



# Science and Innovation



## Eastern Cereal and Oilseed Research Centre

Ottawa, Ontario

The Eastern Cereal and Oilseed Research Centre (ECORC) is one of Agriculture and Agri-Food Canada's (AAFC) national network of 19 research centres. The Centre is located on the historic Central Experimental Farm in downtown Ottawa. It conducts research which can be readily transferred to generate new business and economic growth for many areas of Canada's agricultural sector.

The Centre is involved with a wide range of research activities. A major focus is developing improved varieties of barley, corn, oats, soybeans and wheat for eastern Canada, and providing expertise on plants, fungi and insects for biocontrol and genetic improvement. The Centre holds the largest bioresource reference collections of fungi, insects and vascular plants in Canada in support of efforts to protect Canada's borders from invasive pests.

### Areas of Research

At ECORC, the number of research disciplines represented at the site facilitates working in multi-disciplinary teams. In collaboration with national and international public and private sector organizations, the Centre's research activities are aligned to position Canada as the world leader in food safety, innovation and environmentally responsible agricultural production.

#### Enhancing Environmental Performance

- Establishing environmentally sustainable ways to develop and use land for field crop production in eastern Ontario and western Quebec
- Formulating methods and models to evaluate the impact of agriculture on levels of carbon in the soil, as well as greenhouse gas emissions

- Evaluating and modeling the dynamics of agriculture-based contaminants in soil and water, and studying best management practices to reduce movements of contaminants into the environment
- Creating resource databases for land use and environmental assessments

#### Innovation and Advancing Knowledge

- Identifying and characterizing Canada's flora and fauna to define economically important fungi, insects, crops and weeds
- Studying ways to detect, measure and monitor biodiversity change, and biodiversity assessments to support conservation and sustainable use of Canadian biological resources
- Using systems such as molecular diagnostics to identify economically important fungi
- Using molecular techniques to determine the genetic diversity of crops and weeds
- Developing knowledge on the classifications and relationships of important insect groups

#### New Knowledge for Future Applications

- Diagnosing and identifying tools to facilitate border protection against the introduction of exotic pests
- Developing novel pest management strategies that exploit natural enemies and can be integrated with current agricultural practices

## Better Products for Stronger Markets

- Improving the genetic makeup of corn and corn populations that have been bred for desirable traits for the short-season areas of Canada
- Developing new varieties of soybeans for short-season areas of eastern Canada and Manitoba
- Developing winter and spring wheats, oats and barley for eastern Canada. Traits of importance are resistance to disease and insects, improved quality, early maturity and tolerance for cold
- Developing methods to control Fusarium

## Investing in Healthier Crops

- Determining the best methods to produce crops by less frequent tilling of the soil and making better use of organic nitrogen sources
- Characterizing nitrogen and fertilizer needs and their use by crops; the interactions between crop yield and environment; optimal crop rotations, as well as methods of cultivating crops to reduce soil erosion
- Studying the interaction between plants and the bacteria or fungi that infect them, the effects of agricultural practices on crop diseases, and cereal seed fungi and treatments

## Delivering Value through Science

- Isolating, characterizing and manipulating useful plant genes and the elements that control or regulate them to allow research to add product value, reduce environmental impacts on crops and increase resistance to insects and disease
- Identifying the molecular markers associated with important crop traits to facilitate the genetic enhancement of crops
- Evaluating and documenting the genetic profiles for corn, small grain cereals, canola and the fungi Fusarium and Trichoderma
- Evaluating the resistance of new cereals to the Fusarium fungus
- Developing inventive technologies to isolate new compounds from plants and other organisms
- Identifying those seed components that have high value and methods for isolating, purifying and characterizing them

## Facts, Figures and Facilities

- 75 research scientists and a total staff of 320
- 15 honorary or emeritus researchers associated with Centre activities
- World-class national biological collections. These working collections include the:
  - Canadian National Collection of Insects, Arachnids and Nematodes containing 15 million specimens
  - Glomales In Vitro Collection with 14 specimens
  - National Mycology Herbarium containing 350 thousand specimens
  - National Vascular Plant Herbarium with 1 million specimens
- 425 hectares of experimental fields and plots
- More than 25 superior cultivars of wheat, oats, barley and soybeans developed in the past five years
- National mycotoxin analysis laboratory serving AAFC cereal breeders and Fusarium resistance research projects
- Electronics laboratory and machine shop
- National Arthropod Containment Facility providing a single entry point for exotic insects with beneficial biocontrol potential
- National Identification Services for insects, fungi, nematodes and plants
- National Soil Databases containing soil, climate, land use, crop yield and socioeconomic information for the agri-food sector and other Canadian industries
- National bioinformatics network with capacity for functional and structural genomics including a 32 CPU high performance computing cluster
- Central genomics facility performing global gene expression profiling for a variety of organisms (plant, fungal, animal) using an extensive DNA sequence database, a DNA microarray printer and scanner, and robotic equipment
- Electronic microscopy and nuclear magnetic resonance center for use by AAFC scientists

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