

# Canadian Agri-Science Cluster for Horticulture 3



## Update to Industry

### Final Report – 2018 - 2023

**Activity title:** Sustainable Control Practices for Apple Pests in Canada

**Name of Lead Researcher:** Suzanne Blatt – AAFC-Kentville

**Names of Collaborators and Institutions:** Michelle Cortens, Perennia, Garth Nickerson, NB Department of Agriculture, Joanne Driscoll, PEI Horticultural Association, Jean-Philippe Parent - AAFC–St-Jean-sur-Richelieu, Justin Renkema – AAFC-London, Lauren Des Marteaux – AAFC Harrow, Hannah Fraser – OMAFRA, Kristy Grigg-McGuffin – OMAFRA, Susannah Acheampong – BCAGRI, Tracy Hueppelsheuser – BCAGRI, Daniel Cormier – IRDA, Gérald Chouinard – IRDA, Gaétan Bourgeois - AAFC-St. Jean sur Richelieu

#### Activity Objectives:

The activity has 3 objectives: 1. to compare four currently used commercially available pesticide products (Exirel, Imidan, Assail and Calypso) for apple maggot control and determine how many sprays are required to effect control, 2. to provide producers a model specific to their region to predict when apple leaf curling midge will be flying in their orchards and 3. evaluate the efficacy of host volatiles to capture both males and females of various leafroller species across apple growing regions in Canada.

#### Research Progress & Results:

Objective 1. The activities associated with this objective were completed in March 2020. All products were tested in NS, NB, and PEI. The conclusion was that any of the commercially available products need to be applied at the label rate and the maximum number of application used. Even with this directive, apple maggot damage could still occur in some areas where apple maggot pressure is high.

Objective 2. The final collection of data to develop the models, using sites located in BC, ON, QC, and NS concluded in 2020. With these data, a model was developed for each province during 2021 and shared through the collaborators to their respective industries. The model was uploaded into CIPRA in 2022 and developed into a FactSheet in both English and French which is available for dissemination. The Factsheet describes where to obtain degree day accumulations in real time across Canada and provides a table with the threshold levels for each generation and identifies the window of opportunity for application of product.

Objective 3. The final year of field trials to test host volatiles and other attractant compounds in various combinations occurred during 2022 in QC and four regions of ON. Looking at the results over all the years showed that some species of leafroller, e.g. obliquebanded leafroller, responded differently to the lures by province. This suggests that a 'one lure to attract them all' is not likely possible. In general, the host volatiles were not as effective to attract leafrollers as pheromone lures (installed near orchard blocks to confirm presence of leafroller species), but the addition of the host volatiles to a pheromone lure for monitoring

purposes may improve captures, particularly at low population densities. Although we did not study such combinations, there are commercial pheromone lures with acetic acid now available. Whether these will improve captures in all regions of Canada is unclear. In BC and NS, 2022 was the second year to trial these host volatiles in a mass trapping strategy. Results in NS and BC showed potential to reduce damage from leafrollers (range of 3-10%), but further evaluation is advised. Additionally, the cost of the lures themselves may not translate into a net increase in profit to the grower unless a consistent and higher damage reduction is realized.

#### **Key Message(s):**

In areas where apple maggot is a persistent issue, the need to apply effective products to ensure control is critical. A product that is effective when applied fewer times than the maximum allowed would be of value to the industry and was the focus of one aspect of this project. While the outcome of the research was not as hoped, it does confirm that the maximum number of applications is not wasted product or effort.

Apple leafcurling midge is an increasing problem in some areas of Canada. Knowing when to apply treatments during the first generation can serve to not only reduce damage on early season growth but also significantly reduce the population. The developed degree day model for all regions across Canada has highlighted the window of opportunity for these applications.

There are many species of leafroller which cause damage in apple across Canada. The discovery of host volatiles attractive to multiple species suggested the potential for a single lure to monitor all leafrollers, or for use in a mass trapping strategy as both males and females were found to respond. However, results from field trials conducted in NS, QC and various regions in ON do not support the use of a single lure for multiple species. While there are combination lures and lures with added components commercially available, growers are cautioned to test these within their region to verify their efficacy.

#### **Overall benefit to industry:**

There are two main benefits from this research: the degree day model for apple leafcurling midge and preliminary evidence that lures including host volatiles or synergist components may show variable response across leafroller populations. For the degree day model, it is recognized that there could be microclimates within each apple production region where the presented model thresholds will not be accurate. Validation of these models is highly recommended prior to growers using them as part of their management program.

The discovery that numerous leafroller species were attracted to host volatiles, and synergists, gave promise for the development of a single lure to monitor multiple leafroller populations. These were discovered and subsequently tested in the western regions of Canada and the US. Research within this Cluster evaluated these host volatiles in eastern Canada, expecting to see similar results. However, our research showed some unexpected results. When tested against leafroller populations in Ontario, Quebec and Nova Scotia, some leafroller species were not similarly attracted to the same lures across provinces. This suggests differences in the relative attraction to these lures by eastern leafroller populations. Our results highlight the need for broader testing of new attractants and growers are advised to proceed with caution when considering lures with host volatiles, or their synergists.

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