

MANAGING FORESTS FOR GYPSY MOTH (*LYMANTRIA DISPAR* L.) USING SILVICULTURE: TESTING THE EFFECTIVENESS OF SILVICULTURAL TREATMENTS IN REDUCING DEFOLIATION AND MORTALITY

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Abstract—Invasion of eastern forests by the exotic insect, gypsy moth (*Lymantria dispar* L.), has resulted in widespread defoliation and subsequent tree mortality. Disturbance from these factors varies widely across the landscape; some stands have little or no mortality while other stands have almost complete mortality. With average mortality rates of 25 to 35 percent, silvicultural treatments have been proposed as an alternative to insect suppression treatments to minimize gypsy moth effects. Study objectives were: 1) to evaluate the effectiveness of two silvicultural treatments (presalvage and sanitation thinnings) in minimizing gypsy moth effects on forests; and 2) to determine the mechanisms involved in silviculture-gypsy moth interactions. Only the first objective will be addressed in this presentation.

METHODS

Sanitation thinnings have as their primary objective to reduce the susceptibility of the stand to gypsy moth defoliation. The thinning treatment achieves this objective through manipulation of the species composition; reducing the preferred host composition of mixed stands to 20 percent or less of the basal area. Presalvage thinnings have as their primary objective to reduce the vulnerability of the stand to gypsy moth-related mortality. The thinning treatment achieves this objective by removing trees with higher probabilities of mortality if defoliated (low crown vigor trees) and retaining trees with lower probabilities of mortality if defoliated (high crown vigor trees).

Four replicates of each thinning and adjacent unthinned treatment stands were installed prior to gypsy moth defoliation. Each stand was 20 to 30 acres in size and contained 20 0.1-acre permanent plots arranged in a grid. All trees larger than 2.5 inches were numbered and marked

at dbh. The thinning treatments were completed in April 1990. Gypsy moth defoliation occurred in May and June of 1990 and 1991 in six of 16 stands. Three years after defoliation ended, mortality was evaluated using basal area.

RESULTS AND CONCLUSIONS

Host preference class had a significant effect on defoliation patterns but thinning did not. Susceptible species (oaks, *Quercus* spp.) had higher defoliation levels than resistant and immune species but thinned and unthinned stands of the same oak composition had similar defoliation levels.

Mortality was strongly influenced by defoliation patterns and by thinning. Stands with little or no defoliation had mortality levels similar to pretreatment conditions. Stands that were defoliated had increased mortality. Thinning and defoliation had a significant interaction: in undefoliated stands, thinning had no effect on mortality, but in defoliated stands, it reduced mortality. Defoliated sanitation thinnings did not have a significant effect on either defoliation or mortality, but thinned stands did have lower mortality rates. Defoliated presalvage thinnings had significantly lower mortality rates than unthinned stands.

This study was a worst case scenario for evaluating treatments due to the short time lapse between completion of the thinning treatments and defoliation. Had there been several years for the residual trees to adjust to the thinning treatment and increase in vigor, we might have seen even larger differences. Despite this worst case situation, the significant results for presalvage thinning support the use of silvicultural treatments prior to gypsy moth defoliation to minimize gypsy moth effects on tree mortality.

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