

SPRUCE CONE MAGGOT (*Strobilomyia neanthracina*)

Strobilomyia neanthracina adult on cone

TAXONOMY:

Order (Family): Diptera (Anthomyiidae)

HOST: Most spruces in North America.

DISTRIBUTION: Widespread throughout range of spruce in North America. Other species of *Strobilomyia* are associated with red and black spruces in the east. *S. neanthracina* is associated with white, Sitka, and Englemann spruce and may be the only species in western spruces.

DAMAGE: Larvae bore through cones around the cone axis, destroying scales and seeds and producing characteristic spiral tunnels with resin and small amounts of frass.

Characteristic holes in spruce cone

There is usually little external evidence of damage except for inconspicuous larval exit holes. Scales on severely damaged cones may turn brown prematurely. Damaged cones are usually smaller than healthy ones.

Spruce cones with signs of feeding by *Strobilomyia neanthracina*

IMPORTANCE: Spruce cone maggots are the most serious pest of spruce cones and seeds in North America. Usually no more than two or three larvae will be found in one cone but this number is sufficient to cause complete destruction of seeds. **Seed losses tend to be higher in established seed orchards than in natural wild stands. Is this true? Yes, I believe so.**

Is the insect site specific? More a problem some places than others? A problem in the interior or on the coast or both? In British Columbia, spruce cone maggot is primarily a problem in Interior spruce cone crops.

DESCRIPTION

Life History: One generation per year. Adults emerge in spring, and are attracted to spruce female conelets during the pollination period. The females lay their eggs singly between conelet scales. Eggs may be laid near the edges of conelet scales (1st fig.) or adjacent to ovules deep within scales (2nd fig.). At the time of oviposition, females mark cones, leaving a chemical behind which discourages other female flies from laying eggs on the same cone. Usually only one or a few eggs are laid in a cone. **(Do you want both or just one of these pictures? Let's use both for now)**

Spruce cone maggot egg in a dissected cone scale

Egg: Pearly white, ovoid with one end flattened, about 1.6 mm x 0.5 mm long. .

Spruce cone maggot (larva) on cone tissue

Larva: Larvae hatch in 1-2 weeks. There are 3 larval instars, the first developing within the egg. Second and third instar larvae tunnel around the central cone axis feeding on scale tissue and seeds for about a month. Larvae are whitish, elongate maggots, without a distinct head (head region is marked by a pair of dark mouth hooks). At maturity, larvae are about 5-7 mm long. Mature larvae tunnel to cone surfaces and drop to the ground by mid-July.

S. neanthracina larvae and pupae (darker brown) (from a laboratory colony)

Pupa: Pupation occurs almost immediately after the larvae drop to the ground. Pupae overwinter in soil or litter and may enter an extended diapause of more than one year. Reddish-brown, darkening with age, oblong, about 4-6 mm long.

Adult: Shiny black, resembling a small housefly, about 6 mm long. Usually only seen in early spring on or near spruce conelets during pollination period.

DETECTION AND MONITORING

In spruce seed orchards, spruce cone maggot populations should be monitored on an annual, ongoing basis in seed orchards and controlled when necessary.

The folks in Alberta do some sort of sequential sampling method to determine whether they should use control tactics. Would you like to comment? Ward or Jim may have something to say about this.

Accurate population size estimates and damage predictions can be made by counting cone maggot eggs in random samples of conelets collected immediately after the pollination period, after the majority of spruce conelets are “closed”. Samples should comprise 1 conelet from the mid-crown of each of a minimum of 50 trees. Dissect each conelet under a microscope and record the number of eggs observed. A decision to control cone maggot populations will depend in part upon the current value of a crop and the immediate need for seed. An average of 0.3 eggs / conelet indicates a probable seed loss of 15%.

Do you also sample for larvae? Are traps being developed for Strobilomyia? No to both questions

Insect stage calendar to be added by me

CONTROL

If predicted seed loss is unacceptable, a foliar spray of systemic insecticides applied when the majority of spruce cones are horizontal should provide good control. Currently, dimethoate is the only active ingredient registered in Canada that seems to be effective. **(Will you add to this?)**

Biocontrol options?

In spruce seed orchards, non-crop cones should be picked and destroyed within three weeks of conclusion of pollination to kill larvae before they emerge from infested cones. This will help to reduce the numbers of cone maggot pupae overwintering in the orchard. In natural stands, prior to harvest, examine mature cone samples for tunnelling damage and numbers of filled seeds remaining.

KEY REFERENCES

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PHOTOGRAPHS: Dion Manastyrski unless otherwise noted.