Canadian Agri-Science Cluster for Horticulture 3

Update to Industry

Semi-Annual – Spring 2022

Activity title: Optimizing Delia pest monitoring and management in vegetable brassicas
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Activity Objectives (as per approved workplan): The overarching goal of our project is essentially to improve management practices for *Delia* pests of vegetable brassicas in Canada. To reach that goal, we have developed the following five objectives (listed as activities below): 1. Document and compare the relative contribution of different *Delia* species and genetic lines to crop damage in 6 Canadian provinces (BC, ON, QC, NS, PEI, NB) 2. Develop threshold-based models for conventional management of *Delia* pests 3. Document the development, host preferences and reproductive compatibility of two genetic lines (N-line and H-line) of seedcorn maggot (*Delia platura*) 4. Investigate selected soil parameters as oviposition stimulants in two genetic lines of *D. platura* 5. Validate and optimize the sterile insect release method for cabbage maggot (*Delia radicum*).
Research Progress to Date (use plain language, not to exceed 500 words): ***Update on activities progress for the period from December 1st, 2021 to March 31st, 2022*** **Activity 1.** Identification of the seed maggot complex (*D. florilega* and *D. platura*) using the PCR-HRM molecular method for 1370 larvae collected in 2020 is completed. Further analysis regarding the results will be conducted in the coming year. **Activity 2.** Following unprecedented floodings in the Sumas Prairie of British Columbia during fall 2021, we were able to go back into the flooded fields in February and assess the residue – we found all our samples in their locations within fields and sampled for *D. radicum* pupae. We thus have a complete data set for 2021. Data modelling to explore monitoring and spraying optimization is planned as a next step. **Activity 3.** Data analysis of the reproductive isolation and development of hybrid progeny of the two genetic lines of *D. platura* has been completed. A scientific article on the optimal mating conditions (number of individuals and sex ratio) is currently being written and expected to be submitted for publication within the next 3-4 months. **Activity 4.** Fresh lettuce debris significantly increases *D. platura* oviposition of both genetic lines on organic soil, independently of the presence of germinating seeds. This stimulation gradually decreases over 14 days for the H-line and 21 days for the N-Line. This effect is now investigated for rye debris, a cover crop frequently used. **Activity 5.** Analysis of pupae quality, male survivorship, and female fecundity in relation to temperature, cold shock and hypoxia is completed. Production of diapausing pupae on the new artificial diet developed in this project has been completed and the best diapausing conditions have been applied. The results indicate that, despite major

improvements, the diapause completion conditions are still not optimal and will require further research. It is believed that experimentation with softer cold shocks applied at various moments during cold storage should be evaluated.

Extension Activities (presentations to growers, articles, poster presentations, etc.):
No extension activity to report for this period.

COVID-19 Related Challenges:
Activity 1: COVID had an impact on the availability of some key supplies, including PCR tubes. Identification by HRM had to be suspended until the tubes were shipped. While the molecular identification of all specimens of the *D. platura* complex were completed by the end of the fiscal year, data analysis beyond the descriptive level has not been completed. Nevertheless, we are confident that data analysis will be completed by the end of the 2022-2023 fiscal year.

Activity 2: COVID had an impact on our ability to hire personnel (students) for data entry positions.

Activities 3, 4, 5: We report no impacts of COVID on these activities for the period of December 1, 2021-March 31, 2022.

Key Message(s):
Overall, the project is progressing well, and we are happy to report that we plan on achieving our original targets by the end of the 2022-2023 fiscal year.

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