

# The Science of Organic Agriculture in Canada

## Latest Research Results



## Evaluation of farmer-selected wheat, oat and potato genotypes under organic production in eastern and western Canada.

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Submitted by Dr. Martin Entz

**At the outset of this project, there were no dedicated breeding programs in Canada** aimed specifically at organic production, even though research had demonstrated that the crop variety needs of organic grain and potato farmers were different than those of farmers growing crops within the conventional paradigm. Another impediment to dedicated organic breeding programs in Canada was the expense, especially since organic production occupies a relatively small area in the country.

This project took aim at both of these challenges using a coordinated approach. First, we collaborated with professional plant breeders who were able to create the genetic diversity using parents that both farmers and breeders agreed would be well-suited to organic production. Then, instead of doing all the early generation selection at research centres, we engaged interested organic farmers to do this work on their farms. This system has now been carried out for 10 years, resulting in adapted populations of wheat, oats and potato. It has created a unique partnership between 7 different professional plant breeders and over 60 organic farmers from coast to coast and enabled organic plant breeding to be conducted in a cost-effective manner.

We would not have been able to accomplish the work had it not been for the regional technical specialists (Regional coordinators) from the Bauta Family Initiative on Canadian Seed Security. Their local knowledge was critical to identifying potential farm participants and assisting farmers in the selection process. The Bauta team also helped create a national network which has greatly strengthened farmers confidence and level of participation.

After the farmers had conducted their on-farm selection for three consecutive years, it was time to test the newly developed “landraces” and compare them to conventionally bred varieties. Our team of

graduate students and technicians, in collaboration with colleagues and farmers across Canada, tested these farmer-developed lines under organic conditions across Canada. The field experiments have been located in PEI, New Brunswick, Quebec, Manitoba, Saskatchewan and Alberta.



*Selecting potatoes on Vancouver Island*

In 2021 alone, a total of 16 individual field experiments were conducted. These studies allowed us to address the following objectives:

- 1) Determine the field performance of farmer-selected wheat, oat and potato lines grown under organic production in different areas of Canada;
- 2) Evaluate farmer-selected wheat and oat lines for response to excess water and drought;
- 3) Evaluate farmer-selected oat and wheat lines to Fusarium infection and leaf disease;
- 4) Gain an understanding of the role of the farmer’s selection approach on genetic progress in wheat and oat populations;
- 5) Using this information to inform future users, including farmers, millers, bakers and others in the food sector, and plant breeders looking for improved genetic material for their own organic breeding programs.

Results show that farmers selected well, contributing lines (or landraces) of wheat, oats and potato that often outperformed conventional varieties for yield and provide extra benefits such as weed competitiveness and straw production.

Oat breeder Dr. Kirby Nilsen (Agriculture and AgriFood Canada (AAFC), Brandon Research Centre), is presently including a number of farmer-selected oat lines in final testing for variety registration. Also, Dr. Nilsen will be using farmer-selected oat lines as parents in future crosses for new oat varieties.

### Activity Researchers:

Martin Entz (Activity Lead, University of Manitoba)  
Helen Jensen (SeedChange)  
Jennifer Mitchell Fetch (Brandon Research Centre, Manitoba)  
Benoit Bizimungu (AAFC Potato Research Centre, Fredericton, New Brunswick)

### Plant Breeding Collaborators:

Stephen Fox (DL Seeds, Manitoba)  
Jennifer Mitchell Fetch  
Kirby Nilsen (AAFC, Brandon Research Centre)  
Benoit Bizimungu  
Cameron Wagg (AAFC Fredericton, NB)  
Duane Falk (University of Guelph, retired)  
Anne Kirk (Cereal Specialist, Manitoba Agriculture)

### Contributing Partners:



Dr. Helen Jensen, Bauta Family Initiative, discussing Fusarium Head Blight with farmer selectors in Quebec



Farmer selector in oat selection field, Quebec



Taste test of local PPB wheat, Montreal

For more information visit the [OSC3 Activity 3 webpage](#) and/or [DAL.CA/OACC/OSCIII](#) & <https://organicfederation.ca/organic-science-clusters/>

