Spruce Cone Maggot

Strobilomyia neanthracina Michelsen
Diptera: Anthomyiidae

Sweeney, J. D. 1998. Sequential sampling of spruce conelets to predict the category of seed loss due to spruce cone maggots. Unpublished Report, *Canadian Forest Service, Natural Resources Canada*, P.O. Box 4000, Fredericton, NB. Canada, E3B 5P7.

Objective: To develop a method of predicting seed orchard seed losses from *S. neanthracina* before significant losses occur. This method indicates when control measures are needed.

Abstract: The spruce cone maggot, *Strobilomyia neanthracina* Michelsen, is a destructive, seed-eating cone fly of spruce, *Picea* spp., in eastern Canada. Usually, one egg is laid per cone. After hatching, the larva feeds on the developing seeds by spiraling around the cone axis.

A method of determining the need for control of *S. neanthracina* in white, *Picea glauca* (Moench) Voss., or Englemann, *P. engelmannii* L., spruce seed orchards before substantial seed loss occurs was presented. The optimum sampling intensity for *S. neanthracina* was one conelet from each of 100 trees when conelets on most trees were about half pendant. Infestations were classified as light (≤8%), moderate (12-35%), or heavy (≥40% of conelets infested).

Sampling Procedure: Collect one conelet from each of 100 trees when conelets on most trees are about half pendant. Select trees systematically to ensure adequate coverage across the entire block or orchard being sampled. Bulk all conelets into one sample. Process samples as soon as possible.

First, dissect 20 conelets with a pair of fine forceps under a stereoscopic microscope at 10 power magnification. Starting at the base of each cone and work towards the tip, pulling each cone scale away from the conelet while searching for the presence of eggs, larvae, and feeding damage. Eggs are white and oblong (about 1.4 by 0.5 mm) and are laid between the cone scales. Immature larvae are more difficult to see if they have just hatched from the egg. Look for hatched, flattened eggs with signs of feeding nearby and the small white translucent larva with its pair of black mouth hooks. Once a cone maggot has been found record the conelet as infested. Compare the number of infested conelets in your first 20 conelets dissected with the numbers in Table 1. If you find 7 or more infested cones out of 20, then at least 12% loss of filled seed is predicted. If 15 or more infested cones are found, then 40% loss of filled seed is predicted. If fewer than 9 of 20 cones are infested, dissect another 10 cones and reference Table 1 again. Continue dissecting conelets in bunches of 10 until the cumulative number of infested conelets per number of

conelets dissected corresponds to ≤8%, 12-35% or ≥40%. Dissect a maximum of 100 cones. If the cumulative number of infested conelets does not fall into one of the damage classes, you can predict crudely the percentage of seed loss as follows:

$$\% \text{ seed loss} = \% \text{ infested conelets} \times 0.69$$

Note: This sampling plan requires up to 1 day to complete, depending on the level of infestation.

Table:

Table 1. Sampling plan for predicting the percentage of seeds lost to *S. neanthracina* feeding on *P. glauca*.

No. cones dissected	Seed loss:	Cumulative no. cones with eggs or larvae				
		≤8%		12-35%		≥40%
20		-		7		≥18
30		0		8 - 12		≥25
40		≤2		10 - 18		≥31
50		≤3		11 - 25		≥37
60		≤5		13 - 31		≥43
70		≤6		14 - 37		≥49
80		≤8		16 - 43		≥55
90		≤9		17 - 49		≥61
100		≤11		19 - 55		≥68

Continue sampling (≤8% column)

Continue sampling (12-35% column)