

## Jack Pine Budworm

*Choristoneura pinus* Freeman

Lepidoptera: Tortricidae

Foltz, J. L.; Knight, F. B.; Allen, D. C.; Mattson, W. J., Jr. 1968. A technique for sampling populations of the jack-pine budworm. *Forest Science* 14: 277-281.

**Objective:** To provide a method of sampling *C. pinus* populations in all life stages except the adult stage.

**Abstract:** The jack pine budworm is an important pest of jack pine, *Pinus banksiana* Lamb., and to a lesser extent red pine, *P. resinosa* Ait., in the Great Lake region and Canada. Extensive top kill is common during outbreaks, but tree mortality is rare unless infestations coincide with periods of drought.

Larvae and pupae of *C. pinus* are more prevalent near branch tips and may be concentrated in one crown level. For this reason, a sampling method of estimating population density consists of counting the number of budworms and shoot tips on the first 91 cm of two branches from the mid-crown, and two branches from the lower crown. The number of budworm on a whole branch ( $Y_{1,2}$ ) was related positively to the average number of budworm found on 100 branch tips ( $X$ ) in low ( $Y_1 = 0.52 X + 0.17$ ,  $R^2 = 0.61$ ) and high ( $Y_2 = 1.00 X - 1.34$ ,  $R^2 = 0.99$ ) density populations.

**Sampling Procedure:** Collect and inspect 40 branches from a sample cluster of 10 trees per stand. Cut two distal 91-cm branch tips randomly from the mid-crown and two from the lower crown of jack pine. Count and record the number of budworms present in each sample. Express the population as the number of budworm per 100 tips ( $X$ ). The population density for the entire branch ( $Y_1$ ) is calculated by:

$$Y_1 = 0.52 X + 0.17 \text{ for low density populations}$$

$$Y_2 = 1.00 X - 1.34 \text{ for high density populations}$$

Use the first equation if  $X < 3.146$  and use the second equation if  $X > 3.147$ . The average density of the two branch sample is an estimate of the population density within the crown level. Use the number of tips per tree and the number of trees per ha to convert estimated populations densities for the entire branch ( $(Y_1 + Y_2)/2$ ) to the number of budworms per ha. To predict the number of tips per tree use the following equation:

$$\text{Log (tips per tree)} = 0.06269 (\text{crown diameter (ft)}) + 2.84186$$

**Notes:** Sampling is conducted in a relatively homogeneous stand of jack pine at least 4 ha in area. For statistics concerning the regression equations provided in this review, please consult the original publication.