Growth Loss and Mortality of White Pine Nursery Stock Caused by Pine Bark Aphids After Field Planting

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Outplantings of 2-0 white pine seedlings heavily infested with pine bark aphids were compared with outplantings of uninfested seedlings in a 1980-81 study. After two growing seasons, there was no statistically significant difference in mortality between heavily infested and uninfested seedlings. There was a significant difference in growth, however, with the uninfected seedlings averaging 11 percent greater growth than the infested seedlings.

The pine bark aphid (*Pineus strobi* (Htg.)), a species accidentally introduced from Europe, is found in most areas of the United States wherever white pines grow. Aphid infestations are best recognized by the presence of white spots and patches of white cottony material on the smooth bark of the trunks and limbs, at the bases of needles, or on buds. During the growing season of 1979, a heavy infestation of the aphid occurred throughout the 2-0 white pine seedling nursery beds at Edwards Nursery in Morganton, North Carolina. The purpose of this study was to determine the effects of the pine bark aphid on the survival and growth of white pine nursery-grown seedlings after field planting.

Materials and Methods

White pine seedlings (2-0) were selected for the study in February 1980. All seedlings selected were 19 to 20 centimeters in height, measured from root collar to terminal bud. The seedlings were divided into two categories: (1) lightly infested, and (2) heavily infested. Microscopic examination of heavily infested seedlings revealed a mean aphid density of approximately 1,400 aphids per seedling, while lightly infested seedlings had a mean aphid density of approximately 100 aphids per seedling. To facilitate growth measurement, a yellow stripe of Nelspot tree-marking paint was applied to each seedling 8 centimeters below the terminal bud.

The two study areas were located in Avery County and Burke County, North Carolina. Six 20-tree rows of seedlings were planted in each area in late March and early April 1980. Seedlings were spaced at 4-foot intervals within rows, and rows in each treatment were 4 feet apart. Three of the rows in each study area were planted with heavily infested seedlings, and three rows were planted with lightly infested seedlings.

Rows with lightly infested trees were then treated to remove all aphids. Treatment consisted of hand removal of all visible aphids followed by a 1 percent Lindane spray.

To determine the effects of pine bark aphids, survival was determined and height growth was measured in November 1980 and in November 1981. Data on growth and mortality were statistically analyzed using an analysis of variance.

Results and Conclusions

Table 1 summarizes growth and mortality of study seedlings. There was no significant difference in survival between infested and uninfected seedlings when land 2-year data were analyzed at the 95 and 99 percent significance levels. There was no significant difference in growth after 1 year at the 95 and 99 percent significance levels. After 2 years, however, the difference in growth widens, and the growth of the uninfected seedlings is significantly better than the infested

Table 1—*Growth and Mortality of 2-0 White Pine Seedlings, 1980–81*

	1980		1981	
	Survival	Mean growth	Survival	Mean growth
	%	*cm*	%	*cm*
Infested	97.50	14.84	93.00	31.57
Uninfested	98.33	15.67	97.44	35.49

seedlings, both at the 95 and 99 percent levels.

Since the differences in growth during the first several years in the field tend to diminish with age, we feel that this growth difference will probably not be significant by the end of the rotation.

Seedlings were carefully examined for aphids after one and two seasons of growth. Few aphids were detectable on either the heavily infested or uninfested seedlings.

We speculate that aphids flourish in nursery beds because the dense foilage protects them against both predators and the elements. When trees are outplanted, the aphids become more exposed and vulnerable, and consequently, populations rapidly decrease.