Potato Research Activities

The potato sector has three research activities with the Canadian AgriScience Cluster for Horticulture Cluster 4. These three activities are focused on sustainability, soil health and finding new potato varieties for growers across Canada.

THE CLUSTER 4 POTATO RESEARCH ACTIVITIES ARE:

ACTIVITY 11

National potato variety evaluation for sustainability, resilience and climate change

LEAD RESEARCHERS – Erica Fava, national potato variety trial coordinator and industry liaison; Jen McFarlane, soft fruits IPM coordinator and research coordinator with E.S. Cropconsult; and Katerina Jordan, associate professor at the University of Guelph

ACTIVITY 12

Regenerative and sustainable agriculture for climate change adaptation and carbon sequestration: rebuilding soil health and increasing crop productivity of Canadian potato production systems

LEAD RESEARCHER – Claudia Goyer, research scientist with Agriculture and Agri-Food Canada at the Fredericton Research and Development Centre

ACTIVITY 13

Positioning Canada's potato industry for improved sustainable production

LEAD RESEARCHER – Mario Tenuta, senior industrial research chair in 4R nutrient management and professor of soil ecology at the University of Manitoba

This project is generously funded through the Canadian AgriScience Cluster for Horticulture 4, in cooperation with Agriculture and Agri-Food Canada's AgriScience Program, a Sustainable Canadian Agricultural Partnership initiative, the Fruit and Vegetable Growers of Canada (FVGC), and industry contributors.

Sustainable Canadian Agricultural Partnership

Fruit & Vegetable Growers of Canada | Producteurs de fruits et légumes du Canada

Canada

National Potato Variety Evaluation for Sustainability, Resilience and Climate Change

LEAD RESEARCHERS

Erica Fava
National potato variety trial coordinator and industry liaison

Jen McFarlane
Soft fruits IPM coordinator and research coordinator with E.S. Cropconsult

Katerina Jordan
Associate professor at the University of Guelph

The national potato variety evaluation is working to boost profits and sustainability for the Canadian potato industry by finding new potato selections with improved productivity, disease resistance and climate resilience. New selections are being compared to currently grown potato varieties across the major potato production areas of Canada.

The Agriculture and Agri-Food Canada (AAFC) 2025 trials found a few selections with key traits. The rates of potato virus Y (PVY) infection are on the rise with increased numbers and generations of aphids. This virus can decrease yields and can downgrade potato seed class. Two selections were found to have resistance to PVY—VF180059-06 is a french fry selection and VF180073-14 is a fresh market red selection. VF180073-14 was also found to be resistant to late blight in an inoculation test.

The Eastern AAFC sites suffered from severe drought and higher than average temperatures in 2025. This allowed for heat and drought tolerance evaluations. F20070-06 and VF20037-08, two french fry selections, were found to have higher processing yields than the checks. F20070-06 also has potato wart resistance. VF180073-13 is a fresh market red with higher yields than the checks. It also had excellent yields in the Simcoe, Ont. heat tolerance trial. All three lines have good potential for heat and drought tolerance.

Potato trials during the 2025 growing season at Agriculture and Agri-Food Canada Harrington Research Farm on Prince Edward Island.
Photo: Scott Anderson

In the Ontario trials during the 2025 field season, F180085-04 was found to be a standout early- to mid-season chipping line. It had strong yield potential along with excellent processing characteristics, including high specific gravity and very low sugar levels at harvest. AG1540 was the highest-yielding late-maturing fresh market selection. Several dual-purpose varieties, including VF19006-002, AG1601.05 and Kingsman showed strong potential for the boiling and baking markets.

Storage trials in Ontario have found several advanced selections with excellent chip processing quality. F180085-04 and MSBB058-1 were standout performers, having excellent indicators for chip colour quality after frying and very low dextrose levels. Lamoka also performed well, while VF19095-26 showed the lowest overall sugar concentrations. This compared to Atlantic, which had substantially higher sugars and produced a darker chip colour.

A potato trial plot on Prince Edward Island on Sept. 4, 2025. The plants have not been top killed, but because of the drought some look like they have. Photo: Andrea Bizeau

KEY TAKEAWAYS:

- Two selections were found to have resistance to PVY—VF180059-06 is a french fry selection and VF180073-14 is a fresh market red selection. VF180073-14 was also found to be resistant to late blight.
- F20070-06 and VF20037-08, two french fry selections, were found to have higher processing yields than the checks. The variety F20070-06 also has potato wart resistance.
- VF180073-13 is a fresh market red with higher yields than the checks. It also had excellent yields in the Simcoe, Ont. heat tolerance trial.
- F180085-04 was found to be a standout early to mid-season chipping line. It had strong yield potential along with excellent processing characteristics, including high specific gravity and very low sugar levels at harvest.
- AG1540 was the highest-yielding late-maturing fresh market selection.
- Several dual-purpose varieties, including VF19006-002, AG1601.05 and Kingsman showed strong potential for the boiling and baking markets.
- F180085-04 and MSBB058-1 were standout performers in a storage trial, having excellent indicators for chip colour quality after frying and very low dextrose levels.
- Lamoka also performed well, while VF19095-26 showed the lowest overall sugar concentrations.

Regenerative and Sustainable Agriculture for Climate Change Adaptation and Carbon Sequestration: Rebuilding Soil Health and Increasing Crop Productivity of Canadian Potato Production Systems

LEAD RESEARCHER

Claudia Goyer
Research scientist with Agriculture and Agri-Food Canada at the Fredericton Research and Development Centre

Regenerative and sustainable agricultural practices (RSAPs) are being studied in several locations across Canada to mitigate soil degradation and loss of bio-diversity caused by intensive farming practices and ensure long-term viability of potato farms. Research has been done at 15 farms with researchers finding improved forage yields and reduced pathogen and nematode pressure in some systems. There have been strong regional variations in soil carbon stocks discovered.

Extreme drought in 2025 significantly reduced yields across regions. Despite the stress conditions, the diversified systems (multi-species mixes) maintained higher yields than conventional (potato-barley). The research team found improved soil moisture retention in multi-species mix systems. This led them to the conclusion that RSAPs buffer yield losses under climatic stress making for stronger system resilience. In addition, forage systems of alfalfa and grass significantly improved biomass production. These findings point to RSAPs being able to maintain productivity while improving sustainability.

The research team has found that diversified crop rotations have lower nitrous oxide (N_2O) and carbon dioxide (CO_2) emissions and more efficient nutrient cycling compared to conventional crop production systems and shorter rotations. Three-year rotations and multi-species systems reduced Verticillium dahliae, researchers discovered. Disease severity was found generally to be lower in longer, diversified rotations but similar between some two-year treatments.

(L-R) Tyler Nugent and Thomas Foster harvesting potatoes at the McCain Farm of the Future in Florenceville-Bristol, N.B.

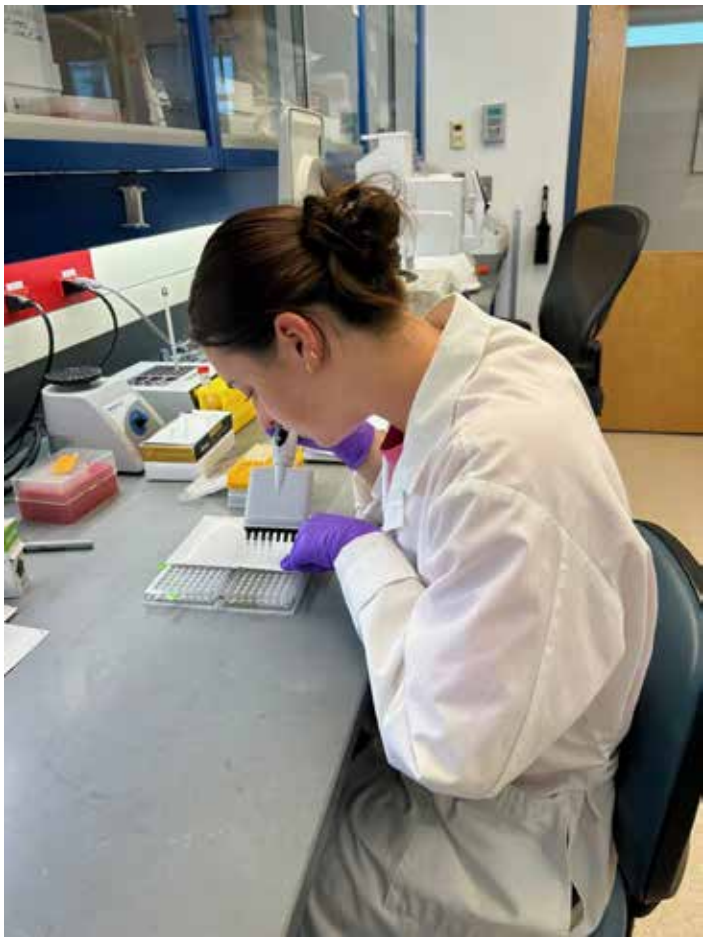
Sean Whitney bagging potatoes at the McCain Farm of the Future in Florenceville-Bristol, N.B. Photos: Claudia Goyer

This points to diversification contributing to natural disease suppression, especially over longer rotations.

In previous years, the research team found the yield differences among management zones, based on electrical conductivity and elevation, were tied to soil properties in non-drought conditions. However, no strong differences in yield and greenhouse gas emissions were observed in 2025, but this was likely masked due to the extreme drought. This shows that climate conditions can override treatment effects in a single year. Another approach to delineate management zones is to map the spatial variability of soil moisture to support future targeted management. Using precision ag tools requires multi-year datasets to show the full impact of how RSAPs work.

KEY TAKEAWAYS:

- Due to severe drought across regions, last years improved soil moisture retention was found in multi-mix systems. RSAPs buffer yield losses under climatic stress making for stronger system resilience.
- Diversified crop rotations have lower nitrous oxide (N_2O) and carbon dioxide (CO_2) emissions and have more efficient nutrient cycling compared to conventional crop production systems and shorter rotations.
- Three-year rotations and multi-species systems reduced Verticillium dahliae. Disease severity was found generally to be lower in longer, diversified rotations but similar between some two-year treatments.
- Yields were highest in diversified three-year rotations and cover crop systems than compared to two-year rotations. Forage systems of alfalfa and grass significantly improved biomass production.



Master of Science student Taylar Austin working in the lab at the Agriculture and Agri-Food Canada Fredericton Research and Development Centre. Photo: Claudia Goyer

Positioning Canada's Potato Industry for Improved Sustainable Production

LEAD RESEARCHER

Mario Tenuta
Senior industrial research chair in 4R nutrient management and professor of soil ecology at the University of Manitoba

This research activity is studying ways to improve nitrogen use efficiency in Canadian processing and table potato production. The research team is working to determine the environmental and agronomic performance indicators for fresh and processing potatoes in Canada. Emissions efficiency and nitrogen management practices on potato farms across the country are being tested. Trials are taking place in Alberta, Manitoba, New Brunswick and Prince Edward Island.

The research team found that by growing the processing potato variety Dakota Russets, they were able to reduce the amount of nitrogen lost to atmosphere, while not impacting yield. Yield remained the same when 20 per cent less nitrogen was applied.

For fresh potatoes, a new potato variety Musica has been outstanding for yield. While it does take more nitrogen than Dark Red Norlands, the yield increase is much greater than the extra nitrogen use. It's a more nitrogen efficient fresh market potato cultivar.

For both fresh and processing trials, the research team found the nitrification inhibitor eNtrench to be effective most years in reducing nitrous oxide emissions. The split nitrogen application depends on the timing of rains. If there isn't a lot of rain after planting and emergence, then the nitrous oxide emissions will increase. Previous research found that the split application produces less nitrous oxide emissions.

Overall, the research team has been able to show that through the use of 4R management, nitrous oxide emissions can be reduced by up to 46 per cent in a single growing season. The researchers also found they can produce three times the amount of potatoes per kilogram of nitrous oxide when combining new potato cultivars and 4R management.

KEY TAKEAWAYS:

- The amount of nitrogen lost to atmosphere was reduced in Dakota Russets. Yield remained the same when 20 per cent less nitrogen was applied.
- While the fresh potato variety Musica does take more nitrogen than Dark Red Norlands, the yield increase is much greater than the extra nitrogen use making it more nitrogen efficient.
- The nitrification inhibitor eNtrench is effective most years to reduce nitrous oxide emissions.
- The split nitrogen application depends on the timing of rains. If there isn't a lot of rain after planting and emergence, then the nitrous oxide emissions will increase.
- Through the use of 4R management, nitrous oxide emissions can be reduced by up to 46 per cent in a single growing season.
- Three times the amount of potatoes per kilogram of nitrous oxide can be produced when combining new potato cultivars and 4R management.

Nitrogen being sampled from a field trial near Portage la Prairie, MB on July 10, 2026. Photo: Toban Dyck