Agriculture Development Fund (ADF) Crops Projects 2025

- **53** crops projects were funded by ADF for a total of $**9,438,402.**
- **10** industry partners co-funded a total of **$5,359,924.**

Institution	Number of Approved Projects	Total Amount Funded
Agriculture and Agri-Food Canada	17	$3,303,041
Biorimor Biosciences Inc.	1	$153,000
Canadian Grain Commission	1	$132,825
GS Dunn	1	$175,500
Insight Plant Health Corp.	1	$49,500
National Research Council Canada	4	$765,132
Prairie Agricultural Machinery Institute - PAMI	1	$50,000
Royal Saskatchewan Museum	1	$120,000
Saskatchewan Food Industry Development Centre	1	$240,000
University of Manitoba	1	$195,000
University of Regina	1	$75,000
University of Saskatchewan	23	$4,179,404
Total Government Support	**53**	**$9,438,402**

Topic	Number of Approved Projects	Total Amount Funded
Cereals	16	$3,280,682
Environment	3	$395,343
Forages	2	$383,500
Oilseeds	6	$903,938
Pulses	15	$2,644,369
Vegetables	1	$240,000
Other/Multiple Crops	10	$1,590,570
Total Government Support	**53**	**$9,438,402**

Crops Project Co-funders	Number of Approved Projects	Total Amount Funded
Alberta Grains	9	$224,761
Alberta Pulse Growers	1	$39,519
Manitoba Crop Alliance	8	$288,412
Mustard 21 Canada	1	$50,000
Saskatchewan Barley Development Commission	1	$54,691
Saskatchewan Forage Seed Development Commission	1	$2,000
Saskatchewan Oilseeds Development Commission	5	$374,421
Saskatchewan Pulse Growers	14	$1,295,885
Saskatchewan Wheat Development Commission	15	$1,264,728
Western Grains Research Foundation	15	$1,760,507
Total Industry Support	**33[1]**	**$5,359,924**

[1]-A total of 33 projects received co-funding support. Some projects were co-funded by more than one co-funder.

Agriculture and Agri-Food Canada

Methods for assaying recombination in crop plants, detecting impact on a 'stressed' genome. *(20240606)*

Principal Investigator: Isobel Parkin, Agriculture and Agri-Food Canada

- The project, if successfully executed, will develop a rapid method for assessing recombination events in canola and provide information on variation in recombination events in a diverse set of *B. napus* lines.
- The project has three objectives:
    - To develop protocols for identifying recombination events in canola.
    - To measure recombination events in a diverse set of 50 *B. napus* lines.
    - To measure levels of recombination in plants grown under heat stress and identify variation among available genotypes.

ADF Funding: $16,500

Developing genomic resources for enriching alleles associated with adaptive traits for drought resilience in spring wheat. *(20240649)*

Principal Investigator: Harpinder Randhawa, Agriculture and Agri-Food Canada

- The project, if successfully executed, will identify physiological, morphological and biochemical traits that can be involved in drought tolerance in wheat.
- The project has three main objectives:
    - To phenotype 200 spring wheat lines under two water regimes at Lethbridge and Swift Current.
    - To genotype and conduct Genome-wide association analysis.
    - To develop and validate KASP markers that can be utilized for selecting drought tolerance in wheat.

Co-funded by: Alberta Grains, Manitoba Crop Alliance, Saskatchewan Wheat Development Commission

ADF Funding: $112,500

Unlocking the genetic potential of synthetic hexaploid wheat for pre-breeding germplasm enhancement. *(20240660)*

Principal Investigator: Andriy Bilichak, Agriculture and Agri-Food Canada

- The project, if successfully executed, will develop pre-breeding germplasm that will be used in genetic improvement of wheat.
- The project has three main objectives:
    - To develop a robust *Agrobacterium*-mediated genetic transformation and gene editing system in synthetic hexaploid wheat.
    - To evaluate epigenetic-chemical disruptors for release of sub-genome D suppression in SHWs.
    - To phenotype the developed lines for leaf rust and nutrient use efficiency.

ADF Funding: $257,819

Agronomic evaluation of dsRNA solutions for FHB under field conditions. *(20240695)*

Principal Investigator: Steve Robinson, Agriculture and Agri-Food Canada

- The project aims to test how effective dsRNA-based fungicides are at controlling Fusarium Head Blight (FHB) in field trials. It will also evaluate the impact of these fungicides on crop yields. Researchers will measure factors that affect FHB development and the effectiveness of the fungicides. Additionally, the project will determine how long dsRNA molecules last in field conditions and work on improving their delivery.
- The anticipated outcome is an RNA-based fungicide that can be commercialized for the control of FHB.

Co-funded by: Alberta Grains, Manitoba Crop Alliance, Saskatchewan Wheat Development Commission, Western Grains Research Foundation
ADF Funding: $320,000

Fusarium avenaceum mycotoxins and virulence factors in cereal and pulse disease – towards improved mitigation strategies. *(20240704)*

Principal Investigator: Nora Foroud, Agriculture and Agri-Food Canada

- Project objectives are to:
    - Characterize Fa pathogenicity and virulence factors involved in root rot of pulses and FHB of wheat.
    - Determine if Fa mycotoxin affects virulence in pulse root rot pulses & FHB of wheat, or in interaction with other pathogens.
- It is anticipated that information from this project will lead to the development of targeted treatments (such as fungicides, RNAi and/or other biotechnological approaches) for improved disease management in cereal and pulse crops.

Co-funded by: Saskatchewan Pulse Growers
ADF Funding: $205,500

Tetra-Tenacious: Extracted Tetraploids as a Source of FHB Resistance in Durum. *(20240708)*

Principal Investigator: Colin Hiebert, Agriculture and Agri-Food Canada

- The project, if successfully executed, will provide a resistance germplasm that can be crossed with durum to improve FHB resistance.
- The project has five objectives:
    - To develop tetraploid version of AAC Tenacious (the most FHB resistant Canadian cultivar).
    - To develop molecular tools to efficiently generate extracted tetraploids from hexaploid wheat.
    - To generate Tetra-Tenacious disomic addition (adding D genome).
    - To evaluate tetra-Tenacious for FHB resistance in the field.
    - To compare the genes in AAC Tenacious and Tetra-Tenacious involved in FHB response.

Co-funded by: Alberta Grains, Saskatchewan Wheat Development Commission
ADF Funding: $72,500

Developing technologies and resources to gain an accurate view of Canadian populations of Plasmodiophora brassicae. *(20240709)*

Principal Investigator: Fengqun Yu, Agriculture and Agri-Food Canada

- The project, if successfully executed, will develop an efficient method for development of pure genotypes of clubroot pathogen and a set of isolates able to differentiate disease reactions on various clubroot resistance genes.
- The project has five main objectives:
    - To improve the efficiency of the methodology for producing near pure genotype isolates of clubroot pathogen (single root protoplast derived isolates).
    - To collect clubroot gall samples in three prairie provinces and produce near pure genotype isolates of clubroot pathogen.
    - To determine the race structure of the clubroot pathogen populations in western Canada.
    - To generate whole genome sequences on selected pathogen isolates.
    - To identify a set of isolates that can clearly differentiate disease reactions of breeding lines carrying *Rcr1*, *Rcr3*, *Rcr5*, *Rcr8*, *Rcr9*, *Rcr10* and *Rcr11*.

Co-funded by: Saskatchewan Oilseeds Development Commission

ADF Funding: $333,327

Optimizing whole pulse soaking to enhance product quality. *(20240742)*

Principal Investigator: Brendan O'Leary, Agriculture and Agri-Food Canada

- The project will provide information on soaking conditions that discriminate the leaching of nutrients/ antinutrients in pulses.
- The specific research objectives are to:
    - Study hydration and leaching properties of chickpea and faba bean lines.
    - Characterize nutrients/ antinutrients during soaking and assess genetic variation in the seed coat.
    - Identify and mitigate off-flavors following chickpea roasting and storage.
    - Assess chickpea and faba bean varieties to produce roasted pulse snacks.

ADF Funding: $182,000

Determining the potential of multi-pest resistance genes for general wheat disease resistance. *(20240795)*

Principal Investigator: Brent McCallum, Agriculture and Agri-Food Canada

- The project, if successfully executed, will provide great information on usefulness of stacking different resistance genes in Canadian wheat and increasing resistance to rusts and FHB.
- The project has four main objectives:
    - To cross near-isogenic lines that each carry one resistant gene (*Lr34*, *Lr67* and *Lr46*) with a susceptible near-isogenic line.
    - To cross between parental lines generated from the first objective and development of double haploid populations. Molecular marker analysis will be done on all progeny lines to determine the alleles present (resistant or susceptible).
    - To evaluate developed lines in objectives 1 and 2 in disease nurseries for leaf, stem, stripe rust and fusarium head blight and DON accumulation.
    - To do transcriptome analysis and understand the biochemical changes conditioned by each gene.

Co-funded by: Alberta Grains, Manitoba Crop Alliance, Western Grains Research Foundation
ADF Funding: $299,640

Forecasting the impacts of pest insects on Canadian prairie crops to generate integrated pest management support tools. *(20240811)*

Principal Investigator: Tyler Wist, Agriculture and Agri-Food Canada

- The main project objectives are to create a web-based portal that produces and stores risk and spread maps for insect pests of prairie crops; and to create a mobile application that producers, agronomists, and researchers can use to report insect pest observations.
- The anticipated outcome is that producers can access these maps and proactively make decisions to control these insect pests and minimize crop losses. Agronomists, researchers, and producers can use the mobile app to report insect numbers, species, and damage. This system will continuously gather and store data for ongoing pest risk assessments.

Co-funded by: Saskatchewan Oilseeds Development Commission, Saskatchewan Pulse Growers, Saskatchewan Wheat Development Commission
ADF Funding: $160,100

Cumulative effects of long-term dual-inhibitor N-fertilizer use on yield, N2O emissions and soil microbiome function. *(20240812)*

Principal Investigator: Jennifer Town, Agriculture and Agri-Food Canada

- Determine the long-term maximum N-rate reduction with DI N-fertilizer that maintains optimal yields of canola and wheat.
- Determine the cumulative N_2O emissions reduction achieved with a DI N-fertilizer compared to urea over long-term use.
- Identify changes in soil microbiome composition after long-term application of DI N-fertilizer compared to standard urea.
- Identify changes in N-cycling dynamics in response to long-term application of DI N-fertilizer compared to urea.

Co-funded by: Saskatchewan Oilseeds Development Commission, Saskatchewan Wheat Development Commission
ADF Funding: $58,163

Optimizing pea frequency in diversified rotations to manage root rot diseases and improve system productivity. *(20240852)*

Principal Investigator: Kui Liu, Agriculture and Agri-Food Canada

- The project's main aim is to monitor the dynamics and evolution of root rot pathogens following different pea frequencies in rotations. It aims to provide knowledge that will improve our understanding of how pea frequency influences pathogen levels in the soil.
- The anticipated outcome is a recommendation of the best pea frequency for root rot management in the Canadian prairies.

ADF Funding: $360,000

Improving pollen fitness in wheat for enhanced thermotolerance under hot and dry environments. *(20240856)*

Principal Investigator: Jatinder Sangha, Agriculture and Agri-Food Canada

- The project, if successfully executed, will provide information regarding pollen fitness among wheat germplasm, which will be used in genetic improvement of wheat for heat and drought tolerance.
- The project has four main objectives:
    - To determine the variation in number of pollens in a panel (50-100) CWRS and CWAD germplasm predominantly used in Canadian breeding and as well as new commercial cultivars using Ampha Z40 impedance flow cytometry.
    - To expose germplasm to different temperature conditions (low and high) in control environment and assess pollen development, viability, and fertility in each line during stress.
    - Evaluate selected lines in objective 2 under hot and dry field (late seeded) and hot but irrigated environments in Swift Current.
    - To compare the pollen metabolites in ten CWRS and CWAD lines showing contrasting tolerance to heat stress.

Co-funded by: Manitoba Crop Alliance, Saskatchewan Wheat Development Commission
ADF Funding: $185,975

Kochia Patch Management in Cereals using Wheat Straw. *(20240895)*

Principal Investigator: Shaun Sharpe, Agriculture and Agri-Food Canada

- The project's main objectives are to assess the tolerance of kochia to burial with wheat straw, as well as evaluate whether the thickness of mulch that might suppress kochia is tolerable for cereal emergence. It also wants to assess how mulching might change the genetic makeup of kochia plants, specifically focusing on their resistance to glyphosate. It will also determine if wheat straw mulching introduces disease pathogens to cereal.
- The anticipated outcome is a cost-effective strategy that can help producers successfully manage kochia.

Co-funded by: Saskatchewan Wheat Development Commission
ADF Funding: $208,500

Molecular characterization of leaf rust resistance in Canadian spring wheat cultivars AAC Brandon, AAC Starbuck and AAC Redberry. *(20240906)*

Principal Investigator: Richard Cuthbert, Agriculture and Agri-Food Canada

- The project, if successfully executed, will provide molecular markers for facilitating breeding process.
- The project has three main objectives:
    - To develop three mapping populations by crossing each AAC Brandon, AAC Starbuck and AAC Redberry with a universally leaf rust susceptible wheat line RL6071 (750 doubled haploid lines).
    - To assess the three populations for leaf rust resistance at the AAFC Morden and Swift Current field nurseries for adult resistance, and in the greenhouse for all-stage resistance.
    - To identify and map the resistance genes and develop markers for marker assisted breeding.

Co-funded by: Alberta Grains, Manitoba Crop Alliance, Saskatchewan Wheat Development Commission, Western Grains Research Foundation
ADF Funding: $222,501

Prairie Invasive Pigweed Biovigilance. *(20240911)*

Principal Investigator: Shaun Sharpe, Agriculture and Agri-Food Canada

- Project objectives include to:
    - Evaluate publicly available software for species identification of Palmer amaranth and waterhemp.
    - Confirm identification of suspected pigweeds from producers through genetic testing.
    - Develop niche maps for Palmer amaranth and waterhemp in prairie systems to assist scouting efforts for these species.
    - Use a grain amaranth as a proxy to understand crop competition and suppression of pigweeds by various prairie field crops.
- The anticipated outcome is an increased awareness of the movement of invasive pigweeds in the province, and enhanced understanding of how competitive prairie crops are against these weeds. These efforts are geared towards limiting the risk of establishment of these pigweeds in Saskatchewan.

Co-funded by: Saskatchewan Forage Seed Development Commission, Saskatchewan Pulse Growers, Western Grains Research Foundation
ADF Funding: $118,202

Exploring the role(s) of pin and spiral nematodes in the emerging chickpea disease in Saskatchewan. *(20240914)*

Principal Investigator: Michelle Hubbard, Agriculture and Agri-Food Canada

- The project aims to determine if pin or spiral nematodes damage chickpea roots and induce symptoms, and to document these symptoms at high nematode densities in various chickpea varieties. It will also seek to assess the nematodes' ability to reproduce on different chickpea varieties. Additionally, the study will screen a broader range of chickpea varieties for host preference and plant damage, and evaluate the impact of nematicides on nematode density and chickpea health. Finally, it will investigate whether moisture stress exacerbates nematode-induced disease in chickpeas under controlled soil moisture conditions.
- The anticipated outcome is that the cause and management of the unresolved chickpea health issue will finally be identified.

Co-funded by: Saskatchewan Pulse Growers, Western Grains Research Foundation
ADF Funding: $189,814

Biorimor Biosciences Inc.

Field trials to evaluate bioproducts for the management of Fusarium Head Blight in Wheat. *(20240904)*

Principal Investigator: Prasad Daida, Biorimor Biosciences Inc.

- The project's main objective is to assess the effectiveness of novel biocontrol agents against Fusarium Head Blight (FHB) in wheat under greenhouse and field conditions.
- The anticipated outcome is the generation of information and data leading to the commercialization of biocontrol agents able to control Fusarium Head Blight.

ADF Funding: $153,000

Canadian Grain Commission

Development and maintenance of management solutions for midge in wheat. *(20240899)*

Principal Investigator: Sean Walkowiak, Canadian Grain Commission

- Project objectives are to use data from the Harvest Sample Program (HSP) and climate/weather information to create a model predicting midge damage based on location, crop types, and year. Additionally, it aims to evaluate the stability of the Sm1 resistance gene and find other resistance sources to support Sm1. It will also determine the impact of midge damage on grain quality and microbial risks.
- The anticipated outcome is a model that will be used as a tool to predict future midge damage in wheat. The information can also help breeding efforts by detecting where resistance breakdown is occurring and identifying new sources of resistance.

Co-funded by: Alberta Grains, Manitoba Crop Alliance, Saskatchewan Wheat Development Commission

ADF Funding: $132,825

GS Dunn

Establishment of irrigation requirements and recommendations for Mustard Seed Producers. *(20240688)*

Principal Investigator: Marc Vincent, GS Dunn

- The main objective of this project is to develop irrigation requirements for yellow and brown mustard.
- The anticipated outcome is that producers who grow mustard under irrigation will have the best information regarding how much water they need for the crop.

ADF Funding: $175,500

Insight Plant Health Corp.

Evaluating Clean Granular Technology in Prairie Cropping Systems. *(20240640)*

Principal Investigator: Dave Greenshields, Insight Plant Health Corp.

- Project objectives are to test the compatibility of three clean granular inoculant prototypes with current application equipment, and to assess the efficacy of these three prototypes in delivering viable rhizobia and initiating nitrogen fixation.
- The anticipated outcomes are the development of new inoculant formulations, a reduction of greenhouse gas emissions from peat mining and the creation of a new value stream for agricultural co-products found to be suitable carriers for granular inoculants.

Co-funded by: Saskatchewan Pulse Growers

ADF Funding: $49,500

National Research Council of Canada

Root of the Problem 2.0: Solidifying Barley Lodging Solutions through Genetics, AI Systems, and Gene Discovery. *(20240665)*

Principal Investigator: Allan Feurtado, National Research Council of Canada

- The project, if successfully executed, will provide markers that can be used in breeding programs for improving the lodging resistance in barley.
- The project has four main objectives:
    - To assess root architecture in 250 barley genotypes and validate the markers that developed in the previous ADF project.
    - To evaluate the 250 barley genotypes under field conditions in Saskatoon and Brandon for lodging and other agronomy characteristics.
    - To advance the prediction model that was developed in previous ADF project.
    - To finalize and validate molecular markers linked to genes involved in lodging resistance for selection.

Co-funded by: Alberta Grains, Manitoba Crop Alliance, Saskatchewan Barley Development Commission, Western Grains Research Foundation
ADF Funding: $265,876

Haploidy mutagenesis for improvement of FHB resistance and drought tolerance in Durum Wheat. *(20240869)*

Principal Investigator: Hai Ying Yuan, National Research Council of Canada

- The project, if successfully executed, will develop an efficient durum wheat microspore embryogenesis platform that will facilitate genetic improvement in durum wheat.
- The project has four main objectives:
    - To establish a highly efficient microspore embryogenesis platform for newly released cultivars and advanced breeding lines from AAFC durum wheat breeding program.
    - To develop mutagenized DH population in durum wheat.
    - To evaluate mutagenized DH population in field conditions for two years for FHB and drought tolerance.
    - To identify genomic regions associated with FHB and drought tolerance.

Co-funded by: Saskatchewan Wheat Development Commission, Western Grains Research Foundation
ADF Funding: $249,046

Developing a Cytoplasmic Male Sterility (CMS) System in Yellow Mustard (Sinapis alba) Using CRISPR/Cas9 Technology. *(20240907)*

Principal Investigator: Daoquan Xiang, National Research Council of Canada

- The project, if successfully executed, will develop a male sterility system in yellow mustard that will facilitate hybrid production in the future.
- The project has three main objectives:
    - To identify genes that are involved in male fertility and fertility restoration in yellow mustard.
    - To develop a specialized CRISPR/Cas9-mediated mitochondrial genome editing system for yellow mustard.
    - To generate male sterility nuclear genome through CRISPR/Cas9-mediated genome editing.

Co-funded by: Mustard 21, Western Grains Research Foundation
ADF Funding: $52,611

Integrating susceptibility genes to develop durable resistance against root rot pathogens in peas. *(20240929)*

Principal Investigator: Sateesh Kagale, National Research Council of Canada

- The project, if successfully executed, will provide information for better understanding of the genetic mechanisms involved in root rot disease susceptibility in pea, which can be used for development of root rot pea resistant cultivars.
- The project has four main objectives:
    - To identify Susceptibility genes in six pea lines, three of which are partially resistant and three are susceptible to root rot disease.
    - To identify changes to the cell wall composition and absolute quantification of carbohydrates in resistant and susceptible lines.
    - To analyze QTLs and fine mapping of disease susceptibility genes.
    - To modify the susceptibility genes using gene editing technology.

Co-funded by: Alberta Pulse Growers, Saskatchewan Pulse Growers, Western Grains Research Foundation
ADF Funding: $197,599

Prairie Agricultural Machinery Institute - PAMI

Evaluating Cold-Weather Performance of Agricultural Battery-Electric Vehicles for On-Road Transport. *(20240943)*

Principal Investigator: Lorne Grieger, Prairie Agricultural Machinery Institute - PAMI

- Determine the working performance of large battery electric vehicles and internal combustion engines under actual on-road duty cycles and cold temperature conditions.
- Develop a model that integrates all data to evaluate potential cost and carbon emissions savings.

ADF Funding: $50,000

Royal Saskatchewan Museum

Predictors of habitat use by wild bees across natural and agricultural habitats in southern Saskatchewan. *(20240723)*

Principal Investigator: Cory Sheffield, Royal Saskatchewan Museum

- The overall objective of the project is to determine how bee diversity and abundance are influenced by habitat quality.
    - It will study bee diversity and abundance in various habitats, from natural areas to agricultural fields, and correlate these with habitat features like flower types and crop yields.
    - It will set up trap nests to attract cavity-nesting bees, monitor them from spring to summer, and study their offspring and parasites to understand how different habitats affect them.
    - It will identify bee pollinators of crops and nearby plants using hand netting and citizen science (photos) to learn which bees are important for pollination and what other plants they need.
- The anticipated outcome is knowledge that can help landowners and producers conserve those habitats that can improve wild bee populations and ultimately benefit crop productivity.

ADF Funding: $120,000

Saskatchewan Food Industry Development Centre Inc. (Food Centre)

Evaluate the Ingredient Development Opportunities and Commercialization Potential for Seasonal Perishable Crops of Saskatchewan. *(20240720)*

Principal Investigator: Maria Hounjet, Saskatchewan Food Industry Development Centre Inc. (Food Centre)

- The project outcome will be vegetable powder ingredients from perishable crops.
- The objectives are to:
    - Develop gentle dehydration techniques for perishable crops.
    - Develop processing techniques for powdered vegetable ingredients.
    - Evaluate the suitability of ingredients for food processing applications.
    - Develop pilot-scale dehydration and spray-drying processes.
    - Conduct techno-economic analysis for scale-up and processing.

ADF Funding: $240,000

University of Manitoba

Managing BLS disease in wheat & barley fields by host resistance, estimating risk thresholds, & studying pathogen interactions. *(20240821)*

Principal Investigator: Dilantha Fernando, University of Manitoba

- The project, if successfully executed, will provide information on the interaction between the host and pathogen. It also, will provide resistance sources to BLS that will be incorporated in wheat and barley breeding programs in western Canada.
- The project has five sub-objectives:
    - To isolate and identify the pathogen to pathovar level yearly.
    - To screen a collection of Canadian and US wheat and barley lines against isolated pathogens and a collection of BLS pathogens collected from different regions in the world and Canada.
    - To investigate the interactions among bacterial leaf streak causal agents in barley by assessing their virulence and abundance both within and between *Xanthomonas translucens* pv. *translucens* (Xtt) and *Xanthomonas translucens* pv. *undulosa* (Xtu).
    - To determine the seed-to-seedling transmission rate of *Xanthomonas translucens* under field conditions to establish the risk threshold levels.
    - To identify and map resistance genes associated with BLS using a segregating population in wheat.

ADF Funding: $195,000

University of Regina

Comparison between Chemical and Agricultural Fibre for Cardboard Recycling. *(20240594)*

Principal Investigator: Denise Stilling, University of Regina

- The project outcome is recycled cardboard from agricultural fibre.
- The specific objectives are to:
    - Assess recycling using chemical additives and agricultural fibre.
    - Analyze and compare material properties between two recycling methods.

ADF Funding: $75,000

University of Saskatchewan

Improving Haskap quality and marketability by examining factors related to fruit shelf life, bioactivity and harvest span. *(20240596)*

Principal Investigator: Haixia Zhang, University of Saskatchewan

- The project outcome is an improved haskap berries cultivar with a better shelf life and nutrition profile.
- The specific objectives are to:
    - Improve haskap berry harvestability, shelf-life, and marketability.
    - Study haskap nutritional profile, bioactivity, and flavor.
    - Create hexaploidy genotypes for haskap breeding.

ADF Funding: $260,000

Revealing Nutrient Uptake and Biomass Development Patterns in Chickpea Cultivars. *(20240637)*

Principal Investigator: Jeff Schoenau, University of Saskatchewan

- The objective of this proposed research is to determine the amount and patterns of nutrient uptake and biomass accumulation of new desi and kabuli chickpea cultivars over a growing season.

Co-funded by: Saskatchewan Pulse Growers
ADF Funding: $32,275

GreenSkEye: a software system for automated and direct monitoring and analyzing continuous changes of greenhouse crops. *(20240653)*

Principal Investigator: Lingling Jin, University of Saskatchewan

- Develop an IOS mobile application that can perform in-app single image analysis.
- Develop a relational database to store, organize, and provide access to different types of data on the remote server.
- Develop, test, and verify machine learning models to extract phenotypes from time-course imaging data captured.

ADF Funding: $263,500

Digging deeper into chickpea root rot issues. *(20240662)*

Principal Investigator: Sabine Banniza, University of Saskatchewan

- Project objectives include development of a molecular assay for detection and quantification of *Fusarium avenaceum*, *Fusarium culmorum* and Verticillium in chickpea root tissues; and examination of the dynamics among root rot pathogens in chickpea.
- The anticipated outcome is a better understanding of root rot disease in chickpea which could lead to better management and more informed resistance breeding.

Co-funded by: Saskatchewan Pulse Growers, Western Grains Research Foundation
ADF Funding: $134,989

Evaluating shade covers to improve reliability of blossom blight disease screening. *(20240670)*

Principal Investigator: Sabine Banniza, University of Saskatchewan

- The project, if successfully executed, will develop a robust blossom blight resistance screening method in coriander, which is essential for developing coriander resistant cultivars.
- The objective of the project is to develop a field-scale inoculation method for blossom blight resistance screening in coriander using two different shade cloth materials for tunnels over the trials.

ADF Funding: $71,300

Breeding the next generation of high value lentil cultivars. *(20240689)*

Principal Investigator: Ana Vargas, University of Saskatchewan

- The support of the project will help the lentil breeding program at CDC to develop high yielding lentil cultivars with improved disease and herbicide tolerance.
- The project has three main objectives:
    - To develop breeding lines with improved root rot (Aphanomyces and Fusarium root rot) resistance.
    - To develop breeding lines with improved herbicide (Group 5 and 14) tolerance.
    - To develop breeding lines with improved foliar disease (Ascochyta blight and anthracnose) resistance.

Co-Funded by: Western Grains Research Foundation

ADF Funding: $337,499

Improving the gelation properties of faba bean and pea protein concentrates for application in structured plant-based products. *(20240753)*

Principal Investigator: Michael Nickerson, University of Saskatchewan

- The project outcome is to produce pea and faba bean protein ingredients with improved gelation properties.
- The specific objectives are to:
- Develop dry mixed faba bean protein ingredients with enhanced gelling attributes.
- Develop processing conditions to create fibrous-type aggregates.
- Apply optimized gelling strategies to pea protein concentrate.
- Evaluate the protein ingredients in food applications.

ADF Funding: $250,500

Development of a wet fractionation process for extracting pea and faba bean albumins by pilot-scale vibrational shear filtration. *(20240761)*

Principal Investigator: Michael Nickerson, University of Saskatchewan

- This project will develop VSF techniques to produce albumin-rich protein isolates and globulin-rich coproducts from peas and faba bean.
- The specific objectives are to:
    - Optimize benchtop alkaline extraction followed by ultrafiltration.
    - Optimize and scale up the pilot scale of the VSF process.
    - Characterize UF and VSF isolates for physicochemical and functional properties.
    - Conduct techno-economic and lifecycle analysis.
    - Assess ingredient performance in food applications.

ADF Funding: $149,800

Cost-Effective and High-Performance Atmospheric Cold Plasma Technology for Wheat, Canola, and Lentil. *(20240775)*

Principal Investigator: Oon-Doo Baik, University of Saskatchewan

- Design and build up a small-scale ACP unit for treating wheat, canola, and lentil seeds.
- Determine the optimum conditions for the application of ACP technology for germination improvement in wheat, canola, and lentil seeds.
- Investigate the effectiveness of ACP technology in the elimination of pathogens in wheat, canola, and lentil seeds.
- Determine the performance of ACP decontamination on seed germination and plant growth.
- Conduct an economic analysis for the application of ACP technology in large-scale seed processing.

Co-funded by: Saskatchewan Pulse Growers
ADF Funding: $137,000

A Sustainable Future for the Saskatchewan Soil Information System (SKSIS). *(20240802)*

Principal Investigator: Angela Bedard-Haughn, University of Saskatchewan

- Ensure ongoing operation, update, upgrade, and maintenance of the SKSIS and SKSIS Mapper.
- Conduct communication workshops and outreach to keep users current on new features and capabilities.
- Evaluate the capacity for generating self-supporting funding through SKSIS Mapper.

Co-funded by: Saskatchewan Oilseeds Development Commission, Saskatchewan Pulse Growers, Saskatchewan Wheat Development Commission
ADF Funding: $90,668

Rapid introgression of aphid resistance into pea elite cultivars. *(20240814)*

Principal Investigator: Tom Warkentin, University of Saskatchewan

- The project, if successfully executed, will develop pea varieties resistance to aphid.
- The project has two main objectives:
    - To develop breeder friendly molecular marker associated with aphid resistance in pea and incorporate this resistance into two recent pea cultivars CDC Tollefson and CDC 6471-2.
    - To screen genome-wide association study panel for aphid resistance.

Co-funded by: Saskatchewan Pulse Growers, Western Grains Research Foundation
ADF Funding: $149,645

Mapping Soil Carbon Sequestration in Saskatchewan Cropland. *(20240816)*

Principal Investigator: Angela Bedard-Haughn, University of Saskatchewan

- Measure and map soil carbon stocks and soil texture.
- Model the effects of land use and climate on soil carbon stocks.
- Develop a predictive modelling of carbon stock change under future scenarios.

Co-funded by: Saskatchewan Oilseeds Development Commission, Saskatchewan Wheat Development Commission
ADF Funding: $290,400

Herbicide screening in spice crops II: continuing the search and generating minor use data. *(20240825)*

Principal Investigator: Christian Willenborg, University of Saskatchewan

- The project's objectives are to screen promising herbicides from ADF 20210733 as well as new candidate herbicides not tested in ADF 20210733 for potential tolerance in spice crops. It will also screen herbicides for use as desiccants in coriander.
- The anticipated outcome is to provide data to support minor use registration for spice crops.

ADF Funding: $179,400

Developing high-value faba bean cultivars. *(20240835)*

Principal Investigator: Ana Vargas, University of Saskatchewan

- The support of the project will help the faba bean breeding program at CDC to develop high yielding and adapted faba bean cultivars.
- The project has three main objectives:
    - To develop breeding lines with reduced seed size and rounder shape.
    - To develop breeding lines with improved resistance to lodging.
    - To develop breeding lines with improved foliar disease (chocolate spot and Stemphylium blight) resistance.

Co-Funded by: Western Grains Research Foundation
ADF Funding: $167,248

Graphene and Epoxidized Oil Strengthen Canola Protein Based Plastics. *(20240850)*

Principal Investigator: Martin Reaney, University of Saskatchewan

- The outcome will be biobased materials from graphene-based epoxidized canola oil and canola protein.
- The specific objectives are:
    - To epoxidize canola oil and evaluate the compatibility of canola protein.
    - To produce epoxy resin and cure it with ultra-violet (UV) light.
    - To enhance the mechanical properties of bioplastics with graphene.
    - To scale up the production of bio-based materials.

ADF Funding: $180,000

Enzymatic modification and ultrasonication to improve functionality, nutritional quality, and flavor of starch-rich pulse flours. *(20240866)*

Principal Investigator: Yongfeng Ai, University of Saskatchewan

- The outcome will be modified starch-rich flour from peas and faba beans.
- The specific objectives are to:
    - Modify starch-rich flours using enzymes or ultrasonication.
    - Evaluate functional, nutritional, and flavor profiles of native and modified starch-rich flours.
    - Evaluate flours in different food prototypes.

Co-funded by: Saskatchewan Pulse Growers
ADF Funding: $149,000

A pea-based beverage for improving bone health. *(20240881)*

Principal Investigator: Philip Chilibeck, University of Saskatchewan

- The outcome will highlight the potential benefit of peas in osteoporosis prevention.
- The specific objectives are to:
    - Determine whether pea-based milk can improve bone health.

Co-funded by: Saskatchewan Pulse Growers
ADF Funding: $150,000

Novel hydrothermal method to develop functional low-glycemic food ingredients and encapsulant from pea starch. *(20240885)*

Principal Investigator: Yongfeng Ai, University of Saskatchewan

- To process pea starch and palmitic acid using extrusion combined with high-temperature drying (EHTD) method.
- To characterize the structures and functional and nutritional attributes of native and EHTD-modified pea starch.
- To co-process pea starch and palmitic acid using EHTD method to encapsulate curcumin.
- To evaluate the performance of EHTD-modified pea starch ingredients in prototype food products.
- Evaluate the performance of pea starch ingredients in food prototypes.

Co-funded by: Saskatchewan Pulse Growers
ADF Funding: $144,500

Accelerating CWRS wheat improvement with multi-trait rapid-cycle recurrent genomic selection. *(20240887)*

Principal Investigator: Adam Carter, University of Saskatchewan

- The outcome will be low-glycemic ingredients and encapsulants from pea starch.
- The specific objectives are:
    - To process pea starch with palmitic acid (1-5%) using extrusion-hydrothermal method.
    - To characterize functional and nutritional attributes of native and modified pea starch.
    - To encapsulate curcumin into a modified palmitic acid-pea starch complex.
    - To evaluate the performance of pea starch ingredients in food prototypes.

Co-funded by: Alberta Grains, Manitoba Crop Alliance, Saskatchewan Wheat Development Commission, Western Grains Research Foundation
ADF Funding: $242,444

Developing Innovative Applications for Spent Bleaching Clay and Soapstocks from Canola Processing. *(20240889)*

Principal Investigator: Bishnu Acharya, University of Saskatchewan

- The project outcome is to produce carbon black material from bleaching clay and soapstocks.
- The specific objectives are to:
  - Characterize bleaching clay and soapstocks.
  - Optimize the process to produce carbon black.
  - Evaluate the effect of carbon material in a rubber composite.
  - Evaluate the conductivity of the carbon black material.

ADF Funding: $146,000

Alternative mechanisms for resistance to the wheat stem sawfly in wheat. *(20240891)*

Principal Investigator: Curtis Pozniak, University of Saskatchewan

- The project, if successfully executed, will develop lines resistant to stem sawfly.
- The project has three main objectives:
  - To identify the genetic and physiological factors that reduce sawfly cutting in hollow-stemmed germplasm of spring wheat and durum.
  - To develop DNA markers to facilitate breeding process.
  - To introgress the identified gene(s) in three spring wheat backgrounds and in a single durum wheat (CDC Wiseton, which also carries FHB resistance).

Co-funded by: Alberta Grains, Saskatchewan Wheat Development Commission, Western Grains Research Foundation

ADF Funding: $206,019

Flexible Allocation of Irrigation Water - Maximizing Productivity and Water Efficiency. *(20240922)*

Principal Investigator: Warren Helgason, University of Saskatchewan

- The objectives focus on assessing improvements in crop water productivity through flexible irrigation allocation schemes and understanding changes in water use, crop productivity, and economic returns for irrigators. They aim to identify decision-making pathways and barriers to adopting flexible water management, ensuring decision tools meet producer needs. Demonstrating flexible water allocation strategies to maximize water use and evaluating beneficial management practices are key goals. Finally, developing a decision support framework using climate and crop yield models will help optimize productivity and mitigate climate risks.
- The anticipated outcome is a comprehensive understanding of the methods and possibilities of adopting flexible irrigation water allocation in Saskatchewan to increase crop productivity and water use efficiency.

ADF Funding: $287,180

Introducing High Protein Content and Early Flowering Alleles from Wild Wheat Relatives while Minimizing Linkage Drag. *(20240924)*

Principal Investigator: Curtis Pozniak, University of Saskatchewan

- The project, if successfully executed, will develop pre breeding lines with improved protein content and early flowering that will be used in genetic improvement of Canadian durum varieties.
- The project has three main objectives:
    - To assess the potential of UV exposure in enhancing homologous recombination frequency (HRF) in wheat.
    - To develop breeding populations with high protein content and early flowering but with reduced linkage drag.
    - To evaluate the developed populations under field conditions for agronomy characteristics and assess the effects of UV-induced HRF on genetic variation.

Co-funded by: Saskatchewan Wheat Development Commission
ADF Funding: $160,037