Summary of Agriculture Development Fund Crops Projects for 2020

Institution	Number of Approved Projects	Total Amount Funded
Agriculture and Agri-Food Canada	11	$1,713,818
Global Institute for Food Security	1	$604,000
Irrigation Crop Diversification Corporation (ICDC)	1	$169,785
Mustard 21 Canada Inc.	1	$265,000
National Research Council Canada	1	$130,964
Prairie Agricultural Machinery Institute - PAMI	1	$295,000
Saskatchewan Polytechnic	1	$80,000
University of Manitoba	1	$75,000
University of Saskatchewan	28	$6,606,733
Genome Prairie	1	$1,047,460
Total	**47**	**$10,987,760**

Commodity	Number of Approved Projects	Total Amount Funded
Alternative Crops	3	$795,470
Cereals	7	$1,813,542
Crops Related	15	$2,946,897
Oilseeds	9	$2,315,450
Pulses	10	$2,799,913
Forages	3	$316,488
Total	**47**	**$10,987,760**

Crops Projects Co-funders	Total Amount Co-funded
Western Grains Research Foundation	$1,564,021
Saskatchewan Canola Development Commission	$127,667
Saskatchewan Flax Development Commission	$22,801
Saskatchewan Wheat Development Commission	$1,442,662
Saskatchewan Barley Development Commission	$41,569
Alberta Wheat and Barley Commission	$708,043
Manitoba Wheat and Barley Commission	$250,000
Saskatchewan Cattlemen's Association	$144,239
Saskatchewan Forage Seed Development Commission	$6,500
Genome Canada	$4,000,000
Canadian Wheat Research Coalition	$413,992
Total	**$8,721,494**

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;
- Elucidate 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 Institue 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

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

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

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-canola-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

4DWheat: 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