FGC Forest Genetics Council of British Columbia

Cone and Seed Insect Pest Leaflet No. 3

British Columbia Ministry of Forests and Range,
Tree Improvement Branch, Saanichton, BC

BRITISH COLUMBIA
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FIR CONEWORM
(Dioryctria abietivorella)

Dioryctria abietivorella adult (W. Strong)

TAXONOMY:

Order: Lepidoptera (butterflies and moths)

Family: Pyralidae (snout moths)

HOSTS: Most Pinaceae in North America, especially Douglas-fir (*Pseudotsuga menziesii*), pines (*Pinus* spp.), spruces (*Picea* spp.), and true firs (*Abies* spp.).

DISTRIBUTION: Widely distributed across North America. In British Columbia, the fir coneworm is most common in the dry interior but can also be abundant on the coast.

DAMAGE: Larvae tunnel throughout cones, feeding voraciously on scales, seeds, and other cone tissues. Cone clusters are often targeted and, as feeding progresses, the cones become bound together with coarse frass and webbing.

Douglas-fir cones with *Dioryctria abietivorella* feeding (D. Manastyrski)

One or more entrance holes or excavations may be visible on individual cones. Also, fir coneworm larvae are often associated with branch and stem galls, graft unions, and other injuries where they cause mining damage similar to that caused by *Synanthedon* pitch moths.

IMPORTANCE: Periodically, fir coneworm is a very important pest of seed and cone crops. One larva may destroy an entire cone and, in some years, entire cone crops. In addition, larvae feed within cones well into the fall and can cause significant post-harvest damage in stored cones awaiting seed extraction. In natural stands, fir coneworm populations tend to follow a cycle of steadily increasing levels (and damage) over a period of a few years before falling off to negligible levels. Although seed orchard populations also fluctuate, they often remain relatively high throughout their cycles.

Description

LIFE HISTORY: In general, there is one generation per year, but the life cycle is highly variable. Newly emerged adults begin flying in late spring; adults are present and active into the late summer.

Eggs have not been found in natural populations. In laboratory populations, eggs are laid singly on bark or other surfaces. Larvae feed within cones from June throughout the growing season. There appears to be substantial brood overlap resulting in a wide range of larval instars occurring at any one time, even within the same cone. In the late summer and early fall, mature, fifth-instar larvae leave the cones to pupate, probably in the duff layer (adults have been reared from soil beneath infested trees). Late season mature larvae overwinter in hibernacula and then pupate in the spring and early summer.

EGG: Oval (0.5 mm x 0.7 mm), pale green-white turning orange at maturity.

Mature *Dioryctria abietivorella* egg laid on cheesecloth by a female moth from a laboratory colony. (W. Strong)

LARVA: Young larvae have brown head capsules and amber bodies; older larvae are a darker brown with faint longitudinal stripes (18-20 mm long); rows of dorso-lateral spots are usually visible.

Dioryctria abietivorella larva on cone surface (D. Manastyrski)

Dioryctria abietivorella larva feeding in a Douglas-fir cone (D. Manastyrski)

PUPA: Pupae are reddish-brown and about 11 mm long.

Dioryctria abietivorella pupa (W. Strong)

ADULT: Medium-sized moth (wingspan 25-28 mm); forewings narrow, grey, marked with transverse lighter bands bordered by black (making a distinctive "w" mark near wing tip), hindwings lighter, unmarked.

Dioryctria abietivorella adult (W. Strong)

Detection and Monitoring

Adult males can be detected using traps baited with commercially available pheromone. Their presence will indicate the likely presence of reproductively active, ovipositing females (but does not necessarily mean that damage will occur in an orchard). Larval monitoring should start two weeks after the first moth capture. Examine 100 cones randomly collected from throughout the orchard for the first signs of larval penetration (very small frass masses, often associated with a pitch droplet). If no damage is found, repeat this procedure at weekly intervals until damage is found. In mid-July, check infestation levels by counting the number of infested

cones out of 100. If control measures have been implemented, this check will help determine control efficacy. Annual recording of trap catch and cone assessment data will provide a useful record of historical densities.

Early detection of *Dioryctria* larval cone infestation (W. Strong)

Dioryctria abietivorella frass on interior spruce cones (W. Strong)

Management and Control

Sanitation methods such as destroying infested cones (while larvae are still within them) are generally ineffective. *Dioryctria* are often abundant around seed orchards and sanitation picking in an orchard is unlikely to affect population levels.

Sprays of the systemic insecticide dimethoate will kill larvae if applied in a timely manner. Apply as soon as first larval damage is detected (see Detection and Monitoring) and again 6 weeks later. Each spray provides approximately 6 weeks residual control. Sprays applied later do not seem as effective, perhaps because the insecticide may not translocate successfully into maturing cones.

The Canadian registration for dimethoate will likely be cancelled by 2012. Although investigation of potential replacements commenced earlier in the decade, as of 2010 no other effective pesticide was registered in Canada for use against *Dioryctria*.

Cone crops damaged by fir coneworm should be processed as quickly as possible to minimize ongoing caterpillar feeding damage. If rapid processing is not possible, infested cones should be kept very cool to slow feeding activity.

Key References

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