

Eastern Hemlock Looper

Lambdina fiscellaria fiscellaria (Guenée)

Lepidoptera: Geometridae

Hébert, C.; St. Jobin, L.; Auger, M.; Dupont, A. 2003. Oviposition traps to survey eggs of *Lambdina fiscellaria* (Lepidoptera: Geometridae). *Journal of Economic Entomology* 96: 768-776.

Objective: To develop an oviposition trap for *L. fiscellaria* that could be used to monitor populations and detect outbreaks.

Abstract: Hemlock looper, *Lambdina fiscellaria* (Guenée), is an important native defoliator of balsam fir [*Abies balsamea* (L.) Mill.], hemlock (*Tsuga* spp.), and white spruce [*Picea glauca* (Moench) Voss] in eastern USA and Canada. Young larvae feed on a variety of hosts but have greater survival on young balsam fir needles. Older larvae feed indiscriminately. Periodical damage in balsam fir stands generally produces defoliation, growth reduction, and tree mortality. Outbreaks of *L. fiscellaria* build and subside quickly, but tree mortality can occur during the first year damage is found.

Egg density in a known volume of bark, epiphytic lichens, and moss or on 1-m branch samples has been used to monitor populations of *L. fiscellaria*, but these methods require an extraction process to remove and collect the eggs from the substrate (Otvos & Bryant 1972; Dobesberger 1989; Shore 1990). The use of an artificial substrate as an oviposition trap was explored for *L. fiscellaria* in Québec, Canada. White polyurethane foam, alone or in conjunction with a Luminoc® light trap (Comlab Inc., Québec City, Québec, Canada), was an attractive substrate for female *L. fiscellaria* and facilitated the determination of egg density without a time-consuming extraction process. Furthermore, these traps are not influenced by the presence of epiphytic lichens that occur in varying amounts on the 1-m branch samples and influence *L. fiscellaria* oviposition. The modified light-trap can detect increases in *L. fiscellaria* populations while populations are still at very low densities. The passive foam strips offer the advantage of being inexpensive and very easy to install.

Sampling Procedure: Modified light trap: Wrap white polyurethane foam around a drainage cylinder (10 cm diam. x 27.5 cm long). Cut two vertical rows of three 5-cm diameter holes through the foam and the cylinder wall. Place a 10 x 30 cm strip of white foam inside the cylinder. Modify the housing of a Luminoc light trap by cutting away part of the bottom section. Attach the drainage cylinder to the bottom of the modified light trap. Moths attracted to the light trap should be able to freely enter the drainage cylinder through the two vertical rows of holes. Hang light traps with attached cylinders on balsam fir branches 3-4 m above ground. Install traps in early August before the female flight period begins and operate through the oviposition period, removing the traps in mid-October. Light traps should run throughout the night. Replace the 6-V batteries after 2 weeks to ensure that traps remain operational.

Passive oviposition trap: Staple the top of a 20 x 45 cm strip of white polyurethane foam directly to a tree trunk at breast height. The 20 cm bottom edge should be free to allow females to oviposit on the underside of the foam strip. Install traps before the female flight period begins and leave in place through the oviposition period.

At the end of the trapping period, remove the white foam from either the modified light trap or from tree trunks and examine on a light table. Classify eggs as follows and tally the number of eggs in each state:

| Egg state | Description |
|-------------|--|
| Unhatched | Brown, intact |
| Hatched | Translucent chorion with hole at operculum |
| Parasitized | Black and intact, or mostly empty chorion with a dark spot and a hole at operculum |

Land managers can use these methods to monitor *L. fiscellaria* over multiple years and detect population changes before an outbreak. Eggs collected on the foam can be reared for study in the laboratory, unlike eggs that are extracted using hot water or bleach solutions.

Notes: The authors did not recommend a specific number of foam strips to use on each tree or the number of traps to install in each plot. Traps in this study were set on transect lines through plots with ≤ 40 m between traps.

References:

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