

SITE PREPARATION AND CULTIVATION IMPROVE SURVIVAL AND GROWTH  
OF PLANTED SLASH PINE

Lloyd F. Smith  
Southern Forest Experiment Station  
Forest Service, U.S.D.A.  
Gulfport, Miss.

In a study established near McNeill, Miss., in 1957, extensive site preparation increased survival of planted slash pine (*Pinus elliottii* var. *elliottii*) more than enough to offset costs. Intensive site preparation followed by cultivation stimulated height growth even more, but perhaps not sufficiently to justify the expense.

The site treatments were furrowing, ridging, plowing, plowing plus cultivation for 2 years after planting with a tandem disk supplemented by hand hoeing, and an untreated control. Furrows were made with a Ranger Pal fireplow; the trees were planted in the furrow bottoms (fig. 1). Ridges were formed by turning two furrows together with a double-disk



Figure 1.--Part of a furrowed plot at planting time.

plow; the pines were planted in the center of the ridges (fig. 2). Plowed plots were prepared with a disk plow that broke the sod about 6 inches deep over the entire plot. The field layout was a randomized block design; each treatment was replicated four times on half acre plots.

The site was a recently clearcut upland formerly supporting second growth longleaf pine. Before it was prepared for planting, little bluestem (*Andropogon scoparius*) and slender bluestem (*A. tener*) were the most abundant grasses. They were associated with other native grasses and annual forbs to form a sod. The soil was a deep, fine sandy loam in the Norfolk series, and the surface varied from nearly level to slightly sloping.

#### Seedling Survival and Height Growth

First-year survival ranged from 77 percent on the control plots to 92 percent on the furrowed plots; mortality resulted mainly from a summer drought. Summer rainfall was generally high after the first year, but losses in the second through the sixth year were still greatest on the control plots. After 6 years, survival ranged from 57 percent on the control to 78 percent on the ridged and plowed plots (table 1).



Figure 2.--Part of a ridged plot at planting time.

TABLE 1.—Survival and height of planted slash pine after 6 years,  
and fusiform rust infections after 3 years

Treatment	Survival	Height	Proportion of trees with rust infections	
			On stem	On branches only
	<i>Percent</i>	<i>Feet</i>	<i>Percent</i>	<i>Percent</i>
Furrowing.....	77	14.2	8	15
Ridging.....	78	15.4	21	23
Plowing.....	78	14.3	12	18
Plowing and cultivating.....	73	18.7	22	50
Control.....	57	14.0	16	16

After 1 year, heights ranged from 1.3 feet on the furrowed treatment to 1.6 feet on the cultivated plots. The average height was 1.4 feet.

The cultivated trees grew about 3 feet during their second year in the field, and about 3.5 feet annually during the next 4 years (fig. 3). Thus, vigorous growth continued after cultivation ceased.

After 6 years, heights averaged 14 feet on the furrowed, plowed, and control plots, 15 feet on ridged plots, and 19 feet on cultivated plots.

#### Rust Infection

Infection by southern fusiform rust was measured after each of the first three growing seasons. This disease was more prevalent in the second and third seasons.

After 3 years, the percentage of trees with stem galls ranged from 8 on furrowed plots to 22 on cultivated plots, and the percentage of trees with branch galls but no stem galls ranged from 15 on the furrowed plots to 50 on the cultivated plots (table 1). Thus, the highest infection was on plots with the most intensive cultural treatments. The proportion of trees with branch infections, but not stem infections, was significantly different (1 percent level) among treatments. Many of the branch galls will be killed by natural pruning of the lower branches, but some will survive long enough to enter the stem.

#### Discussion

Slopes on the furrowed plots eroded somewhat in the first year; however, tree survival was not affected, and the exposed soil was soon revegetated with native grasses. If furrowing is practiced on large areas, the rows should be located on the contour to reduce erosion and silting around the seedlings.

Furrowing cost \$1.25 per acre; ridging, \$2.50; plowing, \$5.00; and plowing plus cultivation for 2 years, \$21.50. Cultivation costs include hand hoeing but not supervision and overhead. The costs are based on 1957 local rates for labor and equipment. They would be somewhat lower on larger areas than on the small blocks of this study. All treatments increased tree survival, but furrowing, the least expensive method, was about as effective as the more expensive treatments. At an estimated planting cost of \$15.00 per acre on



Figure 3.--One of the cultivated plots 6 years after planting. The lower branches were pruned when the trees were 5 years old.

unprepared sites, the increase in survival (because fewer trees would be required) would more than equal the cost of furrowing or ridging but not of plowing or cultivating.

Cultivation was the only treatment that significantly speeded height growth. The worth of this increased growth cannot be appraised until the plantation attains commercial size.