

Canadian Agri-Science Cluster for Horticulture 3



Update to Industry

2018-2019

<p>Activity title: Optimizing <i>Delia</i> pest monitoring and management in vegetable brassicas</p>
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<p>Activity Objectives (as per approved workplan): The overarching goal of our project is essentially to improve management practices for <i>Delia</i> pests of vegetable brassicas in Canada. To reach that goal, we have developed the following five objectives:</p> <ol style="list-style-type: none"> 1. Document and compare the relative contribution of different <i>Delia</i> 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 <i>Delia</i> pests 3. Document the development, host preferences and reproductive compatibility of two genetic lines (N-line and H-line) of seedcorn maggot (<i>Delia platura</i>) 4. Investigate selected soil parameters as oviposition stimulants in two genetic lines of <i>D. platura</i> 5. Validate and optimize the sterile insect release method for cabbage maggot (<i>Delia radicum</i>).
<p>Research Progress to Date (use plain language): We have successfully prepared <i>Delia</i> larvae sampling for objective 1. We have elaborated a protocol that was shared with the partners from all participating provinces, along with sampling kits. The whole team is now ready to sample larvae in brassica crops throughout Canada in spring of 2019 and 2020.</p> <p>We are also actively working on putting in place a colony of N-line <i>D. platura</i> in order to reach objective 3. <i>D. platura</i> adults were collected from the field and eggs laid by collected females were reared. Each female that produced a progeny was genotyped and assigned to either H-line or N-line, allowing us to select N-line offspring for our colony.</p>

As for **objective 5**, the first step towards validating and optimizing the sterile insect release method for *D. radicum* is to successfully maintain a *D. radicum* colony. For that matter, we have been working on the elaboration of artificial diet recipes for *D. radicum* large scale rearing. We tested the artificial diet currently used to rear *Delia antiqua* as well as many variants and compared their efficiency to a natural rutabaga diet. The number and weight of pupae produced on these artificial diets and rutabaga diet were measured and compared. We also progressed in the evaluation of optimal conditions to induce and complete diapause in *D. radicum*. Larvae were raised in autumnal conditions until pupation, at which point they were placed in the cold (4°C) for a period ranging from 8 to 30 weeks, to test which time period was optimal to complete diapause. Starting after 8 weeks in the cold, one batch of pupae was moved to a warmer environment (20°C) every two weeks to take them out of their diapause state. The rate of emergence, fecundity and longevity of the flies were evaluated and compared with untreated pupae (produced in non-diapause conditions).

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

We presented our progress concerning the elaboration of artificial diet recipes for *D. radicum* at the 'Journées PRISME' on February 19th. The presentation entitled 'Mouche du chou: une espèce difficile...' reached out to 25 producers and 23 farm advisors, technicians or research professionals.

Early Outcomes (if any) or Challenges:

We faced challenges when putting in place a colony of N-line *D. platura* (**Obj. 3**). Even though we successfully collected similar proportions of the 2 genetic lines of *D. platura* in the field, the N-line disappeared from the colony in subsequent generations. This could be attributed to competition between the two lines when reared together, and/or current production conditions favoring the H-line. As a consequence, an N-line colony could not be established yet, and efforts in this regard will be pursued in 2019 by testing different rearing conditions.

The elaboration of artificial diet recipes for *D. radicum* mass rearing is progressing well (**Obj. 5**). Some variants of the diet used for the *Delia antiqua* gave promising results; soy flour seems inadequate for *D. radicum*, while wheat germ gave good results. Pinto beans, canola meal and camelina meal based diets gave poor results and will be eliminated from future diet tests. Once promising diets are developed, we will be able to pursue their performance evaluation under normal conditions (2019-2020).

Regarding the evaluation of optimal conditions to induce and complete diapause in *D. radicum* (**Obj. 5**), preliminary results indicate that a minimal period of 18 weeks in the cold is necessary to complete diapause. The poor synchronization of emergence within batches and significant mortality rates of flies at emergence also suggest that current conditions for diapause are not optimal. Data collection for longer periods in the cold is still undergoing, and more tests will be done to induce and complete diapause under different conditions.

Key Message(s):

With this project, we are actively working to improve management practices for *Delia* pests of vegetable brassicas in Canada. During our first year, we initiated a vast sampling of *Delia* larvae across the country that will allow us to draw an accurate portrait of *Delia* infestation, we expanded our knowledge on the conditions required to establish an N-line seedcorn maggot colony, and we progressed in the validation and optimization of the sterile insect release method for cabbage maggot by narrowing down possibly suitable artificial diets, as well as pinpointing key elements of the rearing conditions to work on in order to better control diapause.

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