Tip Midge of Wild Blueberry

Tip midge, also referred to as the blueberry gall midge or cranberry tipworm (*Dasineura oxycoccana*) is a relatively new pest of wild blueberry. In the 1990s this insect became a major pest of all types of blueberries grown in the southern United States and then spread northward to infest blueberries and cranberries in all of North America, including the islands of Newfoundland and Prince Edward Island. The unique biology of the wild blueberry plant and the complex nature of the damage caused by this insect make assessing the impact on blueberry production difficult.

Description

The adult tip midge (**Fig. A**) is approximately 2 mm in length and smaller than most other types of midges commonly found in wild blueberry fields. The abdomen of the female has a light red coloring and the male, which is smaller than the female has large feather-like antennae. Adult midges live for only a couple of days and spend most of this time within the crop canopy.

Colorless eggs are laid within the apex of rapidly growing sprouts and quickly pass through three distinct stages. Larvae (**Fig. B**) are at first translucent, then white and finally light orange in color. Typically, there are three or four larvae present within a leaf gall but occasionally more are found. The last instar drops to the ground and pupates near the soil surface. On wild blueberry, pupation does not occur within the leaf gall as occurs in cranberry. Recent researches have shown that the midges infesting blueberry and cranberry may be distinct strains of *D. oxycoccana*.

The generation time for this pest can be as little as two weeks but in Eastern Canada, cool spring temperatures can increase this to four or five weeks.

Symptoms

In the spring, by the time new sprouts reach five cm in height a few leaf galls can usually be found (**Fig. C**). The calendar date for these first galls will vary between different regions and years but generally occurs during the first week of June in much of eastern Canada. The incidence of new galls increases during the second and third week of June with a second flush occurring in early to mid July. These dates will be slightly later in more northern production regions. New galls continue to appear throughout August and into September. These late season galls occur only on vigorously growing shoots and branches. Sour-top (*Vaccinium myrtilloides*) is a preferred host and often has the highest incidence of infestation.


C


D

In the southern United States tip midge damage to flower buds can be extensive but damage to flower buds has not been found to occur on wild blueberries (*V. angustifolium, V. myrtilloides*). Leaf galls can be found in cropping fields but the incidence is much lower than that found in vegetative (sprout) fields.

Within tip midge galls the growing point and small associated leaves die and turn dark brown without any obvious feeding damage. The outer leaves curl to form a gall and often take on a light red coloring. Branching (**Fig. D**) induced by the death of the growing point is visible within one to two weeks. Later in the growing season tip midge ovipositing may damage the growing point but a true gall does not always form.

Other blueberry pests can cause symptoms similar to tip midge damage. Blueberry thrips can cause the leaves to roll and turn red. (**Fig. E**). The red color is darker than that associated with tip midge galls and the growing point does not usually die. Feeding by plant bugs can cause death of the growing point and damage to the apical leaves (**Fig. F**). In addition, most blueberry shoots undergo natural tip dieback in mid-summer and shoots having vigorous growth will naturally produce branches in the sprout year.

Management

The emergence of first generation midges during late May and June occurs over several weeks. This contributes to an extensive overlap of later generations that makes timing control sprays difficult. Adult midges also migrate into sprout fields from neighbouring areas. The efficiency of monitoring with sticky traps and sweep nets is too low to make these techniques useful for timing control applications. Adult midges are susceptible to broad spectrum, residual insecticides but these chemicals have a negative impact on non target organisms, including tip midge parasitoids and native pollinators. Larvae within the leaf gall are protected from contact with many types of insecticides. Even if larvae are killed by insecticide application the growing point may still die and induce branching. All these factors combine to make chemical control of tip midge difficult.

Damage to the growing point early in the season has little direct effect on yields since there is adequate time for induced branches to grow and produce fruit buds later in the season. Tip midge damage at this time does however modify the structure of the crop canopy by creating more branches and this may affect harvesting efficiency.

Wild blueberry shoots undergo natural tip dieback starting in mid-July and continuing into early August. This is the end of vegetative growth and the beginning of fruit bud production. Shoots which undergo natural tip dieback are not attractive to female midges since they can no longer produce the vigorous shoot growth that is required for leaf gall formation.

Excess vigour in sprout fields can delay natural tip dieback and force late growth that is susceptible to attack by tip midge and other pests. When the growing point is killed on these late growing shoots, branching is induced which delays the formation of fruit buds. If this occurs in combination with defoliation from leaf rust or early frosts then the number of fruit buds will be reduced.

Management plans should focus on both middle and late season infestations. Damage from tip midge and plant bugs is often severe in areas where vigorous growth occurs late in the season. These areas will remain green when most of the field has taken on fall colour (**Fig. G**). Excessive crop vigour resulting from uneven application or too much fertilization increases late season susceptibility. In fields that have not been levelled, fertilizer will leach to lower areas causing uneven growth. Long term management plans may include land levelling and variable rate fertilization to develop uniform crop vigour.


G

Late growing branches will produce fruit buds if healthy leaves are retained into October. For fields that have vigorous growth and late season insect pests additional protection against leaf rust infection is recommended. Growers should apply a minimum of two fungicide sprays starting in mid July. Time the second application to ensure good spray deposit on growing shoots (**Fig. H**). Tall weed canopies intercept spray droplets and prevent good coverage.

H

Tip midge pupae over winter in the field near the soil surface. The effect of burning on tip midge incidence has not however been evaluated and midge damage is commonly observed in June, in sprout fields that have been burned. Since only a small number of midge galls are produced in cropping fields much of the damage in sprout fields is likely due to migration of midges into the field from neighbouring areas.

Insecticide sprays have been shown to reduce *D. oxycoccana* damage in both blueberry and cranberry production. Proper product selection, correct timing and multiple applications are required. Vigorously growing sprout fields are most susceptible to economic damage starting at natural tip dieback and continuing into August. Identifying the source of crop damage is important since pests other than tip midge may also be present. The impact of late season sprays on beneficial insects should be considered.