CANADIAN AGRISCIENCE CLUSTER FOR HORTICULTURE 4

Fruit and Vegetable Growers of Canada's Canadian AgriScience Cluster for Horticulture 4

Update to the Industry for September 2025

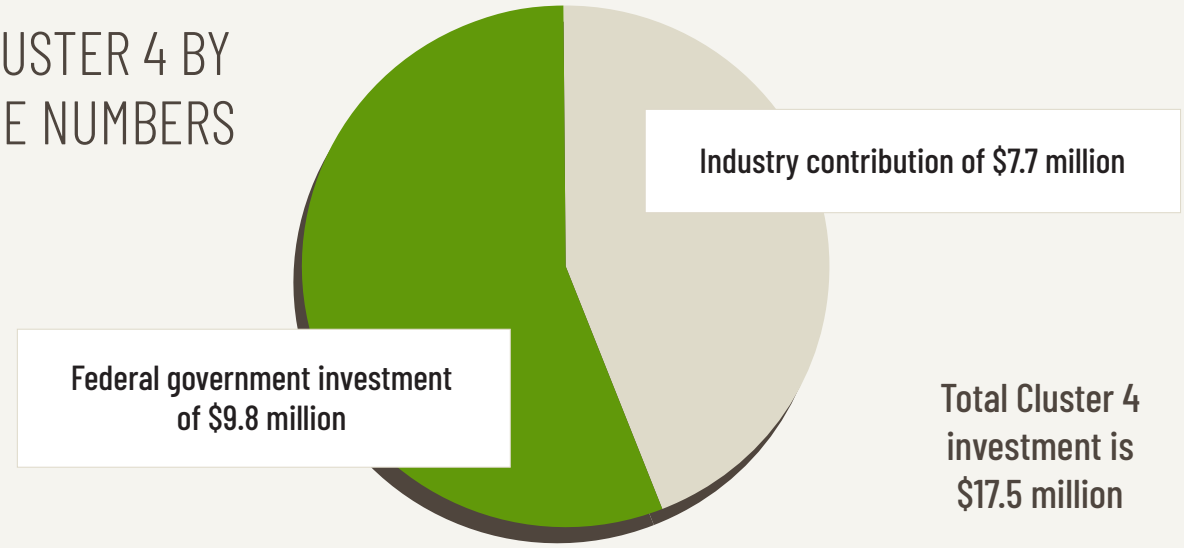
The Canadian AgriScience Cluster for Horticulture Cluster 4 is in its third year with promising research advancements happening. Spanning from 2023 to 2028, Cluster 4 contains 10 research activities focused on the innovation, competitiveness and sustainability of Canada's fruit and vegetable industry.

Cluster 4 is addressing key challenges in the Canadian horticulture industry facing the production of apples, berries, field vegetables, greenhouse vegetables and potatoes. Through the 10 research activities, researchers are investigating ways to improve operational efficiency and sustainability for growers, reduce on-farm chemical use, improve soil health and identify more sustainable fruit and vegetable varieties for growers across the country.

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.

Researchers are working this year to replicate trials to confirm preliminary research results. Some of the preliminary results of these investigations are very promising. Find out more about these intriguing results in this report.

CLUSTER 4 BY THE NUMBERS



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Apple Research Activities

The apple group has two research activities with the Canadian AgriScience Cluster for Horticulture Cluster 4. These two activities are focused on helping apple growers across Canada protect their orchards and be more productive and sustainable.

THE CLUSTER 4 APPLE RESEARCH ACTIVITIES ARE:

ACTIVITY 4

Reducing losses from apple pests with alternative control strategies

LEAD RESEARCHER – Suzanne Blatt, research scientist in entomology with Agriculture and Agri-Food Canada at the Kentville Research and Development Centre

ACTIVITY 5

Apple crop load management: enhancing thinning predictability and tree response through advancements in modelling and new precision thinning products, strategies and technology

LEAD RESEARCHER – John A. Cline, professor of tree fruit physiology at the University of Guelph

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.

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Reducing Losses from Apple Pests with Alternative Control Strategies

LEAD RESEARCHER

Suzanne Blatt
Research entomologist with Agriculture and Agri-Food Canada at the Kentville Research and Development Centre

This research aims to reduce apple crops losses from pests such as apple maggot, ambrosia beetles and leafrollers. The research team is investigating a protocol for sterile insect release for control of apple maggot (SIR for AM) to determine the potential for this strategy as a viable option for management. Ambrosia beetles are being identified in apple orchard agroecosystems, along with new methods to manage the pest. Researchers are also working to find a sustainable non-pesticide tool for management of leafrollers. The purpose of each aspect is to identify a non-pesticide option for control of apple pests across Canada.

Throughout the winter, SIR experiments focused on optimizing an artificial diet to facilitate the mass rearing of apple maggot. Last year, ambrosia and bark beetles were collected from the field and identified. Landscape data was analyzed to determine options to explore in this growing season.

The SIR research team is identifying the ratio of sterile to wild flies needed to reduce stings from apple maggots under field conditions. This is the final year for this work, and a recommendation on the commercial potential will be made. Landscape factors have been identified and trials are underway to review modifications needed to reduce ambrosia and bark beetle populations. The release device for leafroller biocontrol is being field tested in Quebec with field trials in Nova Scotia and British Columbia planned for next year.

The ambrosia and bark beetle research team has discovered the presence of a new species in Ontario. The team discovered the species causing damage in B.C. is different from species in Ontario. This discovery helps researchers better understand the impact species may have on orchards at different times and in different ways. This research will allow growers to target their management practice for the species causing damage in their region.

KEY TAKEAWAYS:

- The SIR research team is identifying the ratio of sterile to wild flies needed to reduce stings from apple maggots, with a recommendation on commercial potential to be made soon.
- Landscape factors have been identified, and trials are underway to identify modifications needed to reduce ambrosia and bark beetle populations.
- Researchers discovered that the species of ambrosia and bark beetles causing damage in British Columbia is different than the Ontario species.

The biocontrol agent in the blue barrel is hooked into the existing spray equipment with the green hoses channeling the agent through the sprayers. Photo: Daniel Cormier

Insecticide treatments have been applied to tree bolts with ambrosia beetle entry holes circled.
Photo: Justin Renkema

Apple Crop Load Management: Enhancing Thinning Predictability and Tree Response Through Advancements in Modelling and New Precision Thinning Products, Strategies and Technology

LEAD RESEARCHER

John A. Cline
Professor of tree fruit physiology
at the University of Guelph

This research activity is aimed at thinning flowers or fruits on overloaded apple trees using new chemical thinners and technologies. Following the first year of trials, the research teams are repeating and refining tests this year to evaluate how the strategies work under different environmental conditions.

This year, the weather conditions in both study locations were unusual and will contribute valuable information about temperature extremes. In Ontario, the cool conditions during early fruit development made chemical thinning atypical, and in Nova Scotia, above-average temperatures suggested a risk of overthinning.

At the Ontario Crops Research Centre in Simcoe, Ont., the research team is conducting thinning experiments using single and sequential sprays and tank mixes of metamitron and ACC (Accede 40SG). They are also investigating computer vision technologies and have worked on using thinning prediction models including the fruit growth and carbohydrate models. The team is currently conducting an experiment using RIMpro's weather carbohydrate model and BreviSmart decision support software.

This past spring at Walsh Farms in Berwick, N.S., the amount of flowering on trees in response to last year's thinning trials was assessed. Treatments were then repeated from last year on Honeycrisp and Gala trees using varying rates and new chemistries. The research team monitored the forecasts and final predictions made by the decision support systems RIMpro and BreviSmart. Specific attention was paid to the predictive ability of the models and the regional limitations.

Cold and cloudy conditions in spring 2025 slowed the rate of fruit growth after flowering in southern Ontario causing chemical thinners to not work as well.

Measuring fruit size on trees in southern Ontario in spring 2025.
Photos: John Cline

KEY TAKEAWAYS:

- Researchers are conducting an experiment using RIMpro's weather carbohydrate model and BreviSmart decision support software at the Ontario Crops Research Centre and at Walsh Farms in Nova Scotia.
- In Ontario, single and sequential sprays and tank mixes of metamitron and ACC are being evaluated for efficacy in thinning Gala and Ambrosia apple trees.
- In Ontario, computer vision technologies and predictive models are being tested for their ability to improve crop load management.

Measuring the size of fruit on trees in southern Ontario in spring 2025. Photo: John Cline

Berry Research Activities

There is one research activity from the berry sector for the Canadian AgriScience Cluster for Horticulture Cluster 4. This research activity is focused on finding new berry varieties for growers across Canada.

THE CLUSTER 4 BERRY RESEARCH ACTIVITY IS:

ACTIVITY 6

Canadian Berry Trial Network

LEAD RESEARCHER – Beatrice Amyotte, research scientist for small fruit germplasm development with Agriculture and Agri-Food Canada at the Kentville Research and Development Centre

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.

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Canadian Berry Trial Network

LEAD RESEARCHER

Beatrice Amyotte
Research scientist for small fruit germplasm development with Agriculture and Agri-Food Canada at the Kentville Research and Development Centre

The purpose of the Canadian Berry Trial Network (CBTN) is to look into how new and established berry cultivars will perform in the typical berry growing regions of British Columbia, Ontario, Quebec and Nova Scotia. Fruit quality traits and yield potential are evaluated along with the economic competitiveness of new berry cultivars.

Over the winter, new strawberry varieties were selected for trials. Varieties were chosen based on industry consultations conducted in B.C., Ontario, Quebec and Nova Scotia as well as plant availability. These included 10 varieties each of short day (June-bearing) and long day (day-neutral) strawberries with some variation between locations due to differences in provincial priorities. There were numbered selections from Planasa and new cultivars from UC Davis among the trial varieties. Plants were purchased and circulated during the spring and planted in new field trials. The next trial plantings will be in 2026 for blueberry and 2027 for raspberry. Variety long-lists are being compiled for these berries.

Strawberry trials planted last year are being evaluated. Blueberry trials planted in 2022 are starting to be evaluated. These include around 16 highbush varieties, with some variation between locations. Harvest season began in late June in B.C. and mid-July in Ontario, Quebec and Nova Scotia. The latest varieties are expected to ripen in September. Data aggregation and analysis will be done over the winter.

Raspberry trials planted in 2024 are being managed to promote plant health and vigour but will not be harvested or evaluated this season. On-farm raspberry trials conducted in B.C. showed some promise for two numbered selections from the B.C. Berry Breeding Program. These will be included in the 2027 raspberry replicated trials as they are good options for fresh markets and mechanized harvest.

The researchers are currently selecting trial varieties for next year. They're establishing new replicated trials at research farms in four provinces and new unreplicated trials at grower sites in B.C. The team is evaluating established trials and presenting one research talk or tour per province.

Strawberry rows at Agriculture and Agri-Food Canada Kentville Research and Development Centre. Photo: Beatrice Amyotte

Growers visiting the 2024 short day strawberry trial at the Agriculture and Agri-Food Canada Kentville Research and Development Centre. Photo: Beatrice Amyotte

Strawberry plants at Agriculture and Agri-Food Canada Kentville Research and Development Centre. Photo: Beatrice Amyotte

KEY TAKEAWAYS:

- Strawberry trials planted last year are being evaluated. These include around 10 short day and 10 long day varieties, with some variation between locations.
- Blueberry trials planted in 2022 are starting to be evaluated. These include around 16 highbush varieties, with some variation between locations. Harvest season began in late June in B.C. and mid-July in Ontario, Quebec and Nova Scotia. The latest varieties are expected to ripen in September.
- Raspberry trials planted in 2024 are being managed to promote plant health and vigour but will not be harvested or evaluated this season.
- On-farm raspberry trials conducted in B.C. that showed promise include BC 1855.11 and BC 1855.14. These will be included in the 2027 raspberry replicated trials as they are good options for fresh markets and mechanized harvest.

Field Vegetable Research Activities

The field vegetable sector has two research activities with the Canadian AgriScience Cluster for Horticulture Cluster 4. These two activities are focused on making soil more resilient and protecting vegetable crops against pests.

THE CLUSTER 4 FIELD VEGETABLE RESEARCH ACTIVITIES ARE:

ACTIVITY 7

Increasing field vegetable yield and resilience to abiotic and biotic stresses through soil microbial engineering

LEAD RESEARCHER – Herve Van Der Heyden, research scientist with Agriculture and Agri-Food Canada Saint-Jean-sur-Richelieu Research and Development Centre

ACTIVITY 8

Reduce risk strategies for cabbage maggot control

LEAD RESEARCHER – Renee Priya Prasad, associate professor and department head for agriculture at the University of the Fraser Valley

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.

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Increasing Field Vegetable Yield and Resilience to Abiotic and Biotic Stresses Through Soil Microbial Engineering

LEAD RESEARCHER

Herve Van Der Heyden
Research scientist with Agriculture and Agri-Food Canada
Saint-Jean-sur-Richelieu Research and Development Centre

This research activity is working to develop, validate and implement bacterial inoculum to improve field vegetable yield and plant diseases while reducing fertilizer and pesticide inputs. This year, the researchers tested 45 candidate bacterial strains against four phytopathogenic *Pythium* species and *Sclerotinia sclerotiorum*. Several strains have shown sustained inhibitory effects on these pathogens for up to three weeks.

Thirty-three of these strains, all part of *Pseudomonas fluorescens* or *P. putida*, have shown restricted effects against the same five plant pathogens in vitro. Eighteen of these *Pseudomonas* strains proved effective against *Pythium* species, while 10 strains showed a restricted effect on *S. sclerotiorum*. Overall, two strains were highly effective in vitro at controlling *P. ultimum*, *P. irregulare* and *P. sylvaticum* (strains 249 and 829), while strains 901, 113, and 1126 showed good in vitro control of *P. tracheiphilum*. Strains 942 and 611 offered some control of *S. sclerotiorum.*

As the research activity moves into the final years, researchers are focusing on biocontrol approaches. The team is using proprietary bacterial strains, isolated from Canadian vegetable farms, that have been shown to promote plant growth, control pathogens and improve drought tolerance. Researchers are doing laboratory and greenhouse experiments along with small-scale field trials.

This year, the research team is extending their screening to include additional plant pathogens and starting greenhouse trials. The team will assess the persistence and durability of the resistance effects revealed by the bacterial strains. They plan to continue evaluating these strains against a wider range of plant diseases and document the impacts of plant growth-promoting rhizobacteria (PGPRs) on multiple crop species. The team wants to determine the effects of PGPRs at various crop growth stages to provide a better understanding of their practical applications, maximizing their agricultural benefits.

KEY TAKEAWAYS:

- Thirty-three strains, all part of *Pseudomonas fluorescens* or *P. putida*, have shown restricted effects against the same five plant pathogens in vitro. Eighteen of these *Pseudomonas* strains proved effective against *Pythium* species, while 10 strains showed a restricted effect on *S. sclerotiorum*.
- Researchers are using proprietary bacterial strains, isolated from Canadian vegetable farms, that have been shown to promote plant growth, control pathogens and improve drought tolerance. They are being tested against various diseases and on multiple crop species.

Reduce Risk Strategies for Cabbage Maggot Control

LEAD RESEARCHER

Renee Priya Prasad
Associate professor and
department head for agriculture
at the University of the Fraser Valley

Crucifers (crops in the cabbage family) provide numerous opportunities for Canadian vegetable growers but are under attack by cabbage root maggots. In this research activity, the team is working to find new management tools to allow growers to see decreased crop losses from cabbage root maggot. Researchers are taking part in their second field season for the study.

Trials this growing season are to confirm last year's successes and explore integrated pest management options. To date, the trial has tested three methods: transplant and spray; plant, spray and cover; and transplant treatment. Results last year showed effective control initially but timely sprays are important as pest pressure can overwhelm chemical control.

This year the researchers have found that regardless of what insecticide is used, based on the insecticides tested in these trials, the duration of control is about three to four weeks. It is important to identify how long any level of pest control or suppression lasts in the field in order to find the timing for follow up treatments. This is especially important for crops such as rutabaga, turnip and radish, which need season-long protection against cabbage root maggots.

The team is beginning to collect maggots and pupae from the field to examine levels of parasitism and to start a colony for small-scale experiments over the fall/winter.

KEY TAKEAWAYS:

- Results last year showed effective control initially but timely sprays are important as pest pressure can overwhelm chemical control.
- Researchers have found that regardless of what insecticide is used, the duration of control is about three to four weeks.

Rows of cabbage plants at Agriculture and Agri-Food Canada Agassiz Research and Development Centre. Photo: Toban Dyck

A broccoli plant at Agriculture and Agri-Food Canada Agassiz Research and Development Centre. Photo: Toban Dyck

The root of a cabbage plant infected with cabbage root maggots in a field near Abbotsford, B.C. Photo: Toban Dyck

Greenhouse Vegetable Research Activities

The greenhouse vegetable sector has two research activities with the Canadian AgriScience Cluster for Horticulture Cluster 4. These two activities are focused on protecting vegetables against pests and managing disease in tomatoes.

THE CLUSTER 4 GREENHOUSE VEGETABLE RESEARCH ACTIVITIES ARE:

ACTIVITY 9

Developing a systems approach to pest management on greenhouse vegetable crops: mirid predator selection

LEAD RESEARCHER – Roselyne Labbé, research scientist in greenhouse entomology with Agriculture and Agri-Food Canada at the Harrow Research and Development Centre

ACTIVITY 10

Novel approaches for the management of tomato brown rugose fruit virus (ToBRFV)

LEAD RESEARCHER – Aiming Wang, research scientist with Agriculture and Agri-Food Canada at the London Research and Development Centre

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.

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Developing a Systems Approach to Pest Management on Greenhouse Vegetable Crops: Mirid Predator Selection

LEAD RESEARCHER

Roselyne Labbé
Research scientist in greenhouse entomology with Agriculture and Agri-Food Canada at the Harrow Research and Development Centre

To find new integrated pest-management strategies to protect greenhouse vegetable crops, a research team is studying two native North American mirid species: *Dicyphus discrepans* and *Dicyphus famelicus*, and one adventive species, *Nesidiocoris tenuis*.

Researchers are focused on breeding genetically improved strains of the native mirid species *Diciphus famelicus*, which appears to be one of the predominant species of the *Dicyphini* tribe in natural ecosystems across eastern Canada and has a broad genetic diversity. Two other native predator species, *Dicyphus discrepans* and *Dicyphus hesperus*, are being assessed for their comparative biocontrol potential of common greenhouse pests, as well as if they are prone to causing fruit injuries.

Through surveys in Ontario and Quebec, researchers have established and maintained a total of 10 source populations of *Dicyphus famelicus* and one source population for each of *D. discrepans*, *D. hesperus* and *Nesidiocoris tenuis*. Genetic analysis for the 10 populations of *D. discrepans* found at least four distinct DNA sequences suggesting there is substantial genetic variation to support strain phenotypic selection.

From the 10 *D. famelicus populations*, researchers established 12 isofemale lines, which have been assessed through 723 tests for plant or prey feeding preferences. One line was found to be particularly predatory, with predatory capacity being a heritable trait, which correlates with predator aggressivity.

The research team has started to explain biases in host plant selection for the four native and adventive mirid species, along with the impact of these host plants on population increase rates. They have found all *Dicyphus* species prefer to reproduce on mullein hosts, whereas the adventive *Nesidiocoris tenuis* has a preference for tomato.

Given the prevalence of *N. tenuis* in greenhouses around the world, researchers have focused on finding ways to control the species to reduce crop injury. This includes examining the efficacy of control products, assessing mass trapping approaches and reviewing exclusion screen dimensions. They are conducting trials to find the interactions between all four diverse mirid species and studying the impacts of LED lights and release rates in greenhouse environments.

Over the 2025–26 research season, the team is working to finalize the establishment of isofemale lines for *Dicyphus famelicus* and complete assessments of their feeding behaviour. This will allow researchers to pick the most promising strains to further assess their biological control potential on greenhouse crops.

KEY TAKEAWAYS:

- Genetic analysis for the 10 populations of *D. discrepans* found at least four distinct DNA sequences, suggesting there is genetic diversity for strain phenotypic selection.
- Researchers have found all *Dicyphus* species prefer to reproduce on mullein hosts, whereas the adventive *Nesidiocoris tenuis* has a preference for tomato.

A female *D. discrepans*. Photo: Carly Demers

A female *D. famelicus*. Photo: Carly Demers

Novel Approaches for the Management of Tomato Brown Rugose Fruit Virus (ToBRFV)

LEAD RESEARCHER

Aiming Wang
Research scientist with Agriculture and Agri-Food Canada at the London Research and Development Centre

Researchers are working to stop Tomato Brown Rugose Fruit Virus (ToBRFV) from threatening Canadian greenhouse tomatoes and peppers. This research activity is studying the infection process and working to develop novel genetic resistance to ToBRFV. Researchers want to better understand how ToBRFV overcomes broad-spectrum resistance given by Tm-22 and bring back Tm-22 -mediated resistance to ToBRFV.

Approximately 16,000 individual tomato plants have been screened, with 30 lines found to have resistance/tolerance to ToBRFV. Resistance in one line has been confirmed after four generations, while resistance in other lines is yet to be confirmed. The research team has cloned the resistance gene Tm22 and ToBRFV movement protein (MP). It was found neither are stable as they have a very short turn-over time. A tomato protein involved in ToBRFV MP degradation was identified.

By investigating the deficiency of two ToBRFV proteins, including coat protein (CP) and MP on virus replication and infection by generation of CP- and MP-deficient mutants followed by protoplast transfection and plant infection assays, it was found both CP and MP provide supplementary but not essential roles in virus replication at the early infection stage. Both MP and CP are necessary for ToBRFV infection.

Researchers have sequenced the full genome sequences of 28 isolates and partial genomic sequences of an additional 100 isolates. Most Canadian isolates were found to be closely related to isolates from the United States and Mexico. However, several Canadian isolates seem to be distantly related, pointing to multiple introductions to Canadian production systems. Two conserved residues in CP were found to be essential for ToBRFV infection.

Researchers are working to finish screening for ToBRFV resistance from the tomato mutant population, confirm resistance in future generations of identified lines, and initiate genetic work to identify the genes needed for resistance. The team will continue to monitor ToBRFV diversity in Canada, and decode what causes ToBRFV break-down of Tm22 resistance. They are also assessing the incidence of ToBRFV and Pepino mosaic virus (PepMV) mixed infection.

Tomato plants infected with typical tomato brown rugose fruit virus (ToBRFV) symptoms.
Photo: Aiming Wang

KEY TAKEAWAYS:

- Approximately 16,000 individual tomato plants were screened with 30 lines found to have resistance/tolerance to ToBRFV. Resistance in one line has been confirmed after four generations, while resistance in other lines is to be confirmed.
- The research team has cloned the resistance gene Tm22 and ToBRFV movement protein (MP). It was found neither are stable, as they have a very short turn-over time. A tomato protein that is involved in ToBRFV MP degradation was identified.
- Most Canadian genome sequence isolates were found to be closely related to isolates from the United States and Mexico. However, several Canadian isolates seem to be distantly related pointing to multiple introductions to Canadian production systems.

Tomato plants infected with tomato brown rugose fruit virus (ToBRFV). Photos: Aiming Wang

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.

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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.

Over the past winter, trial coordinators attended local meetings to provide updates to industry on the trial. Additionally, meetings were held with trial coordinators to discuss improvements that could be made for the growing season. At some trial sites, researchers conducted processing quality assessments on the lines in storage.

Three chip lines, F180085-04, F170084-09 and F160032-06, which store well for chip processing, were selected for a more detailed new storage/processing study in Ontario. Assessing ideal storage temperatures for new chipping varieties is a complementary project that will help predict storage potential.

For the 2025-2026 year, all sites have been planted, and trial coordinators have started gathering field and agronomic data. Agriculture and Agri-Food Canada's (AAFC) breeding program chose six lines to graduate from the trials and put into industry trials for 2025. Many of these lines carry disease resistance, have early maturity and good dormancy, and have very good processing quality in storage.

The researchers are continuing to evaluate the processing quality of lines from the 2024 trials. Three french fry lines (VF170093-09, VF19046-16 and VF19001-04) and two chip lines (F180085-04 and VF19010-22) from the AAFC breeding program have had consistently good colour through eight months in storage at 7 C.

Planting potato trials for the 2025 growing season at Ste-Marie-Salomé, Que. Photo: Sophie Massie

Several lines were also selected for a heat tolerance trial in Simcoe, Ont. Based on this trial, several lines were identified as showing promise as heat tolerant lines. A fresh market red line, VF180073-13, produced the highest yields in the trial. VF170114-01, a fresh market red, and VF140855-07, a french fry type, also had yields higher than other checks. All three of these lines produced attractive tubers and high marketable yields and are in the 2025 trials or are being evaluated by industry.

Potato trials at Delta, B.C. Photo: Toban Dyck

A potato plant at the trials in Delta, B.C. Photo: Toban Dyck

KEY TAKEAWAYS:

- Three chip lines, F180085-04, F170084-09 and F160032-06, which store well for chip processing were selected for a more detailed new storage/processing study in Ontario.
- Three french fry lines and two chip lines from the AAFC breeding program have shown consistently good colour throughout eight months in storage at 7 C.
- As part of a heat tolerance trial in Simcoe, Ont., several lines were identified as showing promise as heat tolerant lines.

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.

Trials conducted at McCain Foods Farm of the Future in New Brunswick are showing multispecies mixes not only increased soil health but ensured a tighter cycling of nutrients, thus reducing carbon dioxide and nitrous oxide losses to the atmosphere. Researchers also found a longer crop rotation with perennial multispecies mix improved soil health indicators. Disease risk was also reduced with potato early dying (PED) severity and the abundance of *Verticillium dahliae* was found to be lower in more diversified crop rotations. Trials are ongoing to see how test results vary in different environmental systems.

In Quebec, trials are testing how a two-year potato system using multi-species service crop as green manure under reduced tillage and fall/spring cover crops compares to a conventional two-year system of potatoes and corn/soybeans. Another trial is testing two RSAPs crop production systems. These include a cash crop in the spring of the first rotation year followed after harvest by a multi-species service crop mixture, and a mix of annual and perennial species sown as cover crops until the next spring with a green manure plant species mixture planted as a fall/spring cover crops until the seeding of potato crops in the next spring.

The team in Ontario is testing the effect of improved crop production systems with greater plant diversity and fumigation compared to unfumigated soils under a continuous potato on soil quality and biodiversity, crop growth and productivity and disease management. This growing season, seven trials were established at four

Bagging plant samples for testing at Agriculture and Agri-Food Canada Fredericton Research and Development Centre.
Photo: Toban Dyck

Soil samples at Agriculture and Agri-Food Canada Fredericton Research and Development Centre. Photo: Toban Dyck

experimental hubs and trials at 18 flagship farms were also planted. Collection of plant, soil and gas samples is ongoing.

KEY TAKEAWAYS:

- Trials are showing multispecies mixes not only increase soil health but ensure a tighter cycling of nutrients, reducing greenhouse gas losses to the atmosphere.
- A longer crop rotation with perennial multispecies mix was found to improve soil health indicators.
- Disease risk was reduced with potato early dying (PED) severity and the abundance of *Verticillium dahliae* was found to be lower in more diversified crop rotations.

Potato rows at McCain Farm of the Future in Riverbank, N.B.
Photo: Toban Dyck

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.

The research activity is in its second of three years of field trials. Trials are taking place in Alberta, Manitoba, New Brunswick and Prince Edward Island. Researchers added different rates of nitrogen fertilizer to standard varieties of table and processing potatoes and newer suspected higher nitrogen use efficient varieties. Researchers found the newer higher nitrogen efficient varieties are generally out yielding standard varieties. More yield is obtained with less of an increase in nitrogen additions than with the standard varieties.

The nitrification inhibitor, eNtrench, has been found to generally reduce N_2O emissions. The exception was the 2024 trial in Alberta where the field had a lot of residual nitrogen from previous legume forage production. With table potatoes, the newer high nitrogen efficient variety, Musica, is drastically out yielding checks. However, it does this with more nitrogen added. Researchers are working to confirm this year if it is actually more nitrogen efficient.

Chris Hoffman at his potato processing trial near Portage la Prairie, M.B. Photo: Mario Tenuta

KEY TAKEAWAYS:

- Newer higher nitrogen efficient potato varieties are out yielding standard varieties. More yield is obtained with less of an increase in nitrogen additions than with the standard varieties.
- The nitrification inhibitor, eNtrench, has been found to reduce N_2O emissions.
- The newer high nitrogen efficient variety, Musica, is drastically out yielding checks, but it does this with more nitrogen added. Researchers are working to confirm this year if it is actually more nitrogen efficient.

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