Gypsy Moth

Lymantria dispar (Linnaeus)
Lepidoptera: Lymantriidae

Buss, L. J.; McCullough, D. G.; Ramm, C. W. 1999. Comparison of three egg mass survey methods in relation to gypsy moth (Lepidoptera: Lymantriidae) defoliation in Michigan. *Environmental Entomology* 28: 485-495.

Objectives: To compare and contrast three egg mass survey methods (fixed-radius plots, timed walks, and 100-tree plots); and to correlate each of these methods with defoliation levels.

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. Fixed-radius plots, timed walks, and a 100-tree plot were used to assess egg mass density and predict defoliation levels in oak, *Quercus* spp., stands. Egg mass counts from the fixed-radius plot and 100-tree plot methods were correlated positively with subsequent defoliation, but timed walks were not. Treatment decisions based on fixed-radius plots and timed walks were similar. However, the 100-tree plot method yielded fewer erroneous classifications. All stands that sustained greater than 30% defoliation had greater than 84% new egg masses and a density of at least 6,583 egg masses per hectare.

Sampling Procedure:

Fixed-radius plots: Examine all trees within a circular 100-m^2 plot for egg masses, scanning the entire tree with binoculars. Logs and large branches should be overturned in search of egg masses. The average time needed to conduct the sample is 18.1 min.

Timed walks: Choose a random direction and starting point to establish a transect, and tally the number of egg masses along that transect for 5 min. Repeat the count along the transect back to the starting point and calculate the mean. The average time needed to conduct the sample is 10 min.

100-tree plots: Begin at plot center and walk in a circular path of increasing diameter until 100 trees (>4 cm d.b.h.) have been examined. Count the number of new egg masses on the lower 2 m of each tree bole, measuring the length along the longest axis of the first 10-15 egg masses encountered and computing the mean. To determine the ground area of each 100-tree plot, add the N-S and E-W radii, and then multiply to determine the area of each 100-tree plot. Allow 30 minutes to collect the sample. This method is most

accurate at predicting defoliation levels and is, therefore, recommended for use.

A two-step protocol has been developed for decision-making based on the 100-tree plot. Control is recommended if the mean number of new egg masses per tree is greater than 2.0, and not recommended if this value is less than 0.2. When the mean is between the two values, use the following equation:

Defoliation class = 0.458 * %Oak + 0.744 * *EML* + 0.432* *ratio*

where, *EML* is the mean length of new egg masses (inches) and *ratio* is the ratio of new to old egg masses ((new egg masses + 10)/ (old egg masses + 10)). A defoliation class of 2 represents 37.5% defoliation and is used as the decision cutoff for recommending control.

Note: Defoliation classes and subsequent control recommendations are based on the number of new egg masses.