CRANBERRY TIPWORM

Common Name: Cranberry tipworm
Scientific Name: *Dasineura oxycoccana*
Order: Diptera (flies, gnats, midges, mosquitoes)
Family: Cecidomyiidae (the gall midge family)

Cranberry tipworm is a very tiny insect, the larvae of which feed at the very growing tip of cranberry, causing death of the tip. This usually results in side-branching which compensates for the damage, and many growers do not consider tipworm to be an economic problem. However, during short growing seasons, such as in northern Wisconsin, much of the regrowth may develop vegetative rather than fruiting buds, resulting in reduction of the subsequent year's crop.

Female (l), male (r).

Biology and Damage

Host Plants:
Cranberry, *Vaccinium macrocarpon*
Rabbiteye blueberry, *Vaccinium asheii*

Description and Diagnosis:
Eggs are deposited singly on the inner leaves of the cranberry plant in the apical tip of the terminal. They are 0.35 mm long, translucent with a scattered reddish-orange pigment, slender and cylindrical. The larvae are maggot-like, reach 1.5-2.0 mm long when fully grown, do not have eyes or legs, and undergo three larval instars. They are initially clear, turn a milky white in the second instar, and an orangish color in the last instar. The pupae are 2.0 mm long, initially orange but darken as they get closer to adult emergence, are enclosed within a white silken cocoon, and remain in the cranberry tip. The adults are gray and tiny – only 2.0 mm long (about 1/10 the size of a mosquito). Adult females have a reddish abdomen.

Top row: 1st, 2nd, and 3rd instar larvae, respectively.
Second row: cocoons (l) and exposed pupa (r).

Economic Importance:
The cranberry tipworm does not damage the current season's crop but can be an important pest for next year's yield. If the terminal is attacked early in the season, lateral buds, or side shoots, can form. If the terminal is attacked later in the season, the damage is more important because the vine may not recover in time to develop a fruiting bud for the following year. There is some evidence that early season damage may actually be beneficial because the pruning results in increased numbers of potentially fruiting terminals. Later season injury is likely to reduce flowering buds for the following year, but populations decline naturally starting in mid summer. Harvesting of uprights for cuttings to plant new beds promotes vegetative growth and the highest populations of tipworms are found in beds so pruned.

Tipworm is usually a more significant problem in northern Wisconsin because the shorter growing season does not allow many of the damaged terminals to set fruiting buds. The same probably occurs in central Wisconsin during years when the weather results in abnormally cool or short growing seasons.

Life Cycle:
The cranberry tipworm overwinters in the larval stage in the leaf litter. The adults emerge in mid-May, just as the cranberry terminals are beginning to grow, providing succulent tips for oviposition. The larval stage lasts about a week, depending on the temperature and the number of larvae present in the terminal. The pupal stage lasts three days with the adults living four to six days. The cranberry tipworm undergoes continuous generations through the entire season until early September when the larvae descend to the ground to overwinter. Depending on the weather, there are four to five generations per year. However, the populations are generally much higher during the first three generations. Generally there is just one larva per growing tip, but when populations are large (such as on mowed beds), as many as 8-10 larvae can be found in some terminals.

Environmental Factors:
Because the eggs and larvae remain in the same terminal for their entire development, they are susceptible to naturally-occurring predatory and parasitic insects. Sanding is effective in controlling overwintering cranberry tipworms because it hampers the emergence of the tiny, fragile adults.

Damage/Symptoms:
The larvae feed on the inner leaves of the growing tip and consume the plant juices. This causes the terminal leaves to become cupped in appearance, a characteristic sign of tipworm damage. The entire tip eventually turns brown and dies as the larvae continue to feed and pupate within the cupped leaves. Damaged terminals may rebud from one of the axillary buds; however, this may not occur until the following spring.

Leaf cupping – initial signs of damage.

The apical meristem has been killed.

Secondary branching caused by death of the apical meristem.

Monitoring and Control

Scouting Procedure/Economic Threshold:
Because of its very small size, cranberry tipworm, in all of its stages, is difficult to monitor. Currently, no sticky traps are available for monitoring adults. Adults can be captured in fine-mesh or muslin sweep nets, but their small size and similarity to related insects frequently found in cranberry beds makes positive identification difficult. Examination for egg, larval, and pupal stages is very difficult in the field. Microscopic examination is laborious and time-consuming, but provides the most accurate assessment of tipworm activity.

Randomly collect 50 uprights from each bed. This can be done by taking 10 uprights each from five randomly chosen locations. Because of the short life cycle and potentially rapid buildup, samples should be taken twice weekly if possible. Samples should be inspected using a low-power, dissecting-type microscope, and the numbers of the various life stages (egg, clear larva, white larva, orange larva, cocoon) recorded.

Egg laying begins within one week of the first shoot elongation; sampling should begin at this time. Populations usually decline by the end of flowering and monitoring can be reduced at this point.

No economic threshold has been established for cranberry tipworm.

Natural Control:
Tipworms survive better in actively growing terminals; spring growth is ideal. After normal growth stops in mid summer, terminals are less likely to be infested. However, any active new growth (caused by terminals damaged by tipworm, other insects, hail, or mechanical injury, or regrowth after pruning, or prolonged growth from heavy fertilization) later in the season will be susceptible.

Several natural enemies attack cranberry tipworm larvae. These include larvae of the predatory hover fly, *Toxomerus marginatus*, which is commonly found in cranberry beds during bloom. Also, at least four types of tiny parasitic wasps attack tipworm larvae, although parasitism rates are generally low, possibly because of the use of broad spectrum insecticides.

Cultural Control:
Sanding effectively reduces tipworm emergence and population levels during the year of sanding. Sanding should be conducted on contiguous blocks of beds, because beds are recolonized from surrounding unsanded beds. Do not over-fertilize beds.

Biological Control:
No commercially-available biological controls are known to be effective. Reducing broad-spectrum insecticide usage will likely conserve beneficial predators and parasites, resulting in better biological control.

Chemical Control:
Chemical controls should be timed for first generation, and for the youngest larval stages. Routine sampling, as outlined above (see Scouting Procedure) will be very beneficial for timing sprays. Both azinphosmethyl and diazinon are effective if applications are timed properly. However, two applications may be necessary if populations are large or if the hatch period is prolonged.

References:

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