CFCRA
CANADIAN FIELD CROP RESEARCH ALLIANCE

ARCCC
ALLIANCE DE RECHERCHE SUR LES CULTURES COMMERCIALES DU CANADA

# CFCRA Research Priorities

## Corn Priorities

- Develop new genetically diverse short season, cold-tolerant inbreds targeting **1800-2000 CHU**, while building high yield potential relative to current commercial short season hybrids
- Develop new inbreds with resistance to diseases and identify resistance genes/markers to facilitate effective incorporation of disease resistance into new commercial hybrid development. Key diseases include *Fusarium/Gibberella*, northern corn leaf blight (NCLB), Goss's wilt, and tar spot. New inbreds must have good standability and must not have significant yield drag
- For the inbred develop targets above, develop new female inbred lines with a minimum of **60 units/acre yield**, achieving a minimum bag weight of **16.5 kg/80,000 kernels** and develop new male inbred lines with good, prolific pollen shed, lasting at least **4-5 days**
- To respond rapidly to changing pathogen profiles, develop a coordinated survey system for identifying current and emerging corn pathogens to improve management strategies, screen inbreds, and identify and validate new sources of resistant germplasm
- Develop strategies to reduce nitrogen losses while maintaining and building yield
- Develop strategies to manage corn rootworm resistance to Bt corn
- Improve grain dryer efficiency (GHG footprint) to increase profitability and sustainability of corn production

## Oat Priorities

- Increase yields of new varieties by **≥2%** per year, while maintaining consistent quality and desired agronomic characteristics. Biotic and abiotic stress tolerances to be incorporated to protect grain yield. New varieties must be early maturing. Varieties should have reduced late tillering to facilitate uniform natural dry-down, be shatter resistant, and have exceptional standability. Yield increase to be measured relative to provincial checks
- Stack durable disease resistance into new varieties with the agronomic traits listed above, breeding against current and emerging pathogen profiles in a variety's adapted region. Key diseases include: oat crown rust, stem rust, yellow dwarf mosaic virus, Septoria leaf blotch, and Fusarium head blight
- Develop varieties with well-defined consistent quality parameters for milling
- Increase stability, predictability and reliability of β-glucan levels in milling oat varieties across environments, targeting β-glucan levels >**4.5%.** Both genetic and agronomic combined solutions are appropriate approaches
- Develop high protein oats for emerging protein market opportunities, targeting minimum protein levels of **20%**

679 Southgate Drive, Guelph, ON, N1G 4S2 | www.fieldcropresearch.ca

The Canadian Field Crop Research Alliance (CFCRA) is a not-for-profit entity founded in 2010 with an interest in advancing the genetic capacity of field crops in Canada, particularly soybean, corn, wheat, barley, and oat. The Alliance is comprised of provincial farm organizations and industry partners, including: Atlantic Grains Council, Grain Farmers of Ontario; Producteurs de grains du Québec; Manitoba Crop Alliance; Manitoba Pulse & Soybean Growers; Saskatchewan Pulse Growers; Prairie Oat Growers Association; SeCan Association; and FP Genetics.

- Enhance genomic selection by leveraging Canada-wide training data, increasing use of multi-trait and multi-environment models, and expanding the number of selected traits
- To respond rapidly to changing pathogen profiles, develop a coordinated survey system for current and emerging oat pathogens across Canada to improve management strategies, screen varieties, and identify and validate new sources of resistant germplasm
- Develop fungicide and nitrogen recommendations for high yield, improved standability, and consistent quality across multiple environments and identify optimum seeding rates for high yielding oat management systems
- Develop methods of cultivation and drying without the use of desiccants in the field and without negatively impacting yield

**Soybean Priorities**

***Note regarding genetic improvement priorities:*** *The CFCRA has an interest in supporting the development of high value conventional and specialty food-grade soybean germplasm and varieties for well-defined end-use markets, as well as the development of very early maturity conventional germplasm and varieties suitable for trait introgression targeting herbicide tolerant commodity markets.*

- Increase yields of soybean varieties by **≥1.5%** per year. Yield increase to be measured relative to provincial checks. Biotic and abiotic stress tolerances to be incorporated to protect grain yield. New varieties must have a minimum pod height of **12 cm** from the soil surface to the bottom pod-bearing node to minimize harvest loss
- Identify and introgress new sources of resistance to key diseases and insect pests. Key diseases and insect pests include: soybean cyst nematode (SCN), sudden death syndrome (SDS), *Phytophthora*, root rot complexes, white mold, and soybean aphid
- Stack durable disease resistance into new soybean varieties with the agronomic and quality traits listed above, breeding against current and emerging pathogen profiles in a variety's adapted region
- Building on recent maturity gene discoveries, develop earlier maturing (MG 00-000) soybean varieties with good yield for short and very short season regions of Canada
- Improve abiotic stress tolerance (e.g. improve grain fill during August drought conditions, improve cold stress tolerance, and improve tolerance to iron deficiency chlorosis/saline soils in western Canada)
- Increase and stabilize minimum soybean protein levels above **40%** (dry matter basis) in new soybean varieties. This is particularly important for western Canadian soybeans that typically have lower protein. Concurrently, examine the value-added opportunities for high amino acid/low crude protein soybeans with premium nutritional value produced on the eastern prairies
- To respond rapidly to changing pathogen profiles and set timely objectives for research, expand coordinated surveys for current and emerging soybean pathogens (particularly root rot pathogens) and insect pests across Canada and use this information to improve management strategies, screen varieties, and identify and validate new sources of resistant germplasm
- Recognizing that soybean production systems vary substantially across Canada, develop system-specific integrated management strategies against relevant weeds, diseases and insect pests.

- Identify ideal nutrient management strategies for soybeans in western Canada and Atlantic Canada (i.e., inoculant recommendations; requirements and management of N, P, K, and S (4R management); rotational fertilization)
- Investigate impact of soybean on overall crop rotation (N-credit benefits, economics, where do soybeans fit best in crop rotations, impact on rotations with peas and lentils for managing Aphanomyces root rot or with canola to manage clubroot); effect of short soybean rotations; and impact of soybean on soil biology (particular priority in western Canada)
- Determine how soybeans can be used in rotation to facilitate low-GHG emission cropping systems (i.e., through reduced N fertilizer, reduce tillage, etc.)

**Eastern Canadian Wheat Priorities**

*Research priorities for eastern Canadian wheat were developed in conjunction with the Canadian Wheat Research Coalition (CWRC) and can be found on the CWRC website.*

**Eastern Canadian Barley Priorities**

*Research priorities for eastern Canadian barley were developed in conjunction with the Canadian Barley Research Coalition (CBRC) and can be found on the CBRC website.*