



Blossom Midge in Hawaii— a Pest on Ornamentals and Vegetables

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Blossom midge, *Contarinia maculipennis* Felt (Diptera: Cecidomyiidae), has been present in Hawaii since the early 1900s and is thought to have originated in Asia (the “West Indies”). Currently, the blossom midge can be found on all of the major Hawaiian islands. Jensen (1946) presented compelling evidence that *C. maculipennis* had been misidentified in earlier reports as *C. solani* (Rübsaamen) or *C. lycopersici* Felt due to its diverse range of hosts. Elsewhere in the USA, the blossom midge was reported on dendrobium orchids in Florida in 1992.

Damage

Blossom midge maggots feed inside unopened flower buds, causing deformed, discolored buds and blossoms and, in severe infestations, premature bud or blossom drop (Fig. 1). As many as 30 maggots may be found infesting a single dendrobium bud.

Hosts

The blossom midge has a wide host range spanning at least six plant families, including the flower buds of orchids, plumeria, hibiscus, pikake (jasmine), white mustard cabbage or pak choi, tomato, eggplant, pepper, potato, bittermelon, and other vegetables and ornamentals.

Biology

The blossom midge reproduces year-round in Hawaii. The duration of its life cycle from egg to adult is approximately 21–28 days. The eggs are deposited in masses by the adult female into the open tips of flower

buds. They are white to cream colored, invisible to the naked eye, and hatch within 24 hours into maggots that move into the bud and feed on fluids from the damaged plant tissue.

The maggots are white when newly hatched, becoming yellow with a pink tinge as they age (Fig. 2). As they mature in 5–7 days, growing to 1/2 inch long (about the thickness of a nickel), the maggots are capable of flipping themselves several inches into the air to exit the buds and burrow into the soil to pupate, like other ground-pupating fly larvae such as the melon fly and oriental fruit fly.

Pupation is most successful in soil that is moist but not wet. The late-stage pupa turns from yellowish-white to brown (Fig. 3) and burrows back up to the soil surface in preparation for emergence as an adult 14–21 days after entering the soil. The pupa works itself partially free of the soil, and the adult emerges, leaving the pupal skin protruding from the soil.

The adult blossom midge is tiny, about the thickness of a nickel in length; males are slightly smaller than females. The adult is somewhat mosquito-like, with typical fly features, and survives for only 4 days. It has relatively large, multifaceted eyes and a single pair of spotted wings about one to two times as long as its body (Fig. 4).

Behavior

Except for the adult, all stages of the blossom midge are secluded within the bud (as maggots) or in the soil (as pupae). Adult emergence from pupae in the soil usually occurs in the early evening.

Figure 1. Feeding damage to flower buds by blossom midge: left, plumeria buds; center, dendrobium buds; right, dendrobium bud drop. (Photos: A. Hara, R. Mau)



When laying eggs, the adult female blossom midge is unable to penetrate plant tissues but rather inserts its ovipositor into the open end of a bud. To ensure an optimal food source and moist environment, the adult midge avoids late-stage buds and prefers to lay eggs in young buds whose growth to maturity will approximately parallel that of the maggot.

If growing conditions become unsuitable for larval development (for example, if the flower or bud on which maggots are feeding begins to dry), immature maggots may leave the flowers or buds to pupate in the soil; however, their pupation may take a few weeks longer, and the emerging adult midges are invariably smaller than adults from fully mature maggots.

In Florida, blossom midge populations maintained in greenhouses were observed to decrease rapidly during the winter, even though the temperature was maintained at 65°F and the plants had sufficient numbers of buds.

Cultural control

Sanitation is the most important management practice for the blossom midge. Remove and destroy all dropped buds and infested buds still on the plant. Place infested flower buds in a plastic bag or a sealed container to pre-

vent escape of maggots.

Due to the blossom midge's wide range of hosts, avoid planting possible alternate hosts around the crop area.

A certain variety of tomato was observed to be more susceptible to blossom midge infestation due to its flower structure, which facilitates ovipositing. Host plant varieties in which petals remain tightly fitted until the bud is almost ready to open may reduce susceptibility.

Biological control

To date, no parasites have been isolated or specifically introduced to Hawaii to control the blossom midge. The adults are vulnerable to general predators, such as web-spinning spiders and ants. Ants may also prey on pupae in the soil.

Chemical control

Only the adult stage of the blossom midge is vulnerable to contact insecticides, because the maggots are protected within the bud and the pupae are burrowed in the soil.

Some insecticides can be applied as a foliar spray against larvae as well as a soil treatment to target the pupal stage. Translaminar insecticides (those that move from the sprayed leaf surface to the lower surface) may

Figure 2. Blossom midge larvae in a dendrobium bud.

Photos in Figures 2 and 3 by Walter Nagamine, Hawaii Dept. of Agriculture; Figure 4 photo by S. Chun.

Figure 3. Blossom midge pupae from hibiscus.

The actual size of the larvae and pupae is 1–2 mm; the adult is about 2 mm long. 1 mm is just over $\frac{1}{32}$ inch; the following lines are 1 and 2 mm long, respectively: - -

be capable of penetrating the bud to affect the maggots. Trials of systemic insecticides (those that are spread from the site of application throughout the rest of the plant) on dendrobium have been disappointing, possibly because the chemicals are not able to reach the flower buds to affect the maggots.

Consult the Hawaii Department of Agriculture or the CTAHR Cooperative Extension Service for registered chemicals that are known to be effective against the blossom midge.

References

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- Jensen, D.D. 1950. Notes on the life history and ecology of blossom midge *Contarinia lycopersici* Felt (Diptera: Cecidomyiidae). *Proceedings, Hawaiian Entomological Society* 14(1):91–100.

Figure 4. Adult blossom midge.

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