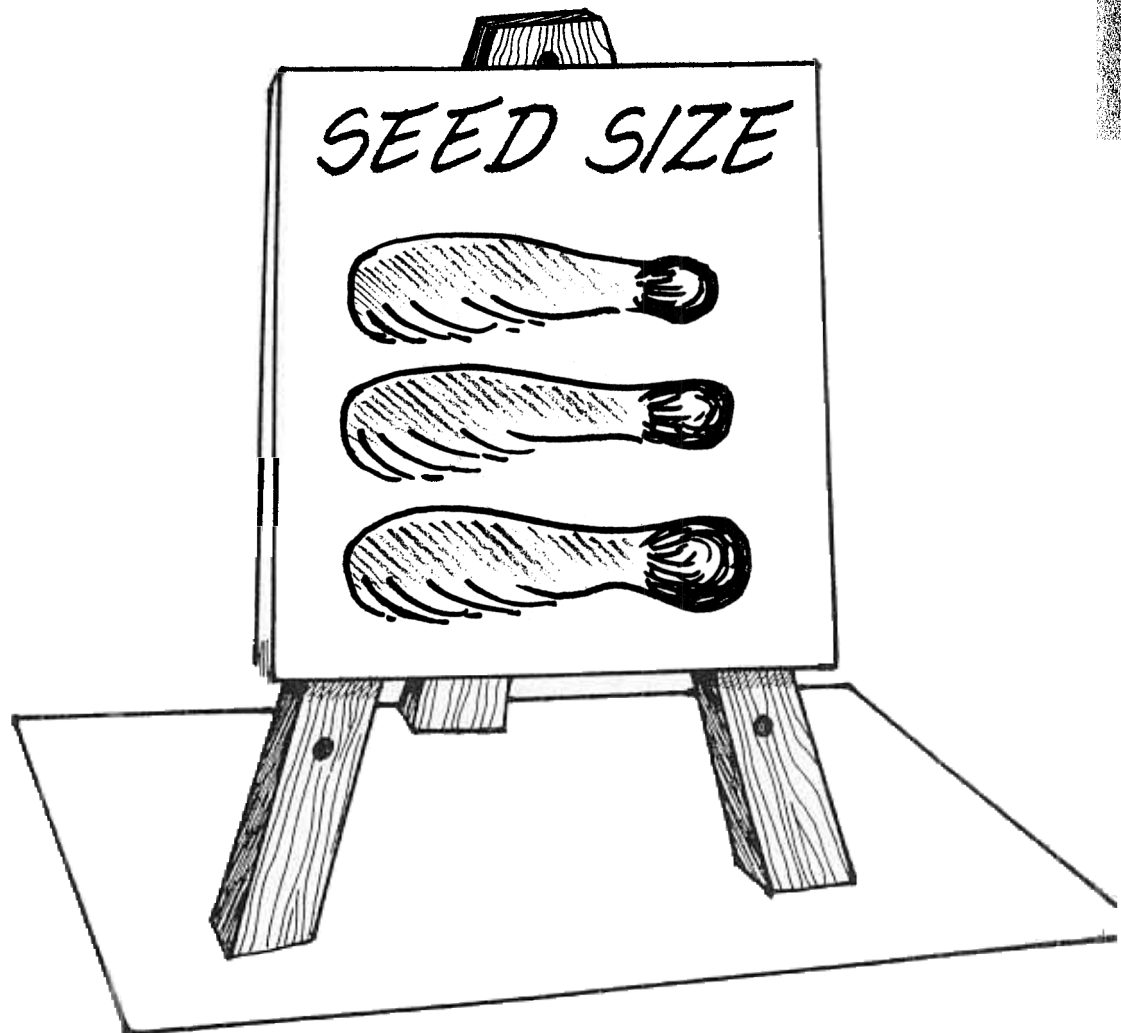
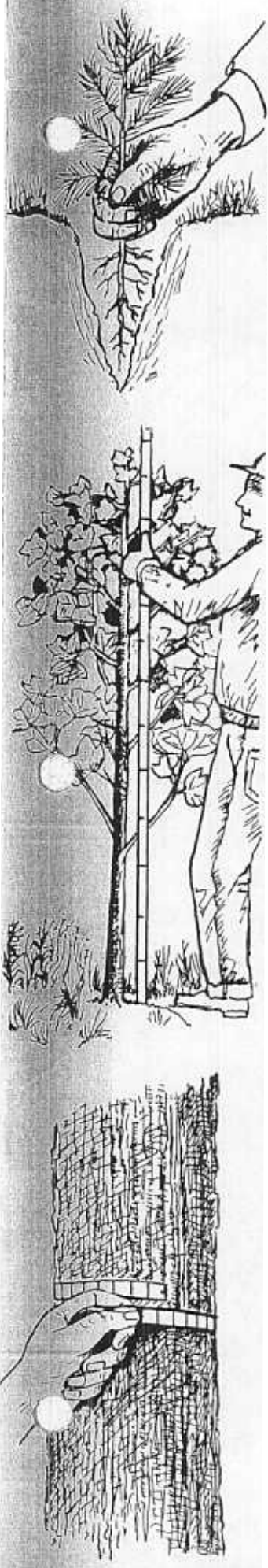


SEED SIZING STUDY



1974 LOBLOLLY PINE SEED SIZING STUDY

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ABSTRACT

A well-mixed loblolly pine seedlot was separated into large, medium and small size classes. Samples from these three size classes, plus a sample of the original seedlot before separation, were sown at approximately the same rate in replicated seedbed plots.

Sowing separately by size class did not increase the production of plantable seedlings. In the field, seedlings from seed sown separately by size class did not survive and grow better than seedlings from unsized seed.

Procedure

A well-mixed seedlot was separated on February 7, 1974 into three size classes using different size screens on a Crippen seed cleaner (Table 1).

Table 1. Seed sizes, ranges, and amount of seed in each size.

<u>Seed Size</u>	<u>Separator Screens</u>	<u>Size Range</u>	<u>Separation</u>	
			<u>Pounds</u>	<u>%</u>
Large		12-14/64	1-3/8	7.7
	12/64			
Medium		10-12/64	11-7/8	66.4
	10/64			
Small		8-10/64	4-5/8	25.9
			17-7/8	100.0

An unsized sample was taken from the same well-mixed seedlot before separation. All samples were analyzed by the Eastern Tree Seed Laboratory at Macon, Georgia (Table 2).

Table 2. Seed lab results - seeds per pound and full seed germination by size class.

<u>Separation</u>	<u>Full Seeds Per Pound</u>	<u>Full Seed Germination %</u>
Large	11,600	90
Medium	15,000	88
Small	19,500	87
Unsize	16,300	88

The seed was placed in stratification on March 25, and after stratification was treated with Arasan 42-S.

Plots were sown in the New Kent Nursery on April 29 and 30 using a Whitfield seeder to drill the seed in rows six inches apart and cover the seed with about three-eighths inch of soil. The desired sowing rate was approximately 62 seeds per square foot, which was calculated would give a seedbed density in the neighborhood of 35 seedlings per square foot. This required calibrating the seeder separately for each seed size. The seeder would not open wide enough to sow the large seed at a rate of 62 per square foot, so the large seed, with the seeder wide open, was sown at a rate of about 58 seeds per square foot.

The four seed separations (large, medium, small and unsize) were sown in four different locations (blocks) in the Nursery. Individual seedbed plots were 15 feet long for the medium, small, and unsize seed, but plots were reduced to 9 feet long for the large seed due to insufficient seed.

Speed of Germination

Speed of germination was obtained for each size class by frequent counts. Two six-inch-wide sampling frames were installed across each plot. Counts were started on May 10, ten days after sowing, when germination was first noted. Counts thereafter were made every few days through June and then about once a week until September 5. Dead seedlings were counted and pulled up. The majority of the seeds germinated during the five-day period between 15 and 20 days after sowing. Speed of germination was not related to seed size (Table 3)^{1/}.

^{1/} The actual number of seeds sown within each sampling frame was not known. Therefore, the germination percents shown in Table 3 are based on maximum counts of living seedlings. Mortality started about 20 days after sowing (May 20) and gradually increased. By the end of June, after 60 days, total counts of living seedlings reached a maximum and began to decline.

Table 3. Percent germination by size class and number of days after sowing.

Seed Size Class	<u>Percent Germination by Days After Sowing</u>					
	<u>15</u>	<u>17</u>	<u>20</u>	<u>22</u>	<u>24</u>	<u>28</u>
Large	19	44	70	83	89	92
Medium	15	41	73	84	89	93
Small	10	38	70	79	86	93
Unsize	12	39	73	82	89	94

Results in the Seedbed

By the end of the growing season there were noticeable differences in size and appearance related to seed size. Large seed produced larger seedlings than small seed. Small seed produced very uniform seedlings. Seedlings from medium and large seed were less uniform, and seedlings from unsize seed were least uniform.

Three evenly-spaced, six-inch-wide samples were lifted across each plot in early January of 1975. These samples were separated by root collar diameter (1/32-inch classes) and top length (one-inch classes). The estimates of average bed density, root collar diameter, and top length shown in Table 4 were obtained from these samples. Table 4 also shows the average number of seedlings per square foot that were smaller than the 3/32-inch class ($< 2.5/32$), and subtracting these from the total number gives an estimate of the number of plantable seedlings

Table 4. Averages for seedbed density, root collar diameter, and top length at time of lifting^{2/}

Seed Size Class	<u>Seedlings per Square Foot</u>			<u>Root Collar Diameter</u> (inches)	<u>Top Length</u> (inches)
	<u>Total</u>	<u>< 2.5/32</u>	<u>Plantable</u>		
Large	34.2 a	2.7	31.5	4.32/32 a	9.0 a
Medium	42.1 b	5.2	36.9	3.75/32 b	8.1 ab
Small	42.2 b	7.5	34.7	3.56/32 b	7.3 b
Unsize	45.7 b	6.3	39.4	3.77/32 b	8.1 ab

^{2/} Separate analyses of variance were made for number of seedlings per square foot, root collar diameter, and top length. Duncan's New Multiple Range Test was used to test differences between treatment means. Means not followed by the same letter are significantly different at the .05 level of significance.

Large seed produced the fewest seedlings per square foot and unsized seed the most, but there was little difference in seedling density between medium, small and unsized seed. The sowing rate was slightly lower for the large seed (about 58 versus 62 seeds per square foot), but not enough to account for differences in total numbers of seedlings (from 7.9 to 11.5 seedlings per square foot) between large seed and the other size classes. Also, seedbed mortality was no higher for the large seed than the other size classes. One possible explanation is that the large seed did not germinate as well in the field, despite slightly higher germination in the seed lab tests (Table 2).

Outplanting Results

Seedlings planted in the field were taken from the same samples lifted to estimate seedbed density, root collar diameter, and top length. Proportional numbers of seedlings were taken from each root collar diameter class from each sample, to provide a representative sample for planting. The seedlings were planted on January 17 on the Cumberland State Forest in the central Piedmont of Virginia. Six randomized blocks were installed, with a 20 seedling row of each of the four seed size classes in each block.

Seedling 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 Table 5. There was little difference among seed size classes for either survival or height.

Table 5. Average survival and height after three seasons in the field.^{3/}

<u>Seed Size Class</u>	<u>Percent Survival</u>	<u>Height in Feet</u>
Large	83.3 a	3.2 a
Medium	76.7 a	3.0 a
Small	77.5 a	2.9 a
Unsize	82.5 a	2.9 a

Conclusions

In this study there was no advantage in separating the seed into large, medium and small size classes and sowing them separately. Unsize seed produced more seedlings (total and plantable) than sized seed, and in the field, seedlings from unsize seed survived and grew as well as seedlings from sized seed.

^{3/} Separate analyses of variance were made for percent survival and height. Survival percents were transformed to arc sin. Duncan's New Multiple Range Test was used to test differences between treatment means. There were no significant differences between treatment means for either survival percent or height.