Jack Pine Budworm

Choristoneura pinus pinus Freeman
Lepidoptera: Tortricidae

Nealis, V. G.; Lomic, P. V. 1996. Forecasting defoliation by the jack pine budworm. Frontline Tech. Note No. 91. Sault Ste. Marie, Ont.: Natural Resources Canada, Canadian Forest Service; 4 p.

Objective: To describe an improved method of forecasting defoliation by *C. pinus pinus* in individual stands.

Abstract: Jack pine budworm, *Choristoneura pinus pinus* Freeman, is a native, periodically significant defoliator of jack pine, *Pinus banksiana* Lamb., in North America. Prior to this effort, defoliation assessments for jack pine budworm had been adapted from those used for the spruce budworm, *Choristoneura fumiferana* (Clemens). However, surveys that related egg and/or overwintering larvae densities to subsequent defoliation by spruce budworm were inaccurate for predictions of jack pine budworm defoliation. This method was improved by including estimates of jack pine pollen cone abundance, an important food source for the survival of young jack pine budworm larvae.

A prediction model was developed whereby estimates of egg mass and/or pollen cone density are used to predict defoliation level. The model was tested against 35 independent data sets and was found to be 77% accurate if using the lowest defoliation class (30% needles consumed) and 89% accurate at the highest defoliation class (>75% needles consumed). This level of accuracy was deemed acceptable for forecasting of budworm defoliation by monitoring and/or for suppression projects. Egg mass sampling can also be combined with defoliation and/or pollen cone surveys to save time and handling of foliage.

Sampling Procedure: Sample egg masses in August and September. Pollen cones can be sampled from October through April, but sampling in fall or winter provides more time to implement control tactics than sampling in the spring.

To sample either egg masses or pollen cones, randomly sample a 1-m terminal branch from the midcrown of six randomly chosen jack pines in a stand. Count the total number of egg masses and pollen cones (microstrobili) on the branch samples. Log ($\log_{10}$) transform each estimate, then use them in the following equation to estimate the density of feeding jack pine budworm larvae per 100 shoots (N_{t+1}):

$$N_{t+1} = \frac{10^{(1.31*EGG+0.70)}}{10^{(-.60*CONE+0.94)}}$$

where N_{t+1} is the estimated number of feeding larvae per 100 shoots, EGG is the $\log_{10}$ density of egg masses per 1-m branch sample, and CONE is the $\log_{10}$ density of pollen cones per 1-m branch sample.

Compare the density estimate to the following density thresholds that coincide with estimated levels of defoliation.

Budworm density per 100 shoots	Defoliation
>6.1	>30%
>16.8	>50%
>55.2	>75%

Defoliation can be assessed from the same 1-m branches sampled for egg masses and/or pollen cone assessments. Defoliation is usually estimated from one 1-m branch sample taken from 6-10 trees.

Defoliation	Percentage current-year shoots removed
light	<25%
moderate	25–75%
severe	>75%

Notes: Obviously sampling for feeding budworm larvae provides a reasonably accurate estimate of defoliation potential (see Fig. 2 in original publication; r^2 = 0.62). However, sampling for feeding larvae is time consuming and tedious. Moreover, larval samples must be made in late spring, which does not give managers sufficient lead-time to implement control tactics.