



MINNESOTA FORESTRY NOTES



No. 31

July 15, 1954

PRELIMINARY RESULTS OF AN INQUIRY INTO EFFECTS OF DEFOLIATION OF ASPEN TREES BY THE FOREST TENT CATERPILLAR (1)

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The current outbreak of the forest tent caterpillar (Malacosoma disstria) has been much more extensive and severe than any preceding one of recent times, trees having been defoliated for 2 to 3 consecutive years over very large areas. At the present time the caterpillar population has been reduced to a low level by various natural control agents over most of the area infested during the past few years, but some heavy defoliation can be expected at least through 1955.

Aspen (Populus tremuloides), the tree species most subject to defoliation by the forest tent caterpillar, is of great economic importance to Minnesota. It is therefore important that the nature, extent and economic importance of damage which may result from such defoliation be determined and evaluated as a basis for deciding what control action, if any, should be initiated and how forest management practices might otherwise be affected.

The procedure followed in this study was to lay out sample plots in typical, undisturbed aspen stands within areas of known defoliation history and to gather stand, tree and entomological data on these plots. A total of 97 plots were established, 46 of which were completely diagrammed for future study. Figure 1 indicates the relative location of these plots.

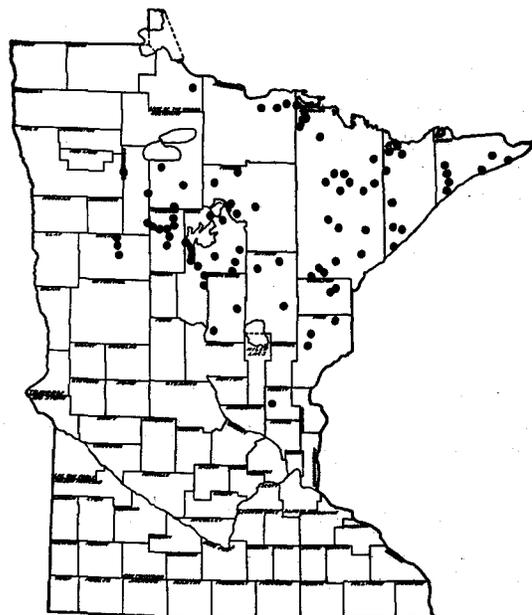


Fig. 1. Location of Aspen Defoliation Study Plots

(1) This study was made possible through a cooperative grant from the Office of Iron Range Resources and Rehabilitation, and the assistance of the State Entomologist and all of Minnesota's major forestry agencies.
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The major preliminary results of this inquiry follow:

1. No aspen tree was found whose death could be attributed solely to defoliation by the forest tent caterpillar.

2. The extent of aspen crown die-back attributed to damage by the forest tent caterpillar on heavily defoliated plots is set forth in the following table:

Defoliation history	Total no. plots	Plots with no crown die-back		Plots with crown die-back		Average per cent crown die-back by tree vigor-classes		
		No.	%	No.	%	High vigor	Medium vigor	Low vigor
Heavy, 1 yr.	41	32	80	9	20	2	8	8
Heavy, 2 yrs.	24	11	46	13	54	5	7	9
Heavy, 3 yrs.	8	3	38	5	62	14	16	25
- Total--	73	46	63	27	37			

General trends indicated in the above table are: 1) For each frequency of heavy defoliation aspen trees of low vigor exhibited more crown die-back than did trees of high vigor. 2) The per cent of crown die-back increased markedly from 1 year to 3 years of heavy defoliation in all tree vigor-classes.

3. A direct relationship exists between frequency and severity of defoliation and radial increment of sampled aspen trees affected. In general, the more severe and frequent the defoliation, the greater the reduction in radial growth. (See Fig. 2.)

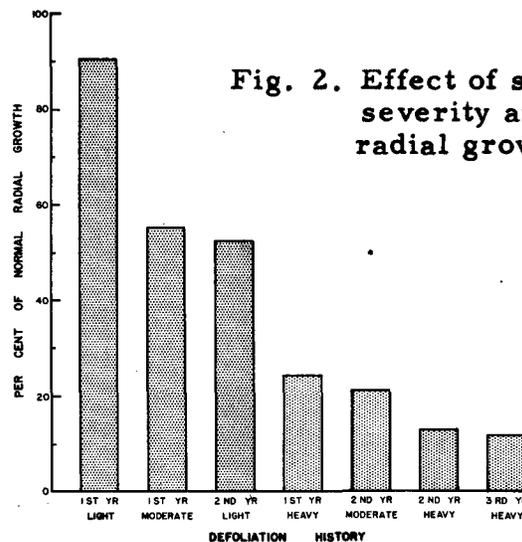


Fig. 2. Effect of stand defoliation severity and frequency on the radial growth of aspen trees.

It was further noted that defoliation of aspen trees by the forest tent caterpillar has an adverse effect on both radial growth and crown die-back that extends into succeeding non-defoliation years.

4. Observed differences in stand age, density and site characteristics, including slope, aspect and soil moisture condition appeared to have no marked influence on the results of defoliation of aspen stands by the forest tent caterpillar.

5. There is a possibility that effective control in the initial stages of a forest tent caterpillar outbreak might avert losses in growth ranging from 1.9 to 6.0 cords per acre of merchantable volume over a period of 4 years (3 years of defoliation and at least one additional year of subnormal radial growth) in fully-stocked, pure, even-aged aspen stands.