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# ROUGHLAND TREE PLANTER STUDY



 **Virginia Division of Forestry**   
Department of Conservation and Economic Development

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by

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## ABSTRACT

*Plots were installed in 1969 and 1970 to compare survival and growth of machine and hand planted loblolly pine seedlings on prepared, cutover sites. Averaging the 10 plots in 1969 and the 19 plots in 1970, there was little difference either year between machine and hand planted seedlings.*

In 1969 and 1970 the Division of Forestry purchased two crank-axle type planting machines designed to plant pine seedlings on cutover woodland. The machines were pulled by a D-4 crawler type tractor with a V-blade mounted in front of the tractor for clearing debris from the path of the planter. Each machine had scalpels mounted on the coulter blade housing. Studies were established during the spring of 1969 and 1970 to compare survival and growth of machine and hand planted loblolly pine seedlings.

## THE STUDY

### 1969

In 1969, 10 plots were installed on 7 tracts located on State Forest lands in the Southern Piedmont of Virginia. After cutting, 4 of the tracts were drum chopped and prescribed burned, with prescribed burning the only site preparation on the other 3 tracts. The plots were located on well-drained, upland soils.

The plots were planted in February and March. The site within each plot was uniform. Each plot consisted of 5 rows of 20 seedlings planted by machine, alternating with 5 rows of 20 seedlings planted by hand. Both hand and machine planted seedlings were taken from the same 2,000 seedling package. The men planted the seedlings as they came from the package. Machine and hand planting was done at the same time.

An inspection of each machine planted seedling was made immediately after planting to determine if the seedling was improperly planted (loose or shallow). Seventeen percent of the seedlings were judged improperly planted.

### 1970

In 1970, plots were installed on 19 different cutover tracts scattered over the Piedmont and Coastal Plain of Virginia. Thirteen tracts had been drum chopped followed by prescribed burning and six were prescribed burned only.

Plots were similar to the 1969 study, except that 10, instead of 5, rows of both machine and hand planted seedlings were installed. Seedlings for both the machine and hand planted rows came from the same 2,000 package, and both plantings were done at the same time. All plots were installed in February and March.

During April and May following planting, 13 of the plots were inspected to determine the number of seedlings improperly planted by the machine. Five percent of the machine planted seedlings were judged improperly planted.

RESULTS AND DISCUSSION

Table 1 summarizes survival for all 10 plots in 1969 and all 19 plots in 1970, after two full growing seasons in the field.

Table 1. Average Survival Percent After Two Growing Seasons.

	<u>1969</u>	<u>1970</u>
Machine	91.5	88.2
Hand	95.0	83.7
Difference	3.5	4.5 <sup>1/</sup>

The results for individual plots varied. In 1969, machine planted seedlings survived better on 2 of the 10 plots and hand planted seedlings survived better on the other 8 plots (on no plot was the difference statistically significant). In 1970, machine planted seedlings survived better on 13 of the 19 plots (the differences were significant at the .05 level on 3 of the 13), and hand planted seedlings survived better on the other 6 plots (the differences were significant at the .05 level on 2 of the 6).

Table 2 summarizes average heights for all 10 plots in 1969 and 19 plots in 1970, after two full growing seasons in the field.

Table 2. Average Total Height in Feet After Two Growing Seasons.

	<u>1969</u>	<u>1970</u>
Machine	2.92	2.98
Hand	2.95	2.88
Difference	.03	.10 <sup>1/</sup>

As with survival, total height results varied by individual plots. In 1969, the machine planted seedlings were taller on 5 of the 10 plots, and hand planted were taller on the other 5 (on 1 plot hand planted seedlings were significantly taller at the .05 level). In 1970, machine planted seedlings were taller on 15 of the 19 plots (the differences were significant at the .05 level on 3 of the 15), and hand planted seedlings were taller on the other 4 plots (on 1 of the 4 plots the difference was significant at the .05 level).

Seedlings improperly planted by the machine did not survive nearly as well as properly planted seedlings. In 1969, 17 percent of the seedlings were improperly planted by the machine, and over one-fourth of these died by the end of the first growing season. In 1970, only 5 percent of the seedlings were improperly planted by the machine but one-half of these died by the end of the first growing season.

Both machine and hand planting was carefully done by experienced planters. However, even with careful planting, some machine planted seedlings are loose and shallow. This is unavoidable in some cases because of rough terrain, unburned logging debris, and stumps.

<sup>1/</sup> Statistically significant at the .05 level.