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 2026

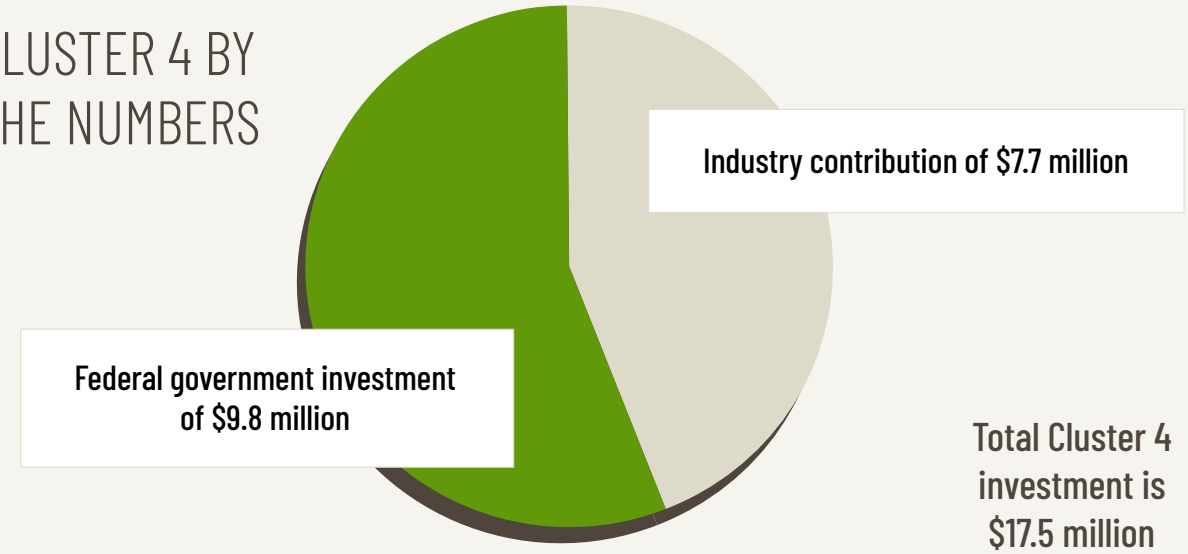
The Canadian AgriScience Cluster for Horticulture Cluster 4 is in its fourth year – with promising research advancements. Spanning from 2023 to 2028, Cluster 4 contains 10 research activities focused on the innovation, competitiveness and sustainability of Canada's fruit and vegetable industry.

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 Agri-Science 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.

Most activities are in their last research year and have been able to discover exciting preliminary results. Read on to learn more about this exciting research.

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 is working to reduce apple crop losses from pests such as apple maggot, ambrosia beetles and leafrollers. The research team has been investigating a protocol for sterile insect release for control of apple maggot (SIR for AM). 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. These projects are all meant to identify a non-pesticide option for control of apple pests across Canada.

The final ratio experiments were completed in March 2026 for SIR for apple maggot control research. With the ratio experiments finished, the research team now has a better understanding of the mass rearing needs for this strategy to be used in the field.

The biocontrol for leafrollers research is in its final year with field trials at four commercial sites—two in Nova Scotia and two in Quebec. The research teams are working to complete biocontrol agent releases and conduct damage assessments at each site.

There is still one more year to go for the landscape management for ambrosia and bark beetles research. Identification of species captured during summer 2025 has happened. Landscape factors were recorded for orchards in Ontario with modification strategies being developed. Sampling for bark beetles in British Columbia and Ontario orchards will continue over the remaining research time, along with identification of beetles. Landscape modifications will be implemented as required.

KEY TAKEAWAYS:

- The final ratio experiments were completed in March 2026 for SIR for apple maggot control research.
- The biocontrol for leafrollers research is in its final year. Field trials are happening at commercial sites in Nova Scotia and Quebec.
- There is still another year remaining for the landscape management for ambrosia and bark beetles research. Sampling for bark beetles in British Columbia and Ontario orchards will continue, along with identification of beetles.

An apple maggot on Aug. 6, 2026.

Apples damaged by codling moths at a Nova Scotia orchard on Aug. 6, 2026. The biocontrol for leafrollers is providing codling moth control also. Photos: Toban Dyck

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 focused on thinning flowers or fruits on overloaded apple trees using new chemical thinners and technologies. This is the last year of field work at Walsh Farms in Berwick, N.S. while another year of field work will happen at the Ontario Crops Research Centre in Simcoe, Ont.

In Simcoe, the spring return bloom was assessed on trees that were part of 2025 experiments. Thinning treatments in six chemical thinning experiments were applied in the spring. Four experiments from 2025 were repeated to ensure the results are repeatable over two years. Two new experiments testing the effects of surfactants and a spray solution pH to improve the efficacy of Accede sprays are happening—Accede sprays haven't performed well in earlier experiments. Another experiment is investigating tank-mix combination sprays of Brevis (metamitron) with various rates of Sevin XLR (carbaryl) and MaxCel (6-BA) to improve the efficacy of thinning with single sprays of Brevis.

In Nova Scotia, return bloom was assessed and recorded in the spring on trees that had been part of the previous year's trials. Thinning trials in both Honeycrisp and Gala orchards were repeated for this growing season. Additional Brevis treatments were incorporated into the trial to further assess performance. Forecasts and final recommendations from the decision-support systems RIMpro and BreviSmart are being monitored to evaluate predictive accuracy and identify any regional limitations under local growing conditions.

Thinned apple tree branch at the Nova Scotia site on Aug. 7, 2026.

The distance that should be between apples on a branch at the Nova Scotia site on Aug. 7, 2026. Photos: Toban Dyck

With Accede applied later than other registered thinning products, researchers are exploring the environmental and management factors that influence its effectiveness. At the same time, the first commercial growing season for Brevis offers a unique opportunity to evaluate thinning strategies under real-world conditions.

In Nova Scotia and Ontario, the growing season started with cooler-than-average temperatures and slow heat accumulation, delaying early development. However, conditions quickly shifted, and heat units accumulated rapidly, compressing management timelines and creating challenges for orchard decision-making.

In Ontario, fruit drop was delayed after an extended post-bloom period of moderate temperatures with higher-than-average solar radiation. These conditions made it more difficult to remove fruit with chemical thinners. In Nova Scotia, fruit drop has been significant, which may lead to lower final crop loads. However, precipitation has remained limited across much of the region, with soil moisture reserves strained from last year's drought.

Evaluations in both regions will focus on how effectively treatments reduced fruit set and hand thinning requirements. Harvest evaluations will provide key insights into fruit quality, including weight, colour and grade.

An overloaded apple tree branch at the Nova Scotia site on Aug. 7, 2026. Photo: Toban Dyck

KEY TAKEAWAYS:

- This is the first growing season that Brevis is registered for commercial use.
- This is the last year of field work at Walsh Farms in Berwick, N.S. while another year of field work will be done at the Ontario Crops Research Centre in Simcoe, Ont.
- Two new experiments in Ontario are testing the effects of surfactants and a spray solution pH to improve the efficacy of Accede sprays—Accede sprays haven't performed well in earlier experiments.
- Tank-mix combination sprays of Brevis with various rates of Sevin XLR and MaxCel are being tested in Ontario to improve the efficacy of thinning using single sprays of Brevis.
- Thinning trials in both Honeycrisp and Gala orchards were repeated for this growing season in Nova Scotia. Additional Brevis treatments are being done to further assess performance.

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.

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 year the Canadian Berry Trial Network is evaluating strawberry, raspberry and blueberry varieties across four provinces. As in previous years, the researchers are conducting replicated trials at research institutes in Nova Scotia, Quebec, Ontario and British Columbia, as well as unreplicated trials on B.C. farms. Fruit quality traits and yield potential are being evaluated to gauge the economic competitiveness of new berry cultivars and breeding selections.

The research team has established new strawberry trials and is harvesting existing trials of all three fruit crops. They are also planning new blueberry trials for the fall. Winter survival, the timing of flowering and fruiting, yield and fruit quality traits will be evaluated. The data will be used to determine which varieties are best adapted to each region. The results will be compared across years and locations to identify varieties with stable performance across climate conditions.

As of July 2026, the new strawberry trials have been planted. The varieties were selected based on industry consultations and plant availability. They include approximately 10 varieties each of June-bearing and day-neutral strawberries with some variation between locations due to differences in provincial priorities. There are numbered selections from Agriculture and Agri-Food Canada (AAFC), a repeat of select day-neutral cultivars from UC Davis and a small number of new Italian cultivars bred for controlled environments.

The new highbush blueberry trials will be planted in fall 2026 in B.C., Ontario and Nova Scotia, and in spring 2027 in Quebec. The new blueberry trials will include 10 to 14 advanced selections from the B.C. Berry Breeding Program along with reference varieties for comparison. The next planting of floricane and primocane raspberries will be in 2027.

Visitors at the new strawberry field plots at AAFC Kentville. Photo: AAFC

Last year, the Quebec research team found that AAFC short-day strawberry selection K15-11 produced the highest total yield among the largest fruit sizes while maintaining a low proportion of unmarketable fruit. In Nova Scotia, K15-11, K16-21 and SC 58-9-20 outyielded the standard cultivar Jewel. UC Monarch and AAC Evelyn produced exceptionally large fruit.

In Ontario, day-neutral strawberries 19-140R and UC Golden Gate had the highest marketable yields among evaluated cultivars. In Quebec, 19-011R and 19-106R showed strong agronomic performance, while Seascape and Murano received the highest flavour ratings.

For blueberries, across multiple locations it was found that advanced selection OREGON-000-1, newer cultivars Valor and ArabellaBlue and several B.C. breeding selections demonstrated yield potential equal to or greater than leading commercial standards. In Ontario, OREGON-000-1, LunaBlue, and Valor were among the highest-yielding varieties. In B.C. on-farm trials, advanced selections BC-015 and BC-016 produced exceptionally high first-crop yields and attracted substantial grower interest.

Strawberry plant rows at the new strawberry field plots at AAFC Kentville.

Strawberries at the new strawberry field plots at AAFC Kentville.
Photos: AAFC

With raspberries, several B.C. Berry Breeding Program selections continued to show strong promise, including BC 10-79-33, BC 1855.11 and BC 1855.14. The varieties are showing high yield potential, desirable fruit quality and firmness characteristics.

KEY TAKEAWAYS:

- In Quebec, AAFC June-bearing strawberry selection K15-11 produced the highest total yield and was among the largest fruit sizes while maintaining a low proportion of unmarketable fruit during the 2024 growing season.
- In Nova Scotia, K15-11, K16-21, and SC 58-9-20 strawberry varieties outyielded the standard cultivar Jewel. UC Monarch and AAC Evelyn produced large fruits.
- In Ontario, day-neutral strawberries 19-140R and UC Golden Gate had the highest marketable yields.
- In Quebec, strawberry varieties 19-011R and 19-106R showed strong agronomic performance, while Seascape and Murano received the highest flavour ratings.
- For blueberries, OREGON-000-1, Valor, ArabellaBlue, and several B.C. breeding selections demonstrated yield potential equal to or greater than leading commercial standards.
- In Ontario, OREGON-000-1, LunaBlue and Valor were among the highest-yielding blueberry varieties.
- In B.C. on-farm trials, advanced blueberry selections BC-015 and BC-016 produced exceptionally high first-crop yields and attracted substantial grower interest.
- Several B.C. Berry Breeding Program raspberry selections continued to show strong promise, including BC 10-79-33, BC 1855.11 and BC 1855.14.

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. The research team has developed an automated and standardized protocol to quantify growth inhibition on artificial media. They have completed the screening of their bacterial strains collection against many fungal and oomycetes pathogens. Preliminary assays to test the bacterial strains against plant pathogens in-planta have begun.

The research team has found biocontrol potential after finishing screening of a large collection of bacterial strains. Three highly promising bacterial strains were selected and tested in-vitro against 16 economically important plant pathogens. It was discovered the bacteria strain B21-024 significantly increased the yield of lettuce in the early stages of plant growth.

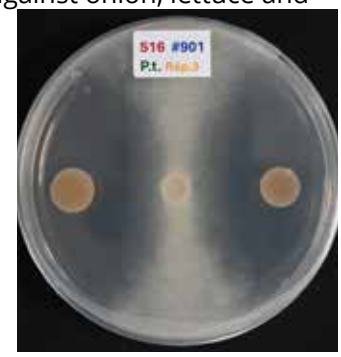
Field trials in Agassiz, B.C. are testing three plant growth promoting rhizobacteria (PGPR) strains in lettuce and broccoli. Field trials were started in Québec in collaboration with lettuce growers to benchmark three PGPR strains in lettuce production. PGPRs and biological control agents can reduce the risks associated with pesticide use.

The research team is planning to complete a first cycle of in-planta trials to assess the performance of their top three bacterial strains against onion pathogens (Stemphylium and leaf blight), lettuce pathogens (Pythium, Rhizoctonia and Sclerotinia) and pepper pathogens (Phytophthora capsici).

KEY TAKEAWAYS:

- The bacteria strain B21-024 can significantly increase the yield of lettuce in the early stages of plant growth.
- Field trials are happening in B.C. and Quebec to test three PGPR strains. PGPRs and biological control agents can reduce the risks associated with pesticide use.
- The research team is planning to complete a first cycle of in-planta trials to assess the performance of their top three bacterial strains against onion, lettuce and pepper pathogens.

The bacterial strain Pythium.



The bacterial strain Botrytis.

A field trial of lettuce in Sainte-Clotilde Experimental Farm in Quebec.
Photos: Melanie Cadieux

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 has been working to find new management tools to allow growers to see decreased crop losses from cabbage root maggot.

This growing season has saw the British Columbia team complete a transplant trial with broccoli and a direct seed rutabaga trial. Two more trials are under way. The crops were transplanted from the University of the Fraser Valley greenhouse.

The research team is assessing transplant tray treatments for products Cimegra and Equento. Cimegra has performed well in trials as a post-transplant drench. Growers are interested in doing Cimegra applications to transplant trays. Equento is newly registered for wireworms, but the company is interested in other possible registrations including cabbage maggots.

A total of five field trials were conducted, although the first direct seed trial was abandoned due to poor germination. The remaining four trials were successful with the fourth and final trial ending in mid-August.

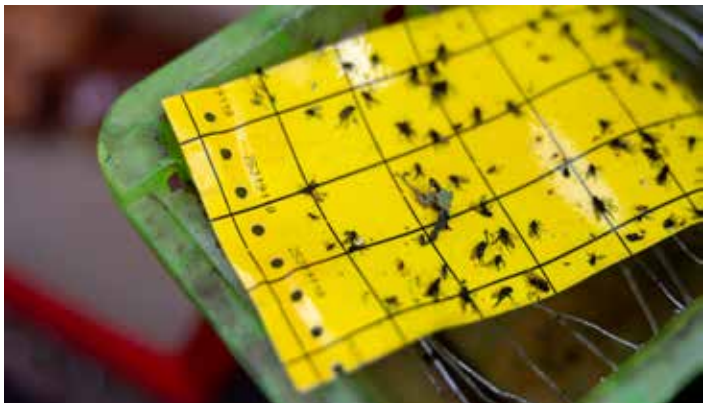
Cabbage plant plots at Agriculture and Agri-Food Canada Agassiz Research and Development Centre.

There are two field trials remaining to collect data on. The researchers also plan to survey for biological control. There are plans to organize field trials in Nova Scotia for the 2027 field season.

KEY TAKEAWAYS:

- Cimegra has performed well in trials as a post-transplant drench. Growers are interested in doing Cimegra applications to transplant trays.
- Equento is newly registered for wireworms, but the company is interested in other possible registrations including cabbage maggots.
- Two trials have been successful this year, with the earliest planting of rutabaga abandoned due to poor germination.
- There are plans to organize field trials in Nova Scotia for the 2027 field season.

Cabbage root maggot field plot trials at Abbotsford, B.C.



A test strip with cabbage root maggots on it. Photos: 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.*

Over the past winter, the research team started mirid olfactometry assays (smell trials) using a Y-tube olfactometer to test predator responses to western flower thrips and greenhouse whitefly. This test was meant to better understand how mirid species use scent cues to find prey in greenhouse environments. Intraguild predation data from petri dish arena trials and full-plant greenhouse trials was analyzed. Greenhouse movement data was inspected comparing dispersal patterns to pest hotspots. Natural adult emergence trials were started to help explain inter-species predation outcomes. A tomato–sesame drench experiment focusing on egg laying preference was conducted, as well as laboratory tests examining the trade-off between fertility and longevity.

Through greenhouse intraguild predation trials, researchers discovered that N. tenuis is suppressed in tomato–mullein systems when combined with D. famelicus. Movement trials showed N. tenuis had the highest dispersal, followed by *D. famelicus,* while *D. hesperus* rarely moved away from banker plants. Olfactometry assays found *D. hesperus* and *N. tenuis* prefer whitefly-infested plants over clean plants but don't have a preference for thrips-infested plants or when both pests are present. Egg laying studies revealed all species prefer to lay eggs on sesame, except *D. hesperus,* which uses sesame and mullein equally. Drenching sesame alone was found to reduce *N. tenuis* populations than compared to untreated controls.

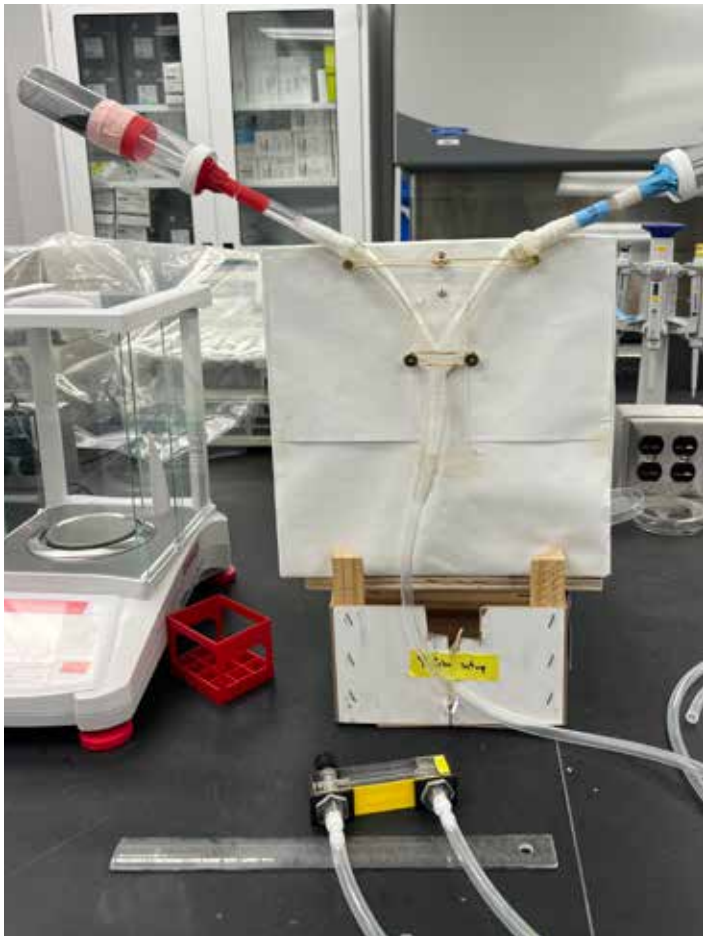
A greenhouse trial of mirid host preferences. Photo: Isabella Nardone

These findings directly impact greenhouse pest management. By understanding inter-species predation dynamics, growers can avoid combinations of biological control agents that may interfere with each other. Movement data is showing growers where to monitor for pests and beneficial insects. The smell test results highlight that mirids are more effective against whitefly than thrips. The strong egg laying preference for sesame and the effects of sesame drenching suggests this plant could be used as a trap crop or oviposition sink to help manage N. tenuis populations.

Throughout the rest of the growing season, the research team will complete the smell test trials with *D. famelicus*, finalize natural mortality trials and analyze all collected data. Microbial control trials targeting *N. tenuis* will happen with light-based experiments started in controlled cabinets as a precursor to larger-scale greenhouse studies. During winter, the researchers plan to finish the remaining smell experiments. They will also work on microbial and lighting studies. Before the research activity is done, the research team wants to develop a theoretical biological-control model comparing organisms with a fast life-history strategy to those with a slow life history.

KEY TAKEAWAYS:

- Through greenhouse intraguild predation trials it has been discovered that *N. tenuis* is suppressed in tomato–mullein systems when combined with *D. famelicus.*
- Movement trials showed *N. tenuis* had the highest dispersal, followed by *D. famelicus*, while *D. hesperus* rarely moved away from banker plants.
- Olfactometry assays (smell trials) found *D. hesperus* and *N. tenuis* prefer whitefly-infested plants over clean plants but don't have a preference for thrips-infested plants or when both pests are present.
- Egg laying studies revealed all species prefer to lay eggs on sesame, except *D. hesperus,* which uses sesame and mullein equally.
- Drenching sesame alone was found to reduce *N. tenuis* populations than compared to untreated controls.



A mirid prey attraction assay. Photo: Isabella Nardone

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 has been studying the infection process and working to develop novel genetic resistance to ToBRFV. Promising results have discovered ToBRFV resistance genes and new biocontrol measures to manage ToBRFV.

Researchers have been able to develop novel genetic resistance for ToBRFV in an elite tomato cultivar. This breakthrough was made through generation and screening of a tomato mutant population. The research team is now working to identify the gene responsible for this novel resistance. This will allow for growers to control ToBRFV through genetic resistance. Genetic resistance is environmentally friendly, target-specific and provides reliable protection without additional labour or material costs during the growing season.

The research team has been working to better understand how ToBRFV overcomes Tm-22 broad-spectrum resistance. It was discovered that while ToBRFV can dodge Tm-22 extreme resistance, tomato plants with Tm-22 gene still show partial resistance to ToBRFV. This weakened resistance can be boosted by increasing Tm-22 expression levels. The Tm-22 gene-encoded protein interacts with the ToBRFV-coded movement protein (MP) to trigger resistance pathways. This shows the possibility to restore Tm-22-mediated immunity through gene expression increases.

Weakened ToBRFV strains that can be used for cross-protection against ToBRFV have been developed by the research team. These strains could potentially allow growers to manage ToBRFV using a biocontrol approach.

A tomato plan infected with Tomato Brown Rugose Fruit Virus (ToBRFV). Photo: Aiming Wang

It was also discovered that several seed-borne viruses, particularly ToBRFV and pepino mosaic virus (PepMV), and to a lesser extent southern tomato virus (STV), are prevalent in greenhouse tomatoes in Canada. A mixed infection of ToBRFV and PepMV induces more severe symptoms, often causing crop termination. New research is needed though to develop a protocol to detect tomato seed-borne viruses and understand why the mixed infection of PepMV and ToBRFV causes more severe symptoms.

Over the next year, the research team is planning to focus on generation population mapping and phenotyping. They will complete screening for ToBRFV resistance from the tomato (Roma) mutant population. Functional characterization of host proteins interacting with ToBRFV infection proteins will be started. The researchers plan to characterize long non-coding RNAs associated with ToBRFV pathogenesis and symptom development. They will continue monitoring ToBRFV diversity in Canada by sequencing and analysis of samples collected in major production regions across Canada. The research team plans to start a study to understand why ToBRFV and PepMV mixed-infections cause more severe symptoms.

KEY TAKEAWAYS:

- Researchers have been able to develop novel genetic resistance for ToBRFV in an elite tomato cultivar and are now working to identify the gene responsible for this novel resistance.
- While ToBRFV can dodge Tm-22 extreme resistance, tomato plants with Tm-22 gene still show partial resistance to ToBRFV. This weakened resistance can be boosted by increasing Tm-22 cells.
- Weakened ToBRFV strains that can be used for cross-protection against ToBRFV have been developed by the research team.
- A mixed infection of ToBRFV and PepMV induces severe symptoms, often causing crop termination.

Tomatoes at the markets showing Tomato Brown Rugose Fruit Virus (ToBRFV) symptoms. Photo: 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.

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.

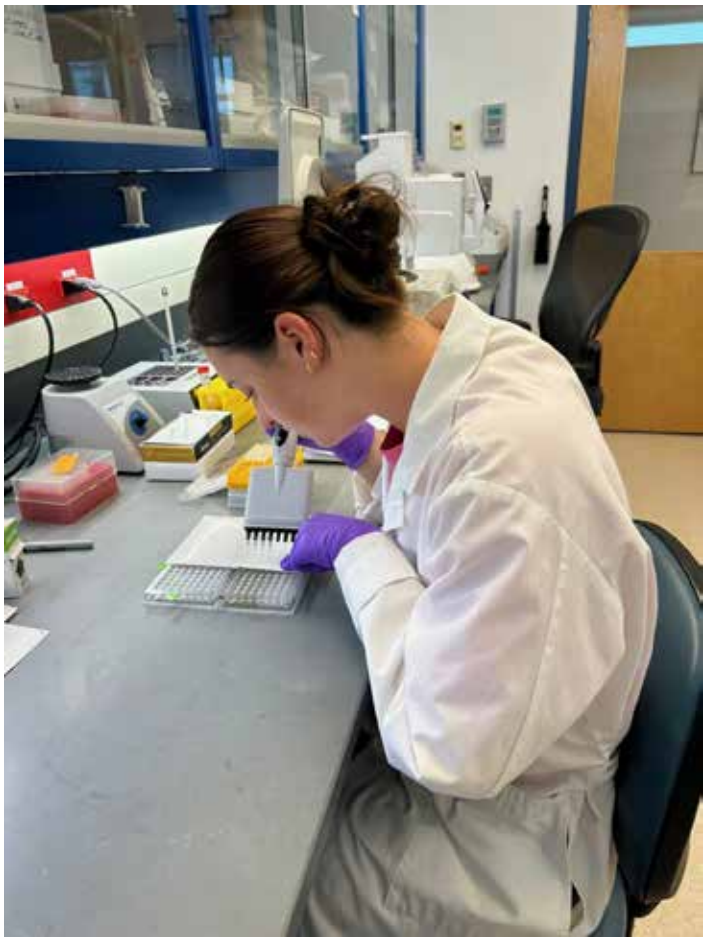
Sean Whitney bagging potatoes at the McCain Farm of the Future in Florenceville-Bristol, N.B. Photos: Claudia Goyer

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

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, and industry contributors.

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