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# Blueberry Gall Midge: A Major Insect Pest of Blueberries in the Southeastern United States [1]

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## Introduction

The blueberry gall midge, *Dasineura oxycoccana* Johnson, feeds on developing leaf and floral buds of blueberry bushes in the southeastern United States (Figure 1). When found on cranberry, *D. oxycoccana* is referred to as the cranberry tipworm. Several studies have now confirmed that the cranberry tipworm is a separate species. In the mid 1990s, Florida growers were re-alerted to blueberry gall midge, as researchers learned that midges affected vegetative and floral buds, a problem that was previously attributed to frost damage. Affected buds take on a dry, shriveled appearance and will often crumble when touched. Left untreated, midge populations are capable of destroying up to 80% of rabbiteye plantings. Blueberry gall midge is a major pest of blueberries in several southeastern states including Florida, Georgia, North Carolina, and Mississippi. It is also becoming an increasing problem in blueberries in Nova Scotia, New Jersey, Michigan, Oregon, and in Europe.

Figure 1. Blueberry gall midge female.
Credits: University of Florida

## Injury

A high population of blueberry gall midge may limit the ability of bushes to produce and maintain a heavy fruit set. Symptoms of infestation include premature floral bud abortion, leaf curl, stunted growth, and blackened leaf tip (Figure 2). Both rabbiteye, *Vaccinium virgatum* Aiton, and southern highbush blueberries, *V. corymbosum* L. X *V. darrowi* Camp, are susceptible to blueberry gall midge. However, floral buds of the earlier blooming southern highbush cultivars appear to escape the damage.


Figure 2. Symptoms of blueberry gall midge infestation in a) flower buds and b) leaf buds.
Credits: C. Roubos, University of Florida

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## Life Cycle

Blueberry gall midges are very small insects, approximately 3 mm in size, or smaller than the average mosquito. They have long slender legs, globular cylindrical antennae, and transparent wings with long black hair-like structures and reduced venation (Figure 1). The larvae are small (2 mm) and generally not easy to observe within the confines of infested buds. Females lay eggs in either floral or vegetative buds just after bud swell, when scales begin to separate and the tips of flowers become visible. A single female can lay up to 20 eggs in the mid-to -nner scales of the buds, which provide protection for the developing midges. Eggs hatch into larvae (maggots) within a few days and the larvae continue to develop inside the buds (Figure 3). The emerging maggots feed on plant juices within the buds, remaining unseen to the naked eye. Ultimately it is the larvae, feeding on the nutritive plant juices, which cause the debilitating symptoms associated with blueberry gall midge infestation. While distribution is unknown in rabbiteye, initial infestations are greatest at the base of northern highbush blueberries.

Figure 3. Maggots emerging from an infested leaf bud.
Credits: University of Florida

Climatic factors including temperature and moisture play a role in emergence dates and midge densities within blueberry plantings. In north-central Florida, milder temperatures appear to favor early emergence. Laboratory experiments suggest that blueberry gall midges require 134 degree-days to emerge from pupation. Midge adults in Michigan, raised on northern highbush buds, emerged between 150 and 209 degree-days.

## Monitoring

Reliable monitoring techniques for detecting blueberry gall midge infestations prior to the onset of symptoms include bud samples, emergence traps, and panel traps. For bud sampling, young buds are collected and placed into a bag at room temperature. If buds are infested, orange larvae will begin to emerge after 3-4 days. Detection early in the season can be achieved by using an emergence trap (Figure 4) — an overturned bucket with a sticky transparent window at the top. This type of trap can also be used to predict peaks in larval infestation which is important for targeting pesticide application. Panel traps (Figure 5), which consist of a 30 cm X 30 cm (1ft x 1ft) sticky panel attached to a wooden stake, can also be used to detect midge adults. The recent identification of the sex pheromone of these midges may lead to improved methods of detection.

Figure 4. Bucket emergence trap.
Credits: E. M. Rhodes, University of Florida

Figure 5. Panel trap.
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## Management

Few insecticides are available for midge control because of the difficulty of penetrating the buds to kill midge larvae. Insecticide applications must be timed to kill adults before they lay eggs in the buds. In terms of biological control,

several species of endoparasitoids that can kill up to 40% of the blueberry gall midge larvae have been identified. These species include platygastrids in the genera *Synopeas*, *Platygaster* and *Inostemma*. In addition, a prepupal parasite, *Aprostocetus* sp. (Eulophidae Tetrastichinae), has been found associated with blueberry gall midge in rabbiteye blueberries (Figure 6). Older larvae, nearer the bud surface, are the most susceptible to parasitism.

Figure 6. *Aprostocetus* sp.
Credits: C. Roubos, University of Florida

## References


Cook, M. A., S. N. Ozeroff, S. M. Fitzpatrick, and B. D. Roitberg. 2011. Host-associated differentiation in reproductive behavior of cecidomyiid midges on cranberry and blueberry. Entomologia Experimentalis et Applicata. 141: 8-14.

Dernisky, A.K., R.C. Evans, O.E. Liburd and K. Mackenzie. 2005. Characterization of early floral damage by cranberry tipworm (*Dasineura oxycoccana* Johnson) as a precursor to reduced fruit set in rabbiteye blueberry (*Vaccinium achei* Reade) International Journal of Pest Management 51: 143-148.

Fitzpatrick, S. M., R. Gries, G. Khaskin, D.A.H. Peach, J. Iwanski, and G. Gries. 2013. Populations of the gall midge Dasineura oxycoccana on cranberry and blueberry produce and respond to different sex pheromones. Journal of Chemical Ecology. 39: 37-49

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

Roubos C. R. and O. E. Liburd. 2013. Parasitism of *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in North Central Florida. Environmental Entomology, 42:424-429.

Roubos C. R. and O. E. Liburd. 2010. Evaluation of emergence traps for monitoring blueberry gall midge (Diptera: Cecidomyiidae) adults and within field distribution of midge infestation. Journal of Economic Entomology, 103:1258-1267.

Roubos C. R. and O. E. Liburd 2010. Pupation and emergence of blueberry gall midge, *Dasineura oxycoccana* (Diptera: Cecidomyiidae), under varying temperature conditions. Florida Entomologist, 93:283-290. 2010

Sampson, B.J., T.A. Rinehart, O.E. Liburd, S.J. Stringer and J.M. Spiers. 2006. Biology of parasitoids (Hymenoptera) attacking *Dasineura oxycoccana* and *Prodiplosis vaccinii* (Diptera: Cecidomyidae) in cultivated blueberries. Ann. Entomol. Soc. Am. 99: 113-120.

Sarzynski, E.M. and O.E. Liburd. 2003. Techniques for monitoring cranberry tipworm (Diptera: Cecidomidae) in rabbiteye and southern highbush blueberries. Journal of Economic Entomology 96: 1821-1827.