

Gypsy Moth

Lymantria dispar (Linnaeus)

Lepidoptera: Lymantriidae

Carter, J. L.; Ravlin, F. W. 1995. Evaluation of binomial egg mass sampling plans for low density gypsy moth populations in continuously forested habitats. *Journal of Economic Entomology* 88: 890-896.

Objective: To develop a useful binomial sampling method for estimating low density populations of *L. dispar*.

Abstract: The gypsy moth was introduced into Medford, Massachusetts in 1869, and is now a major defoliator of hardwoods throughout the northeastern USA and Canada. Defoliation reduces tree growth and vigor, and in combination with other stress factors can cause excessive tree mortality. The use of binomial sampling for low-density (<618 egg masses per hectare) populations was examined. Fixed- and variable-radius plot egg mass samples were also collected at 28 locations (Wilson and Fontaine 1978). A model was fit to the egg mass density and the proportion of trees with zero egg masses. Binomial sampling plans were developed for sample sizes of 9, 16, 49, and 98 and compared with fixed- and variable-radius plot samples.

The binomial method was more efficient than the fixed- and variable-radius plot methods; however, the precision of sample sizes was unacceptable. Binomial sampling was not an effective sampling method for low density populations of *L. dispar*.

Sampling Procedure: The fixed- and variable-radius sampling unit consists of variable-radius plot (BAF 20) for sampling overstory trees and a fixed-radius plot of 20 m² for sampling understory plants. The technique is described in detail by Wilson and Fontaine (1978).

Binomial sampling is an efficient sampling technique whereby the presence or absence of an insect is used to estimate population density. The plan is based on the relationship between the proportion of trees (P_T) with zero egg masses and the population mean. Once the relationship is established, a population mean can be estimated efficiently for any observed value of $P_T = 0$. Binomial sampling significantly reduced the amount of time required for sampling *L. dispar* egg masses. However, the high variability associated with this technique outweighs any savings in time. The continued use of the fixed- and variable-radius plot method (Wilson and Fontaine 1978) for sampling low-density populations is recommended.

Reference:

- *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.