

# PREDICTING DEFOLIATION BY THE GYPSY MOTH USING EGG MASS COUNTS AND A *HELPER* VARIABLE

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## ABSTRACT

Traditionally, counts of egg masses have been used to predict defoliation by the gypsy moth. Regardless of the method and precision used to obtain the counts, estimates of egg mass density alone often do not provide satisfactory predictions of defoliation. Although defoliation levels greater than 50% are seldom observed if egg mass densities are less than 600 per hectare (250/acre), data from Melrose Highlands and the Intensive Plot System (IPS), as well as recent data from New Jersey and Pennsylvania, reveal that egg mass densities above this "threshold" result in damaging defoliation in less than 50% of the observations.

The accuracy of defoliation predictions can be greatly helped by including measures of the habitat and quality of the population in the predictive function. Using data from the IPS, several measures of habitat, i.e., site index, stand basal area, % oak in the site, and soil moisture class, improved predictions. An index of soil moisture (scores of 1-4) obtained from SCS maps was most helpful. Measures of population quality that were helpful included fecundity, vertical location of the egg mass, and incidence of viral infection in larvae emerged from an egg mass.

Instead of providing complex models that need to be solved to obtain a prediction of defoliation level, the models were used to construct an isogram of 60% predicted defoliation for each soil class across a range of egg mass densities and population quality. The example given shows that >60% defoliation occurred in only 9 of the 38 cases where egg mass density was above 250 EM/acre (dashed line). The isogram shows how using egg mass location in conjunction with density can greatly increase accuracy of defoliation predictions; it correctly classified 34 of the 38 cases where density was above 250 egg masses/acre. This illustrates how the accuracy of gypsy moth defoliation predictions can be improved when information on habitat and population quality is used along with estimates of population density.

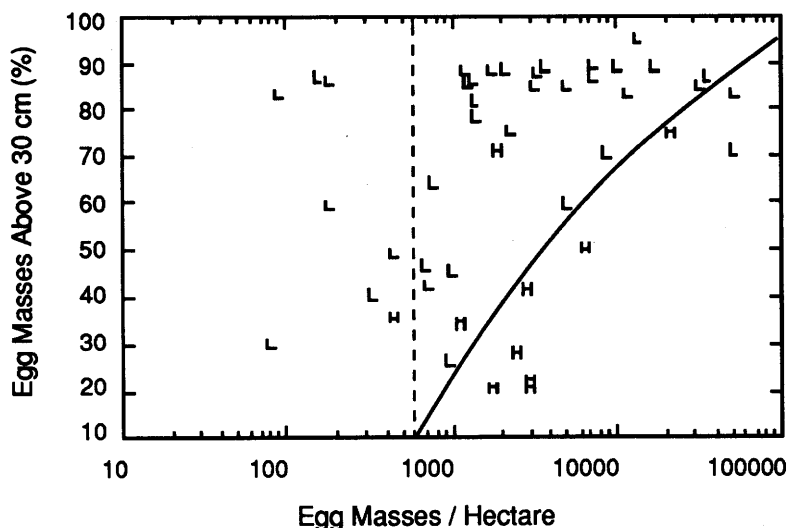


Figure 1. Actual observations of < 60% (L) and > 60% (H) defoliation on a dry site. The dashed line is a typical suppression-action threshold and the solid line is the prediction of 60% defoliation for dry sites.