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Extension Bulletin E3191 · New · March 2013

Michigan Blueberry Facts

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Blueberry Gall Midge

Dasineura oxycoccana (Johnson)
(Diptera: Cecidomyiidae)

Introduction

Blueberry gall midge is a small fly found almost everywhere that blueberries are grown. It is native to North America and can be found from the Canadian maritime provinces to Florida, and from Maine to British Columbia. It is also common in other countries where blueberries are cultivated. The broad geographical distribution is likely the result of it being moved around on infested nursery plants. Larvae have been found in many types of blueberries: lowbush, highbush, southern highbush and rabbiteye. Blueberry gall midge has been reported as a pest of blueberry and also of cranberry, where it is known as cranberry tipworm. Recent studies, however, show that the midge feeding on cranberry may be a separate species. This fact sheet provides information on the biology and management of blueberry gall midge in blueberries.

Identification

Adults are small, only 2 to 3 mm in length. Females are slightly larger than males, and their abdomens are usually orange. Males have slender, yellow abdomens. Like all true flies, adults have one pair of wings, and in this species the wings possess a fringe of small hairs (Figure 1). Blueberry gall midge antennae are long relative to their bodies. Male antennae have longer sensor hairs, which are used in detecting the chemical signal released by females to attract mates. Some of these hairs form loops, a characteristic unique to gall midges. The small size of this fly makes it difficult to see these features without a hand lens or microscope.

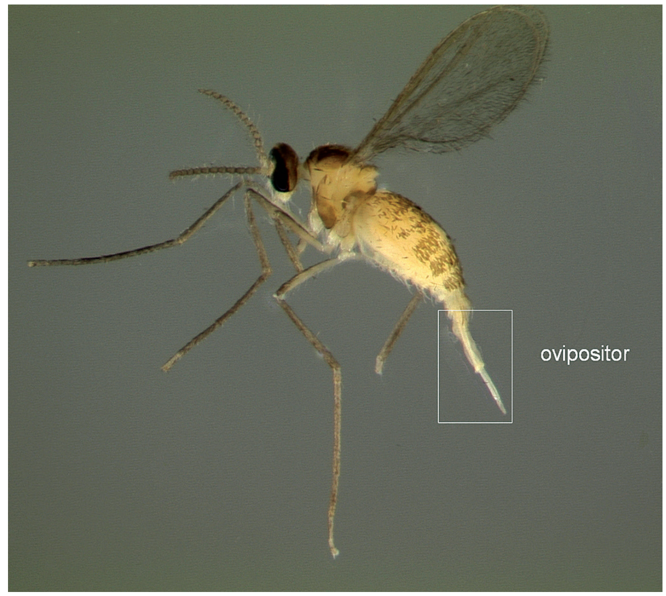

Figure 1. Blueberry gall midge (*Dasineura oxycoccana*) adult female. The ovipositor (used for depositing eggs) is extended.

Larvae range from less than ½ mm when newly hatched to 2 mm when mature (Figure 2). These are legless maggots; the only distinguishing feature is a small T-shaped structure called a "spatula," located on the underside of mature larvae. Mature larvae use this hardened structure for digging into the soil to pupate. There are three larval instars, and the larval stages can be distinguished by their color: newly hatched larvae are colorless, then white, yellow and finally orange.

Figure 2. Blueberry gall midge larvae (red arrows) on a blueberry shoot that has been peeled open.

The larva is the feeding stage and is responsible for plant damage. Larvae feed in unopened leaf buds. This can result in leaves that are distorted as they develop (Figure 3). If this feeding kills the growing point (meristem) of the shoot (Figure 4), it can cause lateral growth that may slow the establishment of the ideal bush architecture (Figure 5).

Life cycle

The midge survives the winter as a pupa in the soil. Adults emerge in the spring, when blueberry plants are putting out new vegetative growth and new leaf buds. Multiple overlapping generations of blueberry gall midge occur each year. Mating occurs shortly after emergence; then females fly to blueberry plants in search of suitable sites to lay eggs. Eggs are cylindrical to elliptical and only ¼ mm long. A female may deposit several eggs in one leaf bud, and each bud can contain eggs from multiple females. Adults live for only one or two days. A larva will feed on a blueberry plant for approximately 10 days. When mature, the larva leaves the plant, drops to the soil and burrows beneath the soil surface to pupate. During the summer, the blueberry gall midge life cycle can take two to three weeks to complete; under cooler weather conditions, it can take longer.

Figure 3. Distorted blueberry leaf resulting from blueberry gall midge feeding during its development.

Monitoring and Damage

Monitoring. Because of its small size, blueberry gall midge can easily be overlooked. Usually symptoms of black shoot tips (Figure 4) on

Figure 4. Blueberry shoot tip showing blueberry gall midge feeding damage.

blueberry plants are the first sign that blueberry gall midge is present and active. These symptoms can be easily confused with frost damage. Sticky traps are not very effective at catching adults, but bucket emergence traps placed between blueberry plants can catch adults emerging from the soil in spring. Emergence traps also catch a number of other small flies that pose no threat to blueberries, so correct identification is critical.

A more reliable method for monitoring blueberry gall midge is to sample blueberry leaf buds and open them to look for larvae. Eggs can also be found using this method, but they are so small that they require high magnification to see and will likely be missed. Begin monitoring when leaf buds start to unfold (early to mid-May) by looking for signs of injury: leaf buds that are starting to curl and turn brown. If buds are completely brown and brittle, the larvae are usually long gone. The sampled shoots (at least 20 spread throughout the field) should be placed in a sealable clear plastic bag with a bit of damp paper towel. The bag can be examined periodically for larvae that have exited the buds. Larvae can be examined directly through the clear plastic bag with the aid of a hand lens. Peeling open leaf buds to remove larvae is also possible, but this is more labor-intensive and, therefore, limits the sample size.

Damage. The branching of blueberry shoots that is caused by blueberry gall midge feeding (Figure 5) can potentially lead to reduced bush height in young plants in nurseries or in newly established fields. In mature bushes, the impact of this feeding may be more significant during short growing seasons because the bushes may not have enough time to compensate for the damage with new shoot growth and formation of buds for the following year's crop.

Figure 5. Blueberry shoot with multiple branches resulting from blueberry gall midge injury to the growing tip.

To date, however, no significant economic loss from blueberry gall midge has been recorded in mature Michigan blueberry fields.

Control

Biological control. Small parasitic wasps have the potential to provide a high level of natural population suppression of blueberry gall midge, and several species of wasps have been documented to parasitize this insect. These wasps attack the midge larvae within the leaf bud, laying their eggs inside the larvae. The wasp eggs hatch and complete their development within the host. A fully developed adult wasp will emerge from the remains of a midge larva. To enhance biological control, growers should conserve the parasitic wasps naturally present through careful selection and use of pesticides that have minimal negative effects on non-target organisms.

Chemical control. Chemical control of blueberry gall midge can be challenging. Eggs and larvae are protected within the leaf buds, and pupae are protected under the soil from foliar pesticides. The adult flies are exposed, but they are also very short-lived, so timing of foliar applications would need to be exact. Nevertheless, some products are labeled for blueberry gall midge control or suppression on blueberry. Products with systemic activity may provide the best control because the active ingredient has a better chance of reaching the target. Because no significant economic losses from blueberry gall midge have been observed in Michigan blueberries, pesticide applications directed specifically at this pest are seldom required. Pesticides targeting other insect pests may provide incidental control of blueberry gall midge. For a list of specific insecticides, see the latest version of MSU Extension's Michigan Fruit Management Guide (E154), available from the MSU Extension Bookstore (**bookstore.msue.msu.edu**).

For more information on blueberry gall midge and other insect pests of blueberry, consult these resources:

Blueberry facts website: **www.blueberries.msu.edu**.

Hahn, N.G., and R. Isaacs. 2012. Distribution and phenology of *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in Michigan blueberries. Environmental Entomology 41: 455-462.

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Sampson, B.J., S.J. Stringer and J.M. Spiers. 2002. Integrated pest management for *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in blueberry. Environmental Entomology 31: 339-347.

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