



# MINNESOTA FORESTRY NOTES

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## PRELIMINARY STUDY OF GROWTH LOSSES IN MINNESOTA JACK PINE FOLLOWING DEFOLIATION BY THE BUDWORM<sup>1/</sup>

P. H. Jaquith, D.P. Duncan, H.M. Kulman, A.C. Hodson<sup>2/</sup>

Defoliation of jack pine (Pinus banksiana Lamb.) by the jack pine budworm (Choristoneura pinus Free.) may result in mortality, in top killing and in reduction in the rate of growth. To help evaluate the effects of defoliation on growth rate, a study of six matched pairs (each pair had one light and one medium defoliation tree) has been undertaken.

The trees studied were divided into two crown classes, progressive and regressive, and two defoliation classes, light and medium. Progressive trees are those in which crowns could be classed as dominant or co-dominant; regressive trees are those in which crowns were below the level of the progressive trees but not suppressed and still competing for light. Light defoliation consisted of from 20 to 50 per cent of the new growth damaged; medium defoliation consisted of 100 per cent of the new growth damaged and from 26 to 75 per cent of the old growth consumed.

The trees were defoliated in 1955 and the area was sprayed immediately after marking the trees according to the damage incurred. At this time the larvae were in the 4th and 5th instars. No further damage took place in 1955, 1956, and 1957. The trees used in this study were cut in the fall of 1957 after the completion of that year's growth. The pairs of trees used were matched as closely as possible for physical characteristics such as diameter, height, size and shape of crown, and location in the stand.

Each tree was sectioned at 3' intervals up the bole of the tree to a 4" top. On each sectional disc removed the average widths of the growth rings for the years 1952 through 1957 were determined. From these data and the radius of each tree after 1951, the cubic volume at the end of that year and of the growth for each year from 1952 to 1957 was computed.

Plotting volume of a tree over age will give a linear relationship in early stages of life and a gradual tapering off of the linear curve as the tree reaches maturity. The trees used in this study were young trees (30 years) so the volume age relationship should approach a straight line. External disturbances, such as defoliation, will result in deviation from the normal linear trend. This deviation resulting from defoliation when compared with the projected normal curve provides a visual estimate of the actual volume loss.

Figures 1 and 2 compare regressive and progressive trees. The assumed normal growth trend is a line extended for the years 1956 and 1957 on the basis of the relationship set up during the years 1951 through 1955. Comparison of the two curves, permits an estimate of the results of defoliation.

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<sup>2/</sup>Respectively, former Research Assistant and Associate Professor, School of Forestry; Research Assistant and Professor, Department of Entomology; University of Minn.  
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