CFCRA
CANADIAN FIELD CROP RESEARCH ALLIANCE

ARCCC
ALLIANCE DE RECHERCHE SUR LES CULTURES COMMERCIALES DU CANADA

Appendix A – 2026 CFCRA Research Priorities for AgriScience Programming

The research priorities presented in this document represent a targeted subset of priorities that have been identified by the CFCRA specifically to guide research investments through AAFC AgriScience programming. They are not intended to represent a comprehensive list of research priorities for the target crops.

Corn Priorities

Corn germplasm development activities must include partnerships with private sector seed companies to ensure research outputs will meet minimum industry performance standards.

- Identify disease resistance genes, molecular markers, and efficient field screening methods to accelerate the incorporation of disease resistance into commercial hybrid breeding programs.
- Develop new germplasm with novel resistance to priority diseases. Germplasm needs to be adapted to CHU ranges where those diseases are of greatest importance. Key diseases include *Fusarium/Gibberella*, tar spot, northern corn leaf blight (NCLB), and Goss's wilt.
- Develop a modern, efficient, coordinated surveillance system to monitor current and emerging corn pathogens and rapidly detect changes in pathogen profiles. Information generated should support disease management strategies, inform germplasm screening methods, and ensure new sources of disease resistance are effective against regional pathogen profiles. Surveillance efforts should focus on the most economically significant diseases and pathogens.
- Develop transformative nitrogen management strategies to improve nitrogen use efficiency, enhance production margins, reduce nitrogen losses, and lower the carbon footprint of corn production.
- Explore new, revolutionary grain drying technologies to substantially improve grain drying efficiency, increase profitability and sustainability of corn production, and reduce greenhouse gas (GHG) emissions.

Oat Priorities

- Develop new oat varieties that deliver annual yield gains of ≥2% relative to provincial check varieties, while meeting milling industry quality requirements and desirable agronomic characteristics for established oat markets. Varieties should incorporate tolerance to key biotic and abiotic stresses to protect yield potential, mature early, exhibit reduced late tillering to support uniform natural dry-down, demonstrate good shatter resistance, and have exceptional standability.
- Stack durable disease resistance genes into new oat varieties while maintaining the desired agronomic traits listed above. Breeding efforts should target resistance to current and emerging pathogen profiles within a variety's adapted region. Key diseases, in order of importance, include oat crown rust, stem rust, Fusarium head blight, yellow dwarf mosaic virus, and Septoria leaf blotch.

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.

- Identify and introgress environmental stress tolerance traits that will prolong the grain fill period in oat during high temperatures.
- Incorporate routine assessment of oat shatter resistance into breeding programs to ensure new oat varieties possess acceptable shatter resistance before entering registration trials (priority for Western Canada). Develop oat varieties that consistently meet the quality parameters required for milling in accordance with current regional variety registration guidelines.
- Increase the stability and consistency of β-glucan levels in milling oat varieties across diverse environments, targeting levels >4.8%. Both genetic and agronomic management strategies can be explored to achieve this objective.
- Evaluate high-protein oats for niche protein market opportunities, targeting protein levels of ≥20% while minimizing associated yield penalties.
- 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.
- Develop a modern, efficient, coordinated surveillance system to monitor current and emerging oat pathogens. Information generated should support disease management strategies, inform germplasm screening methods, and ensure new sources of disease resistance are effective against regional pathogen profiles.

Soybean Priorities

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 conventional germplasm and varieties with abiotic stress resilience and other desirable traits suitable for trait introgression into elite commodity soybean breeding material.

- Develop new soybean varieties that deliver annual yield gains ≥1.5% relative to provincial check varieties across all Canadian maturity groups. Varieties should incorporate tolerance to key biotic and abiotic stresses to protect yield potential and quality.
- 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 (e.g., horizontal resistance and gene-for-gene resistance) into new soybean varieties while maintaining the desirable agronomic and quality traits listed above. Breeding efforts should target resistance to current and emerging pathogen profiles in a variety's adapted region.
- Improve soybean tolerance to key abiotic stresses in the various soybean growing regions of Canada, including heat and drought stress during grain fill, cold stress, iron deficiency chlorosis (IDC), saline soils, and waterlogging. This includes improving nitrogen fixation efficiency under abiotic stresses.
- Leverage maturity gene discoveries to develop very early maturing soybean varieties (MG 000) with good yield and resilience to key environmental stresses (e.g. drought and flooding tolerance) to improve production viability in very short season regions of Canada.
- Increase and stabilize minimum soybean protein levels above 40% (dry matter basis) in new soybean varieties.

- Evaluate value-added opportunities for commodity soybeans with enhanced amino acid profiles and lower crude protein levels that offer premium nutritional value.
- Develop soybean quality profiles for identify-preserved (IP) markets that meet end-user requirements and create opportunities for farmer premiums.
- Investigate tofu quality in Japanese and other germplasm related to 11S/7S protein subunit content. Identify genetic markers (or other inexpensive analytical methods) to improve selection efficiency of desired subunit profiles for Canadian tofu breeding activities. Introgress the desired subunits into a range of adapted higher yielding germplasm for release to Canadian industry.
- Develop a modern, efficient, coordinated surveillance system to monitor and diagnose current, emerging, and new-to-Canada soybean pathogens (particularly root rot pathogens such as red crown rot) across Canada. Information generated should support development of improved management strategies, inform germplasm screening methods, and ensure new sources of resistance are effective against regional pathogen profiles.
- Improve integrated pest management strategies tailored to diverse soybean production systems across Canada, addressing the weeds, diseases and insect pests most relevant to each system.
- Identify agronomic factors influencing soybean protein levels and evaluate production practices to increase soybean protein levels in commodity soybeans and support competitiveness in end-use and export markets.
- Optimize region-specific nutrient management strategies for soybean production in western Canada and Atlantic Canada, including inoculant recommendations, 4R management of nitrogen, phosphorus, potassium, and sulfur, and rotational fertilization.
- Evaluate the impact of soybean on overall crop rotation, including nitrogen credit and economic benefits, optimal placement of soybeans in rotations, and interactions with other crops and rotation-related disease management (e.g., Aphanomyces root rot in pea and lentil rotations and clubroot in canola rotations). Assess the impacts of short soybean rotations, as well as opportunities to reduce GHG emissions through reduced nitrogen fertilizer use and tillage (priority in Western Canada).

Eastern Canadian Barley Priorities

- Develop new spring feed barley varieties with annual yield gains of ≥1.5% relative to provincial check varieties. Varieties should incorporate tolerance to key biotic and abiotic stresses to protect grain yield and have good standability. Feed barley breeding efforts should focus on the highest-yielding crosses of 2-row and/or 6-row barley.
- Stack durable disease resistance genes into new varieties while maintaining the desired agronomic traits listed above. Breeding efforts should target resistance to current and emerging pathogen profiles in a variety's adapted region. Key diseases include: FHB, barley yellow dwarf virus, powdery mildew, scald, and net/spot blotch.
- Enhance genomic selection usefulness in barley breeding by leveraging eastern Canadian barley training data, increasing use of multi-trait and multi-environment models, and expanding the number of selected traits.
- Evaluate existing winter barley varieties from other regions for agronomic performance and market suitability in eastern Canada.

- Evaluate existing malt barley varieties from other regions for agronomic performance and market suitability (e.g., malt quality) in eastern Canada.

Eastern Canadian Wheat Priorities

- Develop new eastern Canadian wheat varieties in the Canadian Eastern Soft Red Winter (CESRW), Canadian Eastern Hard Red Winter (CEHRW), and Canadian Eastern Red Spring (CERS) wheat classes, with annual gains of ≥2% relative to provincial check varieties. New varieties must have strong straw with good lodging resistance, meet the minimum quality requirements of their respective milling classes, and, for winter wheat, demonstrate good winter survivability.

- Stack durable disease resistance genes into new varieties while maintaining the desirable agronomic traits listed above. Breeding efforts should target resistance to current and emerging pathogen profiles in a variety's adapted region. Key diseases and insect pests include Fusarium head blight (FHB), stripe rust and other leaf diseases, barley yellow dwarf virus, cereal leaf beetle and wheat midge.

- Identify and introgress environmental stress tolerance traits that extend the grain fill period in wheat under high temperature conditions.

- Enhance genomic selection usefulness in breeding programs by leveraging eastern Canadian data, increasing use of multi-trait and multi-environment models, and expanding the number of selected traits.

- Develop a modern, efficient, coordinated surveillance system to monitor current and emerging pathogens across eastern Canada. Information generated should support disease management strategies, inform germplasm screening methods, and ensure new sources of disease resistance are effective against regional pathogen profiles.