Summary of Agriculture Development Fund Crops Projects for 2020

<table>
<thead>
<tr>
<th>Institution</th>
<th>Number of Approved Projects</th>
<th>Total Amount Funded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Agri-Food Canada</td>
<td>11</td>
<td>$1,713,818</td>
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<tr>
<td>Global Institute for Food Security</td>
<td>1</td>
<td>$604,000</td>
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<tr>
<td>Irrigation Crop Diversification Corporation (ICDC)</td>
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<tr>
<td>Mustard 21 Canada Inc.</td>
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<td>National Research Council Canada</td>
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<tr>
<td>Prairie Agricultural Machinery Institute - PAMI</td>
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<td>Saskatchewan Polytechnic</td>
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<td>University of Manitoba</td>
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<td>University of Saskatchewan</td>
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<td>Genome Prairie</td>
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<td><strong>Total</strong></td>
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<th>Commodity</th>
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<td>Alternative Crops</td>
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<td>Cereals</td>
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<td>Crops Related</td>
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<td>Oilseeds</td>
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<td>Pulses</td>
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<td><strong>Total</strong></td>
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<tr>
<th>Crops Projects Co-funders</th>
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<tr>
<td>Western Grains Research Foundation</td>
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<tr>
<td>Saskatchewan Canola Development Commission</td>
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<td><strong>Total</strong></td>
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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

**Putting soil residual nitrate to work - variable and deep nitrate (20190035)**

Principal Investigator: Dr. Dale Tomasiewicz, Agriculture and Agri-Food Canada

Objectives:
- To determine the nature and distribution, spatially and with depth, of soil residual nitrate (NO$_3^-$) in typical agric fields;
- To develop management zones within the test fields, and to relate observed spatial and depth nitrate patterns to the zones;
- To determine fertilizer nitrogen (N) response by wheat the following year at many locations in the study fields; and
- To improve soil sampling recommendations and interpretive criteria for N, for wheat and other non-legume crops.

**ADF Funding: $121,000**

**Adapting wheat to arid environments: mining Canadian germplasm for reduced night-time water loss and improved water productivity (20190090)**

Principal Investigator: Dr. Raju Soolanayakanahally, Agriculture and Agri-Food Canada

Objectives:
- Quantify the range of night-time transpiration water loss in a collection of wheat accessions,
- Identify stomatal strategies that allow wheat to thrive and maintain high yield under arid environments;
- Assess the role of epicuticular waxes and individual components on water loss,
- Identify the underlying genetic basis of contrasting wheat lines with varying night-time water losses by gene expression studies; and
- Showcase the most promising lines for improved productivity under arid environments through field days.

Western Grains Research Foundation: $70,819
Saskatchewan Wheat Development Commission: $50,189
Alberta Wheat and Barley Commission: $10,000
Manitoba Wheat and Barley Commission: $10,000

**ADF Funding: $141,639**

**Interaction of B and Ca to reduce clubroot on canola (20190052)**

Principal Investigator: Dr. Bruce Gossen, Agriculture and Agri-Food Canada

Objectives:
- Interaction of Boron and Calcium to reduce clubroot disease;
- Effect of Boron-insensitive lines of *B. napus*;
- Physical mode of action of Boron and Calcium on clubroot disease reduction; and
- Physiological mode of action of Boron and Calcium on clubroot disease reduction.

**ADF Funding: $250,000**
Cloning clubroot resistance genes from B. nigra and transferring the genes into canola through a CRISPR/Cas9 based technology (20190101)

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

Objectives:
- Identify the most probable candidates for the clubroot resistant (CR) genes identified in B. nigra;
- Isolate candidate genes from B. nigra; and
- Deliver the candidate genes into canola using a newly established gene editing (CRISPR/Cas9) based system.

Western Grains Research Foundation: $90,475
Saskatchewan Canola Development Commission: $90,475
ADF Funding: $180,950

The next generation of prairie herbicide-resistant weed surveys and surveillance (20190141)

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

Objectives:
- Conduct the fourth round of herbicide-resistant weed surveys across the Canadian Prairies;
- Lead the discovery of novel cases of herbicide-resistant weeds in the Canadian Prairies;
- Build interactive and accessible maps showing the distribution of herbicide-resistant weeds in the Canadian Prairies;
- Use a grower management questionnaire to link on-farm management practices to the presence of herbicide-resistant weeds; and
- Actively educate Canadian growers and agricultural industry about the status of herbicide-resistant weeds.

Western Grains Research Foundation: $199,750
Saskatchewan Wheat Development Commission: $40,000
Alberta Wheat and Barley Commission: $40,000
ADF Funding: $93,250

A novel approach to improve quality and stability of processed purple wheat products (20190158)

Principal Investigator: Dr. Elsayed Abdelaal, Agriculture and Agri-Food Canada

Objectives:
- To investigate the impact of co-pigmentation on stability of anthocyanin and quality of milled and processed products;
- To scale-up co-pigmentation process to a pilot plant scale (1 to 5 kg);
- To investigate various combinations of pre-treatments to achieve co-pigmentation reaction in purple wheat grains; and
- To probe effects of co-pigmentation on anthocyanin composition and color properties and characterize two purple wheat entries.

ADF Funding: $126,000
Physiological and genetic mechanisms of grain quality associated with nitrogen use efficiency in near isogenic bread wheat (20190177)
Principal Investigator: Dr. Jatinder Sangha, Agriculture and Agri-Food Canada
Objectives:
- Differentiate bread wheat isogenic sisters for grain yield, grain protein, grain quality, and other physiological traits;
- Characterize physiological mechanisms for nitrogen use efficiency (NUE), grain protein and grain quality in contrasting isogenic sisters; and
- Identify potential candidate genes and single nucleotide polymorphisms (SNPs) associated with NUE, grain protein and grain quality in wheat sister lines.

Western Grains Research Foundation: $62,562
Saskatchewan Wheat Development Commission: $62,563
ADF Funding: $125,125

Extending yellow mustard value chain by defining value of fibre, mucilage and protein for the food industry (20190245)
Principal Investigator: Dr. Janitha Wanasundara, Agriculture and Agri-Food Canada
Objectives:
- Identify physical, chemical and functional characteristics of seed coat gums and mucilage in yellow mustard (YM) varieties and lines;
- Provide examples of applications of YM gums and/or mucilage as a functional polysaccharide;
- Generate YM protein-enriched flours and evaluate their functional properties; and
- Develop YM protein-enrich products and pulse protein blends with complementary amino acid profiles.

ADF Funding: $250,000

Identification of durum wheat germplasm with fast dry down characteristics for early harvest durum breeding (20190257)
Principal Investigator: Dr. Jatinder Sangha, Agriculture and Agri-Food Canada
Objectives:
- Evaluate durum wheat germplasm with contrasting rapid dry down characteristics during all three years of the project;
- Elucidae physiological traits linked with grain dry down characteristics in durum wheat in year two and three of the project; and
- Identify a durum wheat line with the most stable shortest dry down period for breeding early harvest durum in third year.

Saskatchewan Wheat Development Commission: $101,991
ADF Funding: $142,900
Role of field boundary habitats in enhancing crop yield and quality (20190279)
Principal Investigator: Dr. Fardausi Akhter, Agriculture and Agri-Food Canada
Objectives:
- Determine the potential benefits/risks to adjacent field crops of field boundary areas;
- Conduct weed survey within field boundaries and quantify the risks of weed spread into the adjacent crop;
- Conduct a cost-benefit analysis of field boundary habitat on farming in Saskatchewan; and
- Conduct a landscape-scale assessment of field boundary habitat impact on crop yield.

ADF Funding: $268,000

Investigating the role of copper fertility in ergot infestation of forage crops (20190322)
Principal Investigator: Dr. Jillian Bainard
Agriculture and Agri-Food Canada
Objective:
- Determine the impact of soil copper fertility levels on ergot infection in forage crops.

Saskatchewan Forage Seed Development Commission: $2,000
Saskatchewan Cattlemen’s Association: $12,500
ADF Funding: $48,000

Global Institute for Food Security
Developing “prairie cold tolerance” for early-season germination and establishment in prairie crops (20190111)
Principal Investigator: Dr. Leon Kochian, Global Institute for Food Security
Objectives:
- Identify canola nested association mapping (NAM) founder lines which exhibit cold tolerant germination;
- Identify canola NAM recombinant inbred lines (RILs) which exhibit cold tolerant root growth;
- Genome wide association (GWA) analysis for markers and candidate genes identification;
- Identify novel proteins with potential to generate robust, cold germination canola varieties;
- Translation to canola pre-breeding program and field validation;
- Identify soybean lines from very early maturity panel (MG000 –MG0) which exhibit cold tolerant germination and root growth;
- GWA analysis for genetic marker and candidate gene identification;
- Identify novel proteins with potential to generate robust, cold germination soybean varieties; and
- Translation to soybean pre-breeding and field validation.

ADF Funding: $604,000
**Irrigation Crop Diversification Corporation**

**Developing target yield nitrogen fertilizer recommendations for irrigated silage and grain corn (20190170)**

Principal Investigator: Garry Hnatowich, Irrigation Crop Diversification Corporation (ICDC)

Objectives:
- Determine nitrogen (N) uptake and N fertilizer use efficiency for silage and grain corn under irrigated and dry land production;
- Determine N fertilizer rate recommendations for silage and grain corn under irrigated and dry land production; and
- Develop corn target yield N fertilizer values based on soil test N levels, N uptake and yield response to applied N.

Saskatchewan Cattlemen’s Association: $$35,000

ADF Funding: $169,785

**Mustard 21 Canada Inc.**

**Identifying agronomic and environment benefits and drawbacks of diverse crops in cereal/canola/pulse rotations on Canadian prairies (20190276)**

Principal Investigator: Dr. Howard Love, Mustard 21 Canada Inc.

Objectives:
- Complete M21 AAFC CAP approved Activity 13 Crop Rotation – soil plant sample analysis with ADF $265,000 fund to deliver the three goals;
- Detailed Controlled Environment & Carbon Input Study to quantify carbon credits (CC’s) from adding special crops into cereals, oilseed & pulse;
- Crop Rotational System Study to develop a robust database of valuable technical information for the semi-arid prairie; and
- Nitrogen Response Study to provide new info on nitrogen fertility management in the context of rotation with special crops.

ADF Funding: $265,000
National Research Council Canada

Barley lodging – getting to the root of the problem (20190282)
Principal Investigator: Dr. Allan Furtado, National Research Council Canada

Objectives:
- Evaluate root system architecture in barley cultivars varying for lodging resistance;
- Evaluate stem and root lodging in field trials;
- Assess the correlation between various root phenotyping methods; and
- Compare root system architecture (RSA) in Canadian barley germplasm to a diverse set of barley germplasm.

Western Grains Research Foundation: $54,612
Saskatchewan Barley Development Commission: $41,569
Alberta Wheat and Barley Development Commission: $13,043
Manitoba Wheat and Barley Commission: $21,739
Saskatchewan Cattlemen’s Association: $25,000
ADF Funding: $130,964

Prairie Agricultural Machinery Institute – PAMI

Development of pea starch-PHA composite fibre modification, electro-spinning and modelling of fibres and starch (20190347)
Principal Investigator: David Yee, Prairie Agricultural Machinery Institute - PAMI

Objectives:
- Improve compatibility between pea starch and polyhydroxyalkanoate (PHA) using different methods;
- Fabricate pea starch/PHA composite fibre fabrics;
- Contextualize the research targeting the textile industry;
- Characterize and optimize the feedstock, the fibre, and the mechanical process; and properties to develop prototypes for industry.

ADF Funding: $295,000

Saskatchewan Polytechnic

Development of eco-friendly light weight veneer for construction industries (20190348)
Principal Investigator: Dr. Satyanarayan Panigrahi, Saskatchewan Polytechnic

Objective:
- Develop a new lightweight aggregate mixture from crop residue and agriculture waste material that can no longer be recycled.

ADF Funding: $80,000
University of Manitoba

Concurrent study of volatile aroma of acidic-basic, neutral and structural alteration of canolol fractions from ground mustard (20190089)

Principal Investigator: Dr. Usha Thiyam Hollander, University of Manitoba

Objective:
- To study the molecular mechanism governing stability, reactivity and degradation of canolol and related antioxidants.

ADF Funding: $75,000

University of Saskatchewan

Exploration of potentially new sources of resistance to Aphanomyces root rot in pea (20190044)

Principal Investigator: Dr. Sabine Banniza, University of Saskatchewan

Objectives:
- Phenotype pea recombinant inbred line (RIL) populations PR-21, PR-22, and PR-23;
- Genotyping of RIL populations PR21, PR-22, and PR23;
- Mapping of Aphanomyces root rot (ARR) resistance quantitative trait loci (QTLs) and comparison with published QTLs; and
- Pyramiding of novel and known ARR resistance.

ADF Funding: $409,500

Commercial products from, and health aspects of, phenolics extracted from Saskatchewan grown berry fruits. (20190076)

Principal Investigator: Nicholas Low, University of Saskatchewan

Objectives:
- Extraction and fractionation of phenolics from a selection of Saskatchewan grown berry fruits and their pomaces;
- Structural analysis of phenolic extracts and fractions employing liquid chromatography coupled with mass spectrometry;
- Commercial and industrial applications of phenolic extracts and fractions for encapsulation and natural antioxidants;
- Evaluation of the antioxidant properties of fruit phenolic extracts and fractions by in vitro methods; and
- Evaluating the health promoting properties of fruit extracts and fractions using a human cell culture system.

ADF Funding: $250,000
Building fertility and productivity of upslope soils in Saskatchewan farm fields (20190049)
Principal Investigator: Jeff Schoenau, University of Saskatchewan
Objective:
- To determine effective strategies for building fertility and productivity of upper slope soils in Saskatchewan farm fields.

ADF Funding: $89,640

Visualization and visual analytics tools for improved crop breeding (20190110)
Principal Investigator: Dr. Carl Gutwin, University of Saskatchewan
Objectives:
- To develop tools for marker-based breeding and comparative genomic analyses in crop genomes;
- To develop tools for visualizing synteny within and between crop genomes; and
- To develop tools for big-data analysis of connection networks.

Western Grains Research Foundation: $96,450
Saskatchewan Wheat Development Commission: $96,450
ADF Funding: $192,900

New tools to improve wild oat and weed management in oat (20190130)
Principal Investigator: Dr. Christian Willenborg, University of Saskatchewan
Objective:
- To reduce competition from wild oat and other weeds in oat crops.

Western Grains Research Foundation: $179,969
ADF Funding: $179,969

Development and scale up of the technologies for purification of crude glycerol and conversion to value-added biochemicals (20190145)
Principal Investigator: Dr. Ajay K. Dalai, University of Saskatchewan
Objectives:
- Continuous purification of crude glycerol to obtain more than 95 per cent purity at laboratory and pilot scale;
- Production of 1,3-propanediol from purified glycerol in batch and continuous mode in laboratory and pilot scale;
- Life cycle analysis and evaluation of process economic benefits for glycerol purification and value added biochemical production; and
- Production of glycerol carbonate from purified glycerol in batch and continuous mode in laboratory and pilot scale.

ADF Funding: $299,500
Mass production of canola phenolic compounds for health, consumer, and industrial applications (20190154)
Principal Investigator: Dr. Martin Reaney, University of Saskatchewan
Objectives:
- Pilot plant scale-up process to extract and purify sinapine from canola meal;
- Produce added-value products from canola meal to support the value of canola;
- Produce pigments and lignans from sinapic acid;
- Produce approved pharmaceuticals from sinapine;
- Produce resveratrol from sinapine;
- Develop practical methods to hydrolyse sinapine (sinapoyl choline) to free sinapic acid and choline;
- Produce canolol from sinapic acid;
- Produce cannabidiol (CBD) and tetrahydrocannabinol (THC) from sinapine;
- Produce compostable polystyrene analogs; and
- Convert sinapic acid to gallic acid.

ADF Funding: $360,000

Production of phospholipids from the ethanol co-product GPC and crop oils (20190155)
Principal Investigator: Dr. Martin Reaney, University of Saskatchewan
Objectives:
- Production of phospholipid (PL)/sinapoyl esters;
- Lipase-catalyzed synthesis of lysophosphatidylcholine (LPC) by direct esterification of a-Glycerylphosphorylcholine (a-GPC);
- Lipase-catalyzed synthesis of phosphatidylcholine by direct esterification of LPC in solvent-free media;
- Production of PLs from the oils of Saskatchewan crops;
- Production of emulsions and nano emulsions prepared from PLs;
- Hydrogenation of phospholipids;
- Production of other PLs with variations of alcohols;
- Testing of antioxidants for increasing PL shelf life; and
- Production of pharmaceutical and cosmetic excipients.

ADF Funding: $360,000

Electrostatic separation of starch-protein mixtures from pulse and cereal flour (20190156)
Principal Investigator: Dr. Venkatesh Meda, University of Saskatchewan
Objectives:
- Construct an electrostatic separator;
- Process optimization of pulses/cereal flour for effective protein-starch separation; and
- Characterization of the composition, nutritional properties and functionality of separated ingredients.

ADF Funding: $208,000
Computer simulation and experimental investigation to develop an ideal encapsulation matrix for flaxseed oil *(20190160)*

Principal Investigator: Dr. Supratim Ghosh, University of Saskatchewan

Objectives:

- Simulation of lipid oxidation in bulk oil;
- Simulation of lipid oxidation in emulsion;
- Experimental validation of computer modeling; and
- Development of flaxseed oil emulsion and spray-dried powder for various food applications.

**ADF Funding:** $275,000

Developing hybrid bromegrass with improved neutral detergent fibre digestibility *(20190197)*

Principal Investigator: Dr. Gregory Penner

University of Saskatchewan

Objectives:

- Evaluate hybrid bromegrass populations for NDF digestibility and growth characteristics in a sward density trial;
- Develop new breeding lines of hybrid bromegrass with enhanced NDF digestibility;
- To develop an NIR calibration to rapidly assess NDF digestibility; and
- To establish a new half-sib progeny nursery to evaluate heritability of NDF digestibility trait in bromegrass.

Saskatchewan Forage Seed Development Commission: $2,000
Saskatchewan Cattlemen’s Association: $25,000

**ADF Funding:** $87,060

Production of coal-like fuel pellets (biocoal) from agricultural residues using thermo-chemical treatments and co-pelletization *(20190207)*

Principal Investigator: Dr. Ajay K. Dalai, University of Saskatchewan

Objectives:

- Synthesis of high quality fuel pellets from agricultural residues using thermo-chemical treatments and co-pelletization;
- Extensive characterization of feedstocks, hydro-chars, torrefied samples, and fuel pellets;
- Scale-up of coal-like fuel pellet production/gasification process;
- Evaluation of fuel characteristics of coal-like pellets;
- Investigation on the application of phosphorus fertilizer value of the ash portion of gasified fuel pellet; and
- Evaluation of technical/economic/environmental aspects of developed process.

**ADF Funding:** $350,750
**Refinement of remote sensing indicies for plant moisture stress** *(20190208)*

Principal Investigator: Evan Derdall, University of Saskatchewan

Objectives:
- Evaluate available thermal indices, for quantifying crop water stress, for application in Saskatchewan;
- Update the Saskatchewan Irrigation Scheduling Manual with thermal based scheduling options; and
- Evaluate crop canopy temperature to determine crop water stress in Canola.

**ADF Funding:** $60,000

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**Evaluating canaryseed germplasm for response to wild oat herbicides and Fusarium Head Blight** *(20190210)*

Principal Investigator: Dr. Pierre Hucl, University of Saskatchewan

Objectives:
- Evaluate canary seed germplasm for response to tralkoxydim and pinoxaden;
- Characterize lines selected after three years of screening with a 3X rate of tralkoxydim;
- Evaluate canary seed germplasm for fusarium head blight resistance in a field disease nursery; and
- Systematic screening of wheat and barley herbicides on canary seed.

**ADF Funding:** $120,000

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**Driving seed protein in pea and faba – leaf area, leaf nitrogen and N placement in yield** *(20190213)*

Principal Investigator: Dr. Rosalind Bueckert, University of Saskatchewan

Objectives:
- Compare pea and faba at low and high plant populations for leaf area, leaf N reserves, and seed protein content; and
- Compare 12 varieties of pea and faba varying in leaf and seed traits and relate vegetative N reserves to high seed protein.

**ADF Funding:** $218,500

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**Testing new potato cultivars for improved nitrogen and phosphorous use efficiency in Saskatchewan** *(20190228)*

Principal Investigator: Dr. Kate Congreves, University of Saskatchewan

Objectives:
- Assess the nitrogen and phosphorous use efficiency of key potato cultivars; and
- Evaluate the effectiveness of an 'enhanced efficiency' phosphorous fertilizer product to increase nutrient use efficiency.

**ADF Funding:** $204,930
Investigation into the spread of blossom blight and breeding for resistance in coriander and caraway (20190230)
Principal Investigator: Dr. Sabine Banniza, University of Saskatchewan
Objectives:
- Determining method of blossom blight spread in coriander and caraway under field conditions; and
- Improving disease resistance of coriander and caraway to blossom blight.

ADF Funding: $340,540

Integrating herbicides with mechanical and cultural weed control techniques for group 2 resistant kochia and wild mustard (20190235)
Principal Investigator: Dr. Steven Shirtliffe, University of Saskatchewan
Objectives:
- Increase efficacy and consistency of soil applied herbicides for control of kochia and wild mustard; and
- Increase efficacy of pre-harvest herbicides in reducing viable weed seed production with weed clipping.

ADF Funding: $212,310

Improvement to the functionality of pea protein hydrolyzed products through conjugation with oligosaccharides from starch (20190242)
Principal Investigator: Dr. Takuji Tanaka, University of Saskatchewan
Objectives:
- Optimization of proteolysis at high protein concentrations;
- Optimization of degrees of hydrolysis of starch fraction in pea protein enriched flour (PPEF);
- Establishment of starch-protein conjugation systems;
- Examination of combined hydrolysis conditions to yield a variety of degree of hydrolysis-dextrose equivalent (DH-DE) combinations;
- Analysis of physicochemical properties and functionality of saccharified-peptides yielded from PPEF; and
- Examination of the properties of starch-protein conjugate in prototype products with a scale-up size of processing.

ADF Funding: $159,000
Screening chickpea germplasm for resistance to *Fusarium avenaceum* (20190243)

Principal Investigator: Dr. Sabine Banniza, University of Saskatchewan

Objectives:
- Development of screening techniques for *F. avenaceum* (*Fa*);
- Identification of root rot causing pathogens on chickpea;
- Screening of the chickpea association mapping panel for *Fa* resistance; and
- Screening of wild chickpea accessions for resistance to *Fa*.

Western Grains Research Foundation: $160,000

ADF Funding: $160,000

Development of meadow brome and cicer milkvetch varieties for stockpiled grazing in western Canada (20190244)

Principal Investigator: Dr. Bill Biligetu

University of Saskatchewan

Objectives:
- Select meadow bromegrass populations for stockpiled grazing in late fall;
- Select cicer milkvetch populations for improved germination, seedling vigor, and high late fall forage yield;
- Conduct transcriptomic analysis for seedling vigor in cicer milkvetch and identify unique alleles associated; and
- Develop optimum ratio of meadow brome-cicer milkvetch mixtures for stockpiled grazing in late fall.

Saskatchewan Forage Seed Development Commission: $2,500

Saskatchewan Cattlemen’s Association: $50,000

**ADF Funding: $193,928**

Screening of diverse and wild lentil germplasm for resistance to *Fusarium avenaceum* (20190252)

Principal Investigator: Dr. Sabine Banniza, University of Saskatchewan

Objectives:
- Development of screening techniques for *F. avenaceum* (*Fa*);
- Screening diversity panel of *Lens culinaris* for *Fa* resistance; and
- Screening of wild lentil accessions for *Fa* resistance.

**ADF Funding: $432,570**
Fermented tempeh products: Adding value to Saskatchewan’s lentils and oats (20190256)
Principal Investigator: Dr. Michael Nickerson, University of Saskatchewan
Objectives:
- Optimizing the pretreatment and fermentation conditions for tempeh manufacture from lentils, peas and oats;
- Characterizing the textural properties of tempeh as affected by fermentation and blending ratios of lentils, peas and oats;
- Characterizing the nutritional properties of tempeh as affected by fermentation and blending ratios of lentils, peas and oats; and
- Assessing the effects of fermentation and blending ratios on tempeh flavor profile and sensory properties.

ADF Funding: $222,000

Agronomic and breeding approaches to improve the harvestability of dry bean (20190259)
Principal Investigator: Dr. Kirstin Bett, University of Saskatchewan
Objectives:
- Identify proper seeding rate to increase the pod height and harvestability of dry bean; and
- Develop molecular markers for pod height to be used in dry bean breeding program.

ADF Funding: $394,743

Water use efficiency and soil water profile depletion in pulse-canalola-wheat rotation in dark brown and black soil zones (20190293)
Principal Investigator: Dr. Bing Si, University of Saskatchewan
Objectives:
- To determine what are the vertical root distributions of lentil, canola and wheat are in the Dark Brown and Black soil zone;
- To determine the water use efficiency of deep soil water left unused by the pulse crop grown in previous year; and
- To determine how much water is left unused by pulses and is utilized by the subsequent canola or wheat.

ADF Funding: $134,124
**Functional utilization of minimally-processed pulse proteins in food and beverage applications (20190325)**

Principal Investigator: Dr. Supratim Ghosh, University of Saskatchewan

Objectives:
- Extraction of minimally-processed native pulse proteins by mild-fractionation of pulse flour;
- Modification of minimally-processed pulse proteins to improve their emulsification properties;
- Preparation and characterization of oil-in-water (nano)emulsions using minimally-processed pulse proteins;
- Scale-up and development of beverage prototypes from the minimally processed pulse proteins; and
- Utilization of byproduct stream of the proposed mild fractionation process.

**ADF Funding:** $300,600

**SKSIS-3: Synergies and sustainability for the Saskatchewan soil information system (20190342)**

Principal Investigator: Dr. Angela Bedard-Haughn, University of Saskatchewan

Objectives:
- Build on the previous Saskatchewan soil information system (SKSIS) predictive soil mapping (PSM) efforts by operationalizing PSM for our user-partners;
- Explore data-sharing models with data partners that leverage the power of information for PSM and soil resource management;
- Develop a business plan to provide self-generating base operating funds for maintenance and updates of SKSIS and PSM modules; and
- Develop a standalone SKSIS feature for efficient remote use in internet-deficient areas of Saskatchewan.

Western Grains Research Foundation: $74,384
Saskatchewan Canola Development Commission: $37,192
Saskatchewan Wheat Development Commission: $74,384

**ADF Funding:** $185,960
Eliminating the source of herbicide resistant kochia (20190343)
Principal Investigator: Dr. Steven Shirtliffe, University of Saskatchewan
Objectives:
- To identify kochia using image based methodologies;
- To determine the degree in which soil salinity influences kochia density, plant size, and abundance within a field;
- To determine if the identification of kochia using unmanned aerial vehicle (UAV) imagery can be scaled up using high resolution satellite imagery; and
- Identify the potential to use salinity based data to develop management systems for spatially explicit weed management systems.

Saskatchewan Flax Development Commission: $22,801
ADF Funding: $205,209

Genome Prairie
4D Wheat: Diversity, domestication, discovery and delivery (20190353)
Principal Investigator: Dr. Curtis Pozniak, Crop Development Centre
Objectives;
- Harnessing Diversity in wheat;
- Domesticating exotic/wild wheat;
- Discovery and introgression of unique genes from wild wheat related to resistance to diseases and insects;
- Assessing the value of utilization of genetic resources; and
- Delivery of genetic innovation.

Genome Canada: $4,000,000
Canadian Wheat Research Coalition: $413,992
Western Grains Research Foundation: $575,000
Saskatchewan Wheat Development Commission: $1,000,000
Alberta Wheat Development Commission: $600,000
Manitoba Wheat Development Commission: $240,000
ADF Funding: $1,047,460