Canadian Agri-Science Cluster for Horticulture 3

Update to Industry

2019-2020

Activity title: Activity 2: Sustainable Control Practices for Apple Pests in Canada
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Activity Objectives (as per approved workplan): 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 to Date (use plain language): For Objective 1: Honeycrisp orchard blocks located at the Kentville Research and Development Centre in Nova Scotia were used for trials in 2019. Four commercially available products: Exirel, Imidan 70 WP, Assail 70 WP and Calypso 480 SC plus a water (no product) control were applied to 4 tree plots 2 or 3 times once apple maggot was captured in the orchard block. Each product was used at label rate: Imidan -2.68 kg/ha, Assail - 240 g/ha, Calypso – 440 mL/ha and Exirel – 1.50 L/ha. Four replications of each treatment and control were applied with treatments randomized within each of the four blocks. At harvest, up to 100 apples from each plot were sampled. These apples were stored in the greenhouse (for 3 weeks) to allow any apple maggot trails to develop. Assessments were completed by November and analysis showed no significant differences between the treatments for percentage of apples with stings. Results were shared with regional growers at the Nova Scotia Fruit Growers Association Annual Convention. For Objective 2: ALCM traps were established in 4 provinces: British Columbia (2 in Kelowna and 2 in east Abbotsford), Ontario (12), Quebec (8) and Nova Scotia (6 around the Annapolis Valley). These were monitored 2-3x/week from early April and up to late October, the actual date range varying for each region. Trap catch data and associated weather for each collection site will be organized into spreadsheets and sent to Dominique Plouffe (Quebec) for analysis. Data was examined and confirmed the presence of 3 generations of ALCM in each region. Preliminary DD models have been developed – 1 for each region: British Columbia, Ontario/Quebec and Nova Scotia. Final data collected in 2020 will further support these models. Preliminary models have been shared with industry in Quebec and incorporated into CIPRA (AAFC-develop pest modelling software) and provided to collaborators in Nova Scotia for initial validation during 2020. For Objective 3: White Delta I traps baited with sex pheromones (ON) or host volatiles (NS, QC and BC) were established in apple orchards. In ON, 5 sites used sex pheromones to determine the flight patterns of the following

species: eyespotted budmoth (*Spilonota ocellana*), red banded leafroller (*Argyrotaenia velutinana*), fruit tree leafroller (*Archips argyrospila*), tufted apple budmoth (*Platynota idaeuslais*), variegated leafroller (*Platynota flavedana*) and lesser appleworm (*Grapholita prunivora*). Flight patterns and population levels were evaluated for each of these species in the five sites. This information will be used to inform the timing of experiments in 2020 to ensure all species can be captured. Experiments using the host volatiles were conducted in Quebec, Nova Scotia and British Columbia. Host volatiles were: BN – benzyl acetonitrile, PET – phenyl ethanol, AA – acetic acid. In Quebec, four species of Tortricidae (leafroller family) were targeted for attraction to the host volatiles: red banded leafroller, oblique banded leafroller, codling moth and lesser appleworm. Six replicates of the following treatments were evaluated in 2 experiments: Experiment 1 - BN, PET, BN+PET, control and Experiment 2 – BN+AA, PET+AA, BN+PET+AA, AA and control. In Nova Scotia, targeted species were: oblique banded leafroller, red banded leafroller, lesser appleworm and eyespotted budmoth. Treatments were similar to those used in Quebec but the AA was in two release rates (high and low). In British Columbia, eye spotted budmoth, oblique banded leafroller and *Pandemis limitata* (3-lined leafroller) were the target species. Three sites were chosen to evaluate the host volatiles as a perimeter trapping method to protect young apple plantings from leafrollers moving in from adjacent older cherry plantings. Thirteen traps baited with BN+PET+AA were placed in a line (13 m between traps) along the perimeter of the young apple planting with an additional 13 traps containing no host volatiles serving as a control. Traps were monitored bi-weekly and all moths captured were identified. Due to the low number of captures in British Columbia, the experiment will be repeated in 2020. In Quebec, results were showing promise for attraction of oblique-banded leafroller to BN, similar to results obtained in Nova Scotia in 2018. Other leafroller species were attracted but not identified in 2019. Identification of captured species in 2020 will be attempted to confirm and compare all species attracted across apple producing regions. In Nova Scotia, the use of high release acetic acid and pear ester in addition to the BN and PET found codling moth to be attracted to the pear ester and for *Hedya* species to be attracted to the pear ester and the high release acetic acid. High release acetic acid seemed to increase attraction of oblique-banded leafroller and eye-spotted budmoth. Further work with these additions to the host volatiles is required.

Extension Activities (presentations to growers, articles, poster presentations, etc.):

At the Nova Scotia Fruit Growers Association, Dr. Blatt presented results from this activity to apple producers from Nova Scotia, New Brunswick and Prince Edward Island. Kristy Grigg-McGuffin presented results from this activity to producers attending the Great Lakes Fruit Workers meeting.

Early Outcomes (if any) or Challenges:

Three preliminary degree day models for apple leaf curling midge have been developed. These have been shared with researchers in Nova Scotia and Quebec for validation. Additional data from British Columbia (fewer years available) and Ontario (data collection challenges encountered in 2019) are needed to confirm these preliminary models before they are ready for distribution.

Key Message(s):

Products registered for use against apple maggot do not appear effective when pest pressure is high. Growers need to follow label recommendations for control of this pest. Degree day models for apple leaf curling midge are under development and will be ready for industry in 2021.

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