

Gypsy Moth

Lymantria dispar (L.)

Lepidoptera: Lymantriidae

Liebhold, A.; Twardus, D.; Buonaccorsi, J. 1991. Evaluation of the timed-walk method of estimating gypsy moth (Lepidoptera: Lymantriidae) egg mass densities. *Journal of Economic Entomology* 84: 1774-1781.

Objective: To compare the timed-walk method of estimating egg mass densities of *L. dispar* against estimates in fixed-radius plots.

Abstract: Gypsy moth, *Lymantria dispar* (L.) is an important defoliator of numerous hardwoods. Defoliation reduces tree growth and vigor, and, in combination with other stress factors, can cause excessive tree mortality. Populations are spreading from an initial accidental introduction at Medford, MA, around 1868, throughout northeastern USA and neighboring Canada.

Population monitoring of *L. dispar* would benefit from sampling methods requiring limited labor and time. Eggen and Abrahamson (1983) recommended using a timed-walk method of estimating egg mass densities, where all visible egg masses are tallied on a 5-min walk through a plot. Egg mass densities are then predicted from the timed observations using linear regression. This technique has been criticized for several problems, including unspecified criteria for classifying population levels of *L. dispar*, unaddressed observer bias, and limited data collection for the development of the regression models used with this technique (Ravlin et al. 1987).

A study was conducted in the Mid-Atlantic region of the USA to compare the statistical feasibility of a timed-walk method (Eggen and Abrahamson 1983) against a sampling method using a fixed-radius plot (Wilson and Fontaine 1978). A single fixed-radius plot provided a more precise estimate of *L. dispar* egg mass densities than conducting \leq four 5-min. walks when populations were at $<1,500$ egg masses per 0.40 hectare, which would encompass the thresholds for control decisions in most management programs for *L. dispar*. Both methods took ≈ 20 min. to conduct. The greater precision offered by using 0.01 ha fixed-radius plots offsets the effort needed to set up the plots and sample them.

Sampling Procedure: Use sequential sampling plans developed for estimating *L. dispar* egg mass densities in fixed-radius plots with known precision levels (Fleischer et al. 1991, 1992; Kolodny-Hirsch 1986). If using timed walks to sample *L. dispar*, each observer should be calibrated to account for observational bias, spatial variation in egg mass densities, and differences in terrain across the landscape. This can be done by first estimating egg mass densities with a more precise fixed-radius or variable-radius plot sampling procedure, but the effort would be greater than simply using a fixed-radius plot in the first place.

Note: See the original publication for a complete description of the statistics used to compare the timed-walk and fixed-radius plot sampling methods.

References:

Eggen, D.; Abrahamson, L. P. 1983. Estimating gypsy moth egg mass densities. Misc. Publ. No. 1, ESF 83-002. Albany, NY: State University of New York, College of Environmental Science and Forestry; 28 p.

* Fleischer, S. J.; Ravlin, F. W.; Reardon, R. C. 1991. Implementation of sequential sampling plans for gypsy moth (Lepidoptera: Lymantriidae) egg masses in eastern hardwood forests. *Journal of Economic Entomology* 84: 1100-1107.

* Fleischer, S. J.; Carter, J.; Reardon, R.; Ravlin, F. W. 1992. Sequential sampling plans for estimating gypsy moth egg mass density. NA-TP-07-92. Morgantown, WV: U.S. Department of Agriculture, Forest Service, Northeastern Area; 12 p.

* Kolodny-Hirsch, D. M. 1986. Evaluation of methods for sampling gypsy moth (Lepidoptera: Lymantriidae) egg mass populations and development of sequential sampling plans. *Environmental Entomology* 15: 122-127.

Ravlin, F. W.; Bellinger, R. G.; Roberts, E. A. 1987. Gypsy moth management programs in the United States: status, evaluation and recommendations. *Bulletin of Entomological Society of America* 33: 90-98.

* Wilson, R. W. Jr.; Fontaine, G. A. 1978. Gypsy moth egg mass sampling with fixed and variable radius plots. Agric. Handb. 523. Washington, DC: U.S. Department of Agriculture; 46 p.