



Canada's Seed Partner



CFCRA Research Priorities

Barley Priorities (eastern-Canadian scope)

- Increase yields of new barley varieties by $\geq 1.5\%$ per year until 2023. Yield increase to be measured relative to 2016 provincial checks, to be named in the proposal. New varieties must also have good standability. Given the limited genetic variability of Fusarium head blight (FHB) resistance in 6-row barley, a focus will be on 2-row barley variety development
- Incorporate durable disease resistance into new varieties, breeding against current and emerging pathogen profiles in a variety's adapted region. In order of priority, key diseases include: FHB, powdery mildew, scald, and net/spot blotch. Given the limited genetic variability of FHB resistance in 6-row barley, a focus will be on 2-row barley variety development
- Develop effective management strategies for FHB
- Develop varieties with consistent quality parameters for feed and food uses. Quality parameters to be set by the applicant and must be clear in the proposal
- Evaluate existing malt barley varieties for agronomic and market suitability in eastern Canada
- In order to rapidly respond to changing pathogen profiles and set timely objectives for research, develop a coordinated survey system for identifying current and emerging barley pathogens to improve management strategies, screen varieties, and identify and validate new sources of resistant germplasm

Corn Priorities (Canada-wide scope)

- Develop new short season, cold-tolerant inbreds targeting **1800-2000 CHU**, while building high yield relative to lowest consistent known varieties
- Develop new inbreds with resistance to diseases. In order of priority, key diseases in **western Canada** include: *Fusarium/Gibberella*, Goss's wilt, northern corn leaf blight (NCLB), rust, smut, and eye spot. In order of priority, key diseases in **eastern Canada** include: *Fusarium/Gibberella*, NCLB, nematodes, rust, gray leaf spot, smut, eye spot, and Goss's wilt. New inbreds must have good standability
- In order to rapidly respond to changing pathogen profiles and set timely objectives for research, 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
- Optimize corn nitrogen use efficiency and management
- Agronomy with emphasis on nitrogen timing and efficiency, and on population density as influenced by pH (particular priority for Atlantic Canada)



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Oat Priorities (Canada-wide scope)

- Increase yields of new varieties by $\geq 1.5\%$ per year until 2023, while maintaining quality and desired agronomic characteristics. Yield increase to be measured relative to 2016 provincial checks, to be named in the proposal
- Incorporate durable disease resistance into new varieties, breeding against current and emerging pathogen profiles in a variety's adapted region. Key diseases include: oat crown rust, yellow dwarf mosaic virus, and Septoria leaf blotch
- Develop varieties with consistent quality parameters for milling. Quality parameters to be set by the applicant and must be clear in the proposal
- In order to rapidly respond to changing pathogen profiles and set timely objectives for research, 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
- Plan and conduct strategic genotype/phenotype testing of appropriate germplasm to provide a shared baseline for genomic selection, particularly selection for yield in defined target environments
- Increase stability, predictability and reliability of β -glucan levels in milling oat varieties across environments, targeting minimum β -glucan levels of **5.0%**. β -glucan levels of $\geq 6.5\%$ are not being targeted, as this is secondary to yield and other traits. Both genetic and agronomic combined solutions are appropriate approaches
- 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

Soybean Priorities (Canada-wide scope)

- Increase yields of new conventional, speciality food-grade, and herbicide tolerant varieties by $\geq 2\%$ per year until 2023, with a lower emphasis placed on herbicide tolerant varieties. Yield increase to be measured relative to 2016 provincial checks, to be named in the proposal
- Identify and validate new sources of resistance to key diseases and pests. In order of priority, key diseases and pests for **eastern Canada** include: soybean cyst nematode (SCN), sudden death syndrome (SDS), *Phytophthora*, root rot complexes, white mould and soybean aphid. In order of priority, key diseases and pests for **western Canada** include: *Phytophthora*, root rot complexes, white mould, SCN, and SDS, soybean aphid
- Incorporate durable disease resistance into new conventional, specialty food-grade, and herbicide tolerant varieties, breeding against current and emerging pathogen profiles in a variety's adapted region. A lower emphasis will be placed on herbicide



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tolerant varieties. Key diseases and pests are listed in order of priority, and by geography, in the second soybean priority bullet point

- Develop earlier maturing (00 and 000) conventional and specialty food-grade varieties with good yield, cold and moisture stress tolerance, and suitability for short and very short season regions of Canada
- Develop earlier maturing (00 and 000) herbicide tolerant varieties with good yield, cold and moisture stress tolerance, and suitability for short and very short season regions of Canada
- Increase and stabilize minimum soybean protein levels above **40%** (dry matter basis) in new conventional, specialty food-grade, and herbicide tolerant soybean varieties by 2023. This is particularly important for western Canadian soybeans that typically have lower protein
- Identify and validate early maturity genes useful to breeders to improve yield and protein quality
- Evaluate the impact of cool nights on yield
- Improve tolerance to iron deficiency chlorosis/saline soils, excess moisture, and mid-season drought (particular priority for western Canada)
- Improve conventional and specialty food-grade soybean quality for well-defined end use markets. Applicant to indicate target end use market in proposal
- In order to rapidly respond 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
- Develop effective management strategies for soybean diseases and insect pests. Key diseases and pests are listed in order of priority, and by geography, in the second soybean priority bullet point
- Improve integrated weed management strategies (with an emphasis on herbicide-resistant weeds) for herbicide-tolerant and non-herbicide tolerant systems in both conventional tillage and minimum/no-till production systems
- 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)
- Improve soybean crop establishment and early season growth in no-till production systems (especially in western Canada)
- Investigate factors controlling pod height in soybean to reduce harvest losses and complications



- Investigate impact of soybean on overall crop rotation (N-credit benefits, economics, where do soybeans fit best in crop rotations); 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.) (particular priority in western Canada)

Please note:

Several field crop funding organizations from across Canada have been discussing the development of a national agronomy cluster to address field crop research from a systems approach. As a national agronomy cluster initiative proceeds, a separate set of cross-commodity agronomy priorities will be released for research projects to tackle. Projects that focus on broad, non-crop-specific agronomic research will be directed to the agronomy cluster. Crop-specific agronomy projects will likely be retained under the CFCRA-led field crop cluster.