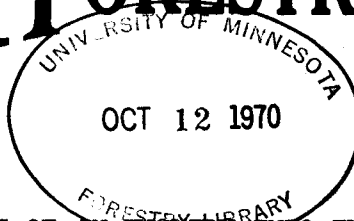


# MINNESOTA FORESTRY NOTES

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## PRELIMINARY OBSERVATIONS OF AN ~~INQUIRY~~ INTO THE EFFECTS OF THE DEFOLIATION OF JACK PINE BY THE JACK PINE BUDWORM

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The jack pine budworm, Choristoneura pinus, is the most important defoliator of jack pine in Minnesota. It feeds mostly on the new needles and staminate flowers, but when this food supply is exhausted it readily moves on to the old needles and may cause complete defoliation. In an effort to assess damage incurred, a study was initiated during the summer of 1956.

In an area near Brainerd, defoliated noticeably for the first time in 1956, twenty 1/50 acre plots were established. Ten were in an unsprayed area and 10 in an area sprayed during the third and fourth larval instars with an aerial application of DDT. The two areas were very similar with respect to tree size and composition. All trees over one inch DBH were tagged and records were taken for degree of defoliation, crown position, and density. A crown classification proposed by Gevorkiantz et al. (2) was used. Minor changes were made so as to emphasize the crown qualities important for the development of jack pine budworm populations. The crown classes used are progressive, provisional, regressive, suppressed, and open-grown.

The classification of defoliation intensities, shown in abbreviated form in the Table, was designed to take into account the feeding habits of the budworm and to include easily recognizable degrees of defoliation. For the purpose of this discussion the 457 trees examined have been grouped into light, medium, and heavy defoliation classes.

### Abbreviated classification of degrees of current year's defoliation of jack pine by the jack pine budworm.

General Defoliation Class	Percent new growth showing feeding damage	Percent old needles defoliated
light (L)	1-100	0-25
medium (M)	100	26-75
heavy (H)	100	76-100

As shown in Figure 1, which is a summary of the data collected at Brainerd, over 95 percent of the sprayed trees in the progressive and provisional classes are only lightly defoliated. In the suppressed

crown class there is no significant difference in the degrees of defoliation between the sprayed and unsprayed areas. In the unsprayed area there are highly significantly greater percentages of lightly defoliated trees than of the heavy defoliated trees in the progressive and provisional classes while in the regressive and suppressed classes this relationship is reversed.

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(2) Gevorkiantz, S. R., Paul O. Rudolf, and Paul J. Zehngraft. 1943. A tree classification for aspen, jack pine, and second growth red pine, Jour. of Forestry, 44:4, Apr. 1943.

In order to study the after-effects of defoliation, twenty 1/20 acre plots were established near Bemidji in an area that received a moderate defoliation in 1954, a heavy defoliation in 1955, and almost no defoliation in 1956. Ten of the plots were established in an area sprayed in the late larval instars in 1955 and again in 1956. Ten were established in an unsprayed area. A total of 663 trees were examined. Individual tree defoliation records for 1954 and 1955 are not available.

Damage was evaluated on the basis of crown injury resulting from previous defoliation. For this purpose the following damage classes were selected:

- Light (L) No more than 50 percent defoliation of any portion of the crown.
- Medium (M) From 51 to 80 percent of any portion of the crown defoliated.
- Heavy (H) From 81 to 100 percent of less than 2/3 of the crown defoliated.
- Very Heavy (VH) From 81 to 100 percent of more than 2/3 of the crown defoliated.

Figure 2, which is a summary of the data collected at Bemidji, shows that more than 85 percent of the trees in all crown classes in the sprayed area suffered only light damage. In the unsprayed area the proportion of lightly defoliated trees is smaller; however, the differences between light and medium damage classes are still highly significant. Individual ratings were not made for suppressed trees; however, severe defoliation of this class was observed. As Figure 1 represents 1956 defoliation and Figure 2 represents tree damage resulting from previous defoliation, there is no basis for comparison.

In summary, (1) spraying with DDT during the third and fourth larval instars materially reduced defoliation damage in all but suppressed crown classes; (2) in unsprayed areas, suppressed and regressive crown classes were much more heavily defoliated than were provisional and progressive; (3) in an area suffering one year of moderate and one year of heavy defoliation, a high proportion of trees showed only light damage the year following the heavy defoliation, although some trees showed severe damage; (4) spraying during late larval instars, in the area described in (3) above, uniformly reduced medium and heavy damage and increased the proportion of trees in light damage classes.

Plots will be re-examined in 1957. Defoliation and mortality observations will be made and, in addition, such items as radial growth, height growth, and rate of tree recovery will be measured. The relationship between insect abundance and defoliation will be given special attention.

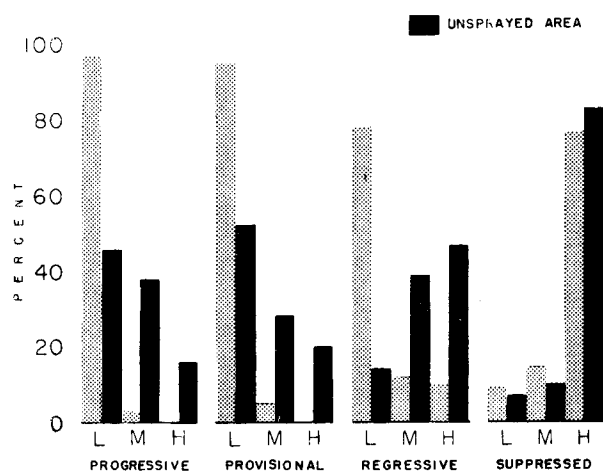


Figure 1. Brainerd. Jack pine budworm defoliation intensities in relation to crown class.

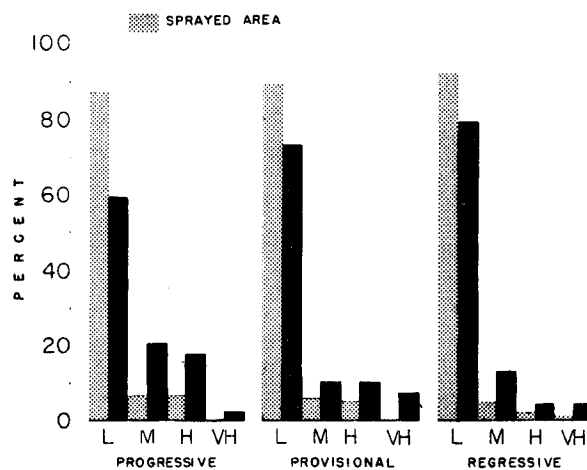


Figure 2. Bemidji. Damage resulting from defoliation by the jack pine budworm in relation to crown class.