Western Hemlock Looper

Lambdina fiscellaria lugubrosa (Hulst)
Lepidoptera: Geometridae

Shore, T. L. 1990. Recommendations for sampling and extracting the eggs of the western hemlock looper, *Lambdina fiscellaria lugubrosa* (Lepidoptera: Geometridae). Journal of the Entomological Society of British Columbia 87: 30-35.

Objectives: To compare methods of extracting eggs of *L. fiscellaria lugubrosa* from lichen and to determine the vertical distribution of eggs among crown levels on western hemlock.

Abstract: Western hemlock looper, *Lambdina fiscellaria lugubrosa* (Hulst), is an important defoliator of western hemlock, *Tsuga heterophylla* (Raf.) Sarg., and other conifers in the United States and Canada. Periodical damage generally occurs in mature or senescing stands, where defoliation results in growth reduction, top kill, and tree mortality. In interior forests of British Columbia, females oviposit on lichens present on western hemlock branches (Thomson 1958).

The efficiency of extracting *L. fiscellaria lugubrosa* eggs from 100 g samples of lichen using a hot water wash was compared to a 2% chlorine bleach extraction. The hot water extraction removed more eggs from the lichen than the bleach extraction in removing eggs. However, the hot water extraction kills the eggs while the bleach extraction does not. The bleach extraction was preferable if eggs were to be reared to measure levels of fertility or identify any parasites present.

No differences in egg densities were found among the lower, mid-, or upper crowns of western hemlock. Lichen samples from the lower crown provide good estimates of egg density and are more accessible than samples from higher portions of the crown.

Sampling Procedure: Use pole pruners to sample lichen-covered branches randomly from the lower crowns of western hemlock. Remove the lichen from the branches and extract the eggs of *L. fiscellaria lugubrosa* using either the hot water or chlorine bleach extraction, depending on the research objectives.

Hot water extraction: Weigh the lichen sample. Place the lichen in a 2-liter plastic container and cover completely with 100° C water. Agitate contents to loosen the eggs from the lichen. Strain the contents of the bucket through a 1000 micron sieve to remove the organic debris. Strain the water a second time through a 250 micron sieve to collect the eggs. Repeat the hot water extraction using the organic debris remaining in the first sieve. Finally, rinse the contents of the 250 micron sieve into a glass jar. Use vacuum filtration to extract the eggs from the rinsate onto filter paper. Count the number of eggs present using a dissecting microscope. Express egg density as the total number of eggs collected in the initial weight of the lichen sample (usually a 100 g sample). Refer to Table 1 to classify eggs as healthy, parasitized, infertile, or old using egg color.

Chlorine bleach extraction: Weigh the lichen sample. Pull lichens apart and place in a 2-liter plastic container. Cover the lichen completely with a solution of 2% chlorine bleach. Agitate the container mechanically for 45 minutes at the lowest possible setting to loosen eggs from the lichen. Strain the contents of the bucket through a 1000 micron sieve to remove the organic debris. Strain the bleach solution a second time through a 250 micron sieve to collect the eggs. Repeat the bleach extraction using the organic debris remaining in the first sieve. Rinse the second sieve with tap water for 10 minutes to remove all traces of bleach. Finally, rinse the contents of the 250 micron sieve into a glass jar. Use vacuum filtration to extract the eggs from the rinsate onto filter paper. Count the number of eggs present using a dissecting microscope. Express egg density as the total number of eggs collected in the initial weight of the lichen sample (usually a 100 g sample). Eggs can be reared on moistened filter paper at 0°C for two months followed by 20°C until hatch to determine viability and parasitism, or refer to Table 1 to classify eggs as healthy, parasitized, infertile, or old using egg color.

References:

* Otvos, I. S.; Bryant, D. G. 1972. An extraction method for rapid sampling of eastern hemlock looper eggs, *Lambdina fiscellaria fiscellaria* (Lepidoptera: Geometridae). Canadian Entomologist 104: 1511-1514.

Thompson, M. G. 1958. Egg sampling for the western hemlock looper. Forestry Chronicle 34: 248-256.

Table

Table 1. Color characteristics of western hemlock looper egg types removed from lichen by the bleach or hot water methods

Type of egg	Bleach Method[1]	Hot water method
Healthy	Brown	Bronze
Parasitized	Black	Black
Infertile	Green	Yellow
Old	Opaque	Opaque

[1]From Ovtos and Bryant (1972).