

Swede Midge: *Contarinia nasturtii* Monitoring Protocol

Host Plants: Plants belong to the family Brassicaceae such as canola, mustard, cabbage, cauliflower and Brassica weeds.

Identification, Life Cycle and Damage:

Adults: Adults are small (1.5-2 mm in size), light brown flies (Figure 1) with long filamentous antennae. Male antennae have 12 sections with swollen ends, so that the antennae look like they are composed of 24 circular beads. The 12 segments of the female antennae are cylindrical. Wing venation is reduced. Cross veins are absent, the radial vein is straight or nearly so and a cubital fork is present. Pre-pupae overwinter in the soil in and near fields; **Adults appear in the spring when temperatures rise and when soil moisture is ample.** They fly during the day.

Eggs: Eggs are laid in clusters of about 2-50 in rapidly growing points of the plant such as leaf clusters, buds, and young flowers. Each female fly can lay up to 100 eggs. Eggs are very small (0.3 mm) and transparent in color when first laid, but change to creamy white color as they mature.



Figure 1. Male swede midge (Left) live one day while female swede midge (Right) live up to five days.

Larvae: Small maggots can be found feeding in groups near the growing points of the plant. Initially the larva is 0.3 mm in length and transparent. At maturity, it is 3-4 mm in length and lemon yellow in color (Figure 2). Larvae spin cocoons and pupate in the soil.

Pupae: Pupation takes place approximately 2.5-5 cm deep in soil near the host plant. Prepupae can go into a state of diapause, overwintering in silken ovoid cocoons in the soil and pupating in the following spring (Figure 3). However, some pupae may overwinter a second season before becoming adults. Larvae and pupae require moist environments to mature. In Ontario, 3-4 overlapping generations have been reported.



Figure 2. Swede midge larvae live 7-21 days.



Figure 3. Swede midge pupa - 10 days or overwintering stage.

Monitoring:

Site Selection: Swede midge adults are not strong fliers and prefer areas of low wind movement, resulting in **more damage along field edges (especially those fields close to previous year's canola), in sheltered areas, and near buildings.**

Because swede midge larvae and pupae can be carried in soil, care must be taken when working within a block/field. To prevent the inadvertent movement of swede midge, footwear should be cleaned thoroughly before moving to a new address. Disposable "booties" or rubber boots are recommended.

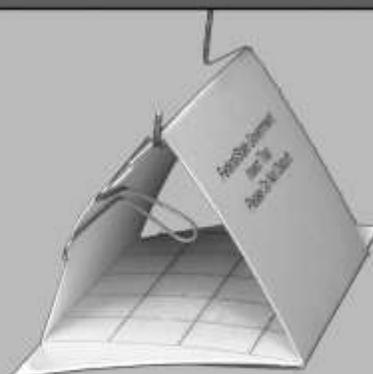
Pheromone Traps for Adult Monitoring

Timing: The first emergence of adults in the province of Ontario occurs in mid-May. On the Prairies traps should be set near the edge of canola fields **at the canola seedling stage, and retrieved just prior to crop harvest. Four (4) traps** will be placed at each field. **Place traps in a location that gives you best coverage, incorporates micro-habitats such as those adjacent to canola stubble, shelterbelts and areas of higher humidity,** and has good accessibility. Label the backs of the trap liners when you remove them from the trap housing. Labels should contain the location, trap number (1-4), date in field, date removed, and sampler. Field location sheets should be sent to Dr. Julie Soroka at the beginning of the trapping season, and field data sheets filled out when liners are changed weekly (See sample data sheets below).

JACKSON TRAP ASSEMBLY INSTRUCTIONS

Components:

- 1 Jackson trap
- Sticky insert (packed in pairs)
- 1 wire hanger
- 1 dispenser holder



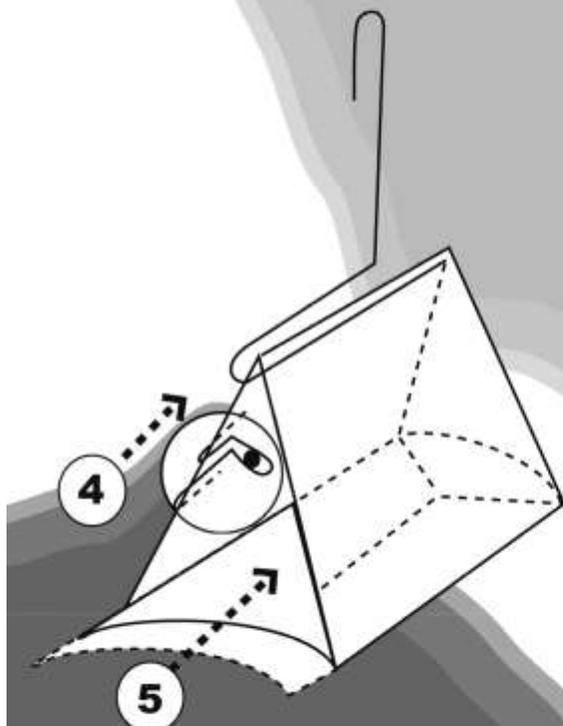
How to assemble:

- 1 Fold open Jackson trap to form a tent shape.
- 2 Remove lure from foil pack (Avoid touching dispenser surface with fingers.).
- 3 Insert plastic or rubber dispenser only into the middle notch of the dispenser holder.
- 4 Slide dispenser holder onto side of trap so that the lure is on the inside and the two legs are on the outside.
- 5 Peel apart face-to-face sticky liners and slide one insert into trap.
- 6 Attach metal hanger as illustrated and hang trap in desired location.
- 7 Replace inserts as required.

NOTE TO USER:

To prolong storage life, refrigerate or freeze unused dispensers in their foil packets.

To avoid contamination, use tweezers or rubber gloves when handling dispensers.



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Trap: The Jackson Trap, with removable sticky liners and lures containing swede midge sex pheromone, is used to monitor swede midge adult populations. All lures should be stored in their unopened, foil-lined packets in sealed containers at temperatures below 0°C. Store only one type of lure per container. Wear disposable gloves when handling lures and use a new pair of gloves between handling lures of different types. This will avoid cross-contamination of the pheromones and possible interference with their attractiveness.

Trap Placement: The stake or rod height should be above the predicted final height of the crop and should be flagged to allow easy detection in the field for the inspector and grower. Initially, place the trap so that the **bottom is 20 cm above the ground**. As the crop height increases during the growing period, the trap should be raised periodically, but **it should always be within the crop canopy, and never higher than 60 cm**. Use string or wire to attach the traps to the stakes or rods to prevent them from twisting or moving; orientate the traps in the field so that the pheromone plume is dispersed down the row or into the field.

Change the trap liners weekly during the growing season. Sticky liners covered in field debris make it almost impossible to see the very tiny swede midge. **Replace the lures after 28 days**. Replace damaged, missing, or badly weathered traps as necessary. Ensure the entrance to the trap remains clear and open.

Instructions for Shipping Sticky Inserts: Ship sticky inserts every 28 days (when you change the lures) for identification of the swede midge. Fold each trap carefully into a circle with the sticky surface inside; hold it with a rubber band (Figure 4). Place lures in a box as shown below and ship to Dr. Julie Soroka, AAFC-AAC, 107 Science Place, Saskatoon, SK, S7N 0X2 (ph 306-385-9352).



Figure 4. Rolled up swede midge sticky trap, and trap inside a shipping box.

In-Field Monitoring for Crop Damage:

Damage caused by swede midge larval feeding results in changes in the physiology of the plant (Figure 5). The growing tip may become distorted and produce several growing tips or none at all, young leaves may become swollen, crinkled or crumpled and brown scarring caused by larval feeding may be seen on the leaf petioles and stems. Flowers may fail to open. **Young plants that show unusual growth habits should be examined carefully for damage and larvae**, especially if the sticky liners have many flies resembling midges (swede midges are about the size of orange blossom wheat midge but are not orange). **Larvae can be seen with a hand lens.**



Figure 5. Canola infested with swede midge larvae.



2014 Swede Midge Pheromone Trapping Survey – Site Information Sheet

Please complete and send the following data with your first pheromone inserts:

1. Site location – Name of nearest town plus GPS lat/long and geographic location, or Section-Township-Range.
2. Crop type, approximate seeding date, size of field, surrounding flora, field history, close crucifer neighbours, any other pertinent information
3. Name of field owner
4. Map or sketch of area where traps are deployed



Swede Midge Pheromone Survey 2014 Data Sheet for Each Sampling Date

1. Field location and sample numbers: _____

2. Date sticky liner placed in field: _____

3. Date sticky liner retrieved from field: _____

4. Notes on sticky liners (anything special or interesting about the trap):

1 _____

2 _____

3 _____

4 _____

5. Crop and crop stage: _____

6. Notes on any crop abnormalities found near trap:

1 _____

2 _____

3 _____

4 _____

7. Short description of past week weather conditions: _____

8. Other notes: _____

9. Sampler's name: _____