## Summary of ADF Projects, 2015

### Crops Research Funding

<table>
<thead>
<tr>
<th>42 crop-related research projects</th>
<th>$6,867,489</th>
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#### Breakdown by Commodity

- **Oilseeds**: $1,603,460
- **Cereals**: $1,438,764
- **Pulses**: $733,100
- **Other**: $3,092,165

**Total**: $6,867,489

#### Breakdown by Organization

- **University of Saskatchewan**: $4,046,395
- **Agriculture and Agri-Food Canada**: $780,254
- **National Research Council**: $619,134
- **University of Regina**: $358,000
- **POS Bio-Sciences**: $225,000
- **Alliance Grain Traders**: $200,000
- **Saskatchewan Research Council**: $193,800
- **Saskatchewan Food Industry Development Centre**: $100,000
- **Northern Quinoa Corporation**: $165,656
- **University of Manitoba**: $69,250
- **Mustard 21 Canada Inc.**: $60,000
- **Saskatchewan Flax Development Commission**: $50,000

**Total**: $6,867,489
Oilseeds

Lecithin Extraction from Canola Gum (20140049)
Objectives:
- Scaling up of the optimized laboratory scale process through pilot scale trials
- Comparison of the composition and functionality of the canola lecithin final product to selected commercially available soybean
- Laboratory scale development of a scalable, cost effective extraction and purification process for canola lecithin.

ADF Funding: $225,000
Organization: POS Bio-Sciences
Contact: Udaya Wanasundara, (306) 978-2800

Genics Carrier Pad for Wood Preservatives using Crop Residue (20140082)
Objectives:
- Develop temporal absorption and release profiles of wood preservative formulas.
- Use aqueous-based wood preservative, develop vacuum-formed, flax-based carrier pads.
- Provide recommendations for technology development for commercialization for a manufacturing line.
- Reduce old carbon content by 55% of commercial carrier pad for wood preservative industry by using flax-based pad.
- Process crop residual (straw) using pulping for vacuum-formed pads with required physical and mechanical properties.

ADF Funding: $208,000
Genics Inc.: $50,000
Organization: University of Regina
Contact: Denise Stilling, Engineering, (306) 337-2696

Canola dehulling and utilization of fractions (20140102)
Objectives:
- The overall objective is to determine both the oil lost to the hull during impact dehulling and to decrease oil losses.
- Determine the effect of seed genotype on dehulling efficiency
- Determine the effect of dehulling on the Crusher’s margin
- The impact of hull lipids on the refining characteristics of canola seed.
- Develop a method for observing impact dehulling.
- Study the effect of collision velocity on dehulling efficiency
- Determine the effect of impact surface geometry on dehulling efficiency
- Determine the effect of seed conditioning on dehulling efficiency
- Determine the chemistry of hull lipid fractions

ADF Funding: $411,500
Organization: University of Saskatchewan
Contact: Martin Reaney, Plant Sciences, (306) 966-5027
Development of broadleaf herbicide tolerant Brassica juncea through microspore mutagenesis (20140142) – conditional approval

Objectives:
- To develop herbicide tolerance in Brassica juncea germplasm through microspore culture and mutations

ADF Funding: $225,000
Mustard 21: $90,000
Organization: Agriculture & Agri-Food Canada (AAFC)
Contact: Murray Lewis, (306) 385-9390

Introgression of disease resistance from Brassica nigra into canola using a new-type B. napus (20140143)

Objectives:
- Transfer blackleg resistance into B. napus.
- Transfer clubroot resistance into B. napus
- Identify and map clubroot resistance gene(s) in B. nigra
- Develop SNP markers tightly linked to the resistance gene(s)

ADF Funding: $195,640
Saskatchewan Canola Development Commission: $96,360
Organization: Agriculture & Agri-Food Canada (AAFC)
Contact: Fengqun Yu, (306) 385-9375

Ecology of Swede Midge Host Plant Interactions (20140159)

Objectives:
- Examine host range of swede midge.
- Investigate host plant resistance of non-hosts.
- Investigate biochemical basis of resistance.
- Examine plant susceptibility factors to swede midge feeding.

ADF Funding: $108,000
Western Grains Research Foundation: $107,000
Saskatchewan Canola Development Commission: $107,000
Organization: Agriculture & Agri-Food Canada (AAFC)
Contact: Juliana Soroka, (306) 385-9362

Western Canadian Oilseed Flax Cooperative Trials 2015 – 2016 (20140160)

Objectives:
- Collect data for the support of varietal registration of oilseed flax lines.

ADF Funding: $50,000
Western Grains Research Foundation: $150,000
Organization: Sask Flax Development Commission
Contact: Wayne Thompson, (306) 664-1901
Integrated Crop Management for High Yielding Flax Production (20140188)
Objectives:
  - The overall objective of this research is to improve flax yield via improved agronomy and weed management.
ADF Funding: $120,320
Western Grains Research Foundation: $120,320
Saskatchewan Flax Development Commission: $120,320
BASF: $21,000
FMC: $15,000
Organization: University of Saskatchewan
Contact: Christian Willenborg, Plant Sciences, (306) 966-8354

Development of Mustard Variety Registration System for SK (20140203)
Objectives:
Primary objective:
  - To help fast track mustard varieties by generating the field Co-op data needed for registration.
  - To provide robust eco zone field data for mustard growers to help make selection of mustard varieties for their farm.
  - To develop data for getting PBR status on new varieties.
  - To establish long-term (3 to 5 years) contracts with research providers / collaborators.
  - Assist M21 and AAFC breeding efforts to identify new cultivars with at least a 10-15% improvement in yield potential.
  - To generate merit data to identify new cultivars with improved yield, seed quality, and disease resist. based on 2 years data.
  - To generate PBR field data and variety descriptions to allow for protection of Mustard Growers sponsored IP.
ADF Funding: $60,000
Western Grains Research Foundation: $165,460
Organization: Mustard 21 Canada Inc.
Contact: Daryl Males, (306) 290-3850

Cereals

Improvement in wheat carbon flux for increased yield and Harvest Index (20140012)
Objectives:
  - Produce an improved wheat prototype line with enhanced productivity and Harvest Index.
  - Specifically, we propose to partially silence the endogenous mtPDHK for enhancing the expression of the mtPDH and subsequently increasing the carbon flux towards the seed sink, using gene editing technology applied to a breeding line amenable to microspore transformation/regeneration and of interest to the industry.
ADF Funding: $500,230
Western Grains Research Foundation: $246,382
Organization: National Research Council
Contact: Elizabeth-France Marillia, (306) 975-5282
Investigation of Avenanthramides, a Type of New Healthy Compounds in Oat (20140027)

Objectives:
- To improve the nutritional value of oat through increasing the level of avenanthramides, and novel bioactive compounds in oat that have strong antioxidant, anti-inflammatory and anti-allergic properties.
- Survey the content of avenanthramides in oat species, cultivars and breeding lines, and identify the genes encoding hydroxycinnamoyl-CoA:hydroxyanthranilate N-hydroxycinnamoyltransferase (HHT) catalyzing the key step of the biosynthesis of avenanthramides in oat seeds. The sequence information of these genes can be used to develop functional DNA markers for oat breeding programs to increase levels of the healthy compounds.

ADF Funding: $336,000
Prairie Oat Growers Association: $90,000
Organization: University of Saskatchewan
Contact: Xiao Qiu, Food & Bioproduct Science, (306) 966-2181

Improving the quality package of high anthocyanin wheat: from field to consumer (20140065)

Objectives:
- To identify the distribution of anthocyanin pigments in CDC Primepurple grain.
- To study the effects of pH and temperature on stability of anthocyanin pigments in CDC Primepurple wheat bran and/or wholegrain.
- Investigate the impact of processing on stability of anthocyanin pigments in bakery products.
- Investigate co-pigmentation to improve the color and stability of anthocyanin pigments
- Enhanced quality. To develop high anthocyanin wheat lines with improved dough handling and baking properties.

ADF Funding: $91,575
Western Grains Research Foundation: $91,575
Organization: University of Saskatchewan
Contact: Pierre Hucl, Crop Development Centre, (306) 966-8667

Development of fully cleistogamous wheat and associated markers (20140081)

Objectives:
- Identify and determine effects of Cly1 null alleles.
- Develop a fully cleistogamous wheat line.
- Develop DNA markers completely linked to Cly1 null alleles and to Cly1 alleles with variation in the miRNA region.

ADF Funding: $118,904
Western Grains Research Foundation: $59,452
Saskatchewan Wheat Development Commission: $59,452
Organization: National Research Council
Contact: Patricia Vrinten, (306) 975-5248
Development and commercialization of SNP marker technology for rapid identification of malting barley varieties (20140123)

Objectives:
- Discovery of SNP markers for identifying malting barley varieties
- SNP assay development, evaluation, selection and validation
- Process development and scale-up
- Commercialization of rapid malting barley variety identification test(s)

ADF Funding: $153,190
Western Grains Research Foundation: $153,190
Organization: University of Saskatchewan
Contact: Aaron Beattie, Crop Development Centre, (306) 966-2102

Aster yellow disease in spring wheat: a benchmark characterization and cultivar assessment (20140198)

Objectives:
- To document the symptomology of AY in recent wheat cultivars and to estimate the yield losses depending on the number of leafhopper
- To evaluate the reaction of selected wheat cultivars to AY
- To estimate the AY disease incidence and identify the phytoplasma strains present in leafhopper and wheat grown in trials grown

ADF Funding: $82,800
Western Grains Research Foundation: $82,800
Saskatchewan Wheat Development Commission: $82,800
Organization: University of Saskatchewan
Contact: Pierre Hucl, Crop Development Centre, (306) 966-8667

Breeding for resistance to leaf blotch pathogens in Saskatchewan oat (20140228)

Objectives:
- Isolation of leaf blotch pathogens from commercial oat fields
- Evaluation of pathogenic variability
- Identification of resistance in oat germplasm
- Genetic mapping of resistance in oat

ADF Funding: $86,815
Western Grains Research Foundation: $86,815
Prairie Oat Growers Association: $45,000
Organization: University of Saskatchewan
Contact: Aaron Beattie, Crop Development Centre, (306) 966-2102
Enhancing wheat midge resistance in spring and durum wheat (20140250)
Objectives:
- Genetic analysis of oviposition deterrence in spring and durum wheat
- Genetic analysis of Sm1 expression in the variety Shaw
ADF Funding: $69,250
Western Grains Research Foundation: $69,250
Saskatchewan Wheat Development Commission: $69,250
Organization: University of Manitoba
Contact: Alejandro Costamagna, Entomology, (204) 474-9007

Pulses

Response of Soybean to Iron Fertilization in Saskatchewan Soils (20140086)
Objectives:
- To determine nature and incidence of iron deficiency in soybean and response to fertilization in Saskatchewan soils.
ADF Funding: $75,400
Organization: University of Saskatchewan
Contact: Jeff Schoenau, Soil Science, (306) 966-6844

Production of fiber-rich, starch-rich and protein-rich fractions from by-product of lentil processing (20140137)
Objectives:
- To investigate the pilot-scale processing of high fibre, high protein and high starch products once the processing is optimized.
- To separate fibre fraction from starch and protein in the by-product obtained from lentil processing.
- To isolate starch and protein fractions using isoelectric technique after separation of fibre from starch and protein.
ADF Funding: $116,000
Organization: University of Saskatchewan
Contact: Lope Tabil, Chemical & Biological Engineering, (306) 966-5317

Metabolic Profiling of Wild Lentils and Their Interspecific Hybrids for Improving Lentil Varieties (20140243)
Objectives:
- Determine the polyphenolic profile of wild lentil accessions
- Determine the polyphenolic profile of interspecific hybrid populations
- Associate polyphenol profiles to disease resistance, especially for Aphanomyces root rot
ADF Funding: $341,700
Organization: University of Saskatchewan
Contact: Albert Vandenberg, Crop Development Centre, (306) 966-8786
**Utilization of pulse proteins as functional bioactive peptide production** (20140245)

**Objectives:**
- Economically analyze the feasibility of pulse proteins for functional peptide processing and development.
- To develop benchtop and pilot processing technology for functional peptides.
- Scale up processing technology will be developed.
- To evaluate the functionality of peptides.

**ADF Funding:** $200,000  
**Organization:** Alliance Grain Traders  
**Contact:** Mehmet Tulbek, (306) 244-5622

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**Other**

**Precision Subsoiling of Fields to Improve Soil Physical Conditions, Plant Growth and Economic Return** (20140025)

**Objectives:**
- To determine effectiveness of subsoil tillage to improve soil conditions and yield in field areas with structural limitation.

**Specific Objectives:**
- To measure and map soil structural limitations across a farm field in southern Saskatchewan in which traffic-induced soil compaction, and naturally dense subsoil (Bnt) horizons exist intermixed with non-compacted soils. Structural limitations will be assessed using a cone penetrometer taking soil penetration resistance (soil strength) readings, bulk density, air permeability and water infiltration measurements at specific points on a grid. A map will be made of the zones with soil strength and density above critical limits for root growth.
- To apply subsoiling using a Paraplow subsoiler only to specific areas in the plot which have been identified as having structural limitations in the root zone. For comparison purposes, a treatment is included in which subsoiling is conducted across the entire plot area. Check plots without sub-soiling will be used as a control. Yield data from three crops grown in rotation over three years (wheat-pea-canola) will be collected.
- To evaluate the effect of the subsoiling by taking soil penetration resistance, bulk density, air permeability, water infiltration and crop yield measurements at grid points in the year of application and the following two years. An economic evaluation of the subsoiling cost-benefit when applied to specific field zones versus whole field will be conducted.

**ADF Funding:** $55,000  
**Western Grains Research Foundation:** $55,000  
**Saskatchewan Wheat Development Commission:** $55,000  
**Organization:** University of Saskatchewan  
**Contact:** Jeff Schoenau, Soil Science, (306) 966-6844
Protein-based entrapment systems for probiotic delivery in feed and food applications
(20140084)
Objectives:
- To demonstrate the ability of probiotic strains to inhibit the growth of pathogenic bacteria in vitro.
- To evaluate the ability of probiotics delivered using the PES to directly (or indirectly enhance intestinal health.
- Modification of the PES system to improve shelf-life and scale-up production.
ADF Funding: $203,416
Organization: University of Saskatchewan
Contact: Michael Nickerson, Food & Bioproduct Sciences, (306) 966-5030

Health effects of Saskatoon berries in elderly smokers (20140090)
Objectives:
- To validate the health effects of saskatoon berries
- To promote saskatoon berries as “superfruits”
ADF Funding: $69,951
Organization: University of Saskatchewan
Contact: Jim Fang, Pharmacy & Nutrition, (306) 966-6372

Quinoa Breeding and Agronomy (20140091) – conditional approval
Objectives:
- Develop detailed agronomic information package for Quinoa for the Northern Prairies of Western Canada.
- New improved quinoa cultivars adapted for Canadian Growing Conditions.
- Identification of quinoa germplasm with traits potentially useful in future Quinoa cultivar development.
ADF Funding: $165,656
Western Grains Research Foundation: $124,242
Organization: Northern Quinoa Corporation
Contact: Alister Muir, (306) 260-9680

Microbial pathways of N2O production in irrigated soils: establishing a biological baseline
(20140099)
Objectives:
- To quantify the rates of microbial conversions among N pools in irrigated soils with different N fertilizer applications
- To quantify the number of gene copies present for key steps in the microbial nitrification and denitrification processes.
- To relate the above information with gaseous emissions to show how soil conditions determine the pathways and magnitude of N2O.
ADF Funding: $82,980
Organization: Agriculture & Agri-Food Canada (AAFC)
Contact: Bobbi Helgason, (306) 975-6510
Effects of Vertical Tillage on Soil Structure and Crop Yields in Southern Saskatchewan (20140108)

Objectives:
- This project will evaluate the performance of vertical tillage (VT) compared to conventional tillage (CT) and no-till (N).

ADF Funding: $43,275
Western Grains Research Foundation: $43,275
Saskatchewan Wheat Development Commission: $43,275
Saskatchewan Pulse Growers: $43,275
Organization: University of Saskatchewan
Contact: Bing Si, Soil Science, (306) 966-6877

Reducing the risk of pathogen contamination on fresh fruits and vegetables (20140114)

Objectives:
- Quantify on-farm pathogen prevalence and persistence
- Rank on-farm environmental sites based on their significance as reservoirs for pathogens
- Minimize risk factors associated with pathogen contamination of produce fields and produce crops

ADF Funding: $150,000
Organization: University of Regina
Contact: Christopher Yost, Biology, (306) 585-5223

Polyploid Breeding of Prairie Fruit Crops (20140115)

Objectives:
- General goal: Understanding feasibility for polyploid breeding of prairie fruits.
  Specific goals:
  - Haskap Improvement for Larger fruit, later ripening, faster growing
  - Develop protocols for flow cytometry for the following prairie fruits: Grapes, Saskatoons, Seabuckthorn and Haskap
  - Create hybrid seeds for use in chromosome doubling
  - Develop chromosome doubling protocols for the following prairie fruits: Grapes, Saskatoons, Seabuckthorn and Haskap
  - Create 4x Parents for breeding of Seedless Table Grapes using prairie germplasm.
  - Saskatoon Improvement for larger fruit and/or later blooming
  - Preliminary investigations of polyploid seabuckthorn

ADF Funding: $130,000
Organization: University of Saskatchewan
Contact: Robert Bors, Plant Sciences, (306) 966-8583

Diesel Grade Drop-in Renewable Fuel from Second Generation Non-edible Oil (20140118)

Objectives:
- To assess the potential for sustainable local small-scale (micro biorefinery) production of diesel fuels from carinata oil.

ADF Funding: $193,800
Milligan: $5,000 (in-kind)
Agrisoma: $5,000 (in-kind)
Organization: Saskatchewan Research Council
Contact: Sundaramurthy Vedachalam, Process Development, (306) 933-7373
**Novel low light tolerant edible crops** (20140124)
**Objectives:**
- To screen existing horticulture food crops which can be grown under low light and cool temperature conditions.
- To evaluate photosynthetic traits of low light adapted crops in order to develop physiological markers for future selection.
- To create Factsheets for the culture of low light tolerant crops.
- To develop a national plant germplasm repository of low light tolerant vegetable and fruit crops.

**ADF Funding:** $85,000  
**Organization:** University of Saskatchewan  
**Contact:** Karen Tanino, Plant Sciences, (306) 966- 8617

**Controlling disease in fenugreek using fungicides** (20140149)
**Objectives:**
- The objective of this research is to protect the yield, and quality of fenugreek from leaf disease. To meet the stated objective we need to develop an understanding of fungicide efficacy, best application timing and number of applications required to control cercospora fungal disease in fenugreek.

**ADF Funding:** $59,250  
**Organization:** Agriculture & Agri-Food Canada (AAFC)  
**Contact:** William May, (306) 695-5225

**Protein Modification using Physical and Hydrothermal Treatments** (20140153)
**Objectives:**
- Expand the expertise in Saskatchewan on protein modification  
- To develop new protein functionality using SK ingredients

**ADF Funding:** $100,000  
**Organization:** Saskatchewan Food Industry Development Centre  
**Contact:** Shannon Hood-Niefer, (306) 964-1819

**Screening of coriander and caraway germplasm for resistance to blossom blight** (20140163)
**Objectives:**
- Characterization of the blossom blight pathogens  
- Collection, preservation and characterization of germplasm of coriander and caraway with emphasis on disease resistance

**ADF Funding:** $137,150  
**Western Grains Research Foundation:** $137,150  
**Saskatchewan Herb and Spice Association Specialty Ag:** $20,000  
**Organization:** University of Saskatchewan  
**Contact:** Sabine Banniza, Crop Development Centre, (306) 966-4959
**Increasing avoidance of frost injury in annual field crops** (20140202)

Objectives:
- To determine if differences in leaf frost resistance are related to physical cuticular parameters
- To determine if differences in leaf frost resistance are related to composition of the cuticular layer

**Funding:** $131,963

**Western Grains Research Foundation:** $43,987

**Organization:** University of Saskatchewan

**Contact:** Karen Tanino, Plant Sciences, (306) 966-8167

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**Development of an Automated Fungal Detection System using MEMS-based Spore Sensor** (20140220)

Objectives:
- To design and build a sensor within a spore trap to detect the presence of specific spore
- To test the sensor and build and test a wireless sensor network

**ADF Funding:** $150,000

**Western Grains Research Foundation:** $50,000

**Organization:** University of Saskatchewan

**Contact:** Anh Dinh, Electrical & Computer Engineering, (306) 966-5344

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**Crop Sequencing of Large Acreage Crops and Special Crops** (20140223)

Objectives:
- An objective of this research is to determine the best fit of special crops into crop sequences
- An objective of this research is to determine if optimum crop sequences change depending on the environment

**ADF Funding:** $109,384

**Western Grains Research Foundation:** $109,383

**Saskatchewan Wheat Development Commission:** $109,383

**Prairie Oat Growers Association:** $32,500

**Canaryseed Development Commission of Saskatchewan:** $32,500

**Organization:** Agriculture & Agri-Food Canada (AAFC)

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

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**Nutritional and soil requirements for propagating and growing Haskap plants** (20140239)

Objectives:
- Survey of mineral content of soils and leaves in Haskap orchards
- Screening germplasm for Iron Chlorosis resistance
- Effect of major Nutrients on Haskap development
- Useful germplasm identified for breeding program
- Analysis of Haskap’s tolerance of salinity
- Website with photos and mineral analysis useful for growers

**ADF Funding:** $73,950

**Organization:** University of Saskatchewan

**Contact:** Robert Bors, Plant Sciences, (306) 966-8583
Can enhanced efficiency N fertilizers mitigate against N losses in single-pass seeding operations? (20140257)

Objectives:
Evaluate the benefits of EEF technologies and related 4R Nutrient Stewardship practices to the agriculture industry
- demonstrate and quantify improved nitrogen use efficiency through reductions in nitrous oxide (N2O) emissions achieved through adoption of enhanced efficiency fertilizer (EEF) products under irrigated and dryland (rainfed) conditions;
- determine the N2O reduction potential of spring versus fall applications of conventional and enhanced efficiency synthetic N fertilizers and relate reduction to enhanced nitrogen use efficiency;
- determine experimentally-based N2O emission modifiers for the Nitrous Oxide Emissions Reduction Protocol (NERP) for Saskatchewan; and
- determine the agronomic and economic benefits of adopting EEF technologies under irrigated and dryland farming conditions in Saskatchewan.

ADF Funding: $235,196
Western Grains Research Foundation: $235,195
Saskatchewan Wheat Development Commission: $117,598
Organization: University of Saskatchewan
Contact: Richard Farrell, Soil Science, (306) 966-2772

Development of Biomass Flocculants for Water & Waste Water Treatment Applications
(20140260)

Objectives:
- Milestone 1 – Preparation of cationic and anionic biopolymer flocculants using starch and cellulose based platforms
- Milestone 2 – Evaluation of flocculant properties in simulated wastewater systems containing simulated particulates.
- Milestone 3 – Evaluation of flocculant properties in real wastewater systems

ADF Funding: $109,000
Organization: University of Saskatchewan
Contact: Lee Wilson, Chemistry, (306) 966-2961

Hydrocolloids from Saskatchewan Crops (20140276)

Objectives:
- Hydrocolloid rheology studies
- Physical tests of hydrocolloid performance in functional food and nutraceuticals.
- Develop rapid analysis method for hydrocolloid composition
- Develop rapid analysis of hydrocolloid viscosity by diffusion
- Develop methods for concentrating seed coat based gum fractions
- Analysis of seed of collections of breeders seed and the core collection of flaxseed

ADF Funding: $447,125
Organization: University of Saskatchewan
Contact: Martin Reaney, Plant Sciences, (306) 966-5027
Production of a protein concentrate from ethanol stillage (20140277)

Objectives:
- Develop a laboratory continuous AGF reactor
- Determine the microbial populations of AGF stillage
- Desalt and concentrate the free solution from ethanol AGF fermentation
- Develop a safe feed ingredient, clarify stillage and isolation of glycercylphosphorylcholine (GPC)
- Determine the feed quality, water quality and amount of protein concentrate produced by AGF of thin stillage: Pilot scale.
- Scale up the process for making AGF stillage for high protein feed to pilot scale
- Separate GPC from AGF stillage concentrate

ADF Funding: $360,069
Organization: University of Saskatchewan
Contact: Martin Reaney, Plant Sciences, (306) 966-5027