Western Hemlock Looper
Lambdina fiscellaria lugubrosa (Hulst)
Lepidoptera: Geometridae

Objectives: To test the efficacy of three types of burlap traps in capturing pupating *L. fiscellaria lugubrosa* larvae; to validate trap capture as a predictor of population density.

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.

Burlap bands are used to collect *L. fiscellaria lugubrosa* pupae, but trap catches have not been validated as an estimator of population densities. In 1993 and 1994, three types of burlap traps with different designs were tested in British Columbia to evaluate trap efficiency in capturing pupating larvae. Traps varied in the number of folds and type of pockets in the burlap material.

Trap capture in a commercially available burlap trap folded once was related positively to *L. fiscellaria lugubrosa* population density. A pooled regression model based on data from three locations was developed to relate the number of pupae caught in a trap to the pupal counts recorded from a 30 cm x 40 cm area of bark on nearby trees:

$$\text{Log}_e(y + 1) = 0.6199\log_e(x + 1)$$

where x = the number of pupae per 100 cm^2 of burlap trap surface area and y = the pupal counts from a 30 cm x 40 cm area of bark of a nearby tree. This model showed a reasonable fit of r^2 = 0.79 (MSE = 0.0079, n = 90) for the pooled data, indicating that trap capture was a good estimator of actual population density.

Sampling Procedure: Traps are commercially available burlap bands (1-m wide) folded over once with the fold located at the bottom of the trap and the opening oriented towards the canopy. Install burlap traps by wrapping once around the trunk at 1.3 m above ground. Study details, including plot characteristics and the pupal sampling procedure, are described in Liang (1997). Express pupal density as the

number of pupae per 100 cm^2 of trap surface area. Use the following formula to estimate the actual population of *L. fiscellaria lugubrosa*:

$$Log_e(y + 1) = 0.6199log_e(x + 1)$$

where x = the number of pupae captured in a burlap trap and y = the pupal counts from a 30 cm x 40 cm area of bark.

Reference:

Liang, Q. 1997. Sampling methods and population prediction in *Lambdina fiscellaria lugubrosa,* in British Colombia. Ph.D. thesis, University of British Colombia, 176 pp.