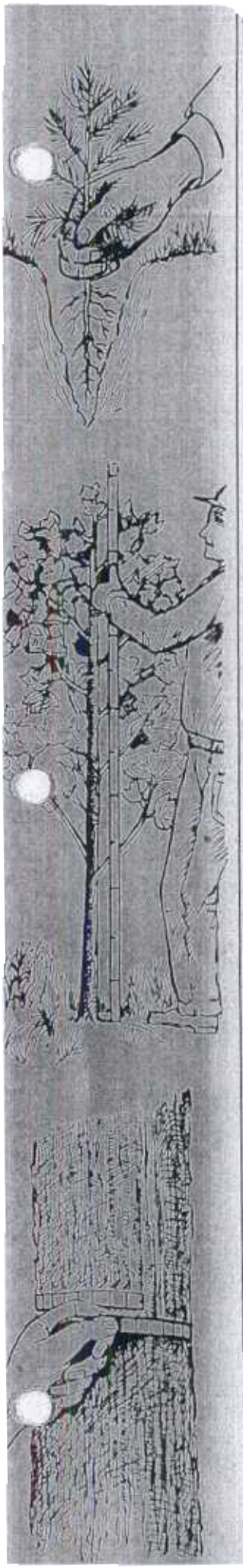

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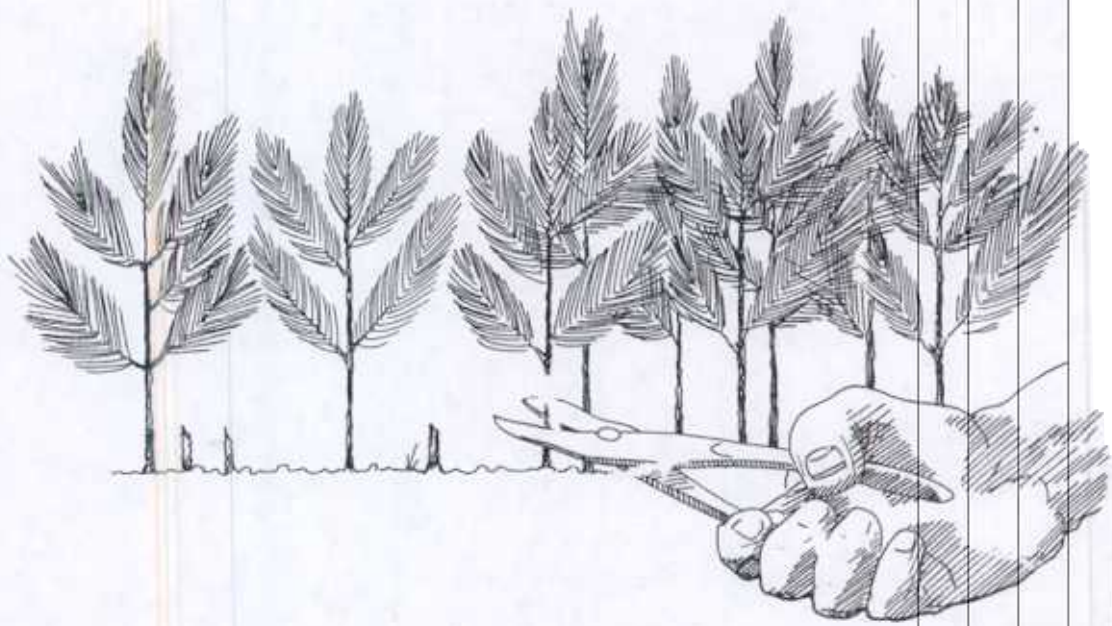

Virginia Division of Forestry
Department of Conservation and Economic Development

RESULTS OF A LOBLOLLY SEEDBED DENSITY STUDY

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ABSTRACT

Seedbed plots were thinned to approximately 24 and 36 seedlings per square foot from an initial average density of 52 seedlings per square foot.

Thinning increased diameter growth in the seedbeds, but not height growth. Thinning reduced the number of plantable seedlings produced.

Seedlings from unthinned seedbed plots survived in the field as well as seedlings from thinned plots, however, growth in the field was slightly better for seedlings from thinned plots.

PROCEDURE

The study was installed on June 26, 1972 at the New Kent Nursery. Seedbed densities of approximately 24 and 36 seedlings per square foot were obtained by hand thinning small plots in operationally seeded seedbeds. The seedbeds had been drilled using a Whitfield seeder. Seedbeds were four feet wide and contained eight seedling rows approximately six inches apart. Plots were one foot long (one foot wide across the bed). Unthinned check plots were also established. The three seedbed densities (24, 36 and check) were replicated in five different sections of the nursery.

Rather than pulling up seedlings, the thinning was done with scissors. The target spacings were 1 inch for the 24 per square foot density and 2/3 inch for the 36 per square foot density. Clumping commonly occurs with the Whitfield seeder, so seedlings frequently had to be left closer together than these target spacings. Where clumping was severe, it was sometimes necessary to leave seedlings as close together as half the target spacings (1/2 and 1/3 inch between seedlings for the 24 and 36 seedling densities respectively).

SEEDBED RESULTS

On December 19, a 9 inch wide sample was lifted across the bed in the center of each 12 inch plot. Seedlings were separated by root collar diameter (1/32 inch classes) and top length (1 inch classes). Average seedbed densities, root collar diameters, and top lengths are given in Table 1. Thinning increased diameter growth but not height growth. On the average, seedlings from plots thinned to 24 per square foot were 1/32 inch larger in diameter than check seedlings.

Table 1. Average number of seedlings per square foot, root collar diameter, and top length by thinning treatment and nursery location.

Nursery Section		Thinning Treatment		
		Check	36/sq. ft.	24/sq. ft.
V	Density	54.3	32.7	23.3
	Diameter	4.9/32	5.7/32	6.3/32
	Height	9.4	9.7	8.6
W	Density	61.7	31.3	22.7
	Diameter	4.0/32	4.7/32	4.8/32
	Height	8.9	9.5	8.1
EE	Density	52.3	35.0	23.7
	Diameter	4.5/32	5.0/32	5.8/32
	Height	8.6	8.7	9.1
FF	Density	50.7	35.7	25.0
	Diameter	4.4/32	4.6/32	5.0/32
	Height	8.8	8.9	8.9
HH	Density	39.3	30.7	22.3
	Diameter	5.0/32	5.6/32	6.1/32
	Height	10.0	9.7	10.8
Averages	Density	51.7	33.1	23.4
	Diameter	4.6/32	5.1/32	5.6/32
	Height	9.1	9.3	9.1

Thinning resulted in proportionally more seedlings being in the larger diameter classes, but did not increase the number of plantable seedlings (Table 2). Culling the 2/32 inch seedlings would leave an average of 47.9, 32.2, and 23.1 plantable seedlings per square foot for the check, 36 and 24 seedling densities. If the 3/32 inch seedlings were also culled, the average number of plantable seedlings would be 40.4, 30.0, and 22.0 per square foot.

Table 2. Number of seedlings per square foot by root collar diameter class for the three seedbed densities. Figures in parenthesis are cumulative, starting with 9/32 inch seedlings

Root Collar Diameter	Seedbed Density		
	Check	36/ft.^{2}	24/ft.^{2}
2/32	3.7 (51.6)	.9 (33.1)	.1 (23.2)
3/32	7.5 (47.9)	2.2 (32.2)	1.1 (23.1)
4/32	16.3 (40.4)	8.3 (30.0)	3.5 (22.0)
5/32	12.8 (24.1)	9.6 (21.7)	7.3 (18.5)
6/32	7.5 (11.3)	7.1 (12.1)	5.1 (11.2)
7/32	2.9 (3.8)	3.4 (5.0)	4.4 (6.1)
8/32	.8 (.9)	1.3 (1.6)	1.2 (1.7)
9/32	.1 (.1)	.3 (.3)	.5 (.5)
Total	51.6	33.1	23.2

RESULTS OF FIELD PLANTING

Seedlings for planting were taken from the same samples lifted for grading. Proportional numbers of seedlings were taken from each root collar diameter class (except the 2/32 inch class, which was culled) to give a representative sample from each seedbed plot. The seedlings were planted on December 21 on the Buckingham State Forest in the central Piedmont of Virginia. Three randomized blocks were installed, with a 20 seedling row of each seedbed density and nursery location planted in each block. Thus, there were 15 rows of seedlings in each block.

Survival was tallied and the height of each seedling was measured after one, two and three seasons in the field. Average survival and height after three seasons in the field are given in Tables 3 and 4. Seedlings from unthinned seedbed plots survived almost as well as seedlings from plots thinned to 36 and 24 seedlings per square foot (Table 3).

Table 3. Average survival percent after three seasons in the field, by thinning treatment and nursery location[1/]

Nursery Section	Thinning Treatment			Averages
	Check	36/sq. ft.	24/sq. ft.	
V	96.7	100	96.7	97.8
W	98.3	96.7	100	98.3
EE	98.3	96.7	100	98.3
FF	95.0	96.7	96.7	96.1
HH	91.7	98.3	95.0	95.0
Averages	96.0	97.7	97.7	97.1

Seedlings from seedbed plots thinned to 24 seedlings per square foot gre lightly better than seedlings from the check and 36 per square foot plot (Table 4).

1/ Analyses of variance were made for percent survival and height. Survival percents were transformed to arc sin. Survival was not significantly affected by either seedbed density or nursery location. Heights, however, were significantly affected by both seedbed density and nursery location, both at the .025 level.

Table 4. Average heights in feet after three seasons in the field, by thinning treatment and nursery location[1/]

Nursery Section	Thinning Treatment			Averages
	Check	36/sq. ft.	24/sq. ft.	
V	5.7	5.5	6.0	5.7
W	5.1	5.6	6.0	5.6
EE	5.6	5.8	6.1	5.8
FF	5.4	5.4	5.4	5.4
HH	5.4	5.3	6.0	5.6
Averages	5.4	5.5	5.9	5.6

DISCUSSION

In this test, operationally sown seedbed plots were hand thinned to provide reasonably uniform spacing between seedlings in the drill rows. Thinning to densities of 24 and 36 seedlings per square foot did not increase the number of plantable seedlings produced and did not improve field survival (although growth in the field was improved slightly). At the present time there are not any row seeders on the market that will drill seeds at a reasonably uniform spacing. Using available seeders, such as the Whitfield used in this study, to operationally obtain densities of 24 and 36 seedlings per square foot, would result in much less uniform spacing than we obtained by hand thinning. Therefore, operational sowing to achieve rates of 24 and 36 seedlings per square foot would be less effective than hand thinning and could be expected to produce more undersize "cull" seedlings than did our hand thinned plots.

1/ Ibid.