Summary of Agriculture Development Fund Crops Projects for 2021

Institution	Number of Approved Projects	Total Amount Funded
Agriculture and Agri-Food Canada	12	$2,525,684
Canada-Saskatchewan Irrigation Diversification	1	$117,700
Carleton University	1	$97,800
Saskatchewan Polytechnic	2	$249,674
University of Alberta	1	$78,000
University of British Columbia	2	$645,500
University of Regina	2	$299,000
University of Saskatchewan	18	$5,786,981
Total	**39**	**$9,800,339**

Commodity	Number of Approved Projects	Total Amount Funded
Alternative Crops	3	$404,490
Cereals	6	$1,357,903
Crops Related	15	$2,589,464
Oilseeds	3	$864,674
Pulses	11	$4,488,812
Forages	1	$94,996
Total	**39**	**$9,800,339**

Crops Projects Co-funders	Total Amount Co-funded
Alberta Wheat Commission	$217,601
Manitoba Crop Alliance	$125,491
Saskatchewan Alfalfa Seed Producers	$15,000
Saskatchewan Barley Development Commission	$40,000
Saskatchewan Canola Development Commission	$294,849
Saskatchewan Oat Development Commission	$18,478
Saskatchewan Pulse Growers	$1,039,367
Saskatchewan Wheat Development Commission	$677,719
Western Grains Research Foundation	$749,314
Total	**$3,177,819**

The projects granted funding through the Agriculture Development Fund (ADF) are listed in detail throughout this document by lead organization.

Agriculture and Agri-Food Canada

Marker Assisted Breeding For Common Bunt Resistance In New Wheat Varieties Adapted To The Canadian Prairies (*20200033*)

Principal Investigator: Ron Knox, Agriculture and Agri-Food Canada
Objectives:

- To generate crosses of elite bunt susceptible Canadian western red spring (CWRS) lines with bunt resistance sources for marker assisted selection;
- To improve on and validate markers for future use; and
- To deploy breeder-friendly markers for bunt resistance for use in marker-assisted selection (MAS) of breeding lines.

Western Grains Research Foundation: $112,200
Saskatchewan Wheat Development Commission: $67,200
Alberta Wheat Commission: $45,000
ADF Funding: $224,400

Physical IPM Strategies For Remediating Kochia Patches For Canola, Wheat And Pulse Production (*20200066*)

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

- Survey of kochia patch ecology in Saskatchewan;
- Assess physical control strategies for kochia patch remediation;
- Assessing hydro-mulch application volumes for kochia suppression; and
- Evaluating hydro-mulch stability in Saskatchewan.

Saskatchewan Wheat Development Commission: $124,366
ADF Funding: $124,366

Intercropping Pea With Canola Or Oat: Impact On Nitrogen, Disease And Economics (*20200093*)

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

- Determine effects of intercropping pea with oat or canola on grain yield, quality and soil health;
- Quantify nitrogen transfer from pea to oat (mycorrhizal crop) or canola (non-mycorrhizal crop) and nitrogen recovery at different nitrogen rates;
- Assess effects of intercropping on disease; and
- Evaluate economic returns of intercropping.

Saskatchewan Oat Development Commission: $15,000
ADF Funding: $210,000

Evaluation Of New Products To Reduce Impacts Of Aphanomyces Root Rot Of Field Peas (*20200128*)
Principal Investigator: Syama Chatterton, Agriculture and Agri-Food Canada
Objectives:

- Evaluate the effect of lime products on suppressing aphanomyces root rot; and
- Field trials for evaluation of products in the pipeline for efficacy against aphanomyces root rot.

Saskatchewan Pulse Growers: $192,500
ADF Funding: $217,559

Impact Of Herbicides, Moisture, Disease And Fungicides On Chickpea (*20200067*)
Principal Investigator: Michelle Hubbard, Agriculture and Agri-Food Canada
Objectives:

- Conduct a survey of damage to commercial chickpea fields;
- Test the impact of fungicide application on the ability of chickpea to metabolize herbicides;
- Assess the impact of herbicides on chickpea susceptibility to ascochyta blight or other diseases;
- Evaluate how the timing of moisture deficit and excess influence chickpea response to herbicides and/or disease; and
- Compare the susceptibility to drought stress and herbicides in multiple chickpea varieties.

Saskatchewan Pulse Growers: $96,250
ADF Funding: $89,650

Developing Single-Spore Isolates Of Pathotypes Of Plasmodiophora Brassicae (*20200155*)
Principal Investigator: Bruce Gossen, Agriculture and Agri-Food Canada
Objectives:

- Develop techniques for whole-genome sequencing of single spores of *Plasmodiophora brassicae*; and
- Single-spore isolates of *P. brassicae*.

Saskatchewan Canola Development Commission: $60,000
ADF Funding: $60,000

Bionomics, Feeding Patterns And Action Threshold Of The Striped Flea Beetle In Brassica Crops Grown In Saskatchewan (*20200217*)
Principal Investigator: Chrystel Olivier, Agriculture and Agri-Food Canada
Objectives:

- Determine the presence, abundance, location and movement in the fields and between fields and edges of the striped flea beetle (SFB) population;
- Identify overwintering sites of SFB and survival and sex ratio of the overwintering population of SFB;
- Determine plant species and plant tissue feeding preference for SFB among Brassicaceous species and canola lines and cultivars;
- Feeding behavior and feeding damage caused by both SFB and crucifer flea beetles at various ratios under various environmental conditions; and
- High cereal stubble as a cultural control to slow down SFB movement.

ADF Funding: $297,000

Exploring The Source Of Camelina's Resistance To Flea Beetles (*20200180*)

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

- Phenotyping of lines varying in glucosinolate moieties and amounts;
- Generation of camelina and canola lines with mutated alleles for multiple glucosinolate metabolism genes;
- Generation of material for field testing;
- Field testing of developed lines; and
- Generate a catalogue of crucifer genes involved in glucosinolate biosynthesis sand accumulation.

ADF Funding: $478,000

Understanding Auxinic Herbicide Resistance In Kochia And Staying Ahead Of What's Next (*20200318*)

Principal Investigator: Charles Geddes, Agriculture and Agri-Food Canada
Objectives:

- Assess the efficacy of a potential "new" (old) herbicide, dichlorprop for management of auxinic herbicide-resistant kochia;
- Determine whether dicamba or fluroxypyr resistance traits in kochia confer fitness penalties;
- Conduct a baseline survey of protoporphyrinogen oxidase inhibitor-resistant kochia in Western Canada;
- Work toward determining the mechanisms of auxinic herbicide resistance in kochia in western Canada; and
- Assess kochia populations for cross-resistance to other synthetic auxin herbicides, herbicide mixtures and usage windows.

Saskatchewan Barley Development Commission: $40,000
Saskatchewan Pulse Growers: $54,000
Saskatchewan Wheat Development Commission: $50,000
Alberta Wheat Commission: $40,000
Manitoba Crop Alliance: $13,900
ADF Funding: $167,900

Fungicide Insensitivity In Colletotrichum Lentis, The Causal Agent Of Anthracnose Of Lentil (*20200328*)

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

- Assess sensitivity to group 3 and group 7 fungicides in the *Colletotrichum. lentis* population;
- Explore how an initial fungicide application impacts group 11 insensitivity in *C. lentis*;
- Assess the proportion of lentil fields in Saskatchewan with *C. lentis* insensitive to group 11 fungicides;
- Examine the within-field distribution of anthracnose with/without sensitivity to group 11 fungicides; and
- Compare the aggressiveness and fitness of strobilurin sensitive/insensitive *C. lentis* isolates.

Saskatchewan Pulse Growers: $61,667
ADF Funding: $123,683

Improving The Vigour Of Forage Legumes Using Automated Image Analysis Technology (*20200337*)

Principal Investigator: Sean Asselin, Agriculture and Agri-Food Canada
Objectives:

- The development of reproducible screening methodology for seedling vigour using automated image analysis;
- Genotyping of native forage legumes; and
- Genetic mapping of seedling vigour in genotyped alfalfa and native legume lines.

Saskatchewan Alfalfa Seed Producers: $15,000
ADF Funding: $94,996

Managing Farm Level Wetlands: Develop Practices That Support Yield, Biodiversity, And Ecosystem Services On Prairie Farms (*20200376*)

Principal Investigator: Fardausi Akhter, Agriculture and Agri-Food Canada
Objectives:

- Determine the potential benefits and risks of retaining smaller and ephemeral wetlands to adjacent land productivity;
- Develop design guide and demonstrate the feasibility of constructed forage and willow buffer for managing farm-level wetlands;
- Describe and develop a new wetland model component for AAFC's whole-farm HOLOS model designed for Canadian producers;
- Conduct an economic cost-benefit analysis of retaining small wetlands in Saskatchewan; and
- Dissemination of technology and knowledge to stakeholders - in integration with activities and results from objectives 1-4.

ADF Funding: $438,130

Carleton University

Low Cost Paper-Based Strip Tests For Detection Of Mycotoxins In Grains (*20200307*)

Principal Investigator: Maria DeRosa, Carleton University
Objectives:

- Development of other single mycotoxin test strips (Deoxynivalenol -DON, Fumonisin B1-FB1, Aflatoxin B1-AFB1;
- Pilot field test after go/no go decision;
- Multiplexed mycotoxin test strips; and
- Optimization and scale up of test kits for Ochratoxin A.

Western Grains Research Foundation: $48,900
Saskatchewan Wheat Development Commission: $19,560
Alberta Wheat Commission: $14,670
Manitoba Crop Alliance: $14,670
ADF Funding: $97,800

Canada-Saskatchewan Irrigation Diversification

Leafy Green Vegetable Production In Saskatchewan: Enhancing Yield, Quality, And Bioactives Under High-Tunnel And Open-Field (*20200110*)

Principal Investigator: Jazeem Wahab, Canada Saskatchewan Irrigation Diversification
Objectives:

- Identify spinach cultivars suited for manual (multiple) and once-over (machine) harvesting;
- Identify spinach, kale, bok choy cultivars suited for field and high tunnel production in Saskatchewan;
- Refine irrigation scheduling techniques to increase yields, minimize disease incidence of spinach, kale and bok choy;
- Assess storage effects on shelf-life and quality attributes for kale, spinach and bok choy;
- On-farm producer evaluation of promising BMP's for spinach, kale and bok choy;
- Evaluation of high tunnel production system for season extension and off-season crop production of spinach, kale and bok choy;
- Assess the performance of spinach, kale and bok choy when grown sequentially in high tunnel and open fields;
- Comparison of yield and crop quality of kale, spinach and bok choy grown on bare ground and plastic mulch with drip irrigation;
- Screen spinach, kale and bok choy cultivars and identify management practices to control bolting; and
- Develop technology transfer materials and host technology transfer events.

ADF Funding: $117,700

Saskatchewan Polytechnic

Application Of Hyperspectral Imaging For Detection And Mapping Of Small Patch Clubroot Infestations In Commercial Canola Fields (*20200315*)

Principal Investigator: David Halstead, Saskatchewan Polytechnic
Objectives:

- Identify readily applied diagnostic features for mapping small clubroot patches and develop a diagnostic tool; and
- Refine and validate diagnostic tool for identifying small patch clubroot infestations.

Saskatchewan canola Development Commission: $48,286
ADF Funding: $89,674

Development Of Agricultural-Based Carbon Black Masterbatch For Plastic Processing Via Rotational/Injection Molding (*20200399*)

Principal Investigator: Satyanarayan Panigrahi, Saskatchewan Polytechnic
Objectives:

- Develop high concentrated biocarbon masterbatch for polymer and other industries.

ADF Funding: $160,000

University of Alberta

Saskatchewan Farmer Adoption And Preferences For Agri-Environmental Best Management Practices (*20200204*)

Principal Investigator: Sven Anders, University of Alberta
Objectives:

- Determine what it takes for a Best Management Preactices Program to incentivize Saskatchewan farmers to adopt agri-environmental practices.

ADF Funding: $78,000

University of British Columbia

Mining Barley Landraces And Wild Accessions In The PGRC Genebank For Gene Discovery And Trait Improvement In Elite Cultivars (*20200165*)

Principal Investigator: Gurcharn Singh Brar, University of British Columbia
Objectives:

- Generating molecular (genotypic) characterization data (molecular fingerprint) on the PGRC barley landrace collection;
- Genome-wide association genetic analyses to identify genes/markers associated with phenotypic traits;
- Selection of a core-set of approximately 2,000 barley landraces for phenotyping for agronomic and disease resistance traits; and
- Development of breeder-friendly molecular markers for marker-assisted selection in breeding programs aimed at cultivar development.

ADF Funding: $493,000

Mapping Novel Fusarium Head Blight (FHB) And Stripe Rust Resistance Genes In Wheat (*20200205*)

Principal Investigator: Gurcharn Singh Brar, University of British Columbia
Objectives:

- Mapping genes for resistance to FHB and stripe rust from two Watkins landraces (Wat.1190308 and Wat.1190580);
- Developing breeder-friendly molecular markers for introgression of resistance into elite cultivars;
- Genetic mapping of novel adult-plant resistance (APR) gene(s) from spelt wheat lines; and
- Introgression of APR stripe rust resistance gene identified from objective 3 into elite CWRS cultivars carrying Lr34/Yr18.

Saskatchewan Wheat Development Commission: $76,250
Alberta Wheat Commission: $45,750
Manitoba Crop Alliance: $30,500
ADF Funding: $152,500

University of Regina

Discoveries in Extrusion Pulping Agricultural Crop Residue Into Compostable Products (*20200099*)

Principal Investigator: Denise Stilling, University of Regina

Objectives:

- To discover value-added process to manufacture consumer product(s) from crop residue;
- To assimilate material properties and manufacturing processes parameters;
- To determine product criteria and design equipment for product manufacturing;
- To assess additive and manufacturing processes for optimization;
- To assess products and complete consumer reviews; and
- To transfer technology based on commercial viability.

ADF Funding: $150,000

The Application Of Artificial Intelligence In Agricultural Land Flooding Prediction In Southern Saskatchewan (*20200195*)

Principal Investigator: Peng Wu, University of Regina

Objectives:

- Flooding prediction under climate change scenarios using artificial intelligence techniques;
- Flood simulation using artificial intelligence techniques on agricultural land flooding;
- Data analysis of historical agricultural land flooding in southern Saskatchewan; and
- Flooding characterization and categorization in the research area.

ADF Funding: $149,000

University of Saskatchewan

EVOLVES: Enhancing The Value of Lentil Variation For Ecosystem Survival (*20200026*)

Principal Investigator: Kirstin Bett, University of Saskatchewan

Objectives:

- Develop genomic tools to better understand the impact of genome introgression on lentil seed-quality traits;
- Describe variability in protein quality and function within the wild and cultivated lentil species;
- Identify genes controlling seed visual traits– cotyledon and seed coat colours and size;
- Characterize the carotenoids, B-vitamins and minerals and identify the underlying genetics leading to genetic markers;
- Identify regions of the genome involved in seed coat permeability;
- Develop a transcript atlas of developing seeds;
- Improve functionality of our database and develop genome visualization tools that support decision making processes;
- Better understand consumer preference for lentil products to help prioritize research and breeding targets;
- Identify ways to incentivize practices that will facilitate technology transfer and adoption within the plant breeding community; and
- Develop a low-cost, quicker method for determining seed coat thickness.

ADF Funding: $825,000

Creation Of A *Cannabis Sativa* Core Collection As A Solid Foundation For A Legitimate Industry (*20200370*)

Principal Investigator: Tim Sharbel, Global Institute for Food Security
Objectives:

- Statistical genomic analysis of a sub selection of the Klonetics germ plasm collection;
- Phenotypic analyses of core collection for agronomically important, biochemically important and industrially important traits; and
- A basis for a Saskatchewan-based producer group which serves the Canadian industry.

ADF Funding: $187,815

Dry Bean Breeding for Saskatchewan (*20200027*)

Principal Investigator: Kirstin Bett, University of Saskatchewan
Objectives:

- Develop high-yielding, high-quality dry bean cultivars with tolerance to local diseases for short-season production in Saskatchewan.

Saskatchewan Pulse Growers: $178,500
ADF Funding: $609,552.80

Protein and Yield Response of Pea Cultivars to Micronutrient Fertilization (*20200039*)

Principal Investigator: Jeff Schoenau, University of Saskatchewan
Objectives:

- To assess how micronutrient fertilization affects protein, yield and micronutrient content of pea cultivars.

ADF Funding: $65,700

Pea Breeding for Western Canada (*20200071*)

Principal Investigator: Tom Warkentin, University of Saskatchewan
Objectives:

- Develop high-yielding pea varieties for western Canada with improved resistance to root rot.

Western Grains Research Foundation: $163,525
Saskatchewan Pulse Growers: $163,525
ADF Funding: $981,150

Breeding Chickpea Cultivars For Western Canada (*20200133*)

Principal Investigator: Bunyamin Tar'an, University of Saskatchewan
Objectives:

- Develop high-yielding kabuli chickpea cultivars for western Canada.

Saskatchewan Pulse Growers: $243,439
ADF Funding: $730,317

Diversifying Sources For Resistance To Ascochyta Blight In Chickpea (*20200134*)
Principal Investigator: Bunyamin Tar'an, University of Saskatchewan
Objectives:

- To characterize the resistance to ascochyta blight in an interspecific population (*C. pinnatifidum* and *C. judaicum*).

Western Grains Research Foundation: $236,200
ADF Funding: $236,200.00

Comparative Study of The Epidemiology Of Different Foliar Faba Bean Pathogens In Saskatchewan (*20200193*)
Principal Investigator: Sabine Banniza, University of Saskatchewan
Objectives:

- Compare temperature and leaf-wetness optima for *Stemphylium botryosum*, *Alternaria alternata* and *Botrytis fabae*;
- Screening of faba bean germplasm against *Stemphylium botryosum* and *Alternaria alternata*; and
- Determine spore release and infectivity of *Stemphylium spp*, *Alternaria alternata* and *Botrytis fabae* in the field.

Western Grains Research Foundation: $49,488
Saskatchewan Pulse Growers: $49,487
ADF Funding: $98,975.00

Collecting The Carbon Data Needed For Climate-Smart Agriculture In Saskatchewan (*20200291*)
Principal Investigator: Kate Congreves, University of Saskatchewan
Objectives:

- Provide direct, year-round field-scale measurements of greenhouse gas emissions from a representative cropping system in Saskatchewan;
- Provide field-scale assessments that encompass 4R+ practices aimed at minimizing carbon footprints; and
- Test the hypothesis that Saskatchewan cropping systems are a net carbon sink by determining net ecosystem exchange and carbon footprint.

Saskatchewan Canola Development Commission: $96,532
Saskatchewan Oat Development Commission: $3,478
Saskatchewan Wheat Development Commission: $57,919
ADF Funding: $228,199

Agricultural Residues For Removal Of Arsenic From Mining Industry Wastewater: Adding Value To Saskatchewan Agricultural Byproducts (*20200239*)
Principal Investigator: Jafar Soltan, University of Saskatchewan
Objectives:

- Optimization of the biomass(es) modification process to increase their arsenic sorption capacity;
- Optimization of the biochar preparation and modification procedure to improve arsenic sorption;
- Selection of the best biomass(es) and treatment method for creation of an arsenic biosorbent; and
- Evaluation of the economic feasibility for application of the prepared sorbents for real-world arsenic treatment.

ADF Funding: $70,000

Shining Light On Digital Agriculture: Linking Soil NIR Measurements, Fertility And Crop Yields (*20200221*)

Principal Investigator: Derek Peak, University of Saskatchewan
Objectives:

- Use spectral sensing to produce spatially-resolved soil based yield potential maps; and
- Develop methodology to link field near infrared (NIR) data and laboratory analyses.

Saskatchewan Canola Development Commission: $90,031
Saskatchewan Wheat Development Commission: $72,025
ADF Funding: $198,069.00

Biomass Filtration Media For Removal Of Airborne Particulates (*20200408*)

Principal Investigator: Lee Wilson, University of Saskatchewan
Objectives:

- To modify and screen flax fibers based on length, diameter, fineness, colour and strength;
- To prepare different types of single component and multi-component fibers of nonwoven mats of variable configuration (wet- vs. dry-laid);
- To test the efficiency of flax fiber filtration media (single component and multi-component fiber systems; single or overlapped layers); and
- To test for inhibition of flammability, bacteria and mold growth of fiber filtration media; and
- Technoeconomic analysis of optimized fiber mats will be carried out for the optimized filtration media.

ADF Funding: $204,000

Foam Generation And Stabilization By Pulse And Oilseed Proteins In Plant-Based Creamers For Coffee And Beverage Applications (*20200346*)

Principal Investigator: Supratim Ghosh, University of Saskatchewan
Objectives:

- Investigating plant protein-food gum interactions for optimum emulsion and foam quality;
- Development and characterization of plant protein-food gum complex-stabilized foam and emulsion-based foams;
- Improving foam stabilization in the presence of various aerated coffee-based beverages; and
- Scale-up plant protein-food gum complex-based liquid and powder coffee creamer production and prototype development.

ADF Funding: $250,000

Maximizing Durable Disease Resistance In Wheat (*20200353*)

Principal Investigator: Curtis Pozniak, University of Saskatchewan
Objectives:

- Tapping resistance from the elite gene pool;
- Expanding broad-spectrum stripe rust resistance into Canadian germplasm; and
- Exploring novel sources of resistance in a global gene bank collection.

Saskatchewan Wheat Development Commission: $142,798
Alberta Wheat Commission: $35,700
Manitoba Crop Alliance: $31,500
ADF Funding: $209,998

Biodegradable Plastics From Canola and Pulses (*20200357*)

Principal Investigator: Martin Reaney, University of Saskatchewan
Objectives:

- Identify novel sources of plastic feedstock materials;
- Fabricate plastic materials using canola and pulse products;
- Evaluate elastomers for modifying material strength and flexibility;
- Mechanical testing of materials;
- Biodegradability testing of materials; and
- Cost evaluation.

ADF Funding: $360,000

Multi-Pronged Fusarium Head Blight Management Strategy In Western Canada Through Insight Into Pathogen Virulence Mechanisms (*20200383*)

Principal Investigator: Curtis Pozniak, University of Saskatchewan
Objectives:

- The identification and mapping of quantitative trait loci (QTL) conferring virulence in *Fusarium graminearum*; and
- The isolation of priority virulence and mycotoxin genes in *F. graminearum*.

Western Grains Research Foundation: $100,000
Saskatchewan Wheat Development Commission: $52,000
Alberta Wheat Commission: $24,000
Manitoba Crop Alliance $24,000
ADF Funding: $200,000

Production of Texturized Vegetable Proteins (TVPs) From Pulses And Their Application In Meat Products (*20200300*)

Principal Investigator: Michael Nickerson, University of Saskatchewan
Objectives:

- Product application of TVPs;
- Optimization of extrusion process for TVP; and
- Optimization of TVP formulation.

ADF Funding: $254,000

Increasing Grain Yield In CWRS Wheat While Maintaining Grain Protein Levels And Baking Quality (*20200380*)

Principal Investigator: Pierre Hucl, University of Saskatchewan
Objectives:

- To develop CWRS wheat cultivars that are 10-15 per cent higher yielding while meeting protein and baking quality targets; and
- To identify emmer wheat accessions carrying high molecular weight glutenin subunit 1Ay21.

Western Grains Research Foundation: $39,001
Saskatchewan Wheat Development Commission: $15,601
Alberta Wheat Commission: $12,481
Manitoba Crop Alliance: $10,921
ADF Funding: $78,005