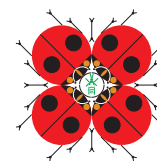


Cornell University



Integrated Pest Management



Entomology
Department
Geneva

Swede Midge (also known as the cabbage crowngall fly and cabbage gall midge)

Contarinia nasturtii (Kieffer)

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Swede midge appears to feed only on plants in the Brassicaceae (cabbage or mustard family). In Europe it is considered an endemic and common pest of cruciferous vegetable crops (e.g. broccoli, Brussels sprouts, cabbages, cauliflower, collards, kale, radishes, rutabaga, and turnips) often causing severe losses. Other hosts include canola, field mustards, Asian vegetables, and many common cruciferous weed species such as shepherd's purse, wild mustard, wild radish, field pennycress and yellow rocket.

Description and Life Cycle

The adult (Fig. 1) is a small (1.5- 2 mm), light brown fly which is difficult to distinguish from many other small midges except by a specialist. Adults emerge in the spring from pupae, which have overwintered in the soil. Mating occurs soon after emergence and females then begin to look for suitable hosts. Eggs are laid in clusters of 2-50 eggs, with each female laying about 100 eggs during her short (1-5 day) lifetime. Eggs are very small (0.3 mm) and transparent at first, but change to a creamy white color as they mature. Eggs are laid typically on the growing point of the plant (apical meristem). After a few days, depending on the temperature, the larvae hatch from the eggs and begin to feed on plant tissue. They feed typically in groups about the growing point of the plant.

Introduction

The swede midge is a relatively new insect pest in North America and poses a serious threat to cruciferous vegetables and field crops. It was first identified in Ontario, Canada in 2000 and in the United States in 2004 in Niagara County, New York. It is now known to be widespread throughout New York State and the provinces of Ontario and Quebec, Canada. It has also been found in Nova Scotia and Saskatchewan, Canada and in a few states that neighbor New York. Swede midge has the potential to spread to most crucifer growing areas of North America.

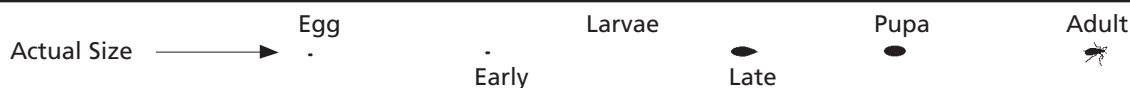


Fig. 1. Swede midge adult.

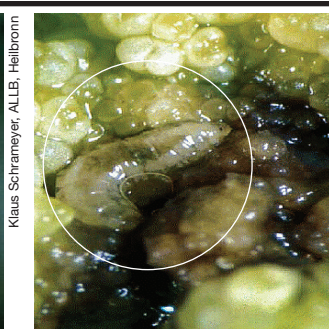


Fig. 2. Larva of swede midge.



Fig. 3. Growing tip of broccoli infested by larvae (circles).



Fig. 4. Twisted leaves and brown scarring in the growing tip of cauliflower.



Fig. 5. Leaf puckering in cabbage.



Fig. 6. Blind head, swollen leaf bases, and brown scarring in red cabbage.



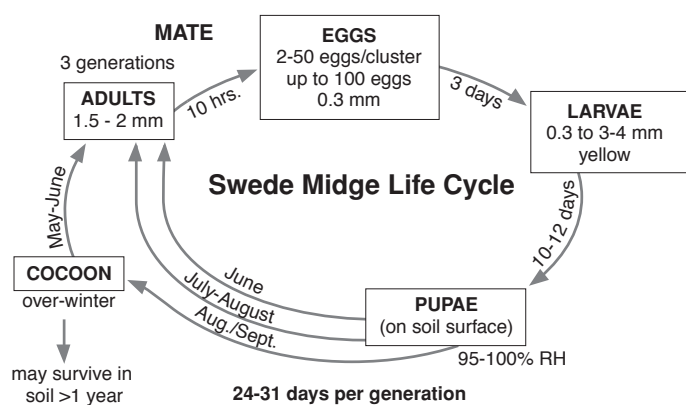
Fig. 7. Multi-headed cabbage.



Fig. 8. Multi-stemmed broccoli.

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Larvae are small maggots initially about 0.3 mm in length before reaching their final size of 3-4 mm (Figs. 2, 3). Larvae can be seen with the naked eye. They are transparent and become increasingly more yellowish with age and are lemon yellow at maturity. Depending on the temperature and host plant quality, larvae can complete their development in 7-21 days. Mature larvae have the unique capability of flipping themselves off of the leaf when disturbed and use this tactic to leave the plant to pupate in the soil.

Adults can emerge from the soil within two weeks, depending on temperature and humidity, and start the cycle again. The swede midge can have 4 to 5 overlapping generations per year. In the fall, the pupae sense the short day length and go into a state of diapause to spend the winter. Some overwintering pupae may survive in the soil for more than a year.

Damage

Swede midge injury is often difficult to distinguish from other factors that can damage the growing tip of a plant such as mechanical injury from cultivation, insect and animal feeding, molybdenum deficiency, herbicide injury, genetic variation of the plant, and heat or cold stress. For confirmation of injury due to swede midge, the larvae should be found on or within the plant tissue. During feeding, larvae produce a secretion that breaks down plant tissue, creating a moist environment. The secretion is toxic to the plant and results in swollen tissue, abnormal growth and brown scarring (Fig. 4). Signs of swede midge feeding include puckered and crinkled leaves (Fig. 5), distorted growing points, leaf and flower galls, brown scarring, blind heads (Fig. 6), and plants with multiple small heads (Fig. 7) or shoots (Fig. 8).

How to Scout

Early detection is the key to holding swede midge populations at manageable levels. Pheromone traps can help to determine if swede midge is present in a field because the traps can detect very low populations. However, identification of adults on the traps must be done by a trained individual.

When scouting for swede midge, pay attention to sheltered areas, along field edges and buildings. Swede midge adults are not strong fliers and tend to prefer areas of low wind movement. Examine young crop plants for unusual growth habits, with emphasis on the growth point and any side shoots. Check the growing tips of young plants for galls and swollen leaf bases. Brown, corky scarring along leaf petioles and stems is a key diagnostic feature. Infested plant material often has a "moist" or "wet" appearance where larvae are actively feeding.

Once a suspect plant is found, new growth should be carefully examined for the presence of larvae by peeling back the leaves. Larvae can be seen with the naked eye or a hand lens. If larvae are not found, place the suspect plant material in a vial of rubbing alcohol and shake. Typically the larvae will come right out of the plant material. If no larvae are found, they may have already dropped to the soil to pupate. So, keep looking!

Management

The best management is to limit the spread of the pest since, once it becomes present in an area, it is difficult to manage. Although adults are weak fliers, it is possible for them to be carried by winds. Other avenues include the movement of transplants, which may contain eggs or larvae, or soil, which may contain pupae. Since the pupae are located near the soil surface, working the soil may reduce the number of viable pupae. The most important management strategy is to destroy crop residue as soon as possible after harvest. This will minimize the population of the over-wintering generation. The second most important management strategy is to rotate away from crucifers as far as possible. If the over-wintering population does not have a suitable host when it emerges, a significant proportion of the population will die. Although most cruciferous weeds are less suitable host plants in comparison to cole crops, it is important that they be controlled during the cropping season as well as afterwards.

Insecticides are used with some success to kill adults or to prevent them from laying viable eggs. Systemic insecticides are required to kill the larvae, since they are usually well protected within the plant material. When swede midge populations are very high, insecticide sprays alone will not eliminate economic damage to the crop. Insecticides available for use in New York can be found in the annual Cornell University Integrated Crop and Pest Management Guidelines for Vegetable Crops.

What to do if you see injury?

If you suspect injury, contact your local Cornell Cooperative Extension Office.

For further information

www.nysaes.cornell.edu/ent/swedemidge

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