

Some Insect Pests of Conifer Seedlings in British Columbia¹

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Abstract.--Girdling damage to conifer seedlings caused by the Cranberry girdler, *Crambus nevadellus*, the European Marsh Crane fly and adult weevils is described. A monitoring program for fungus gnat populations in greenhouses is also discussed.

INTRODUCTION

Conifer seedling nurseries in British Columbia (B.C.) have sustained girdling damage from several insect pests. Criteria to differentiate the types of girdling have been compiled so that control programs can be readily implemented. This paper briefly outlines the insect girdlers found, describes the type of damage they do and discusses some control programs that have been developed in B.C. A program used to monitor populations of fungus gnats that occasionally become pests of container seedlings is also described.

INSECT GIRDLERS OF CONTAINER SEEDLINGS

The Cranberry girdler *Chrysoteuchia topiaria* was confirmed as a pest in B.C. in 1981. Pheromone trapping programs have determined its presence at all ministry nurseries in the province. To date damage has been confined almost exclusively to bareroot, 2+0, true firs and Douglas fir. Transplant stock, container stock and seedlings of other species are rarely affected. Damage is caused by the larvae that live in the duff layer at the surface of the soil. The larvae feed on stock from late August to mid-November. The solitary larvae appear to stay in one place long enough to feed on up to 5 seedlings and then move on for about 20 inches before feeding again. Damage generally occurs in scattered patches. The larvae eat the bark and chew into the wood, though the stem is not always completely ringed. The area, approximately one inch above and below the soil line, is attacked; some chewing may be

found on the upper roots. An excellent control program using pheromone traps has been developed for this pest (Triebwasser & Overhulser, 1980).

In 1985 and 1986 another small moth *Crambus nevadellus*, a relative of the cranberry girdler, was found girdling container seedlings at two nurseries in the Okanagan. Damage appears as a uniform ring about .25-.5 inch wide just at soil line. It resembles adult root weevil damage, but fine silk webbing is often seen at the surface of the plug and larvae may be found near the damaged seedling. To date, damage has occurred during the month of August and only spruce seedlings have been attacked. Damage is distributed in small pockets of 1-7 seedlings throughout the greenhouses. Moths of this species have been caught in low numbers in cranberry girdler pheromone traps for a number of years and their life histories are similar.

The European Marsh Crane fly *Tipula paludosa* has been a chronic pest at several coastal nurseries for the past ten years. Girdling caused by the soil dwelling larvae occurs from March to May. Any stock present at the nursery during this time can be attacked. To date, most damage has occurred in bare-root stock, where there seems to be no host preference. The damage consists of a uniform ring about one inch wide just at soil line. The stem is nearly always completely ringed and only the bark is consumed. Some of the upper roots may also be stripped. Damage has a spotty distribution with small patches of 1-7 seedlings attacked throughout an infested area. Each patch is generally the work of one larva which is often found with the damage.

Several species of adult weevils have been confirmed or are suspected to girdle conifers in greenhouses. Adults of three root weevils *Otiorhynchus ovatus* the strawberry root weevil, *O. rugosostriatus* the rough strawberry root weevil and *O. sulcatus* the black vine weevil have been observed feeding on seedlings.

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Adults of Trachyphloeus bifoveolatus the small grey grass weevil and Strophosoma melanogrammum have been observed in sufficient numbers where damage has occurred to suspect them as the cause.

Girdling consists of a uniform little ring about 1/4" wide, often just below the point at which foliage begins in the fleshiest part of the stem. Damage usually occurs in June and July. Weevils seem to attack seedlings for a limited period of time when enough bark tissue has developed for them to feed, but before the stems have become too woody. Most girdled seedlings are between 3 1/2 and 6 inches in height. Seedlings at the edges of the greenhouses and ones on the outsides of the styroblocks are attacked most frequently. Usually only one seedling is girdled at a time. There appears to be a preference for spruce, however cedar, larch, fir and pine have also been attacked.

Adult root weevils are elusive, feeding at night and hiding during the day. As a result, populations usually go undetected until damage occurs. Monitoring programs have been attempted at several nurseries. Weevil boards, bait stations, pitfall traps, indicator plants such as rhododendrons and sticky traps have all been tried without success.

A control program to reduce girdling by adult weevils using Pydrin (fenvalerate) has been developed and was successfully implemented at one nursery in 1986. The timing of the applications is critical for effective control. Adult weevils emerge when the weather becomes warm in the spring around the middle of May. This is also the time when the seedlings have reached a susceptible stage. Pydrin is applied as a foliar spray during the second week of May, and this is followed by a second application 3 weeks later. It appears that the insecticide acts more as a repellent than as an insecticide. These insects have a large host range and will move on to feed on plants in a more favourable environment.

SMALL FLY POPULATIONS IN GREENHOUSE FACILITIES

Many nurseries in B.C., especially the older established greenhouse facilities, have large populations of small flies. In 1981 and 1982, adult and larval flies were collected from seven nurseries and eleven different families were identified (table 1). Of these the shore flies family Ephydriidae were the most common. These insects breed in algae and decaying matter in wet areas and are not nursery pests. Occasionally, however, populations of fungus gnats family Sciaridae have

been observed damaging container seedlings. The larvae infest the plugs feeding on the upper roots, and in heavy infestations, they can girdle the stems just below and at soil line. Infestations of fungus gnats are not common and the seedlings attacked have usually been predisposed, often by an infection of Fusarium. Once the seedlings are well established and vigorously growing, these insects are generally not pests.

Table 1.--Families of small flies collected in container facilities.

Agromyzidae
Anthomyiidae
Cecidomyiidae
Chironomidae
Dolichopodidae
Empididae
Ephydriidae
Muscidae
Psychodidae
Sciaridae
Sphaeroceridae

In 1986, a monitoring program for populations of small flies was conducted at 4 nurseries in B.C. Yellow sticky ribbons were hung throughout the greenhouses. Yellow is a color that attracts many species of insects which then become stuck to the surface of the ribbon.

The purpose of the program, was to monitor the populations of insects present, and to train nursery personnel to distinguish between the innocuous shore flies and the potentially damaging fungus gnats using the characteristics in table 2. The second purpose was to actually reduce the numbers of flies present in the greenhouses. Although many of the flies present are not directly damaging to the stock, large swarms can be annoying to nursery workers. In cucumber greenhouses, growers have successfully reduced fly populations using these yellow sticky ribbons at a density of one every ten square feet.

Insect girdlers generally are not major pests of conifer seedlings. However, effective control programs can be developed once characteristics have been determined to differentiate the various types of girdling. Fungus gnats can occasionally become pests on the nurseries but the majority of the flies present will not feed on conifer stock and are only a problem because of their nuisance value.

Table 2.-- Characteristics used to differentiate shore flies and fungus gnats.

	Shore Flies	Fungus Gnats
Family	Ephydriidae	Sciaridae
Body	size and shape of fruit flies	resemble tiny mosquitoes
Size	2 - 4 mm	2 - 4 mm
Wings	have pale spots	grey with "Y" shaped vein
Antennae	short with a bristle	long bead-like
Flight	tend not to fly but are strong fliers when they do	easily excited into flight but are poor fliers
Larvae	maggots have no distinct head	maggots are slender with dark shiny heads

LITERATURE CITED

Triebwasser, Mark E., and David C. Overhulser. 1980. The cranberry girdler in conifer nurseries of Western Washington and Oregon. Proceedings Intermountain Nurseryman's Assoc., Western Forest Nursery Council, Joint Meeting, Boise, Idaho, August 12 - 13, 1980.