Reducing Losses from Apple Pests with Alternative Control Strategies

LEAD RESEARCHER

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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.

In the fall 2024, two prototype injectors for spraying *Trichogramma* minutum in apple orchards to parasitize leafroller eggs were tested. Of the two prototypes, growers found one easy to use. Experiments were then fine-tuned. A series of spray trials in the experimental orchard tested how effectively the *Trichogramma* were distributed over the apple foliage. Last summer, two additional sprays of *Trichogramma* were done to test their ability to parasitize leafroller eggs using oblique banded leafroller (*Choristoneura rosaceana*) sentinel egg masses. The percentage of *Trichogramma* parasitism, determined by counting the number of emerged *Trichogramma* from the eggs, was estimated after each application. Results have been promising and researchers expect to have a finalized version of the device ready for trials in Nova Scotia and British Columbia this year.

Bark beetles were trapped in 10 orchards in Ontario and four orchards in B.C. last year. Around four times more beetles were captured in 2025 than 2024 in B.C. Two years of collection data is now available from these sites. Landscape features were recorded during 2024 and 2025. Dead and dying trees from six orchards in Ontario were sampled for beetles. An insecticide assay for ambrosia beetles was done next to an orchard in the Niagara Ontario region. Currently available insecticides, including Pounce, Altacor Max, Exirel, Delegate, Closer, Aceta, were found to be ineffective for reducing the number of beetle entry holes compared to the control when tested at one, two and three weeks following application. Beetle gallery formation and species identifications are underway.

The sleeve cage set up used as part of the sterile insect release for control of apple maggot (SIR for AM) trial. Photo: Kim Hiltz

The needed ratio of sterile flies to wild flies to reduce oviposition from apple maggot was tested in the lab last winter. Researchers found an increasing reduction in apple maggot success at 67 per cent, 82 per cent and 94 per cent, as the ratio of sterile to wild flies increased 10:1, 20:1 and 30:1 (sterile to wild), when compared to controls. Field trials last summer used the 30:1 ratio and compared the number of pupae realized versus controls. SIR reduced apple maggot success by 84 per cent compared to the controls. Final test trials of the artificial diet for rearing apple maggot are happening this winter. A final recommendation on the feasibility of sterile insect release for apple maggot control and mass rearing to be made this spring.

KEY TAKEAWAYS:

- Results for a prototype injector have been promising for spraying eggs parasitized by *Trichogramma* minutum in apple orchards. Researchers expect to have a finalized version of the device ready for trials in Nova Scotia and British Columbia this year.
- Currently available insecticides, including Pounce, Altacor Max, Exirel, Delegate, Closer, Aceta, were found to be ineffective for reducing the number of beetle entry holes.
- Researchers have found an increasing reduction in apple maggot success as the ratio of sterile to wild flies increased.
- The final test trials of the artificial diet for rearing apple maggot are happening this winter with a final recommendation to be made this spring.