Douglas-Fir Tussock Moth

Orgyia pseudotsugata (McDunnough)
Lepidoptera: Lymantriidae

Shepherd, R. F.; Otvos, I. S.; Chorney, R. J. 1984. Pest management of Douglas-fir tussock moth (Lepidoptera: Lymantriidae): a sequential sampling method to determine egg mass density. *Canadian Entomologist* 116: 1041-1049.

Objectives: To develop a method of assessing tussock moth egg mass density rapidly within non-defoliated stands; and to predict if significant damage will occur the following year.

Abstract: The Douglas-fir tussock moth is a major defoliator of Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco, and true firs, *Abies* spp., in western North America. Defoliation can often be severe and cause tree mortality during the first year of defoliation. Outbreaks erupt suddenly and often synchronously in patches over large forested areas. To reduce losses, early warning of potential outbreaks are necessary to schedule control operations.

A sequential egg mass sampling system, based on visual scanning of the lower branches of Douglas-fir, was designed. No consistent trend in egg mass density per branch could be found among crown levels, and no level proved superior as a representative of the whole tree. Therefore, the lower whorl of branches was selected for survey purposes because of sampling efficiency. The sampling system is designed to assess egg mass density rapidly within non-defoliated stands and predict defoliation levels for the following year.

The number of egg masses on three lower branches on each of 20 trees is examined, and a sequential graph is referenced (Fig. 2). As samples are taken, the cumulative number of egg masses is plotted over the number of trees sampled. Sampling continues until a decision is met and defoliation is predicted as none or little (0-0.7), noticeable (0.7-2.0), or severe (≥2.0 egg masses per three branch sample).

Sampling Procedure: Autumn egg mass surveys provide the basis for a rough estimate of defoliation the following year since there is considerable loss of egg masses during winter and early spring. However, this plan can be used as a tool to determine the potential of an outbreak. Its main advantage is the efficiency at which egg mass densities can be estimated, and the amount of advanced notice available for scheduling control programs over conventional sampling techniques.

Determine if egg masses are present, and then make a circuit to locate the center and extent of the infestation. Count the number of egg masses on three lower branches on each of 20 trees. Reference the sequential graph to

determine the upper and lower stop sampling lines, representing the number of samples required to determine the density within 20% of the true mean 95% of the time (Fig. 2). As samples are taken, the cumulative number of egg masses is plotted over the number of trees sampled. At the point of crossing an upper or lower stop sampling line, a population estimate can be made. If the total number of egg masses found is ≤4 or ≥40, stop sampling and calculate the average number of egg masses per tree. If the total number of egg masses is 5-39, sampling continues until a decision is met and defoliation is predicted as either none or little, noticeable, or severe.

Notes: This system is designed as an early detection tool to predict potential outbreaks in non-defoliated stands with branches low enough for visual observation of egg masses. Please refer to our review of Shepherd and others (1985) for more detailed information on defoliation classes.

Reference:

*Shepherd, R. F.; Otvos, I. S.; Chorney, R. J. 1985. Sequential sampling for Douglas-fir tussock moth egg masses in British Columbia. Joint Rep. 15. *Canadian Forest Service, Pacific Forest Research Centre*. 7 p.

Figure:

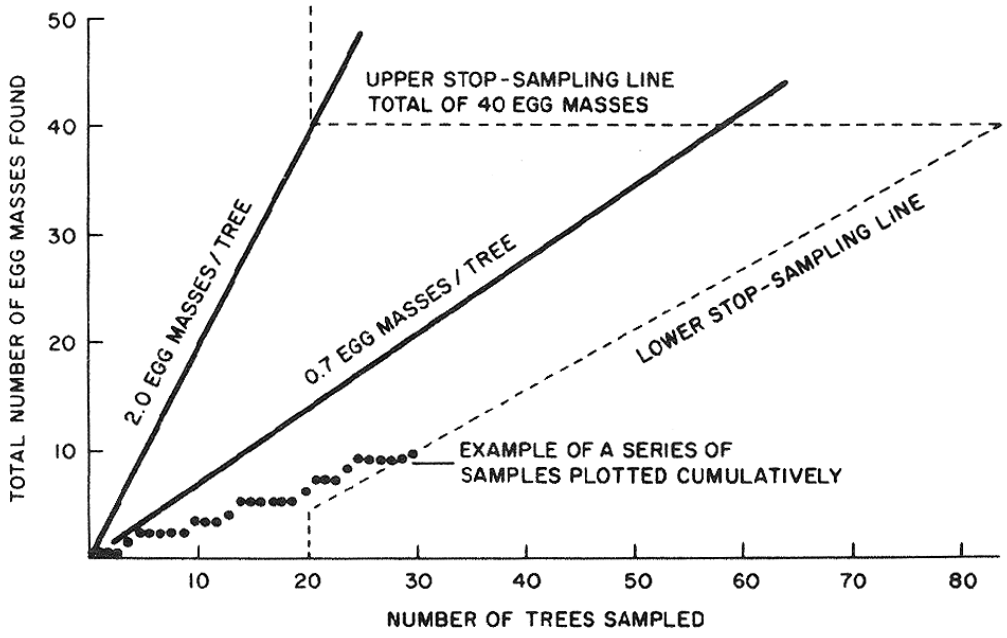

Fig 2. Stop-line of cumulative number of egg masses to be sampled when the density estimate is to be within 20% of the true mean, 95% of the time.

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