# Summary of ADF Projects, 2016
## Crop Research Funding

| | |
|---|---|
| 40 crop-related research projects | $7,018,399 |

### Breakdown by Commodity

| | |
|---|---|
| Cereals | $1,701,255 |
| Oilseeds | $1,259,199 |
| Pulses | $1,837,928 |
| Alternative Crops | $509,612 |
| Miscellaneous Crops Related | $1,710,405 |
| **TOTAL** | **$7,018,399** |

### Breakdown by Organization

| | |
|---|---|
| University of Saskatchewan | $4,479,126 |
| National Research Council | $711,087 |
| Agriculture & Agri-Food Canada | $481,135 |
| Global Institute for Food Security | $369,000 |
| Prairie Tide Chemicals | $244,000 |
| POS Bio-Sciences | $200,000 |
| Alliance Grain Traders | $150,000 |
| Canaryseed Development Commission of Saskatchewan | $110,624 |
| Prairie Agricultural Machinery Institute | $95,089 |
| Indian Head Agriculture Research Foundation | $89,900 |
| Rourke Farms Ltd. | $88,438 |
| **TOTAL** | **$7,018,399** |

# 2016 Crop Research Funding by Commodity

## Cereals

***Extracting Value from Fusarium Damaged Grain and Screenings*** (20150030)
**Objectives:**

- To help Saskatchewan agricultural producers extract value from fusarium-damaged grain and screenings.

**ADF Funding:** $52,575
**Organization:** Prairie Agricultural Machinery Institute
**Contact:** Joy Agnew, (306) 682-5033 ext. 280

***Characterization of Multiple Rust Resistance Genes to Design an Optimal Deployment Strategy*** (20150035)
**Objectives:**

- Identification of major Adult Plant Resistance genes (APRs) that confer resistance from varieties Parula and Thatcher.
- Identification of the most effective combinations of APR and R genes.
- Diversify the resistance gene pools in Canadian wheat breeding programs.

**ADF Funding:** $102,500
**Sask Wheat:** $102,500 plus $15,375 overhead
**Organization:** National Research Council
**Contact:** Wentao Zhang, (306) 975-4796

***FHB Screening of CDC Barley Breeding Selections, 2016-2020*** (20150126)
**Objectives:**

- Near Infrared (NIR) calibration development for prediction of grain deoxynivalenol (DON) content.
- DON evaluation at Crop Development Centre (CDC).
- Association mapping for fusarium head blight (FHB)/DON tolerance.
- Identify CDC barley breeding lines with improved FHB/DON tolerance.

**ADF Funding:** $183,333
**Western Grains Research Foundation:** $166,667 plus maximum of 15% overhead
**SaskBarley:** $150,000
**Organization:** University of Saskatchewan
**Contact:** Aaron Beattie, Crop Development Centre, (306) 966-2102

***Improving Fusarium Head Blight Management in Durum Wheat in Saskatchewan*** (20150176)
**Objectives:**

- Identify Fusarium species and toxins produced from FHB infected spring and durum wheat from the 2014 epidemic.
- Optimize fungicide timing in durum to control fusarium head blight (FHB) in Saskatchewan.

**ADF Funding:** $105,000
**Western Grains Research Foundation:** $105,000 plus maximum 15% overhead
**Sask Wheat:** $105,000 plus $15,750 for overhead
**Organization:** University of Saskatchewan
**Contact:** Randy Kutcher, Plant Sciences, (306) 966-4951

***Genetic Improvement of Photosynthetic Efficiency and Capacity in Canadian Wheat Cultivars*** (20150183)
**Objectives:**

- Genetic and physiological assessment of photosynthetic efficiency in Canadian wheat cultivars.
- Developmental analysis of architecture, flag leaf and spike photosynthesis lines.
- Perform genome-wide transcriptome and metabolome studies in these lines.
- Define the molecular identity of the underlying genetic regulatory factors and their respective functions in photosynthesis.
- Develop gene and metabolite based targets and markers for photosynthetic efficiency.
- Deployment of these gene targets and their corresponding appropriate alleles into elite wheat cultivars.

**ADF Funding:** $608,587
**Organization:** National Research Council
**Contact:** Raju Datla, Plant Biotechnology Institute, (306) 975-5267

***Feeding Fusarium-Infected Wheat to Insect Larvae to Produce a Safe Replacement Protein Source*** (20150240)
**Objectives:**

- Determine usefulness of mealworms to detoxify mycotoxins.
- Breeding trial with mealworms.
- Search for genetic variants.
- Determine usefulness of Black Soldier Fly larvae to detoxify mycotoxins.

**ADF Funding:** $145,000
**Enterra Feeds:** $5,000 (in-kind)
**Organization:** University of Saskatchewan
**Contact:** Fiona Buchanan, Animal and Poultry Science, (306) 966-4160

***Rapid Screening for Fusarium Head Blight Resistance in Isogenic Wheat Lines Using Biomolecular Imaging and Genomics Tools*** (20150250)

**Objectives:**

- Identify and quantify the internal structural differences (of the floret and rachis) in near-isogenic wheat lines (NILs).
- Identify the biomolecular composition and determine variation between susceptible and resistant FHB NILs.

**ADF Funding:** $100,000

**Organization:** University of Saskatchewan

**Contact:** Randy Kutcher, Plant Sciences, (306) 966-4951

***New Sources of Resistance to Fusarium Head Blight in Spring Wheat*** (20150258)

**Objectives:**

- Identify wheat germplasm with new sources of FHB resistance by screening a world collection of Triticum aestivum accessions.
- Identify novel alleles for FHB resistance from a synthetic hexaploid wheat population.

**ADF Funding:** $41,667

**Western Grains Research Foundation:** $41,667 plus maximum 15% overhead

**Sask Wheat:** $41,667 plus $6,250 for overhead

**Organization:** University of Saskatchewan

**Contact:** Randy Kutcher, Plant Sciences, (306) 966-4951

***Enhancing the Marketability of CWRS Wheat by Creating 'Cleaner Label' Opportunities Through Genetics and/or Enzymes*** (20150280)

**Objectives:**

- Study the role of chemical oxidizers in dough.
- Explore the role of enzymes as a replacement for chemical oxidizing agents.
- To test the bread making performance of selected formulations.

**ADF Funding:** $168,500

**Organization:** University of Saskatchewan

**Contact:** Michael Nickerson, Food and Bioproduct Sciences, (306) 966-5030

***The Effect of Pre-harvest Glyphosate on Quality of Milling Oats*** (20150338)

**Objectives:**

- To determine the effect of application timing of pre-harvest glyphosate on oat yield, seed physical and functional properties.
- To investigate the interaction of cultural practices with pre-harvest glyphosate on seed physical and functional quality.
- To investigate alternative cultural / herbicide combinations for managing perennial weeds.

**ADF Funding:** $194,093

**Organization:** University of Saskatchewan

**Contact:** Christian Willenborg, Plant Sciences, (306) 966-8354

## Oilseeds

***Impact of Drought and Heat during Flowering on Canola Yield*** (20150009)
**Objectives:**

- Evaluate spring canola Nested Association Mapping population founder lines for drought, heat and combined stresses in greenhouse.
- Comprehensive analyses of plant metabolites exhibiting enhanced stress-responsive roles leading to the discovery of biomarkers.
- Selection of stress tolerant canola varieties based on the abscisic acid (ABA) level.
- Explore new rapid and non-destructive biomolecular imaging techniques to predict stress tolerance using Canadian Light Source.
- Evaluation of abiotic stress tolerance under field conditions.

**ADF Funding:** $332,785
**SaskCanola:** $41,667 plus maximum of $24,959 for overhead
**Organization:** Agriculture & Agri-Food Canada
**Contact:** Raju Soolanayakanahally, (306) 385-9585

***Optimal Nitrogen and Phosphorus Management for Flax*** (20150105)
**Objectives:**

- To evaluate the yield response of flax to various rates and combinations of nitrogen, phosphorus and sulphur fertilizer.
- To evaluate the potential yield response to higher N and P rates than are typically recommended or utilized for flax.
- To evaluate the probability of a yield response to sulphur fertilization for flax grown on Chernozemic soils in western Canada.

**ADF Funding:** $89,900
**Western Grains Research Foundation:** $89,900 plus maximum 15% overhead
**SaskFlax:** $89,900 plus maximum 15% overhead
**Organization:** Indian Head Agricultural Research Foundation
**Contact:** Chris Holzapfel, (306) 695-7761

***Total Recovery of Active Components of Flax*** (20150200)
**Objectives:**

- Compare alternative varieties of flaxseed for the recovery of different components.
- Develop methods for the removal of residual alcohol.
- Develop scale-up methods for the extraction of mucilage.
- Develop an unassailable intellectual property portfolio.
- Develop scale-up methods for the improved recovery of flax components.

**ADF Funding:** $244,000
**Organization:** Prairie Tide Chemicals
**Contact:** Martin King, (306) 955-3566

***Adding Value to Flax Orbitides*** (2015206)
**Objectives:**

- Optimize and quantitate the efficiency of orbitide organic light emitting devices (OLED).
- Develop knowledge on the interaction of orbitides with metal ions and lipids.
- Determine response of normal and cancer cells cultures to the presence of orbitides.
- Determine the potential of orbitides to be used as a drug carriers.
- Formulate pure and derivitized orbitides in hydrophobic and surfactant media.
- Prepare photodynamic material from orbitide and core shell nanomaterial. Test photodynamic material in-vitro.

**ADF Funding:** $360,000
**Organization:** University of Saskatchewan
**Contact:** Martin Reaney, Plant Sciences, (306) 966-5027

***High Value Bioactives and Vitamins from Canola Crush Waste Stream*** (2015216)
**Objectives:**

- Extraction of active metabolites from the deodorizer distillate of canola.
- Analyzing the product (active metabolites).
- Product formulation.

**ADF Funding:** $190,000
**Organization:** University of Saskatchewan
**Contact:** Anas El-Aneed, Pharmacy & Nutrition, (306) 966-2013

***Determining Best Practices for Summer Storage of Canola (continuation)*** (20150293)
**Objectives:**

- To generate and validate best management practices for summer storage of canola.

**ADF Funding:** $42,514
**Organization:** Prairie Agricultural Machinery Institute
**Contact:** Joy Agnew, (306) 682-5033 ext. 280

## Pulses

***Nutrient Uptake and Nitrogen Fixation by Faba bean in Saskatchewan Soils*** (20150076)
**Objectives:**

- To determine the soil nutrient uptake, removal and N fixation by faba bean.

**ADF Funding:** $32,625
**SaskPulse:** $32,625 plus maximum 15% overhead
**Organization:** University of Saskatchewan
**Contact:** Jeff Schoenau, Soil Science, (306) 966-6884

***Application of Abscisic Acid (ABA) Analogs in Pulse Agronomy and Physiology*** (20150111)
**Objectives:**

- Developing rapid generation technology (RGT) involving wild lentil crosses to produce aphanomyces-resistant lentil varieties.
- Increasing germination rate of pulse crops seeds at low temperatures.
- Hastening maturity in faba bean and chickpea.
- Breaking dormancy in seeds of wild relatives of lentil and chickpea.

**ADF Funding:** $241,412
**SaskPulse:** $275,000 plus 15% overhead (committed March 2015)
**Organization:** University of Saskatchewan
**Contact:** Suzanne Abrams, Chemistry, (306) 966-1719

***Evaluation of Pulse Starches to Produce Modified Pulse Starch and Resistant Starch Production*** (20150175)
**Objectives:**

- To chemically and naturally modify the functional properties of pulse starches (pea, lentil and faba bean).
- To evaluate the economic feasibility of select modified pulse starches and resistant starches.
- To identify and establish functionality and nutritional attributes of pulse starches.
- To evaluate the select modified pulse starch for commercialization process.
- To establish the performance of modified pulse starches in food systems.

**ADF Funding:** $150,000
**Organization:** Alliance Grain Traders
**Contact:** Mehmet Tulbek, (306) 244-5622

***Genome Wide Association Study (GWAS) of Folate and Micronutrient Profile in Pea*** (20150212)
**Objectives:**

- Evaluation of diverse pea accessions for folates and micronutrients.
- Genome-wide association study to identify associated single nucleotide polymorphisms (SNPs).
- SNP variation within candidate genes associated with folates and micronutrients.
- Development of Kompetitive Allele Specific PCR (KASP) markers for marker assisted selection.

**ADF Funding:** $460,358
**Organization:** University of Saskatchewan
**Contact:** Tom Warkentin, Crop Development Centre, (306) 966-2371

***Marker-Assisted Introgression of Useful New Diversity into the Pea Genome for Rapid Cultivar Improvement*** (20150251)

**Objectives:**

- Identification of pea germplasm with new diversity for key traits as candidate starting material for the project.
- Develop five F2 populations based on identified donors in objective 1 crossed to the common recurrent parent, CDC Amarillo.
- Development of genetic linkage maps for selection of F2 individuals to represent donor genomes in the background of recurrent parent.
- Development of ¼ chromosome segment substitution lines (CSSLs) by backcross breeding.
- Phenotypic and genotypic characterization of ¼ CSSLs.
- Fine mapping and development of near isogenic lines (NILs).
- Gene pyramiding for targeted traits.

**ADF Funding:** $152,939
**Western Grains Research Foundation:** $152,939 plus maximum 15% overhead
**SaskPulse:** $152,939 plus maximum 15% overhead
**Organization:** University of Saskatchewan
**Contact:** Tom Warkentin, Crop Development Centre, (306) 966-2371

***Modification of a Commercial Lentil, Pea, and Faba Bean Protein Isolate Production Process for Improved Flavor Profiles*** (20150273)

**Objectives:**

- Production of pea and lentil protein isolates.
- Examine the surface and functional properties.
- Determination of flavor compounds and sensory evaluation.
- Scale up best washing/absorbent treatments for producing a lentil protein isolate product in the pilot plant.
- Scale up best washing/absorbent treatments for producing a pea protein isolate product in the pilot plant.
- Food product development.

**ADF Funding:** $148,000
**SaskPulse:** $100,000 plus maximum 15% overhead
**Organization:** University of Saskatchewan
**Contact:** Michael Nickerson, Food and Bioproduct Sciences, (306) 966-5030

***Entrapment of Heart Healthy Oils Using Lentil Protein Isolates by Spray Drying*** (20150274)
**Objectives:**

- Examine a range of oil types within the encapsulation system.
- Examine the impact of synthetic and natural antioxidants on oil stability.
- Characterize the resulting encapsulated ingredient.
- Carry out product development using the new encapsulated ingredient.
- Produce kg quantity lentil proteins ingredients within the pilot plant.
- Scale up encapsulation process from benchtop to pilot plant.
- Re-formulate wall formulations to increase payloads.

**ADF Funding:** $187,000
**SaskPulse:** $51,500 plus maximum 15% overhead
**Organization:** University of Saskatchewan
**Contact:** Michael Nickerson, Food and Bioproduct Sciences, (306) 966-5030

***Technology Platform for Comprehensive Nutritional Profiling of Seeds*** (20150281)
**Objectives:**

- Combine mid-infrared (mid-IR) and X-ray spectroscopy based quantitative methods as a one stop 'shop' to profile seed nutrition.
- Validate spectroscopic method developed in objective 1 on the seed obtained from a range of pea germplasm.
- Develop recommendations for implementing high throughput nutritional profiling at the U of S.

**ADF Funding:** $153,094
**Western Grains Research Foundation:** 153,094 plus maximum 15% overhead
**Organization:** University of Saskatchewan
**Contact:** Tom Warkentin, Crop Development Centre, (306) 966-2371

***Faba Beans for the Future – N-telligent Farming*** (2015285)
**Objectives:**

- Develop commercially acceptable and adapted faba bean germplasm with drought tolerance for the south and west regions of SK.
- Develop faba bean germplasm with reduced height and yield stability for the north and east regions of SK.
- Improve the micronutrient biovailability (iron and zinc) of faba bean by reducing seed phytate for human nutrition.
- Develop faba bean germplasm with improved resistance to chocolate spot (Botrytis fabeae) using local and introduced germplasm.
- Rapidly develop faba germplasm with low vicine/convicine to change perception of anti-nutritional properties in food processing.

**ADF Funding:** $312,500
**Western Grains Research Foundation:** $312,500 plus maximum 15% overhead
**Organization:** University of Saskatchewan
**Contact:** Albert Vandenberg, Crop Development Centre, (306) 966-8786

## Alternative Crops

***Allergenicity Considerations in Glabrous Canary Seed*** (20150214)
**Objectives:**

- To investigate the potential allergenic nature of glabrous canaryseed compared to wheat allergens.

**ADF Funding:** $110,624
**Organization:** Canaryseed Development Commission of Saskatchewan
**Contact:** Kevin Hursh, (306) 933-0138

***Hemp Protein as a Microencapsulation Carrier for Hemp Oil and Hemp Oil Concentrate*** (20150232)
**Objectives:**

- Process development for encapsulating hemp oil and hemp oil concentrates using hemp protein.
- Stability testing of the microencapsulated product.
- Pilot scale process testing and optimization.
- Lab-scale assessment of hemp protein isolate or selected fractions as microencapsulation wall materials.
- Lab-scale development of a hemp oil concentrate with high alpha-linoleic acid (ALA) and gamma-linoleic acid (GLA) content.

**ADF Funding:** $200,000
**Naturally Splendid:** $100,000
**Organization:** POS Bio-Sciences
**Contact:** Udaya Wanasundara, (306) 978-2800

***Herbicide Screening in Hemp (Cannabis sativa)*** (20150253)
**Objectives:**

- To screen hemp germplasm to determine variability in tolerance to broadleaf herbicides.
- To provide data to Minor Use of Pesticides Program to support herbicide registration.

**ADF Funding:** $110,550
**Organization:** University of Saskatchewan
**Contact:** Christian Willenborg, Plant Sciences, (306) 966-8354

***Optimizing the Agronomic Viability of a New, Higher Quality Commercial Quinoa Variety in the Southern Regions of Western Canada*** (20150262)
**Objectives:**

- Variety Screening/Trials and Assessment to determine the most suitable varieties for the soil and climate conditions in W. Canada.
- Testing and re-testing to determine pesticides, herbicides, fungicides and insecticides for quinoa varieties in W. Canada.
- Performing agronomic trials to determine practices that produce the highest seed yield, nutritional quality and germination rate.
- Engaging with Western Canada producers, food processors, agricultural government, etc.

**ADF Funding**: $88,438
**Organization:** Rourke Farms Ltd.
**Contact:** David Rourke, (204) 776-5557

## Miscellaneous Crops Related

***Improved Iron Chelates for Treatment of Iron Chlorosis in Saskatchewan Pulse and Fruit Crops*** (20150006)
**Objectives:**

- Preparation and testing of a new foliar spray for treating iron chlorosis in pulse and fruit crops.

**ADF Funding:** $26,667
**SaskPulse:** $13,333 plus maximum 15% overhead
**Organization:** University of Saskatchewan
**Contact:** Matthew Paige, Chemistry, (306) 966-4665

***Improved Variable Rate Irrigation Prescription Development*** (20150056)
**Objectives:**

- Assess the role of emerging technologies in developing Variable Rate Irrigation prescriptions.
- Recommend improvements to Variable Rate prescription writing methodology.
- Evaluate economic benefits associated with the adoption of Variable Rate Irrigation Technology.
- Produce a Variable Rate Irrigation training package.

**ADF Funding:** $148,350
**Organization:** Agriculture & Agri-Food Canada
**Contact:** Evan Derdall, (306) 385-9383

***Investigation and Demonstration of Close Coupled Gasification of Novel Fuel Pellets Developed from Agricultural Residues*** (20150057)

**Objectives:**

- Scale-up of moisture resistant pellet gasification process.
- Thermodynamic modeling of the pellet gasification process.
- Synthesis of moisture resistant fuel pellets from canola meal, oat hulls and wood residues using bio-additives and optimization.
- Development and characterization of the catalysts for tar conversion to gaseous product during gasification of fuel pellets.
- Gasification of fuel pellets synthesized at optimum operating conditions and optimization of gasification process conditions.
- Extensive characterization of feedstocks and fuel pellets.
- Life-cycle and process economic analysis for synthesis and gasification of bio-based fuel pellets.

**ADF Funding:** $291,000
**SaskPower:** $30,000 (in-kind)
**Spectrum Technologies:** $45,000 (in-kind)
**Richardson Oilseeds:** $30,000 (in-kind)
**Milligan Biofuels:** $36,000 (in-kind)
**Biofueltech:** $50,000 (cash and in-kind)
**Prairie Agricultural Machinery Institute:** $50,000 (cash and in-kind)
**Organization:** University of Saskatchewan
**Contact:** Ajay K. Dalai, Chemical Engineering, (306) 966-4771

***Crop Response to Foliar Applied Phosphorus Fertilizers*** (20150077)

**Objectives:**

- To determine the crop response to foliar applied phosphorus (P) fertilizer, applied alone and in combination with soil applied phosphorus.
- To determine the efficiency of the added P fertilizer in recovery by the crop and increasing the yield.

**ADF Funding:** $17,400
**Sask Wheat:** $17,400 plus $2,610 for overhead
**SaskCanola:** $17,400 plus maximum $2,610 for overhead
**SaskPulse:** $17,400 plus Maximum 15% for overhead
**Organization:** University of Saskatchewan
**Contact:** Jeff Schoenau, Soil Science, (306) 966-6884

***Identifying the Mechanisms Responsible for Greater Than Expected Residue-Induced $N_2O$ Emissions from Canola and Flax*** (20150083)

**Objectives:**

- Identify plant factors that contribute to enhanced nitrous oxide (N2O) emissions from oilseed residues.

**ADF Funding:** $168,409
**SaskCanola:** $56,136 plus maximum $8,240 for overhead
**Organization:** University of Saskatchewan
**Contact:** Richard Farrell, Soil Science, (306) 966-2772

***Quantifying the Contribution of Pulse Crop Residues to GHG Emissions, N Nutrition, and the Growth of a Subsequent Wheat Crop*** (20150084)

**Objectives:**

- Demonstrate the beneficial role that pulse crops can play in prairie cropping systems.
- Specific objectives:
- Quantify direct N2O emissions from soils under pea, lentil, chickpea, faba bean and wheat crops.
- Quantify direct N2O emissions from soils under a wheat crop grown on pea, lentil, chickpea and faba bean residues.
- Develop BMPs for pulse stubble management.
- Partition the relative contribution for each major N source [fertilizer-N, residue-N and background (indigenous soil N)] to overall soil-emitted N2O
- emissions.
- Quantify BNF from pea, lentil, chickpea and faba bean.
- Quantify N-mineralization/immobilization from soils under pea, lentil, chickpea, faba bean and wheat.

**ADF Funding**: $93,941
**Western Grains Research Foundation:** $93,940 plus maximum 15% for overhead
**Organization:** University of Saskatchewan
**Contact:** Richard Farrell, Soil Science, (306) 966-2772

***Comparative Genomics of Apomictic Plants: Advancing Novel Tools for Niche Breeding*** (20150123)

**Objectives:**

- High-quality genome assembly of 3 sexual and 3 apomictic Boechera (Brassicaceae).
- Isoform sequencing of ovule transcriptomes from 3 sexual and 3 apomictic Boechera (Brassicaceae).

**ADF Funding:** $369,000
**SaskCanola:** $41,000 plus maximum $6,150 for overhead
**Organization:** Global Institute for Food Security
**Contact:** Tim Sharbel, (306) 966-3701

***Improving Weed Management for Saskatchewan Growers (Renewal of ADF Project 20120029)*** (20150154)

**Objectives:**

- To assist in the maintenance of a weed science research program in the Plant Sciences Department at the University of Saskatchewan.
- To leverage the core funding of this grant to obtain industry and producer groups funds to maintain viable weed science program.

**ADF Funding:** $269,770
**Sask Wheat:** $38,258 plus maximum $5,739 overhead (Yr. 3 funding)
**SaskCanola:** $38,258 plus maximum $5,739 overhead (Yr. 3 funding)
**SaskFlax:** $38,258 plus maximum $5,739 overhead (Yr. 3 funding)
**Organization:** University of Saskatchewan
**Contact:** Christian Willenborg, Plant Sciences, (306) 966-8354

***Evaluating the Effect of Tillage Radish ™ on Water Infiltration Rate in Annual Cropland*** (20150246)
**Objectives:**

- To examine the effect of radish cover crop on water infiltration, water storage, and flax yield.

**ADF Funding:** $25,000
**Organization:** University of Saskatchewan
**Contact:** Bing Si, Soil Science, (306) 966-6877

***Development and Scale-up Production of Plant Endophytic Microorganisms for Seed Treatment of Wheat and Corn*** (20150278)
**Objectives:**

- To undertake development and scale-up studies on three plant endophytes with plant growth and yield promoting efficacy.
  Descriptions:
  - Test 1 and 5 L batch fermentations of the three endophytes for optimizing media components and culture conditions.
  - Scale-up studies to test 15 and 300 L batch fermentations from optimized shake flask culture parameters.
  - Test different strategies for recovery and downstream processing of biomass.
- To undertake development and scale-up studies on three plant endophytes with plant growth and yield promoting efficacy.
  Description: Field testing of large-scale derived biomass for efficacy testing.

**ADF Funding:** $200,401
**Organization:** University of Saskatchewan
**Contact:** Vladimir Vujanovic, Food and Bioproduct Sciences, (306) 966-5048

***Enhanced Saskatchewan Soil Data for Sustainable Land Management*** (20150286)
**Objectives:**

- Enhance access to Saskatchewan soil data.
- Enhance resolution of soil data through digital soil mapping.
- Develop a sustainable land management app.

**ADF Funding:** $100,467
**SaskCanola:** $50,233 plus maximum $7,535 for overhead
**SaskPulse:** $50,233 plus maximum 15% for overhead
**Organization:** University Of Saskatchewan
**Contact:** Angela Bedard-Haughn, Soil Science, (306) 966-4291