Douglas-Fir Tussock Moth

Orgyia pseudotsugata (McDunnough)
Lepidoptera: Lymantriidae

Shepherd, R. F. 1985. Pest management of Douglas-fir tussock moth: estimating larval density by sequential sampling. *Canadian Entomologist* 117: 1111-1115.

Objective: To determine densities of early instar larvae of *O. pseudotsugata* with known precision.

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. A sequential sampling system for estimating early instar larval density within 20% of the mean 95% of the time is presented. The system was used to measure lower crown densities equivalent to 4.3-130 larvae per square meter at mid-crown as part of an assessment system for control decision-making.

The number of larvae per three branch sample was determined and compared with the sequential sampling plan. Sampling was continued until a decision was met (Table 1). Above the upper stop-sampling line, noticeable defoliation is expected. Below the lower stop-sampling line, the larval density is at least one generation away from causing noticeable defoliation. A minimum of 10 trees was sampled before a decision was met.

Sampling Procedure: Incipient outbreaks are initially detected by sampling low level larval densities (Mason 1977) or by pheromone trapping and scouting for egg masses (Shepherd and others 1984). Once an infestation is located, select three branches randomly from each of 10 trees per plot, and beat the terminal portions over a 60 by 90-cm canvas trap to dislodge larvae. Record the number of larvae per sample. Sampling should coincide with an abundance of first and second instar larvae, and before new foliage has begun to change color. After 30 samples (10 trees), reference the sequential sampling plan (Table 1), and continue sampling until a decision is made. Larval populations will be classified as capable of producing noticeable defoliation or at least one generation away from causing noticeable defoliation.

Note: This system is designed to be used in stands that were not defoliated previously. The relationship between lower and mid-crown densities is discussed.

References:

*Mason, R. R. 1977. Sampling low-density populations of the Douglas-fir tussock moth by frequency of occurrence in the lower tree crown. Res. Pap. PNW-216. Portland, OR: *U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station*; 8 p.

*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.

Table:

Table 1. Densities of Douglas-fir tussock moth larvae where sampling is discontinued. A density below the lower stop-sampling line indicates that the larval density is at least 1 generation away from causing noticeable defoliation.

	Stop sampling when cumulative number of larvae is equal to or	
No. of trees	Less than	More than
10	17	68
12	23	64
14	29	61
16	35	59
18	41	58
20	47	57
22	53	56
24	59	55

Table 1 reprinted with permission from the Canadian Entomologist, January 15, 2001.