The Effects of Defoliation and Thinning on the Dieback, Mortality, and Growth of Sugar Maple in the Tug Hill Region of New York

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Abstract

Some recent literature suggests that thinning should not be conducted immediately prior to, during, or immediately following an outbreak of defoliating insects. Although the individual effects of both defoliation and thinning are well documented in the literature, no study has assessed the combined effect of these two stressors. An outbreak of forest tent caterpillar, *Malacosoma disstria* Hbn., in the Tug Hill region of New York from 1990 to 1993 afforded the opportunity to assess the combined effects using a 2X2 factorial design. The two factors were recent defoliation and recent thinning. The two levels of defoliation were undefoliated and severely defoliated. Stands defined as severely defoliated were those in which a majority of the sugar maple (*Acer saccharum* Marsh.) had a midsummer reflush of foliage for two consecutive years. The two levels of recent thinning were unthinned and thinned. Thinned stands were those that had been treated between fall 1989 and fall 1992. Five defoliated and thinned, eight defoliated and unthinned, five undefoliated and thinned, and six undefoliated and unthinned stands were selected. Five 0.02 hectare (0.05 acre) plots per stand were established to determine the extent of mortality and to assess crown condition. Crown dieback was estimated in 1995 and again in 1997 on 250 dominant and codominant (DC), 112 intermediate (INT), and 260 suppressed (SUP) sugar maple using North American Maple Project (NAMP) protocol. Growth analyses were conducted on 220 DC sugar maple in 1995.

In both 1995 and 1997, DC sugar maple in defoliated stands had significantly greater average dieback (22 percent and 26 percent) than did DC sugar maple in undefoliated stands (9 percent and 11 percent). In both 1995 and 1997, the percent mortality of DC sugar maple was significantly higher in the defoliated stands (10 percent and 22 percent) than in the undefoliated stands (1 percent and 1 percent) Also, DC sugar maple in defoliated stands had significantly reduced growth in 1992, 1993, and 1994 when compared to trees from undefoliated stands during the same years. In

1995, INT sugar maple in defoliated stands had significantly greater average dieback (19 percent) than did INT sugar maple in undefoliated stands (7 percent). Also, in 1995, the percent mortality of INT sugar maple was significantly greater in defoliated stands (14 percent) than in undefoliated stands (1 percent). In 1995, SUP sugar maple in thinned stands had significantly greater average dieback (21 percent) than SUP sugar maple in unthinned stands (13 percent). In 1997, the percent mortality of SUP sugar maple was significantly greater in thinned stands (30.0 percent) than in unthinned stands (10 percent). No defoliation by thinning interactions were detected indicating that during the most recent outbreak of *M. disstria* in the Tug Hill region of New York State, thinning did not exacerbate the effects of defoliation.

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