



## RESEARCH PRIORITIES GRAIN FARMERS OF ONTARIO

Revised June 2018

---

Investment in research is a long-term strategic initiative of the Grain Farmers of Ontario for the benefit of all barley, corn, oat, soybean and wheat farmers. Ontario's grain farmers have sponsored and participated in decades of practical research that has resulted in economic gains and improved agricultural sustainability for Ontario farmers and the Ontario environment. Our goal is to target our research and innovation investments toward opportunities that will enhance our farmer members' returns.

Grain Farmers of Ontario aims to address the research needs for barley, corn, oat, soybean and wheat through four overall priority areas: **Agronomy and Production; Weed, Disease and Insect Pests; Crop Utilization and Crop Quality;** and **Breeding and Genetics**. Within each priority area, Grain Farmers of Ontario invests funds in projects of high priority to Ontario farmers, strives to maximize public sector research investment, and encourages private sector research investment.

Each year Grain Farmers of Ontario identifies specific priorities toward which it would like to target increased research investment. This year, Grain Farmers of Ontario is placing a particular emphasis on research proposals targeting the following research priorities:

- Developing **integrated weed management strategies** that consider management and prevention of herbicide resistance and/or biology of specific weed species
- Developing **integrated disease & insect pest management strategies** that consider management and prevention of trait and pesticide resistance and/or biology of specific diseases and insects
- Quantifying the impact of standard field practices on soil health and developing strategies to improve or maintain **soil health**
- Developing integrated management strategies for **Gibberella ear rot** to reduce the occurrence of **vomitoxin (DON)** in corn

Other important research priorities are listed for each of the four overall priority areas, below:

### **Agronomy and Production Priorities**

- Identifying soil health parameters and practices affecting crop resilience under various stresses
- Developing, evaluating, and/or improving resolution of testing procedures to measure key soil health parameters in production of barley, corn, oat, soybean, and wheat
- Developing strategies to minimize and remediate impacts of soil compaction on soil health (*new priority for 2018-2019*)



- Identifying tillage and seeding systems that maximize profit, maintain soil health, and prevent erosion
- Developing a thorough understanding of the economic and environmental benefits and/or detriments of cover crops in field cropping systems
- Identifying and validating best management practices for effective integration of cover crops into field cropping systems
- Developing integrated systems approaches to crop management that take into account the interactions among inputs and specific cropping practices, for increased production and sustainability
- Optimizing plant use efficiency and economics of nutrients, particularly nitrogen, phosphorus, potassium, and sulfur (e.g., 4R nutrient stewardship)
- Improving the environmental sustainability of production practices, particularly as they relate to fertilizer use (e.g., water quality protection, energy efficiency)
- Developing innovative new cropping systems (e.g., intercropping winter wheat and soybeans, relay cropping soybeans into a standing crop, etc.) that provide novel approaches to improving productivity and profitability
- Developing and validating site-specific production practices that improve efficiency of inputs, support ecosystem services, and contribute to overall farmer profitability
- Validating precision agriculture technologies for use as agronomy research tools that improve efficiency and accuracy of data generation to better address experimental variables

### **Weed, Disease, and Insect Pests Priorities**

- Develop integrated weed management strategies that consider management and prevention of herbicide resistance and/or biology of specific weed species
- Develop integrated disease & insect pest management strategies that consider management and prevention of trait and pesticide resistance and/or biology of specific diseases and insects
  - Key diseases and insect pests include *Fusarium* in wheat and barley, *Gibberella* in corn, western bean cutworm, white mould, soybean cyst nematode (SCN), soybean sudden death syndrome (SDS), corn nematodes and other nematodes, foliar pathogens (e.g., stripe rust, Northern corn leaf blight, powdery mildew, oat crown rust, etc.), seedling diseases, slugs (new for 2018-2019), soybean aphid, and true armyworm
- Developing effective management strategies for mycotoxin producing pathogens (*Gibberella*, *Fusarium*, *Penicillium*) and associated fungal toxin accumulation (e.g., DON, OTA) in the field and in stored grain
- Developing strategies to address emerging weed, disease, and insect pest risks from changing weather patterns and potential foreign introductions
- Assessing performance of herbicide programs when few control options exist for specific weed species or cropping systems (e.g., non-GM soybeans, wild oat in cereals)
- Surveying and monitoring of weeds, diseases, and insect pests to identify changes in population structure and resistance to pest control strategies



- Identifying the economic risks to crop production arising from soil insect pest pressure and improving early-season soil insect pest management strategies
- Developing best management practices for seed treatments and determining their economic value

### **Crop Utilization and Crop Quality Priorities**

- Identifying and characterizing quality and functional parameters relevant to improving specific end uses or identity-preserved market opportunities for barley, corn, oat, soybean, and wheat
- Identifying production practices that improve grain quality for specific end uses leading to value-added markets, including feed, food and bioproducts
- Developing effective, rapid, and sensitive testing and sampling methods for fungal toxins (e.g., DON) for use on-farm or at the first point of delivery
- Improving testing and grading technology to provide objective, rapid assessment of grain quality and functionality
- Developing new bio-products from barley, corn, oat, soybean, and wheat (e.g., industrial products, fuel, and bio-plastics) linked to existing and emerging market opportunities for use of Ontario grain

### **Breeding and Genetics Priorities\***

*\* Grain Farmers of Ontario is placing a lower emphasis on Breeding and Genetics research projects in 2018-2019, as these particular research priorities are generally addressed through Cluster and Projects under the new Canadian Agricultural Partnership AgriScience programming.*

- Developing high-yielding, high-quality barley, oat, soybean (GM & non-GM), winter wheat and spring wheat varieties and corn inbreds adapted for Ontario
- Developing competitive new varieties for value-added, identity-preserved markets
- Developing genetic resistance to important diseases and insect pests in Ontario including *Fusarium* in wheat and barley, *Gibberella* in corn, western bean cutworm, white mould, soybean cyst nematode (SCN), soybean sudden death syndrome (SDS), corn nematodes and other nematodes, foliar pathogens (e.g., stripe rust, Northern corn leaf blight, powdery mildew, oat crown rust, etc.), seedling diseases, soybean aphid, and true armyworm
- Identifying and breeding for traits that will enable crops to better tolerate environmental stresses (e.g., temperature and water stress)
- Improving variety performance trials and tools for variety selection