

BETTER LONGLEAF SEEDLINGS FROM LOW-DENSITY NURSERY BEDS

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In south Mississippi, longleaf pine planting stock from nursery beds with not more than about 24 seedlings per square foot were larger at lifting time, survived better in the field, and began height growth sooner than seedlings from denser beds.

The seedlings were raised in the nursery of the Harrison Experimental Forest, Saucier, Mississippi. Four different seedbed densities were tested -12, 24, 36, and 48 seedlings per square foot of bed. The beds were sown in March 1950 and thinned to the required densities in May. Each density was replicated three times.

The nursery beds were well fertilized. Just before sowing they received the equivalent, per acre, of 4,000 pounds of super-phosphate, 300 pounds of muriate of potash, and 10 tons of sawdust. Three months after sowing, they were given a liquid application of nitrogen equivalent to 100 pounds ammonium nitrate per acre.

Nursery Results

The seedlings were lifted, weighed, and measured in December 1950. Table 1 summarizes the measurements made at this time.

A higher percentage of plantable seedlings were produced in the lowdensity beds. With lower bed densities fewer seedlings died during the summer and there were less culls (seedlings too small to plant). The total loss from these two causes was only one seedling per square foot for the lowest density, but 16 seedlings for the highest density.

The effect of bed density on seedling growth showed up most clearly in seedling weight. The lower the bed density the heavier were the seedlings. The seedlings grown at the lowest density were almost three times as heavy as those grown at the highest density.

Seedlings from the two lower densities were larger in diameter at the root-collar. There was no difference in root-collar diameter between stock from 36- and 48-seedling beds, but the tap roots of the seedlings at the latter density had a very abrupt taper about an inch below the ground line.

The needles at the lowest density were shorter and stiffer than those of the other seedlings.

TABLE I

Effect of seedbed density on nursery production of longleaf pine seedlings

Seedlings per square foot of bed			Green weight per seedling	Root-collar diameter
After thinning in May	When lifted in December	Plantable		
----- Number -----			Grams	Inch
12	12	11	29	0.39
24	22	19	20	.33
36	33	27	15	.28
48	42	32	11	.28

Field Results

Seedlings from this test were planted on a moderately severe site. In the second year after planting, the seedlings were sprayed twice with Bordeaux to control brown spot.

Large longleaf seedlings from bed-run stock usually survive less well than smaller seedlings (1, 2, 3) but start height growth sooner (1). In this test, seedlings grown at low densities survived, better than those grown at high densities, despite the fact that the low-density seedlings were larger (table 2). However, it is possible that, among seedlings grown at the same density, the large ones survived less well than the small ones. This point was not tested.

TABLE 2

Longleaf seedling development two years after planting

Seedbed density	Survival	Proportion of planted pines over 2-1/2 inches tall	Average height of living seedlings
	Percent	Percent	Inches
12	96	73	4.7
24	94	54	3.3
36	77	29	2.6
48	76	22	2.3

Seedlings from the low-density beds also began height growth sooner than the rest. Thus after two years, nearly three-quarters of the pines from the 12-seedling beds were starting out of the grass. Three years after

planting, these same seedlings averaged 27 inches in height, as against 15 inches for the high-density stock. The difference in the field is impressive (fig. 1). The seedlings from the intermediate densities averaged 21 and 16 inches respectively. Early height growth of longleaf seedlings is important because it reduces the period when the seedlings can be killed by brown spot, hogs, and fire.

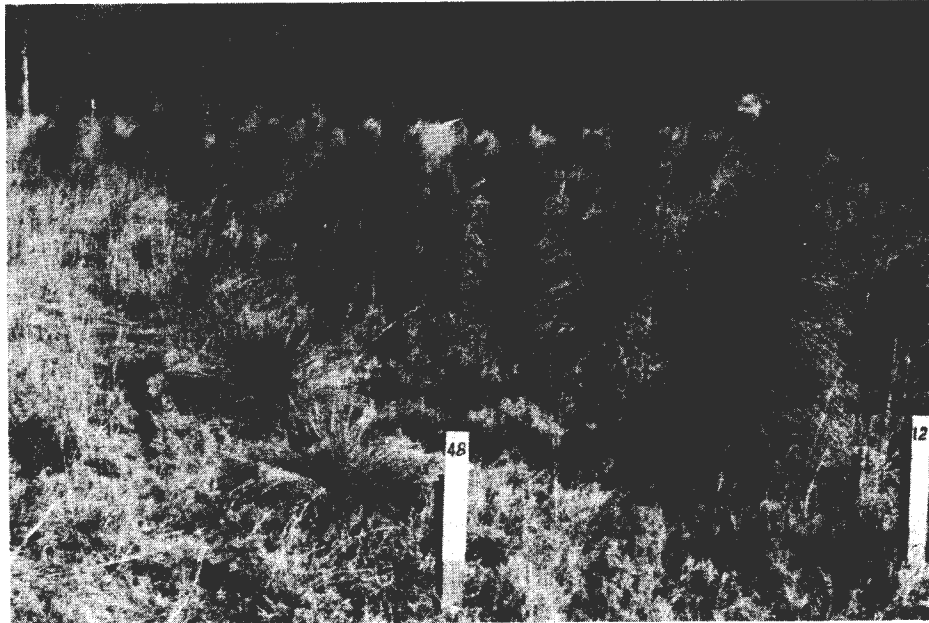


Figure 1 - Effect of nursery seedbed density upon longleaf seedlings three years after planting. The seedlings in the row on the right were grown at a bed density of 12 per square foot. Those in the row on the left were grown at a density of 48 per square foot.

In another test, seedlings grown at a seedbed density of 39 per square foot averaged only 2.6 inches in height after two years in an old field, and only 32 percent of the original number planted were over 2.5 inches tall. Seedlings grown at 21 per square foot averaged 4.6 inches in height with 58 percent starting height growth in two years. Extra large seedlings from beds with a density of 12 per square foot had an average height of 6.2 inches and 79 percent had started height growth.

Suggestions

The seedlings in all of these tests were grown in good nursery soil which had been well fertilized. On poorer soils with minimum fertilization, reduction of seedbed density has not stimulated seedling growth in the nursery as much as in these tests.

Longleaf seedbed densities" cannot be reduced safely on some nursery soils without getting considerable mortality from sandsplash. Low seedbed densities should not be tried on such soils unless some protective mulch is used. Also, on soils which have a tendency to crust, lowering the density will aggravate the condition.

The optimum density will be that point where increased nursery production costs, brought about by the reduction in seedbed density, will be offset by increased field growth and survival. This point has not been determined, and will probably vary with different nurseries. However, nurserymen should avoid raising longleaf at densities above 30 per square foot and should investigate the possibilities of lowering the density to 20 or 25 seedlings per square foot.

Literature Cited

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3. Wakeley, P. C. 1951. Planting the southern pines. Occas. Paper 122, p. 278.