

Spruce Budworm

Choristoneura fumiferana (Clemens)

Lepidoptera: Tortricidae

Moody, B. H.; Otvos, I. S. 1980. Distribution of hibernating spruce budworm larvae within crowns of balsam fir trees in Newfoundland. Information Rpt. N-X-182. St. John's, Newfoundland: Environment Canada, Forestry Service, Newfoundland Forest Research Centre; 21 p.

Objective: To determine the appropriate crown level for sampling *C. fumiferana* larvae overwintering in balsam fir trees.

Abstract: Spruce budworm, *Choristoneura fumiferana* (Clemens), is the most destructive defoliator of balsam fir, *Abies balsamea* (L.) Mill., and white spruce, *Picea glauca* (Moench) Voss, in eastern North America. The last three larval instars cause most of the defoliation. Periodic outbreaks occur every 30 years, while epidemics can last 5-10 years.

Estimates of second instar *C. fumiferana* are used to predict the risk of defoliation the subsequent year. A study was carried out in two stands of immature balsam fir in Newfoundland to determine the distribution pattern of overwintering second instars. The results indicated that a high proportion of larvae hibernated in the mid-crown of balsam fir, which is the most appropriate sampling universe for this larval stage. Only 5 and 18% of the second instars were found on the main stem and internodal branches, respectively. Entire nodal (whorl) branches cut at 2.5 cm from the trunk should be sampled, as only 36% of the larvae found on branches from the mid-crown occurred within the apical 45 cm of the branch. Sampling efficiency, expressed as coefficients of variation, were lower for the upper and middle crowns than the lower crown.

Sampling Procedure: Randomly select and remove whole nodal branches from the mid-crown of balsam fir. Branches should be cut 2.5 cm from the trunk. Count and record the number of second instars on the entire branch. The branch surface area (calculated as the total length of branch X the width at half the total length) should be determined if larval density is to be expressed on a per-hectare basis. Either measure all sampled branches or subsample a smaller number of branches to estimate a mean branch area for each plot.

Notes: This study is based on 5 randomly selected immature balsam firs from two locations in Newfoundland. As such, the distribution of second instar *C. fumiferana* reported by the authors may not represent distribution of instars on other host trees or in other regions in North America. The authors did not suggest how many branches should be removed from each tree for practical sampling, but they selected two branches from the mid-crown for their study.