Apple Research Activities

The apple sector 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

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 and ambrosia beetles and other leafroller pests. 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 of apple maggot. 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 leafroller pests.

The research team is evaluating the ratio of sterile to wild flies needed to stop apple maggots from stinging apples. The team is developing an artificial diet to raise large numbers of apple maggot flies for sterilization. Laboratory and sleeve cages on apple tree branches in field studies have been done with different ratios of sterile to wild flies. Several artificial diets for maggots have been tested. An artificial substrate to collect eggs is in development. Results from the field and laboratory ratio studies are being analyzed. This year the in-field ratio experiments will continue with a possible scaling up to whole-tree treatment.

Researchers are identifying captured ambrosia beetles and analyzing data to understand what makes an orchard more susceptible to an attack. Dying apple trees from some orchards and adjacent woodlots were collected in 2024 to count and identify emerging ambrosia beetles. Researchers have attempted rearing some ambrosia beetle species for future studies. Plans for the growing season will be based on data analysis.

Release devices for a biocontrol agent are being tested to ensure the device allows for the survival of parasitic wasps but is forceful enough to provide full tree coverage against leafroller pests. Researchers found that the device is easier than expected to attach to growers' sprayer setups. Researchers are hoping this will lead to faster adoption by growers.

KEY TAKEAWAYS:

- Evaluation of the ratio of sterile to wild flies needed to stop apple maggot from stinging apples is underway.
- Artificial diets to raise large numbers of apple maggot flies for sterilization are in development and are being tested.
- Researchers are identifying captured ambrosia beetles and analyzing data to understand what makes an orchard more susceptible to an attack.
- It is easier than expected to attach a device to growers' spray set ups to protect apple trees against leafroller pests. Researchers are hoping this will lead to faster adoption by growers.

FAR LEFT: A BugDorm where sterile flies emerge from sand post-sterilization in preparation for use in laboratory or field studies.
LEFT: A BugDorm containing 10 pairs of sterile flies and one pair of non-sterile flies in order to determine the ratio of sterile to non-sterile to prevent stings on apples.
Photos: Suzanne Blatt

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. Researchers are working to develop and use decision support systems to improve the management of apple crop loads. Researchers are also looking at artificial intelligent-based computer vision systems to aid in managing and measuring the response to crop load decisions.

At the Ontario Crops Research Centre in Simcoe, Ont., the research team conducted a thinning experiment using metamitron and Accede. The team investigated crop vision technologies and worked with thinning prediction models, including the fruit growth model and carbohydrate model. The researchers

experimented with using the RIMPro weather carbohydrate model. Data analysis and report writing is ongoing and planning for the 2025 growing season is underway.

At Walsh Farms in Berwick, N.S. two thinning experiments were completed over the first field season by using new thinners and industry-standard thinners while also investigating the RIMPro carbohydrate model. Analysis of crop load and fruit quality is ongoing to produce an annual report. For the 2025 field season, the researchers plan to replicate the research activities with different weather conditions to observe changes in treatment effects and comment on the accuracy of predictive modelling.

Michelle Cortens discusses the influence of the fruit thinning products and strategies in a Honeycrisp orchard with Jeff Walsh of Walsh Farms in Berwick, N.S. Photo: Perennia, Nova Scotia

Jeff and Courtney Walsh of Walsh Farms in Berwick, N.S. evaluate the crop load on Honeycrisp trees after implementation of fruit thinning products and strategies. Photo: Perennia, Nova Scotia

Michelle Cortens evaluates Gala apples at the end of August 2024 to compare the efficacy of products and strategies at Walsh Farms in Berwick, N.S. Photo: Perennia, Nova Scotia

Following treatments with fruit thinning products and strategies, the Nova Scotia team counts fruit set and calculates crop load to determine efficacy. Photo: Perennia, Nova Scotia

KEY TAKEAWAYS:

• In 2024, researchers have conducted several in-field apple thinning experiments using metamitron and Accede.
• Researchers investigated crop vision technologies and worked with thinning prediction models including the fruit growth model and carbohydrate model.
• Analysis of crop load and fruit quality will be used to compare the treatments and suggest the accuracy of predictive modelling.