoid contact with eyes, skin, and clothing.

## Environmental Hazards:

**Bees:** Highly toxic to bees exposed to direct treatment, drift or residues on blooming plants. Do not apply this product or allow it to drift to blooming plants if bees are visiting the treatment area.

**Aquatic organisms:** Highly toxic to aquatic invertebrates. Do not contaminate aquatic habitats, such as lakes, rivers, sloughs, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands, when cleaning and rinsing spray equipment or containers.

**Others:** Harmful to parasitoids and predatory mites and slightly harmful to foliage-dwelling predators.

## Hazard Rating:



Caution – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Superior 70 Oil

Insecticide Group  
NA

Refer to page 600

## Company:

Loveland Products Canada Inc. (Superior 70 Oil – PCP#14981)

N.M. Bartlett Inc. (Superior “70” Oil – PCP#9542)

## Formulation:

Mineral Oil, 99%, emulsifiable concentrate.

- Container sizes - 10 L, 200 L and 1000 L



## Insects Controlled and Registered Crops:

Crop	Pest	Application Timing:
Potato	Reduce the spread of Potato Virus Y (PVY) transmitted by aphids.	Max – 10 applications when aphids first appear; Pre-harvest interval: 14 days.

## Application:

### *Superior 70 Oil*

- Ground application only. DO NOT apply by air.
- DO NOT use the spray mixture before the oil has been properly emulsified. Spray at one week intervals as soon as aphid vectors are present.
- Thorough coverage of the plants is essential. Apply at a 10% rate (e.g. 10L per 1000L water). Boom height must be 60 cm or less above ground or crop canopy.

## How it Works:

The mineral oil reduces the spread of potato virus Y (PVY) disease vectored by aphids. The mineral oil does not kill the aphids.

## Tank Mixes:

None registered. Do not mix with dinitro compounds, fungicides such as Captan, Maestro, Folpet, Karathane, Morestand, Wettable Sulphur or any other product containing sulphur, or the insecticide Sevin.

## Effects of Weather:

Avoid application when heavy rain is forecast.

DO NOT apply on drought stressed plants, in hot sun or when there is a risk of freezing temperatures.

DO NOT apply during periods of dead calm. DO NOT apply when winds are gusty or wind speed is greater than 16 km/h.

## Restrictions:

- **Maximum number of applications:** 10 per season
- **Re-entry Interval (REI):** Do not re-enter treated areas within 12 hours of application.
- **Pre-harvest interval (PHI):** 14 days
- **Storage:** Store in original tightly closed container in a cool dry, well-ventilated area away from feed and foodstuffs. DO NOT store below 0°C.

## Precautions:

DO NOT use within 30 days before or after using Sulfur.

## Environmental Hazards:

**Aquatic organisms:** DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

## Hazard Rating:



Danger – Poison, Eye irritant

For an explanation of the symbol used here see pages 7 and 8.

# Thimet 20G

Insecticide Group  
**1B**

Refer to page 600

## Company:

Amvac Chemical Corporation (PCP#29000)

This product is ONLY for retail sale to and use by individuals holding an appropriate provincial pesticide applicator certificate or license.

## Formulation:

20% phorate formulated as a granular.

- Container sizes - 20 kg bag

## Insects Controlled and Registered Crops:

Crop	Insect
Potato	Reduction of wireworm damage

## Application:

### Thimet 20G

- Ground application only at seeding time: This is a restricted product and can only be applied with a *SmartBox* pesticide application system properly calibrated to ensure accurate placement and rate. Distribute granules evenly in furrow at planting time only. Use low rate for sandy or light soils and high rate for silt or heavy soils. For use ONLY in potato fields where wireworm populations have been observed.

## How it Works:

Phorate is an organophosphate insecticide that works as a systemic poison, with effective initial residual activity on soil and foliar insects.

## Restrictions:

- DO NOT apply *Thimet* more than once per season.
- DO NOT apply *Thimet* to saturated soils or in wet conditions that may prevent the equipment from covering pesticide granules. DO NOT apply while precipitation is occurring and conducive to run-off from treated areas. DO NOT apply if intense or sustained precipitation is forecast to occur within 48 hours as this will favour run-off.
- Leave a 20 metre (66 feet) buffer area if used on highly erodable land adjacent to aquatic bodies. DO NOT apply within 15 metres (50 feet) of any drinking water well.
- **Storage:** DO NOT store in or around the home. Store away from food or feed. Store open bags in labeled sealed drums or heavy plastic bags.
- **Others:** DO NOT use in muck soils. DO NOT apply later than at planting time. Will provide reduction of wireworm damage.
- DO NOT use on muck soils.
- A plant-back interval of 6 months is required for all crops except potatoes and legume is required. A plant-back interval of 12 months is required for legume vegetables. There is no plant back restriction for potatoes.
- DO NOT enter or allow workers to enter into treated areas for a period of 48 hours. DO NOT harvest potatoes before 90 days after planting time.

## Precautions:

*Thimet* is of high acute mammalian toxicity. DO NOT allow product to contact eyes and skin. Poisonous by skin contact, inhalation or swallowing. DO NOT breath dust. Repeated inhalation or skin contact with *Thimet 20G*, other organophosphorus or carbamate insecticides may, without symptoms, progressively increase susceptibility to poisoning. Wear freshly-laundered, long-sleeved work clothing daily. DO NOT handle *Thimet* with bare hands. Use rubber gloves when transferring from package to equipment. Sleeve cuffs should be worn over gloves to prevent granules from falling into the gloves. Rubber gloves should be washed with soap and water after each use. Destroy and replace gloves frequently. In case of contact, immediately remove contaminated clothing and wash skin thoroughly with soap and water.

## Environmental Hazards:

**Aquatic organisms:** Toxic to aquatic organisms. Do not apply while precipitation conducive to runoff is occurring or while conditions favor runoff from the treated area. Do not apply when forecasted precipitation event favors runoff from treated area.

**Others:** Toxic to earthworms. Toxic to birds and small wild mammals. Any spilled or exposed granules must be incorporated into the soil or otherwise cleaned-up from the soil surface. One granule is sufficient to kill a small bird or small mammal.

## Hazard Rating:



Danger – Poison

For an explanation of the symbol used here see pages 7 and 8.

# Voliam Xpress

Insecticide Group

3, 28

Refer to page 600

## Company:

Syngenta Canada Inc. (PCP#30325)

## Formulation:

50 g/L lambda-cyhalothrin and 100 g/L chlorantraniliprole formulated as a suspension concentrate

- Container size – 4 x 3.78 L pack

## Insects Controlled and Registered Crops:

Crop	Insect
Bean, chickpea, faba bean, lentil, pea, soybean	Aphids, armyworms, cabbage looper, corn earworm, European corn borer, grasshoppers, Lygus bugs, pea leaf weevil, potato leafhopper
Canola, rapeseed, mustard (seed and condiment), sunflower	Bertha armyworm, cabbage looper, cabbage seedpod weevil, imported cabbageworm, diamondback moth, flea beetles, grasshoppers, Lygus bugs, sunflower beetle
Corn	Armyworm, corn earworm, European corn borer
Potato	Cutworms, corn earworm, beet armyworm, leafminers, psyllids
Safflower	Grasshoppers
Flax	Armyworms, grasshoppers, Lygus bugs

## Application:

### Voliam Xpress

- May be applied by ground or air.
- Timing of applications should target the pest and when populations are in a damaging life stage and at economic levels. Ensure adequate water volumes are used for optimum coverage.
- **Potatoes and Corn**
  - **Ground** – Apply in a minimum of 60 L of water per acre.
  - **Air** – Apply in a minimum of 16 L of water per acre.
- **Bean, chickpea, faba bean, lentil, pea, soybean, canola, rapeseed, mustard (seed and condiment), sunflower** –  
**Apply when insect feeding is first seen on foliage. Reapply after 7 days if populations reach economic threshold levels.**
  - **Ground** – Apply with a minimum of 40 – 80 L water per acre.
  - **Air** – Apply with a minimum of 16 L of water per acre.

## How it Works:

*Voliam Xpress* insecticide works through contact and ingestion. It provides rapid knockdown and residual control of Lepidopteran (e.g. moth larvae) and sucking and chewing insects. After foliar application most of the insecticide stays on the leaf surface with a small amount penetrating into the leaf tissue. Initial and residual control is dependent on thorough coverage of the crop. *Voliam Xpress* is most effective against early developmental stages of surface feeding insects and adults of pest that deposit eggs within plant parts. Insecticide components: lambda-cyhalothrin is a synthetic pyrethroid insecticide and chlorantraniliprole is a diamide insecticide.

## Restrictions:

- DO NOT make a foliar application of *Voliam Xpress* for a minimum of 60 days following an in-furrow or soil application or planting of seed treated with any Group 28 insecticide.
- **Bean, chickpea, lentil, pea, soybean**
  - **Ground** – DO NOT apply more than 3 times per season
  - **Air** – DO NOT apply more than once per season.
  - DO NOT graze or harvest treated forage, straw or hay for livestock feed. A 7 day interval is required between applications.
  - **Pre-harvest interval** – 14 days except – Soybean pre-harvest interval – 21 days.
  - DO NOT exceed the following amount of product per season. This includes *Voliam Xpress* as well as other Group 3 and/or Group 28 insecticides. Consult the label of other products containing these active ingredients prior to treatment to ensure the annual maximum is not exceeded:
    - 90 g chlorantraniliprole per acre by ground or aerial application and;
    - 30 g lambda-cyhalothrin per acre by ground application or;
    - 10 g lambda-cyhalothrin per acre by air

- **Canola, rapeseed, mustard (seed and condiment), sunflower**
  - **Application interval** – 7 days
  - **Pre-harvest interval** – 7 days
  - Make only 1 application per season by either ground or air for cabbage seedpod weevil. DO NOT make more than 3 applications per season by ground application
  - DO NOT make more than 1 application per season by air
- **Corn**
  - DO NOT make more than 2 applications of *Voliam Xpress* per year.
  - **Application interval** – 7 days
  - **Pre-harvest interval** – 14 days if crop is harvested for silage and 21 days for field corn.  
DO NOT exceed – 90 g chlorantraniliprole per acre by ground or aerial application and;
    - 27.6 g lambda-cyhalothrin per acre by ground application or;
    - 20 g lambda-cyhalothrin per acre by air
- **Potato**
  - DO NOT apply *Voliam Xpress Insecticide*, which contains a Group 28 insecticide, following a seed piece, in-furrow, or soil application of any Group 28 insecticide.
  - DO NOT make more than 2 applications of *Voliam Xpress* per year.
  - **Application interval** – 7 days
  - **Pre-harvest interval** – 7 days
- **Buffer Zones:** – The buffer zones specified in the table below are required between the point of direct application of *Voliam Xpress* and the closest downwind edge of sensitive freshwater habitats (e.g. lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands). Spray drift buffer zones can be modified based on weather conditions and spray equipment.

Method of Application	Crop	Freshwater habitat Less than 1 metre	Freshwater habitat Greater than 1 metre
Ground sprayer	Corn, potato, canola, mustard, sunflower	15	15
Aerial (fixed wing)	Corn, potato	225	25
Aerial (fixed wing)	Bean, chickpea, faba bean, lentil, pea, soybean	100	15
Aerial (fixed wing)	Canola, mustard, Sunflower	45	10

## Precautions:

DO NOT apply during periods of dead calm or when winds are gusty.

Avoid application at temperatures above 25 degrees C. Control of insects may be reduced at higher temperatures. DO NOT enter or allow entry into treated areas for a period of 24 hours after application of *Voliam Xpress*.

If *Voliam Xpress* is to be applied to a commodity destined for export to the United States, visit Crop Life Canada's website [www.croplife.ca](http://www.croplife.ca) for information on acceptable residue limits.

**Storage:** Do not use or store in or around the home. Store unused product away from feeds, seeds, fertilizer, plants and foodstuffs. *Voliam Xpress* must be stored above freezing.

In pulse crops (pea, lentil, chickpea, beans and faba beans) if applied according to label rates early in the crop year at a vegetative stage or during flowering there is no need for MRL concerns. In cases of later application during pod development or seed fill to maturity (e.g. late season grasshopper control), consult with your exporter / processor.

## Environmental Hazards:

**Bees:** Toxic to bees when exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Spray deposits should be dry before bees commence foraging in treated crop.

**Aquatic organisms:** Toxic to aquatic organisms. Avoid application when heavy rain is forecast. The use of this product may result in contamination of groundwater, particularly in areas where soil is permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

**Others:** Toxic to certain beneficial insects.

## Hazard Rating:



Danger – Poison

Potential skin sensitizer

For an explanation of the symbol used here see pages 7 and 8.

## Weatheradio Canada

Weatheradio is a network of radio stations operated by the weather service of Environment Canada that transmits weather information continuously over VHF-FM radio. The service operates 24 hours each day, seven days a week, providing up-to-the minute weather forecasts and reports detailed to each broadcast area.

Weatheradio is transmitted from 14 locations in Saskatchewan:

- Estevan, Fort Qu'Appelle, Prince Albert, Stranraer, Regina Beach, Lanigan and Waseca on frequency 162.400;
- Regina, Swift Current, Yorkton and Saskatoon at 162.550 (Medicine Hat west of Maple Creek); and
- North Battleford, Lake Diefenbaker (Elbow) and Broadview at 162.475.

## Meteorological Service of Canada

### Weather One-on-One Service

(charge to phone) 1-900-565-5555

(charge to credit card) 1-888-292-2222

### Weather Information

Broadview	306-696-2229
Estevan	306-634-2833
Hudson Bay	306-865-2721
Lanigan	306-365-3011
Lloydminster	780-875-7709
Medicine Hat, AB	403-526-0483
North Battleford	306-445-7000
Prince Albert	306-929-2114
Regina	306-780-5744
Saskatoon	306-975-4266
Swift Current	306-773-5599
Whitewood	306-735-2928
Yorkton	306-782-1511

### Severe Weather Reporting and Weather Awareness

Call toll free 1-800-239-0484

## DriftWatch

In Saskatchewan, commercial beekeepers and producers with sensitive crop areas are encouraged to register locations on DriftWatch: <https://sk.driftwatch.org/map>. This tool is intended to aid identifying areas especially sensitive to pesticide drift for reference by commercial pesticide applicators.

[www.fieldwatch.com](http://www.fieldwatch.com); [www.driftwatch.org](http://www.driftwatch.org).

## Crop Protection Companies

### ADAMA Canada

[www.adama.com](http://www.adama.com)  
1-855-264-6262

### Allbaugh LLC / Agri Star

[www.albaughllc.ca](http://www.albaughllc.ca)  
1-877-924-9378

### Arysta LifeScience

[www.arysta-na.com/ca](http://www.arysta-na.com/ca)  
1-866-761-9397

### BASF

[www.basf.ca](http://www.basf.ca)  
1-877-371-2273

### Bayer\*

[www.bayercropscience.ca](http://www.bayercropscience.ca)  
[www.monsanto.ca](http://www.monsanto.ca)  
1-888-283-6847

### Degesch America Inc.

[www.degeschamerica.com](http://www.degeschamerica.com)  
1-800-330-2525

### Corteva Agri-Science

[www.corteva.ca](http://www.corteva.ca)  
1-800-667-3852

### Engage Agro

[www.engageagro.com](http://www.engageagro.com)  
1-866-613-3336

### AgraCity Crop & Nutrition

[www.agracity.com](http://www.agracity.com)  
1-844-269-3276

### FMC Canada

[www.fmccrop.ca](http://www.fmccrop.ca)  
1-833-362-7722

### Gowan Canada

<http://ca.gowanco.com>  
1-800-883-1844 ext. 2

### Great Northern Growers

[www.gng.ag](http://www.gng.ag)  
1-866-727-5226

### Heads Up Plant Protectants Inc.

[www.headsupst.com](http://www.headsupst.com)  
1-866-368-9306

### Hedley Technologies

[www.hedleytech.com](http://www.hedleytech.com)  
1-888-476-4473

### IPCO

[www.ipco.ca](http://www.ipco.ca)  
1-204-233-3461

### Loveland Products Canada

[www.lovelandproducts.ca](http://www.lovelandproducts.ca)  
1-800-328-4678

### Norac Concepts

[www.noracconcepts.com](http://www.noracconcepts.com)  
1-519-821-3633

### Nufarm Agriculture

[www2.nufarm.com/ca](http://www2.nufarm.com/ca)  
1-800-868-5444

### Nova Source

[www.novasource.com](http://www.novasource.com)  
1-800-525-2803

### Peacock Industries

[www.grasshoppercontrol.com](http://www.grasshoppercontrol.com)  
306-225-4691

### Rotam North America

[www.rotamnorthamerica.com](http://www.rotamnorthamerica.com)  
1-866-927-6826

### Sharda CropChem

[www.shardacropchem.com](http://www.shardacropchem.com)  
1-888-931-2530

### Syngenta Canada

[www.syngenta.ca](http://www.syngenta.ca)  
1-877-964-3682

### United Phosphorus Inc. (UPI)

[www.upi-usa.com/canada](http://www.upi-usa.com/canada)  
1-800-438-6071

### Univar Canada

[www.univarag.com](http://www.univarag.com)  
1-844-963-8967

### United Agri Products Canada

[www.uap.ca](http://www.uap.ca)  
1-800-561-5444

### Valent BioSciences

[www.valent.ca](http://www.valent.ca)  
1-800-868-5444

### Winfield United

[www.winfieldunited.ca](http://www.winfieldunited.ca)  
1-888-975-4769

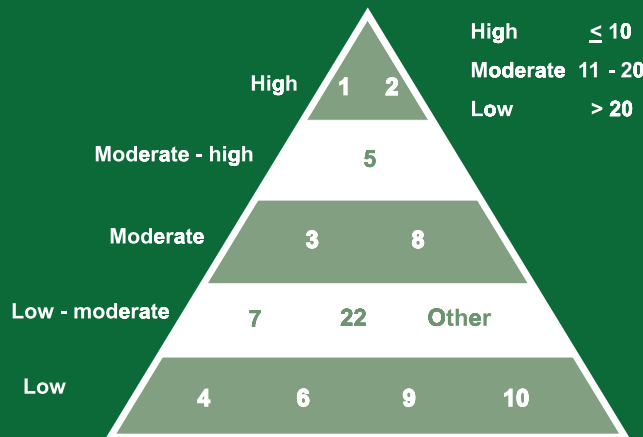
\* For information on former Monsanto products, see the old Monsanto website. Note: this website may become unavailable in the future.

# HERBICIDE ROTATION – 2019

Resistance to a pesticide group will reduce the effectiveness of pesticides in that group over time. Rotation of herbicides and other pesticides is an important measure to delay the onset of resistance to any one pesticide group or mode-of-action.

By rotating herbicides, the risk of developing widespread resistance over a field drops. The illustration below gives a relative ranking of the risk of developing herbicide resistance from repeated use of herbicides from that particular resistance group. The top of the triangle indicates groups that may develop resistance quickly. Those at the bottom of the triangle have demonstrated a low risk of resistance developing over long-term use. Be aware that low risk does not mean no risk, since weeds have developed resistance to herbicides in these groups, as well.

## Herbicide Resistance Development Risk Based on Number of Applications



**Classification of herbicide group numbers by risk of selection for weed resistance**  
 ('Other': all other herbicide groups that pose a low or moderate risk)

Adapted from Beckie, H. J., 2006 *Herbicide Resistant Weeds: Management Tactics & Practices*  
 Weed Technology Vol. 20 Issue 3 (July-September) pp. 793-814

## Rotation of Herbicides to Prevent Resistance

See "Trade Names, Active Ingredients and Formulations" chart in the introduction chapter for a complete list of products containing these active ingredients.

### OTHER GROUPS

linuron (7), amitrol (11), diflufenzopyr (19),  
 diclobenil (20), quinclorac (26 - grassy weeds)

### GROUP 27

pyrasulfotole, topramezone

### GROUP 22

diquat, paraquat

### GROUP 15

dimethanamid, metolachlor,  
 pyroxasulfone

### GROUP 14

(Grass & Broadleaf control)  
 acifluorfen, carfentrazone, flumioxazin,  
 fomesafen, pyraflufen, saflufenacil,  
 sulfentrazone

### GROUP 10

glufosinate

### GROUP 9

(Grass & Broadleaf control)  
 glyphosate

### GROUP 8

(Grass & Broadleaf control)  
 EPTC, triallate

**GROUP 1** (Grass Control)  
 clethodim, clodinafop, fenoxaprop,  
 pinoxaden, quizalofop, sethoxydim,  
 tralkoxydim

### GROUP 2

(Grass & Broadleaf control)  
 ethametsulfuron, foramsulfuron, florasulam, flucarbazone,  
 halosulfuron, imazamethabenz, imazamox, imazapyr, im-  
 azethapyr, metsulfuron, nicosulfuron, pyroxsulam, rimsulfu-  
 ron, thiencarbazone, thifensulfuron, tribenuron

### GROUP 3

(Grass & Broadleaf control)  
 ethalfluralin, propyzamide, trifluralin

### GROUP 4

(Broadleaf Control)  
 2,4-D, 2,4-DB, aminocyclopyrachlor, aminopyralid,  
 clopyralid, dicamba, dichlorprop, fluroxypyr, halauxifen,  
 MCPA, MCPB, mecoprop-p, picloram, quinclorac

### GROUP 5

(Grass & Broadleaf control)  
 atrazine, hexazinone, metribuzin,  
 simazine

### GROUP 6

(Broadleaf Control)  
 bentazon, bromoxynil

