## Summary of ADF Projects, 2019

**Crops Research Funding**

<table>
<thead>
<tr>
<th>Description</th>
<th>Funding</th>
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</thead>
<tbody>
<tr>
<td>44 crop-related projects</td>
<td>$12,020,568</td>
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### Breakdown by Commodity

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Funding</th>
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</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>$2,042,815</td>
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<tr>
<td>Oilseeds</td>
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<tr>
<td>Pulses (includes the SRI)</td>
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<tr>
<td>Alternative Crops</td>
<td>$496,050</td>
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<tr>
<td>Miscellaneous Crops Related</td>
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### Breakdown by Organization

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<thead>
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<tr>
<td>University of Saskatchewan</td>
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<td>Agriculture &amp; Agri-Food Canada</td>
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<td>National Research Council Canada</td>
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<td>Northern Quinoa Production Corporation</td>
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<td>POS Bio-Sciences</td>
<td>$200,000</td>
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<tr>
<td>Prairie Agricultural Machinery Institute - PAMI</td>
<td>$109,000</td>
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<tr>
<td>Saskatchewan Food Industry Development Centre</td>
<td>$115,000</td>
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<tr>
<td>University of Manitoba</td>
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$12,020,568
## Crops Related Projects - Co-Funders

<table>
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<td>Saskatchewan Wheat Development Commission</td>
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<td>Saskatchewan Canola Development Commission</td>
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<td>Saskatchewan Flax Development Commission</td>
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<tr>
<td>Manitoba Wheat and Barley Growers Association</td>
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<td><strong>Total</strong></td>
<td><strong>$3,613,772</strong></td>
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Cereals

Establishing Resistance to Fusarium Head Blight by Improving the Wheat Immune System (20180001)

Identify Pathogen Recognition Receptors (PRRs), related to Fusarium Head Blight (FHB) disease in wheat. Functional Validation of PRRs, to identify genomic resources associated with FHB resistance in wheat.

ADF Funding: $360,000

Organization: Agriculture & Agri-Food Canada
Contact: Dr. Gopal Subramaniam, (613) 759-7619

Accelerating the Introgression of Enhanced Stem Solidness from Tall Wheatgrass to Spring Wheat (20180078)

To develop a solid-stem red spring wheat cultivar(s) via introgression of the stem solidness trait from tall wheatgrass sources.
To develop high-throughput molecular markers to track the introgression of stem solidness in wheat breeding programs.
To identify potential candidate genes related to stem solidness in lines of intergeneric origin.

ADF Funding: $81,022

Saskatchewan Wheat Development Commission: $124,500
Alberta Wheat Commission: $43,478
Organization: University of Saskatchewan
Contact: Dr. Pierre Hucl, Crop Development Centre, (306) 966-8667

Breeding High Anthocyanin Spring Wheat with Improved Quality (20180079)

To improve the underlying grain quality of high anthocyanin spring wheat.

ADF Funding: $129,750

Organization: University of Saskatchewan
Contact: Dr. Pierre Hucl, Crop Development Centre, (306) 966-8667

Building on Past Success: Furthering Our Understanding of Wheat Stripe Rust to Mitigate Disease and Improve Resistance (20180095)

Identify the most recent races and genetic lineages of the stripe rust pathogen in Canada.
Identify genes in the pathogen (Pst) virulent on stripe rust resistance genes (Yr) through genomic analysis.
Isolate stripe rust resistance genes in wheat relatives in preparation for gene cloning by AgRenSeq (association genetics with R gene enrichment sequencing).

ADF Funding: $189,750

Saskatchewan Wheat Development Commission: $112,533
Alberta Wheat Commission: $65,217
Manitoba Wheat and Barley Growers Association: $12,000
Organization: University of Saskatchewan
Contact: Dr. Randy Kutcher, Plant Sciences, (306) 966-4951
**Development of Triticale Lines with Wheat-Like Baking Quality (20180109)**

To identify triticale lines with baking quality approaching that of spring wheat.

**ADF Funding:** $99,935  
**Organization:** University of Saskatchewan  
**Contact:** Dr. Pierre Hucl, Crop Development Centre, (306) 966-8667

**Developing Novel Technologies for Controlling Herbicide Resistant Wild Oat in Wheat (20180196)**

The overall objective of this research project is to develop a weed control system for herbicide resistant wild oat in wheat.  
Determine the weed control efficacy and crop damage when using herbicides applied between crop rows.  
Determine the efficacy of utilizing precision, in-crop mechanical weed control techniques to control wild oat in wheat.  
Screen unique herbicide modes of action for suppression of wild oat and / or reducing seed production.  
Evaluate the efficacy of utilizing a combined system of inter-row herbicide application and precision mechanical weed control.

**ADF Funding:** $273,259  
**Saskatchewan Wheat Development Commission:** $104,348  
**Alberta Wheat Commission:** $104,348  
**Organization:** University of Saskatchewan  
**Contact:** Dr. Steven Shirtliffe, Plant Sciences, (306) 966-4959

**Alternatives to Sm1: Hairy Glumes, Awns, and Egg Antibiosis for Managing Wheat Midge (20180216)**

Development of a spring wheat line that carries the “hairy glume” (HG) trait, an awned trait and the Sm1 trait.  
Testing the HG/Awned lines for wheat midge deterrence and reduction in damage under controlled laboratory conditions.  
Testing the HG/awned lines for wheat midge deterrence and reduction in damage under field conditions.  
Testing wheat midge resistance and genetic mapping of resistance genes for egg antibiosis (EA) from winter wheat line MAC-274.

**ADF Funding:** $204,621  
**Saskatchewan Wheat Development Commission:** $114,620  
**Alberta Wheat Commission:** $65,000  
**Manitoba Wheat and Barley Growers Association:** $25,000  
**Organization:** Agriculture & Agri-Food Canada  
**Contact:** Dr. Tyler Wist, (306) 385-9379
**Breeding Milling Oat Varieties with Improved Agronomic, Quality and Disease Traits for Saskatchewan Oat Producers (20180260)**

Produce improved milling oat varieties.
Produce ‘hairless’ groat milling oat lines.
Nutritional quality evaluation.

**ADF Funding:** $300,000

**Western Grains Research Foundation:** $1,014,500

**Prairie Oat Growers Association:** $225,000

**Organization:** University of Saskatchewan

**Contact:** Dr. Aaron Beattie, Crop Development Centre, (306) 966-2102

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**Development of Markers Linked to Oat Crown Rust Resistance to Help Breed Improved Oat Varieties for Saskatchewan Producers (20180264)**

Evaluate crown rust reaction in bi-parental oat populations.
Qualitative genetic loci (QTL) mapping of crown rust resistance.
Development of high-throughput marker assays.

**ADF Funding:** $219,478

**Western Grains Research Foundation:** $184,696

Prairie Oat Growers Association: $34,782

**Organization:** University of Saskatchewan

**Contact:** Dr. Aaron Beattie, Crop Development Centre, (306) 966-2102

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**Eco-Friendly Non-Thermal Inactivation of E.coli in Wheat Flour Using Cold Plasma Technology (20180293)**

To investigate the effect of the plasma treatment on flour properties such as bread-yeast growth, dough ripening and rheological.
To set up a cold plasma system suitable for treating wheat flour.
To investigate the effects of plasma operating conditions on the extent of inactivation of *E. coli* (measured in colony forming units).
Analyzing microflora of the flour before and after treatment.

**ADF Funding:** $185,000

**Organization:** University of Saskatchewan

**Contact:** Dr. Oon-Doo Baik, Agricultural and Bioresource Engineering, (306) 966-5320
### Oilseeds

**Sclerotinia Resistant Canola and HEAR Lines for Western Canada and Understanding the Molecular Basis of Resistance (20180021)**

Determine the contribution of lectin genes to sclerotinia resistance in canola.
Determine the contribution of penetration-resistance genes to sclerotinia resistance in canola.
Determine the contribution of other candidate defense genes to sclerotinia resistance in canola.

**ADF Funding:** $270,000

**Saskatchewan Canola Development Commission:** $90,000

**Organization:** Agriculture & Agri-Food Canada

**Contact:** Dr. Lone Buchwaldt, (306) 385-9417

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**The Effect of Flax Seeding Rate, Crop Placement, and N Rate on the Development and Yield of Chickpea and Flax (20180086)**

To increase the production of flax in western Canada.
To determine if intercropping can be used to reduce disease pressure in chickpeas.
To determine if the area of adaptation for chickpeas can be expanded by utilizing an intercrop with flax.
To develop an agronomic system for intercropping chickpea with flax in Saskatchewan.
To improve the agronomic performance of flax.

**ADF Funding:** $172,400

**Western Grains Research Foundation:** $86,200

**Saskatchewan Flax Development Commission:** $86,200

**Organization:** Agriculture & Agri-Food Canada

**Contact:** Dr. William May, (306) 695-5225

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**Preserving Hybrid Vigour Through a Novel Apomixis Breeding Strategy in Brassica Crops (20180141)**

Testing for stable inheritance of the apomixis trait in the bridging species.
Generating apomictic brassica crops via intergeneric crosses.
Identification of all apomixis factors in the backcrosses of de novo generated hybrid apomictic boechera and brassica crops.
Transfer of apomixis from selected diploid unbalanced apomictic boechera lines into sexual bridging species via hybrid crosses.
Generation of diploid, hybrid unbalanced apomictic boechera backcrosses.

**ADF Funding:** $561,600

**Saskatchewan Canola Development Commission:** $62,400

**Organization:** Global Institute for Food Security

**Contact:** Dr. Tim Sharbel, Seed and Developmental Biology, (306) 966-3709
### Modified Lipid Metabolism to Deliver Improved Low Temperature Tolerance in Brassica Napus (20180160)

The goal is to apply a targeted approach to identify new traits to confer improved low temperature tolerance in seedling canola.

- Evolution of enhanced cold tolerance through iterative selection.
- Identify strategies to modify lipid metabolism to deliver improved, early season, low temperature tolerance in *Brassica napus*.
- Determine the membrane lipid composition of *Brassica napus* seeds and seedlings in lines with different seed oil composition.
- Test the hypothesis of a link between *B. napus* seed lipid composition and germination/seedling establishment at low temperature.

**ADF Funding:** $176,900

**Saskatchewan Canola Development Commission:** $67,100

**Organization:** Agriculture & Agri-Food Canada

**Contact:** Dr. Mark Smith, (306) 385-9425

### Upscaling the Extraction of Bio-Actives and Vitamins from Canola Crush By-Product (20180211)

Scaling up the extraction process of phytosterols from the deodorizer distillate of canola.

- Formulation development for functional foods.
- Extraction of vitamin E (tocopherols) from the deodorizer distillate of canola.
- Brassicasterol efficacy testing.

**ADF Funding:** $246,976

**Organization:** University of Saskatchewan

**Contact:** Dr. Anas El-Aneed, Pharmacy and Nutrition, (306) 966-2013

### Process Adaptation and Assessment of Market Development Constraints for Protein Products from Cold-Press, Genetically Modified (GM) Canola Meal (20180213)

To modify AAFC *Brassica* protein fractionation process to use cold-press canola meal.

- To assess solid-state fermentation as pretreatment for cold-press and prepress-solvent extracted canola meals to improve protein recovery.
- To evaluate canola meal protein fractions in applications based on functional attributes.
- Assess consumer acceptance and market penetration constrains of genetically modified (GM)-canola based protein products.
- Techno-economic analysis of cold-press canola operation in combination with canola.

**ADF Funding:** $346,500

**Saskatchewan Canola Development Commission:** $115,500

**Organization:** Agriculture & Agri-Food Canada

**Contact:** Dr. Janitha Wanasundara, (306) 385-9488
Establishing Transgene-Free CRISPR/Cas9 Based Genome Editing Platform to Improve Canola Resistance Against Clubroot Disease (20180243)

Identify novel clubroot resistance genes and create novel resistance allelic variants in elite canola germplasms. Establish transgene-free CRISPR/Cas9 based genome editing platform to support canola breeding programs.

ADF Funding: $267,375

Saskatchewan Canola Development Commission: $89,125
Organization: University of Saskatchewan
Contact: Dr. Wei Xiao, Microbiology and Immunology, (306) 966-4308

Oilseed with Depleted Glycosides and Metals (20180248)

Produce a whole flaxseed that is largely depleted in heavy metals.
Produce a flaxseed gum powder that is substantially free of metals and cyanogenic glycosides.
Produce a whole flaxseed that is substantially degummed and free of cyanogenic glycosides.
Produce flavoured flaxseed products that are a dietary source of omega three fatty acids, protein, and lignan.

ADF Funding: $94,400

Saskatchewan Flax Development Commission: $23,600
Organization: University of Saskatchewan
Contact: Dr. Martin Reaney, Plant Sciences, (306) 966-5027

Electrostatic Conditioning of Vegetable Oil and Biodiesel (20180253)

Develop mathematical models that predict the behavior of specific vegetable oil contaminants in electric fields.
Determine if compounds can be refined from crude vegetable oil using dielectrophoresis.
Preparation and characterization of oils.
Emulation of a commercial dielectrophoretic filter in an experimental cell.
Study the fate of particulate matter in crude or partially refined oils when it is passed through a dielectric field.
Determine the mass balance of dielectrophoresis and compare it with conventional refining.
Study the fate of particulate matter in refined oils adulterated with a specific contaminant.
Determine if dielectrophoresis conditions affect oil quality.

ADF Funding: $297,000

Organization: University of Saskatchewan
Contact: Dr. Martin Reaney, Plant Sciences, (306) 966-5027
Nitrogen Fertilization of Irrigated Dry Bean (20180081)

Determine nitrogen fertilizer rate yield responses for pinto market class irrigated wide row dry bean production. Determine whether ESN nitrogen fertilizer is beneficial compared to urea as a fertilizer nitrogen source for irrigated dry bean.

**ADF Funding:** $75,420

**Organization:** Irrigation Crop Diversification Corporation

**Contact:** Mr. Garry Hnatowich, (306) 867-5405

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Commercial Extraction of Canolol from Ground Mustard By-Products Press Cake for Nutraceutical and Cosmetics in Saskatoon (20180324)

Prevention of lipid oxidation and the delivery of canolol via oil-in-water emulsion. To develop a new commercial technology for super antioxidant “canolol” extraction.

**ADF Funding:** $130,500

**Organization:** University of Manitoba

**Contact:** Dr. Usha Thiyam, Food and Nutritional Science, (204) 474-9976

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Practical Oilseed Protein Products (20180255)

Scale up oil removal from hulls.
Scale up oil separation and refining.
Scale up processing of the meal aqueous ethanol extract.
Production of canola sugar, canola ethanol, and hull fuel.
Scale up protein enrichment by aqueous ethanol.
Scale up commercial processes to separate oilseed hulls.
Scale-up low temperature oil removal from oilseed.

**ADF Funding:** $389,250

**Saskatchewan Flax Development Commission:** $129,750

**Organization:** University of Saskatchewan

**Contact:** Dr. Martin Reaney, Plant Sciences, (306) 966-5027

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Pulses

Nitrogen Fertilization of Irrigated Dry Bean (20180081)
**Oil Emulsifier from Chickpea (20180091)**

Optimize parameters to maximize aquafaba-based emulsifier functionality and stability.
Collaborate with CDC to identify chickpea cultivars that produce the superior aquafaba emulsifier.
Develop new food products using aquafaba based emulsifier.
Determine the safety, the antinutritional and the nutritional value of the emulsifier.
Standardize the process of emulsifier extraction from chickpea seed.
Pilot plant scaleup value-added process to extract emulsifier from chickpea.
Publish the optimized value-added process for extraction of aquafaba from chickpea.
Publications and patents.

**ADF Funding:** $360,000

**Organization:** University of Saskatchewan

**Contact:** Dr. Martin Reaney, Plant Sciences, (306) 966-5027

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**Fungicide Timing to Manage Ascochyta Blight in Chickpea Varieties with Contrasting Ascochyta Resistance (20180116)**

To evaluate the effectiveness of *Ascochyta rabiei* resistance in new chickpea varieties under different fungicide regimes.
To measure the frequency of seed-to-seedling transmission of *A. rabiei* from chickpea with different disease resistance.
To assess fungicide insensitivity in *A. rabiei* chickpea plant matter exposed to different fungicide regimes.
To assess the impact of the number of fungicide sprays on *Ascochyta* in chickpea varieties with differing resistance.
To assess the inoculum potential of the residue remaining in the field post-harvest.
To evaluate *A. rabiei* infection in seeds produced by chickpeas grown under contrasting fungicide regimes.
To assess the impact of a very early fungicide application on *Ascochyta* in chickpea varieties with contrasting resistance.
To evaluate interactions between IMI herbicide tolerance and *A. rabiei* resistance.

**ADF Funding:** $161,720

**Organization:** Agriculture & Agri-Food Canada

**Contact:** Dr. Michelle Hubbard, (306) 770-4461

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**Developing Ingredients from Wrinkle Peas Using Wet Isolation Techniques (20180132)**

Determine whether it is more efficient to use wrinkle peas for wet isolated ingredients.
Develop the knowledge to help the pulse industry find value propositions for wrinkled peas.
To innovate for developing new ingredients using enzymes on the proteins and starches.
To determine functional differences between wrinkled and smooth pea proteins and starches.
To determine means to enhance efficiency for the wet extraction of proteins and starches from wrinkled or smooth peas.
To develop wet isolated protein and starch ingredients from wrinkle peas.

**ADF Funding:** $115,000

**Organization:** Saskatchewan Food Industry Development Centre

**Contact:** Dr. Ricky Lam, (306) 964-8701
Understanding the Impact of Particle Size on Physicochemical Properties and Nutritional Benefits of Pulse and Oat Flours (20180182)

To examine the relationships between flour particle size and postprandial glycemia in humans.
To examine the chemical compositions and functional properties of the flours with variations in particle size.
To prepare pea, lentil and oat flours of coarse, granular and fine particle sizes.
To determine the performance, starch digestibility and dietary fiber contents of the obtained flours and resultant foods.

**ADF Funding:** $282,568

**Prairie Oat Growers Association:** $25,587

**Organization:** University of Saskatchewan

**Contact:** Dr. Yongfeng Ai, Food and Bioproduct Sciences, (306) 966-2139

Characterization of Pea Lines with Improved Nitrogen Fixation and High Grain Yield (20180146)

To assess the potential of an LCO product on pea lines with diverse nodulation traits.
To evaluate pea lines for nitrogen fixation traits with the broader goal to breed for improved nitrogen fixation in pea.
To assess the potential of selected lines as cover crops.
To assess nodulation traits in selected lines with or without nodulation enhancing treatment.

**ADF Funding:** $269,500

**Organization:** University of Saskatchewan

**Contact:** Dr. Tom Warkentin, Crop Development Centre, (306) 966-2371

Improving Iron Status Increases the Value of Pea in Whole Food and Protein Markets (20180149)

To evaluate the agronomic performance of 20 biofortified pea lines in field trials over multiple years and locations.
To compare a sub-set of the 20 biofortified lines as whole grain flour and as protein isolates to control pea.
To compare biofortified pea to regular pea consumption on iron status and exercise performance in endurance-trained women.

**ADF Funding:** $298,100

**Organization:** University of Saskatchewan

**Contact:** Dr. Tom Warkentin, Crop Development Centre, (306) 966-2371

Understanding the Impact of Particle Size on Physicochemical Properties and Nutritional Benefits of Pulse and Oat Flours (20180182)
**Introgression of Novel Traits from Wild Chickpea to Improve Adaptation and Yield of Cultivated Chickpea under Suboptimal Environments (20180215)**

Evaluate the interspecific populations for yield potential, agronomic and developmental traits across a range of suboptimal environments.

Identify the physiological and morphological traits associated with improved adaptation to suboptimal environments.

Identify chromosomal regions and candidate genes introduced from *C. reticulatum* for improved adaptation to suboptimal environments.

Investigate association between the candidate genes and phenotypic traits through the association analysis.

Identify single nucleotide polymorphism (SNP) markers for selection of genomic regions conferring improved adaptation to suboptimal environments.

**ADF Funding:** $433,276  
**Organization:** University of Saskatchewan  
**Contact:** Dr. Bunyamin Tar’an, Crop Development Centre, (306) 966-2130

**Improved Management of Pea Aphid and Aphid-Transmitted Viruses in Saskatchewan Pulse Crops (20180234)**

To survey Saskatchewan pulse fields for the presence of important aphid vectored Potyviruses.

To describe the symptoms of pea seedborne mosaic virus (PSbMV) in faba bean and evaluate damage in controlled laboratory studies.

To determine the LC50 and efficacy of “soft” and novel insecticidal compounds for control of pea aphid in faba bean and lentil.

Develop nominal & economic thresholds & control methods to control pea aphids, maximize yield & protect aphid predators.

**ADF Funding:** $101,000  
**Western Grains Research Foundation:** $101,000  
**Organization:** University of Saskatchewan  
**Contact:** Dr. Sean Prager, Plant Sciences, (306) 966-8359

**Genetic Improvement of Protein and Seed Quality Traits in Pea (20180240)**

To develop pea lines with an improved concentration of sulfur amino acid.

To develop pea lines with reduced off-flavor.

**ADF Funding:** $275,000  
**Organization:** National Research Council Canada  
**Contact:** Dr. Pankaj Bhowmik, (306) 975-5566
**Evaluation of Genetic Diversity for Glycemic Index in Pea Flour (20180258)**

To determine the variation in starch digestion rate in a pea genome-wide association study (GWAS) panel.
To develop DNA markers associated with low glycemic index in pea.
To evaluate pea varieties contrasting most widely in starch digestion rate to determine the potential related mechanisms.
To determine glycemic index in humans consuming pea varieties contrasting in starch digestion rate.

**ADF Funding:** $294,800

**Organization:** University of Saskatchewan

**Contact:** Dr. Tom Warkentin, Crop Development Centre, (306) 966-2371

**Iron Fortified Canadian Lentil Dal for Bangladesh – A Human Efficacy Trial (20180296)**

Obtain scientifically relevant, ethically approved and medically acceptable Fe status data for 1,200 young women. Use these data to support the publications arising from the world’s first human study with Fe-fortified lentil dal from Canada.
Develop a long-term plan for production and distribution of fortified lentil dal.
Develop a plan to publicize the results.

**ADF Funding:** $150,000

**Organization:** University of Saskatchewan

**Contact:** Dr. Albert Vandenberg, Crop Development Centre, (306) 966-8786

**Identification of molecular markers for the introgression of aphanomyces root rot from Lens orientalis into cultivated lentil (20180317)**

Assessment of aphanomyces root rot resistance in an intraspecific Lens orientalis population.
Mapping of quantitative trait loci (QTLs) associated with aphanomyces root rot resistance.
Development of QTL markers and their validation to confirm their stability and effectiveness in different genetic backgrounds.

**ADF Funding:** $322,550

**Organization:** University of Saskatchewan

**Contact:** Dr. Sabine Banniza, Crop Development Centre, (306) 966-4959

**Improving Efficiency of a Novel Protein Extraction Technology for Pulses (20180320)**

To determine the economic potential of a novel protein extraction process.
To develop a preliminary framework for counter-current process simulation modeling.
To evaluate and optimize the concept of counter-current washing as a method to produce solubilized protein from pulses.
To develop a novel process to increase efficiency of protein extraction from pulses.

**ADF Funding:** $109,000

**Organization:** Prairie Agricultural Machinery Institute - PAMI

**Contact:** Mr. Arnie Harrison, (306) 682-5033
**Pea Protein "Omics Determination (P-POD)" (20180436)**

This project will undertake novel work to enhance the protein content and the amino acid profile of smooth yellow pea.  
Project outcomes will include:  
1) one or more varieties of yellow pea with protein concentration at 26 per cent (increasing from the current average of 23 per cent).  
2) improved amino acid profile of yellow pea.  
3) the development of genomic tools to facilitate the rapid evaluation of genetic material from study populations and the subsequent inclusion of beneficial traits within a breeding program.

**SRI Funding:** $2,475,214  
**Organization:** University of Saskatchewan  
**Contact:** Dr. Tom Warkentin, Crop Development Centre, (306) 966-2371 and Dr. Bunyamin Tar'an, Crop Development Centre, (306) 966-2130

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**Alternative Crops**

**Determination of Ideal Seeding Date for Quinoa (20180231)**

Determine ideal seeding rate for quinoa production.  
Determine ideal seeding date range for quinoa production.  
Determine ideal seeding depth for quinoa.

**ADF Funding:** $120,050  
**Organization:** Northern Quinoa Production Corporation  
**Contact:** Mr. Derek Flad, (306) 514-3698

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**Hemp Protein and Oil Powders for Food and Functional Food Use (20180232)**

Hemp protein production as a food and health food ingredient and use as a carrier for commercial scale oil encapsulation.  
Generation of oil powders by incorporating other oils and functional ingredients into the hemp protein-oil matrix.  
Stability testing of the products made with microencapsulated powders.  
Market introduction and commercialization of new hemp protein and different oil powders as food ingredients.

**ADF Funding:** $200,000  
**Organization:** POS Bio-Sciences  
**Contact:** Dr. Anusha Samaranayaka, (306) 978-2836

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**Value-Added Processing of Canary Seed for Its Protein and Starch (20180290)**

Characterization of canary seed flour.  
Lab-scale process development for protein and starch fractionation and functionality testing to identify value-added applications.  
Scale-up the developed method and comparison of the functionality of the final products with that of lab-scale products.  
Evaluating different dehulling and milling techniques for efficient downstream fractionation of canary seed protein and starch.
### Miscellaneous Crops Related

**Improving Weed Management for Saskatchewan Growers (20180028)**

The objective of this project is to assist in the maintenance of a weed science research program in the Plant Sciences Department at the University of Saskatchewan.

**ADF Funding:** $176,000

**Organization:** University of Saskatchewan

**Contact:** Dr. Michael Nickerson, Food And Bioproduct Sciences, (306) 966-5030

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<td>University of Saskatchewan</td>
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<td>Dr. Christian Willenborg, Plant Sciences, (306) 966-8354</td>
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**Intercropping of Pulse and Oilseeds to Enhance Nutrient Use Efficiency and Nitrogen Fixation (20180064)**

To determine how chickpea-flax and pea-mustard intercropping can be used to improve soil nutrient use efficiency.

**ADF Funding:** $47,410

**Organization:** University of Saskatchewan

**Contact:** Dr. Jeff Schoenau, Soil Science, (306) 966-6844

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<tr>
<td>Western Grains Research Foundation</td>
<td>$219,507</td>
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<td>University of Saskatchewan</td>
<td>$219,507</td>
<td>Dr. Christian Willenborg, Plant Sciences, (306) 966-8354</td>
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**Balancing Agronomic and Environmental Outcomes Using Enhanced Efficiency Nitrogen Fertilizers (20180193)**

Quantify the influence of enhanced efficiency nitrogen fertilizers on crop nitrogen use efficiency, yield, and N$_2$O emissions.

Quantify and compare crop N uptake, nitrogen use efficiency, yield, and oil content of canola following fall and spring applications of two enhanced efficiency nitrogen fertilizers (EENFs) or conventional (untreated) urea.

Quantify and compare N$_2$O emissions from fall vs. spring applications of two enhanced efficiency nitrogen fertilizers (EENFs) with those associated with application of conventional (untreated) urea.

Calculate yield-scaled N$_2$O emission factors for each fertilizer type and application timing to determine the combination that yields the best balance of agronomic and environmental outcomes.

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<td>ADF</td>
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<td>Saskatchewan Canola Development Commission</td>
<td>$50,371</td>
<td>Dr. Richard Farrell, Soil Science, (306) 966-2772</td>
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<tr>
<td>University of Saskatchewan</td>
<td>$176,000</td>
<td>Dr. Michael Nickerson, Food And Bioproduct Sciences, (306) 966-5030</td>
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Extending the Seasonal Photosynthetic Period to Minimize Cropping System Greenhouse Gas Intensity (20180237)

Assess the greenhouse gas mitigation potential of extending the photosynthetic period of cash crop sequences with winter wheat.
Compare N₂O emissions from fall-seeded wheat-canola compared to spring-seeded wheat - canola sequences.
Assess the greenhouse gas balance of crop sequences that combine winter wheat with a fall seeded cover crop.

**ADF Funding:** $197,670

**Organization:** Agriculture & Agri-Food Canada

**Contact:** Dr. Reynald Lemke, (306) 385-9444

Priming Plant Defense: A Broad Spectrum Defense Response that Protects Crops That Have No Genetic Resistance or Effective Chemical Resistance (20180322)

Assessment of ascr#18 (namatode pheromone), a natural product, for priming defenses of pulse crops against Ascochyta blight and Aphanomyces root rot.
Protecting wheat against Fusarium head blight (FHB) disease by priming wheat defense using ascr#18.
Validation of priming under the field conditions.
Durability of priming signals.

**ADF Funding:** $190,000

**Western Grains Research Foundation:** $95,000

**Saskatchewan Wheat Development Commission:** $95,000

**Organization:** Agriculture & Agri-Food Canada

**Contact:** Dr. Hossein Borhan, Molecular Genetics, (306) 385-9411