Eastern Canada Oilseeds Development Alliance

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Activity 13 Factsheet

Yield Impacts and Insecticide Management of Swede Midge in Canola

Objectives

The purpose of this activity is to develop effective integrated pest management practices for swede midge in canola to: 1. Evaluate the effects of the timing of swede midge infestations on canola damage and yield; 2. Evaluate insecticide efficacy and timing of insecticide applications for reducing swede midge damage in spring canola; and 3. Develop insecticide timing recommendations for canola growers.

Methodology

The swede midge (SM) is an invasive pest of cruciferous plants. Over the past 3-4 years, SM incidence and damage to canola has increased to economically damaging levels throughout canola production regions in Eastern Canada. SM has multiple and overlapping generations each year, and canola is susceptible in multiple growth stages; thus, it is critical to develop methods that can be used to optimize the timing of insecticide applications for yield protection. There are two insecticides registered for control of SM in canola (Matador and Coragen). This activity will be conducted primarily through strip trials and monitoring of swede midge populations and damage on grower fields in Ontario, which were found in 2012 to support very high populations of swede midge.

In 2013, strip trials were conducted on 4 grower fields with Coragen, to evaluate the efficacy of application made during two plant growth stages: late rosette/early primary bud development, and secondary bud development. Treatments included insecticide application at: 1. late rosette-bud (i.e. 8- to 10-leaf stage); 2. late rosette-bud + secondary bud development; and 3. an untreated control. Pheromone monitoring traps were installed at each of these sites, traps were monitored twice a week, SM damage to plants assessed each week, and yields determined at harvest. In 2014, strip trials were conducted on 4 grower fields with both Matador and Coragen, to evaluate the efficacy of application made during three plant growth stages: Early (early rosette stage, 1 to 4 leaf stage); Mid (late rosette stage, 8 to 10 leaf stage); and Late (early secondary bud stage). Treatments included insecticide application at: 1. Early; 2. Mid; 3. Late; 4. Early + Mid; 5. Early + Mid + Late; and 6. Untreated Control. In 2015, the same experiment, but without the Late only treatment, was conducted on 6 grower fields with Matador and Coragen. Lab experiments were conducted to evaluate density-dependent effects of swede midge infestation on canola damage, growth and yield parameters, by caging plants at the early bud stage (i.e. mid plant stage) with 0, 5, 10, 50 or 100 female midges.

Results

Preliminary analyses of 2013 data on the relationship between plant stage, timing of SM presence and intensity, with amount of damage incurred and yields attained, suggested that the presence of swede midge during the early rosette stage (i.e. 2- to 4-leaf stage) has a major impact on damage development and yield. In all cases where swede midge numbers were high at this time, yields were ~50% less than in fields with lower midge presence during this stage. In Ontario, earlier planting dates typically favour low SM populations during this stage. For the most part, the insecticide timing treatments were not effective in limiting SM damage relative to the untreated controls at each site. Two sites had relatively low damage incidence, very low damage ratings and high yields; two sites had high damage incidence, high damage ratings, and low yields. Differences between these sites were not explained by differences in average daily SM captures per trap, however at sites with low SM damage, no SM were captured until on or after the 3-leaf stage, and large numbers of SM were not present until after the 4-leaf stage. In comparison, high numbers of SM were present during early growth stages at the high damage sites. Year 1 results suggest that SM damage severity and yield impacts may be related instead to the presence of SM before the 5-leaf stage. Results from 2013 also indicated that earlier insecticide application timings are likely needed to adequately protect canola from economic damage by SM.

Overall, results of the 2014 and 2015 trials suggest that multiple insecticide applications are required to reduce swede midge damage and the percentage of plants damaged. Single applications of insecticide at the early or mid plant stage timings can be as effective as multiple applications under some circumstances, related to swede midge numbers and emergence dynamics at the time of application. The late timing alone is not an effective treatment for reducing damage. Where Matador and Coragen were effective in reducing swede midge damage, several weeks were required before their effect was observed, and significant reductions in damage were observed for 1 to 3 weeks thereafter. An application at the early timing should be made by growers when a cumulative total of 20 or more midges are captured (based on 4 pheromone traps per field, and beginning swede midge counts at the cotyledon stage) prior to the 4-leaf stage. Thereafter, an application at the late vegetative stage should be made if swede midge pressure remains high in the field. Both lab and field trials indicate that the pheromone-based action threshold approach has potential for management of swede midge in canola, as density-dependent differences are seen in damage, growth and yield. The relationship between midge numbers used in lab assays and trap captures in the field needs to be determined, in order to establish the action threshold. In order to maximize the efficacy of insecticide applications, development of pheromone-based action thresholds during vulnerable growth stages needs to be pursued.

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