EFFECTS OF PREVIOUS STAND MANAGEMENT ON MORTALITY FOLLOWING GYPSY MOTH DEFOLIATION[1]

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Abstract.--The question of whether intermediate stand treatments and the timing of those treatments relative to the time of defoliation increases or decreases the vulnerability of those stands to the gypsy moth has been addressed. The primary objective was to determine if past management practices, especially thinnings, increases or decreases the mortality that occurs when these stands are subsequently defoliated by the gypsy moth. A secondary objective was to determine if the timing of such treatments relative to defoliation changes this mortality response. Study sites were selected on three adjoining forest districts in Central and South-Central Pennsylvania and Western Maryland in the Ridge and Valley province. Stands were identified as to type and timing of treatment through information available in the states' forest management records. Defoliation intensity and frequency were delineated using either infrared optical-bar photography or aerial sketch maps. Selected stands were then classified by defoliation history and time of silvicultural treatment. Each plot consists of a forest stand or management unit ranging from 10 to 90 acres.

Study design was a split block with time of treatment (uncut, 1-3, 4-6, 7-10, 10-15, >15 years predefoliation, and 1-3 years postdefoliation) as the main plot split by defoliation classes (defoliated or undefoliated). Defoliation frequency and site factors are covariants in the analysis. Orthogonal contrasts were used to test specific hypotheses. Each stand was sampled using variable radius plots. A minimum of 15 plots were taken in each stand with additional plots added as necessary to assure accuracy to within 10 percent of the mean. Data was recorded using SILVAH data collection protocol for all live and standing dead trees larger than one inch dbh. Two regeneration plots were recorded for each overstory plot. Stand summaries were computed using the SILVAH computer program (V. 2.3). Stand summary values were used as the variables in statistical analysis.

Preliminary analyses indicate significant differences in mortality (percent of basal area) between defoliation classes within treatment classes. Mortality levels were also highly significant between treatment classes within defoliation classes in all of the undefoliated stands but only in two classes within the defoliated stands. Mortality increased in direct response to the number of defoliations a stand experienced. Mortality was higher in the pole size class in undefoliated stands, while defoliated stands have greatest mortality in the medium and large sawtimber classes. Mortality in uncut, undefoliated stands averaged 12.1 percent, while undefoliated, thinned stands ranged from 3.6 to 7.2 percent. Mortality in uncut, defoliated stands averaged 30.9 percent, while defoliated, thinned stands ranged from 8.4 to 48.5 percent.

Reanalysis using defoliation frequency and intensity instead of thinning treatments resulted in a better explanation of the variation (>90 percent). Due to this confounding variable, additional stands will be measured in a factorial design of thinning treatments and defoliation classes to account for the confounding. Collection of additional data will be completed in 1988, pooled with the previous data, and new analysis conducted. The results have direct bearing to the timing and application of thinnings to oak stands in relation to gypsy moth defoliation.

Keywords: oak-hickory forest type, thinning, tree mortality, *Lymantria dispar* L.

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