

GYPSY MOTH DEFOLIATION - TREE

MORTALITY RELATIONSHIPS

IN RHODE ISLAND

BY

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ABSTRACT

This investigation was conducted in three forest stands to obtain data on tree mortality, changes in species composition, and radial growth of trees following defoliation by the gypsy moth (Porthetria dispar L.). Upland oak-ridge, mixed oak-pine, and mesic mixed-hardwood sites were studied in a defoliated area in the Arcadia State Forest, Exeter, Rhode Island, and in a non-defoliated area within the Scituate Reservoir Watershed, Scituate, Rhode Island.

Canopy defoliation of affected tree species ranged from high (60-100%) in 1971 and 1972, to medium (20-60%) in 1973, and low (0-20%) in 1974. Oaks were the most heavily defoliated of all species with white oak the most severely affected. Refoliation following defoliation was prevalent in the oaks, especially white oak, and appeared to be strongly related to degree of defoliation.

Intermediate and suppressed oaks comprised the majority of the mortality occurring during the study period with white oak accounting for the greatest mortality. Tree mortality varied between forest types and was strongly related to the proportion of oaks present in the stands. Cumulative oak mortality for 1973 and 1974 on the defoliated oak-ridge site was 5.3 and 17.1 percent, respectively, of the oak stems present in 1972. Mortality projected through 1975 is expected to reach 30.4 percent of the oaks present in 1972. Similar oak losses were observed on the defoliated oak-pine and mixed-hardwood sites during 1973 and 1974, though projected oak losses through 1975 were somewhat lower. Cumulative oak basal area losses based upon basal area present in 1972

were comparatively lower, reflecting the small size of affected oaks. Mortality in the non-defoliated stands was, in general, significantly lower.

Several changes in species composition resulting from defoliation were noted. Defoliation appeared to favor black oak group species on the oak-ridge at the expense of white oak. In the oak-pine stand mortality was proportionally greater for oaks than for white pine resulting in an increase in relative numbers and space occupied by white pine in the stand.

Radial growth of oaks decreased significantly following defoliation. Average reductions in radial growth for all defoliated stands studied were 51, 47, 43, and 38 percent for red, scarlet, white, and black oak, respectively. Reductions in radial growth were greater on the oak-pine site in contrast to the oak-ridge. Radial growth loss in white pine, though significant, was similar to losses for white pine growing in the non-defoliated oak-pine stand.

Degree of defoliation of tree regeneration was similar to that incurred by overstory species. White oak seedlings and sprouts were the most severely affected. In general, mortality of oak regeneration was negligible on both defoliated and non-defoliated plots. Shrub and groundcover vegetation experienced only minor defoliation. Relative abundance of sedge and lowbush blueberry increased during the study period on the defoliated oak-ridge and oak-pine sites, respectively.