

## Summary of Agriculture Development Fund Crops Projects for 2022

| Institution                                      | Number of Approved Projects | Total Amount Funded |
|--|-----------------------------|---------------------|
| Agriculture and Agri-Food Canada                 | 13                          | \$2,264,153         |
| Conservation Learning Centre                     | 1                           | \$82,109            |
| Global Institute for Food Security at the U of S | 1                           | \$295,000           |
| Insight Plant Health Corporation                 | 1                           | \$189,400           |
| J4 Agri-Science Limited                          | 1                           | \$142,250           |
| National Research Council of Canada              | 1                           | \$119,659           |
| University of Calgary                            | 1                           | \$199,000           |
| University of Regina                             | 3                           | \$405,600           |
| University of Saskatchewan                       | 33                          | \$5,428,679         |
| <b>Total</b>                                     | <b>55</b>                   | <b>\$9,125,850</b>  |

| Commodity         | Number of Approved Projects | Total Amount Funded |
|-------------------|-----------------------------|---------------------|
| Alternative Crops | 3                           | \$385,675           |
| Cereals           | 15                          | \$2,399,290         |
| Crops Related     | 7                           | \$651,286           |
| Forages           | 1                           | \$228,983           |
| Oilseeds          | 15                          | \$3,577,394         |
| Other             | 4                           | \$422,702           |
| Pulses            | 9                           | \$1,392,520         |
| Vegetables        | 1                           | \$68,000            |
| <b>Total</b>      | <b>55</b>                   | <b>\$9,125,850</b>  |

| Crops Projects Co-funders                  | Total Amount Co-funded |
|--|------------------------|
| Alberta Wheat                              | \$155,000              |
| Manitoba Crop Alliance                     | \$203,026              |
| Mustard 21                                 | \$4,960                |
| Prairie Oat Growers Association            | \$13,044               |
| Results Driven Agriculture Research (RDAR) | \$99,500               |
| Saskatchewan Canola Development Commission | \$201,888              |
| Saskatchewan Flax Development Commission   | \$134,715              |
| Saskatchewan Pulse Growers                 | \$492,418              |
| Saskatchewan Wheat Development Commission  | \$1,312,962            |
| Western Grains Research Foundation         | \$1,546,565            |
| <b>Total</b>                               | <b>\$4,164,078</b>     |

## **Agriculture and Agri-Food Canada**

### **Communal Gene Editing Systems to Accelerate Canadian Crop Improvement and Innovation (20210575)**

Principle Investigator: Kevin Rozwadowski, Agriculture and Agri-Food Canada

Objectives:

- Optimise CRISPR/Cas gene editing system for functionality in Canadian crops
- Edit canola gene to increase seed yield

**ADF Funding: \$468,785**

### **Integrated and Innovative Strategies to Build a Foundation to Mitigate the Root Rot Threat in Pea (20210610)**

Principle Investigator: Syama Chatterton, Agriculture and Agri-Food Canada

Objectives:

- Identify genetic variation for root rot resistance from a core collection of diverse pea germplasm lines
- Accurately predict root rot disease resistance of pea with genomics prediction and machine learning
- Development of capacity to evaluate Fusarium Solani
- Develop innovative tools to support producer decision-making for pea and lentil cropping in the field
- Identify key environmental and site-specific factors that drive root rot development

Co-funded By: Saskatchewan Pulse Growers Association; Western Grains Research Foundation

**ADF Funding: \$353,006**

### **Reducing Variability in FODMAP Content of Chickpea and Dry Beans (20210689)**

Principle Investigator: Brendan O'Leary, Agriculture and Agri-Food Canada

Objectives:

- Identify Canadian dry bean and chickpea varieties and breeding lines with low-FODMAP content more suitable for human consumption
- Examine the effect of high temperatures and drought on FODMAP accumulation during seed fill in chickpea and dry bean seed
- Quantify variety specific changes to FODMAP content following seed processing to roasted chickpeas or canned beans

**ADF Funding: \$90,001**

### **Early Generation Selection for High Grain Yield and Protein Content in Wheat Using Physiological Breeding (20210711)**

Principle Investigator: Jatinder Sangha, Agriculture and Agri-Food Canada

Objectives:

- Determine the variation in wheat lines for stable isotope composition as it relates to grain yield and protein content
- Assess the potential of  $\delta^{13}\text{C}$ ,  $\delta^{18}\text{O}$  and  $\delta^{15}\text{N}$  in early selection of wheat lines for higher grain yield and protein content
- Mapping QTL for grain  $\delta^{13}\text{C}$ ,  $\delta^{18}\text{O}$  and  $\delta^{15}\text{N}$  traits in bread wheat population
- Physiological breeding to develop a spring wheat DH line using grain  $\delta^{13}\text{C}$ ,  $\delta^{18}\text{O}$  and  $\delta^{15}\text{N}$  and other associated traits

Co-funded By: Saskatchewan Wheat Development Commission; Manitoba Crop Alliance

**ADF Funding: \$132,350**

### **Molecular Characterization of Stem Solidness Genes from Hexaploid Wheat (20210738)**

Principle Investigator: Harpinder Randhawa, Agriculture and Agri-Food Canada

Objectives:

- Genotypic and phenotypic data analysis of two doubled haploid (DH) mapping populations
- Identification and validation of stem solidness candidate genes from P2711
- Development of breeder friendly molecular markers for selection of stem solidness genes

Co-funded By: Saskatchewan Wheat Development Commission; Western Grain Research Foundation; Alberta Wheat

**ADF Funding: \$120,000**

### **Preventing Wild Oat Patch Expansion with Harvest Weed Seed Control (20210747)**

Principle Investigator: Breanne Tidemann, Agriculture and Agri-Food Canada

Objectives:

- Management of wild oat patches with harvest weed seed control
- Develop technologies to detect and map wild oat patches in crop

Co-funded By: Saskatchewan Wheat Development Commission

**ADF Funding: \$152,562**

### **Managing Farm Level Woodlot and Pasture Lands: Develop Practices that Support Forage Production and Reduce GHG Emissions (20210766)**

Principle Investigator: Farid Akhter, Agriculture and Agri-Food Canada

Objectives:

- Collect and analyze data to validate technical information for silvopasture systems in Saskatchewan
- Document economic costs and benefits at each research and demonstration site over the duration of the project
- Describe and develop a new silvopasture model component for AAFC's Holos model
- Disseminate technology and knowledge to stakeholders
- Design, establish, and maintain three silvopasture research and demonstration sites in brown, dark brown, and black soil zones

**ADF Funding: \$228,983**

### **Integrated Weed Management Strategies for Pulse/Oilseed Intercrops (20210774)**

Principle Investigator: Shaun Sharpe, Agriculture and Agri-Food Canada

Objectives:

- Explore the impact of intercropping on weed competition
- Evaluate weed suppression in various pulse crops when intercropped with camelina within ethalfluralin-treated systems
- Integrate ethalfluralin and camelina seeding rates and a stale-seedbed technique for weed control in pea/camelina intercropping
- Assess the impact of intercropping on diseases

**ADF Funding: \$71,900**

### **Fall and Spring P & N Placement to Reduce Snowmelt Nutrient Losses and Improve Nutrient Use Efficiency of Canola and Wheat (20210820)**

Principle Investigator: Haben Asgedom Tedla, Agriculture and Agri-Food Canada

Objectives:

- To develop new coefficients of P & N losses for fall and spring applications that support model routines
- Determine effectiveness of sources and placement methods of P & N in spring and fall to enhance canola and wheat yield and protein
- Quantify snowmelt nutrient losses and mitigation potential of band placement when P & N fertilizers are applied in fall and spring

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation

**ADF Funding: \$67,402**

### **Discovering the Optimal Rate of a Dual-Inhibitor N-Fertilizer for Maximum N<sub>2</sub>O Emissions Reduction (20210863)**

Principle Investigator: Reynald Lemke, Agriculture and Agri-Food Canada

Objectives:

- Determine the maximum N<sub>2</sub>O emissions reduction that can be achieved with a dual inhibitor N-fertilizer as compared to urea
- Determine maximum N-rate reduction possible with dual inhibitor N-fertilizer that maintains optimal yields of canola and wheat
- Determine the agri-environmental optimum N rate for urea and a dual inhibitor N-fertilizer as an N source for canola

Co-funded By: Saskatchewan Canola Development Commission;

Saskatchewan Wheat Development Commission; Western Grains Research Foundation

**ADF Funding: \$138,025**

### **Sustaining Crop Yields and Nutritional Quality Under Future CO<sub>2</sub> Climate (20210869)**

Principle Investigator: Raju Soolanayakanahally, Agriculture and Agri-Food Canada

Objectives:

- Assess the effects of elevated CO<sub>2</sub> and temperature on crop growth and yield and how this relates to photosynthetic properties
- Determine if the leaf metabolome, seed ionome, and seed nutritional quality vary in response to eCO<sub>2</sub> and temperature
- Decipher functional gene network regulation in major Canadian crops when faced with climate change

Co-funded By: Saskatchewan Wheat Development Commission

**ADF Funding: \$167,789**

### **Introgression of Alien FHB Resistance Into Adapted Canadian Durum Wheat (20210872)**

Principle Investigator: Samia Berraies, Agriculture and Agri-Food Canada

Objectives:

- To develop effective molecular markers to track the transfer of the *Fhb7* resistance gene to Canadian durum germplasm
- To introgress a small 7E chromosome segment harboring *Fhb7* alien FHB resistance into Canada Western Amber Durum (CWAD) wheat
- To quantify *Fhb7* resistance performance in Canadian durum wheat background

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation; Alberta Wheat

**ADF Funding: \$184,250**

### **Modified Surface Wax for Improved Water Retention in Canola (20210891)**

Principle Investigator: Mark Smith, Agriculture and Agri-Food Canada

Objectives:

- To improve the cuticular water barrier of canola by modifying levels of secondary alcohols/ketones, alkyl-esters, or triterpenes
- To evaluate prototype lines with altered wax composition under dehydration stress
- Identification of genetic sequences conferring epidermal gene expression

Co-funded By: Saskatchewan Canola Development Commission; Western Grains Research Foundation

**ADF Funding: \$89,100**

### **Conservation Learning Centre**

#### **Investigating Agricultural Drainage Methods Using Tile Drainage in Saskatchewan (20210708)**

Principle Investigator: Robin Lokken, Conservation Learning Centre

Objectives:

- Determine if nutrient availability varies with drainage treatments and between high and low salinity soil zones within wetlands
- Compare the effectiveness of surface and subsurface drainage treatments to improve crop productivity
- Compare the effectiveness of surface and subsurface drainage treatments to reduce soil salinity of wetlands

Co-funded By: Saskatchewan Wheat Development Commission

**ADF Funding: \$82,109**

### **Global Institute for Food Security at the University of Saskatchewan**

#### **Discovery of Favorable Alleles to Increase Phosphorus and Nitrogen Use Efficiency in Wheat (*Triticum Aestivum L.*) (20210849)**

Principle Investigator: Leon Kochian, Global Institute for Food Security at the University of Saskatchewan

Objectives:

- Determine the genetic diversity of phosphorus/nitrogen use efficiency genes in 65 varieties of hexaploid wheat
- Identify potentially favorable allelic variants in PUE/NUE genes by comparative sequence analysis
- Recreate naturally occurring favorable allelic variants in a wheat variety (CDC Landmark) using CRISPR/Cas9 genome editing
- Generate novel genetic variation in PUE/NUE genes in a wheat variety (ie. CDC Landmark) using CRISPR/Cas9 genome editing
- Phenotype genome-edited wheat lines for improved PUE/NUE traits
- Transfer knowledge concerning favorable allelic variants of PUE/NUE genes alleles into wheat breeding programs

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation; Alberta Wheat; Manitoba Crop Alliance

**ADF Funding: \$295,000**

## **Insight Plant Health Corp.**

### **Evaluating Rhizobial Inoculants for Saskatchewan Fenugreek Production (20210611)**

Principle Investigator: Dave Greenshields, Insight Plant Health Corp.

Objectives:

- Identify commercial inoculants that are able to initiate nodulation and biological N fixation in Saskatchewan-grown fenugreek
- Screen rhizobia germplasm for strains with a superior biological N fixation in Saskatchewan-grown fenugreek

Co-funded By: Saskatchewan Pulse Growers Association

**ADF Funding: \$189,400**

## **J4 Agri-Science Limited**

### **Breeding Flax for Western Canada (20210654)**

Principle Investigator: Jodi Souter, J4 Agri-Science Limited

Objectives:

- Developing flax cultivars with improved agronomic characteristics for increased productivity and reduced harvest challenges

Co-funded By: Saskatchewan Flax Development Commission; Manitoba Crop Alliance

**ADF Funding: \$142,250**

## **National Research Council of Canada**

### **Oat Lodging: Identifying Key Root and Shoot Traits for Improved Standability (20210755)**

Principle Investigator: Allan Feurtado, National Research Council of Canada

Objectives:

- Evaluate root system architecture in oat cultivars which vary in lodging resistance
- Evaluate stem and root lodging in field trials
- Assess impact of seeding rate on key stem and root lodging-related traits in field trials
- Assess the correlation between various root phenotyping methods to develop a robust trait selection pipeline for breeding application
- Compare root system architecture between Canadian oat germplasm and a diverse set of oat germplasm

Co-funded By: Western Grains Research Foundation; Prairie Oat Growers Association

**ADF Funding: \$119,659**

## University of Calgary

### **Molecular Breeding Approaches to Develop Elite Drought-Tolerant Canadian Wheat Cultivars with High Water Use Efficiency (20210833)**

Principle Investigator: Marcus Samuel, University of Calgary

Objectives:

- Detailed phenotyping of mutant lines in control and field conditions
- Genetic and molecular characterization of the identified polymorphisms in the mutant lines
- Integration of traits from mutant lines into elite wheat germplasms
- Mutagenesis and chemical screening of elite germplasm to develop drought tolerant cultivars

Co-funded By: Saskatchewan Wheat Development Commission; Alberta Wheat; Manitoba Crop Alliance;

Results Driven Agriculture Research (RDAD)

**ADF Funding: \$199,000**

## University of Regina

### **Automated Trap Counting of Flea Beetles (FB), Aster Leafhoppers, and Wheat Midge and Automated FB Damage Assessment for Canola (20210555)**

Principle Investigator: Abdul Bais, University of Regina

Objectives:

- Develop and test flea beetles, aster leafhopper, and wheat midge sentinel traps for rapid population spike monitoring
- Electronic detection and quantification of canola leaf damage caused by flea beetles
- Ecological study of flea beetle, aster leafhopper, and wheat midge infestation and correlation with environmental conditions
- Validation of leaf puncher and evaluation of agronomic traits using imaging of individual plants in a small plot study

**ADF Funding: \$183,100**

### **Technological Development to Mitigate Filamentous Algal Blooms in Lake Diefenbaker's Irrigation Canals (20210619)**

Principle Investigator: Stephanie Young, University of Regina

Objectives:

- To develop a proof-of-concept for filamentous algal control technologies for Lake Diefenbaker's irrigation canals

**ADF Funding: \$150,000**



### **Image Based Detection of Fusarium Head Blight, Lodging, and Grain Yield to Aid Phenotypic Selections in Wheat Breeding (20210626)**

Principle Investigator: Abdul Bais, University of Regina

Objectives:

- Wheat spike and kernel detection and localization in a wheat plot using multispectral image analysis
- Detection and localization of Fusarium head blight (FHB) infection in durum wheat spikes using multispectral image analysis
- Estimating grain yield based on multispectral image analysis of wheat spikes and plant biomass using deep neural networks
- Identification of plant stature in a wheat plot using Machine Learning assisted multispectral image analysis

Co-funded By: Saskatchewan Wheat Development Commission; Manitoba Crop Alliance

**ADF Funding: \$72,500**

### **University of Saskatchewan**

#### **Improving Chickpea, Mustard, Durum Yield, Crop Health, and Soil Fertility with Potassium Chloride Fertilizer (20210597)**

Principle Investigator: Jeff Schoenau, University of Saskatchewan

Objectives:

- To assess impact of starter potash fertilizer on yield, soil fertility, and crop health in chickpea, mustard, and durum

Co-funded By: Saskatchewan Pulse Growers Association;

Saskatchewan Wheat Development Commission; Alberta Wheat; Mustard 21

**ADF Funding: \$59,920**

#### **Connecting Craft Brewing Quality with Yeast Genomics (20210615)**

Principle Investigator: Christopher Eskiw, University of Saskatchewan

Objectives:

- Establish the relationship between beer styles and yeast genomics
- Identification/confirmation of chemical signatures presents in specific beer styles
- Connect the expression and timing of specific yeast genes with beer style chemical signatures
- Establish priming conditions to increase yeast performance during the craft brewing process

**ADF Funding: \$120,000**

### **Understanding the Effects of Crop Rotation on Soil Organic Carbon Stabilization (20210620)**

Principle Investigator: Bobbi Helgason, University of Saskatchewan

Objectives:

- Determine the stability of soil organic carbon in soils from different long-term wheat and canola based rotations
- Quantify carbon storage in different soil functional pools
- Relationship of microbial abundance, community structure, and activity with soil organic matter storage and stabilization

Co-funded By: Saskatchewan Canola Development Commission;  
Saskatchewan Wheat Development Commission; Western Grains Research Foundation

**ADF Funding: \$23,667**

### **Phenotypic Screening Methods and a Diagnostic Seed Test to Assess Bacterial Leaf Streak in Canadian Wheat Germplasm (20210659)**

Principle Investigator: Randy Kutcher, University of Saskatchewan

Objectives:

- Characterize pathogenic *Xanthomonas translucens* strains affecting wheat across western Canada
- Establish a seed testing protocol to detect pathogenic *Xanthomonas translucens* on wheat kernels
- Develop an indoor phenotype-based screening method to evaluate germplasm for Bacterial Leaf Streak resistance
- Screening for resistance against Bacterial Leaf Streak in commercial cereal varieties from Canada

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation;  
Alberta Wheat; Manitoba Crop Alliance Alliance

**ADF Funding: \$133,399**

### **Winter Broadleaves in the Canadian Prairies (20210663)**

Principle Investigator: Maryse Bourgault, University of Saskatchewan

Objectives:

- Determine optimal planting dates and seeding rates for winter broadleaves in Saskatchewan
- Determine the feasibility and performance of winter broadleaves in Saskatchewan

**ADF Funding: \$60,000**

### **Field Evaluation of Next-Generation Solid-Stemmed CWRS Wheat (20210681)**

Principle Investigator: Pierre Hucl, University of Saskatchewan

Objectives:

- To develop near-homozygous solid-stemmed lines and their evaluation under field conditions
- Haplotyping of inbred backcross lines (IBC) and evaluation for disease resistance

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation;  
Alberta Wheat

**ADF Funding: \$103,220**

### **New Source of Resistance to Fusarium Head Blight (FHB): Wheat - *Thinopyrum* Derivatives (20210694)**

Principle Investigator: Pierre Hucl, University of Saskatchewan

Objectives:

- To identify new sources of FHB resistance by screening an intergeneric wheat - *Thinopyrum* population
- To introgress the new source of FHB resistance into western Canadian wheat germplasm

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation; Alberta Wheat; Manitoba Crop Alliance

**ADF Funding: \$104,598**

### **The Feasibility of Flax Biomass Fractionation and Conversion to High Value Products (20210695)**

Principle Investigator: Bishnu Acharya, University of Saskatchewan

Objectives:

- Understand the effect of mild fractionation process on structure of cellulose, hemicellulose and lignin of flax biomass
- Synthesis of high value cellulose based intermediate products and their application in bioplastic and Pickering emulsion
- Synthesize bio-adhesives and furfurals from lignin and hemicellulose, respectively
- Study the financial and life cycle assessment of using flax biomass for high value application

**ADF Funding: \$325,000**

### **Trait Stacking to Maximize Resistance to the Wheat Midge (20210717)**

Principle Investigator: Pierre Hucl, University of Saskatchewan

Objectives:

- To assess the effectiveness of stacking the oviposition deterrence (OD trait) and antibiosis (*Sm1*) traits in CWRS wheat
- To stack glume pubescence (HG trait) with the OD and *Sm1* sources of insect tolerance in CWRS wheat

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation; Alberta Wheat; Manitoba Crop Alliance

**ADF Funding: \$104,919**

### **Association Mapping of Aphanomyces Root Rot Resistance in a Pea GWAS Panel (20210723)**

Principle Investigator: Tom Warkentin, University of Saskatchewan

Objectives:

- Phenotyping of the GWAS-2 pea panel for Aphanomyces root rot resistance
- Association mapping for identification of SNP markers associated with Aphanomyces root rot resistance
- In silico comparison of identified loci with known QTLs of Aphanomyces resistance
- Field evaluation of selected GWAS-2 accessions for resistance to root rot complex

Co-funded By: Saskatchewan Pulse Growers Association; Western Grains Research Foundation

**ADF Funding: \$99,113**

### **Herbicide Screening in Spice Crops (20210733)**

Principle Investigator: Christian Willenborg, University of Saskatchewan

Objectives:

- To screen herbicide options for potential tolerance by and use in spice crops
- To provide data to Minor Use of Pesticides Program

**ADF Funding: \$136,275**

### **Post-Fractionation De-flavoring Strategies for Protein Ingredients from Canola, Hemp, and Flaxseed (20210748)**

Principle Investigator: Michael Nickerson, University of Saskatchewan

Objectives:

- To examine alcohol extraction as a means of de-flavouring oilseed protein
- To examine small molecule separation methods as a means for de-flavouring oilseed proteins
- To examine the impact of de-flavouring on ingredient properties
- Pilot plant scale up flavour reduction strategies at the U of S Bioprocessing Pilot Plant
- To examine the sensory properties of de-flavoured ingredients

**ADF Funding: \$317,523**

### **Investigating Potential Threats and Detection of Plant Viruses in Pulse Crops (20210756)**

Principle Investigator: Sean Prager, University of Saskatchewan

Objectives:

- Determine the frequency of plant pathogenic viruses in Saskatchewan pulse crops
- Quantify yield effects of Bean Yellow and Pea Seedborne Mosaic Virus in pulse crop varieties
- Examine the population genetic variation of PSbMV among North American growing regions
- Develop tools for the efficient and accurate detection of viruses in Saskatchewan pulse crops and document the symptoms of important pulse viruses
- Test the vector capacity of pea aphid for transmitting BYMV and PSbMV to pulse crop varieties

Co-funded By: Saskatchewan Pulse Growers Association; Western Grains Research Foundation

**ADF Funding: \$120,000**

### **Integrated Seedbank Management to Augment Long-Term Weed Control (20210764)**

Principle Investigator: Christian Willenborg, University of Saskatchewan

Objectives:

- Determine the impact of cover crops and harvest weed seed control on weed management

Co-funded By: Western Grains Research Foundation

**ADF Funding: \$87,113**

### **Environment Control Technologies for Energy Efficient Solar Greenhouses (20210770)**

Principle Investigator: Huiqing Guo, University of Saskatchewan

Objectives:

- Design and test temperature-humidity control system for automated environment control of solar greenhouses
- Evaluate one or more energy saving technologies to maximize solar heat gain and minimize heat loss of the solar greenhouse
- Improve a heating prediction model using the data collected and provide a reliable heating model for solar greenhouses
- Conduct economic analysis on the solar greenhouse in Saskatchewan
- Evaluate the thermal performance of a Chinese solar greenhouse (CSG) in Saskatchewan climate

**ADF Funding: \$68,000**

### **Modular Purification Processes for Upgrading and Enriching Ethanol (20210773)**

Principle Investigator: Martin Reaney, University of Saskatchewan

Objectives:

- Upgrade and enrich fusel oil co-products of ethanol production
- Produce natural blend of ethanol and isopropanol
- Scale-up to generate sufficient quantities of food and pharmaceutical-grade ethanol for domestic and international markets
- Implement regulatory testing of food and pharmaceutical-grades of ethanol following accredited methodologies (e.g. FCC & USP)
- Upgrade ethanol fuel to meet both food and pharmaceutical grade standards

**ADF Funding: \$240,000**

### **Developing Tools for Management of Lygus Bugs in Faba Bean (20210793)**

Principle Investigator: Sean Prager, University of Saskatchewan

Objectives:

- Establish correlations between insect number and scarring damage for various Lygus species and determine optimal sampling times and methods for lygus in faba bean
- Determine the amount of Lygus feeding (time) required to cause seed damage in faba bean
- Determine whether lygus populations in canola just before harvest are correlated to numbers in faba bean
- Evaluate Lygus preferences between faba and potential trap crops

Co-funded By: Saskatchewan Pulse Growers Association; Western Grains Research Foundation

**ADF Funding: \$97,500**

### **Carbon Storage in Drained Agricultural Soils (20210795)**

Principle Investigator: Angela Bedard-Haughn, University of Saskatchewan

Objectives:

- Measure the amount of soil carbon in drained wetlands and the associated consolidation wetland
- Determine how total soil carbon storage in a wetland complex is influenced by drainage and consolidation
- Determine drained wetland soil organic carbon stock change factor

Co-funded By: Saskatchewan Wheat Development Commission

**ADF Funding: \$94,331**

### **Soil Salinization Risk Mapping with Remote Sensing (20210797)**

Principle Investigator: Angela Bedard-Haughn, University of Saskatchewan

Objectives:

- Develop soil salinity and sodicity prediction tools using remote sensing data and machine-learning modelling techniques
- Develop soil drainage predictive soil mapping tool
- Develop a salinization risk assessment tool using remote sensing tools to support irrigation planning

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation

**ADF Funding: \$96,262**

### **Pulse Protein Based 3D Printed Foods (20210816)**

Principle Investigator: Michael Nickerson, University of Saskatchewan

Objectives:

- Optimization of the 3D printing process
- Optimization of edible ink formulations and 3D printed products suitable for Dysphagia Diet
- Optimization of edible inks and 3D printed product for plant-based meat analogue

**ADF Funding: \$73,500**

### **Plant-Based Protein and Lipid Nanocomposites as Edible Biodegradable Packaging (20210817)**

Principle Investigator: Michael Nickerson, University of Saskatchewan

Objectives:

- Formulate plant protein stabilized nanoemulsion based films
- Characterize films prepared by casting
- Characterize the ability for films to extend shelf-life of foods

**ADF Funding: \$187,500**

### **Development of a Plant-Based Scrambled Egg Replacer Through Improved Gelation of Pulse Protein Isolates (20210818)**

Principle Investigator: Michael Nickerson, University of Saskatchewan

Objectives:

- Characterization of plant protein isolates
- Production and characterization of modified commercial pulse protein isolates
- Formulation development of plant based egg replacer
- Enhancement of plant based egg replacer formulation

Co-funded By: Saskatchewan Pulse Growers Association

**ADF Funding: \$127,392**

### **Comprehensive Investigation of Pesticides in Honey, Pollen, Bees, and Soil Collected from Canola Fields (20210846)**

Principle Investigator: Elemir Simko, University of Saskatchewan

Objectives:

- Collection and analysis of samples of honeybees from apiaries within canola fields and from northern boreal locations
- Samples will be tested for pesticide residue in the bees, honey, collected pollen and nearby soil
- Statistical analysis of total pesticide exposure will be conducted

Co-funded By: Saskatchewan Canola Development Commission

**ADF Funding: \$125,000**

### **Heat and Frost Avoidance in Crops: The Importance of the Plant Cuticular Layer (20210847)**

Principle Investigator: Karen Tanino, University of Saskatchewan

Objectives:

- To determine if hydrophobic sprays will cost effectively enable heat and frost avoidance in tender annual crops
- Validation that the *CER1* and *CER3* alkane genes are key to avoiding heat stress and frost

**ADF Funding: \$435,531**

### **Development of Hot Extrusion Technology (HET) for Fortifying Lentil Consumer Products with Vitamins and Minerals (20210855)**

Principle Investigator: Albert Vandenberg, University of Saskatchewan

Objectives:

- Develop acceptable lentil analogues that are multi-fortified with essential micronutrient using hot extrusion technology
- Determine if HET-fortified lentils are acceptable to consumers in comparison to unfortified lentils
- Determine if the cost of uncooked multi-fortified lentils is acceptable and comparable to unfortified lentils
- Determine if the cooked HET-fortified lentil products will be acceptable to both domestic and international lentil consumers

**ADF Funding: \$300,000**

### **The Saskatchewan Soil Health Test as a Tool for Prairie Horticulture (20210870)**

Principle Investigator: Kate Congreves, University of Saskatchewan

Objectives:

- Develop a version of the Saskatchewan Soil Health Test that is representative of prairie fruit and vegetable cropping systems

**ADF Funding: \$75,000**

### **Field-Scale Estimation of Canola Emergence Using Remote Sensing Methods (20210879)**

Principle Investigator: Steven Shirliffe, University of Saskatchewan

Objectives:

- To develop methodology to quickly and accurately assess canola emergence using UAVs at a field scale
- Measure spatial variability of commercially grown canola and measure variability in canola seedling density and uniformity affects canola yield
- Assess sampling frequency and design to accurately assess spatial variability in canola emergence including image processing methods and optimum and canola staging

**ADF Funding: \$157,951**

### **Bioprocessing Canola Proteins for Health-Promoting Bioactivity and Improved Food Functionality (20210886)**

Principle Investigator: Supratim Ghosh, University of Saskatchewan

Objectives:

- To hydrolyze canola proteins from canola meal using proteases and subcritical water processing to prepare bioactive peptides
- To purify and characterize the bioactive peptides using chromatographic techniques and LC-MS/MS
- To determine the bone formation potential of bioactive peptides using osteoblastic cells
- To prepare hydrogel microparticles for encapsulation of bioactive peptides for improved stability and bioavailability
- To evaluate the efficacy of bioactive canola peptides against osteoporosis in an ovariectomized (OVX) rat model
- To establish the conditions for preparing a range of hydrolyzed canola proteins with the best functional properties for foods
- To demonstrate the competitive advantages of hydrolyzed canola proteins as a valuable ingredient in various food systems

**ADF Funding: \$280,000**



### **High-Resolution Crop Monitoring Using UAV-Based Sensors (20210900)**

Principle Investigator: Warren Helgason, University of Saskatchewan

Objectives:

- Develop recommendations for incorporating UAV sensor metrics into precision agriculture applications
- Identify the most appropriate remote sensing metrics for characterizing in-field variability of crop status and yield
- Develop high resolution maps of spatial variability of crop health status

**ADF Funding: \$114,999**

### **Industrial Products from Vegetable Oils (20210902)**

Principle Investigator: Martin Reaney, University of Saskatchewan

Objectives:

- Identify the oilseed sources of eco-friendly adhesive
- Develop an organic solvent-free method for epoxidized vegetable oil production
- Prepare eco-friendly adhesive with epoxidized vegetable oil
- Magnetocuring of epoxidized vegetable oil-based eco-friendly adhesive
- Apply magnetocuring eco-friendly adhesive to 3D printing

**ADF Funding: \$360,000**

### **TEN-TG: A TILLING and Genome Resource for Fusarium Head Blight (FHB) Improvement (20210906)**

Principle Investigator: Curtis Pozniak, University of Saskatchewan

Objectives:

- Genome assembly of AAC Tenacious to identify FHB resistance genes to assist breeding
- Phenotypic characterization of a TILLING resource of AAC Tenacious
- Identification of FHB associated resistance and/or susceptibility mutant/genes from the TILLING population

Co-funded By: Saskatchewan Wheat Development Commission; Western Grains Research Foundation;  
Alberta Wheat; Manitoba Crop Alliance

**ADF Funding: \$302,606**

### **Biomaterial Coatings for Enhanced Functionality, Food Safety, and Environmental Sustainability for Meat Processing Facilities (20210913)**

Principle Investigator: Lee Wilson, University of Saskatchewan

Objectives:

- To develop single and multicomponent biopolymer-based material (BBM) spray coatings with antibacterial properties
- To characterize of the physicochemical & mechanical properties of BBMs for the design of functional coatings
- To evaluate the antimicrobial properties of BBM coatings to assess the Minimal Inhibitory Concentration (MIC)
- To evaluate the efficacy of antimicrobial effects of BBMs in coatings applied onto various material surfaces
- Technology evaluation of films & coatings containing BBMs for wider industry applications & technology transfer activities

**ADF Funding: \$244,000**

### **Accelerated Breeding Strategy for Flax Improvement (20210948)**

Principle Investigator: Bunyamin Tar'an, University of Saskatchewan

Objectives:

- Determine optimum conditions required for accelerated growth of flax for seed production and reduced generation time
- Evaluate speed breeding to generate a RIL population for genetic mapping
- Use speed breeding to generate pre-registration lines via integrating MAS and selection based on phenotypes

Co-funded By: Saskatchewan Flax Development Commission; Western Grains Research Foundation; Manitoba Crop Alliance

**ADF Funding: \$254,360**