ROOT COLLAR DIAMETER IS A GOOD MEASURE OF HEIGHT GROWTH POTENTIAL OF SYCAMORE SEEDLINGS

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A sycamore planting on a well-drained bottom-land site in the Georgia piedmont has shown that first-year height growth is related to root collar diameter. Mean height growth ranged from 2.6 feet to 5.9 feet. The study consisted of three replicates in a randomized complete block design, with three plots per replicate. Each plot contained 32 seedlings spaced 4 by 4 feet. Seedlings of three diameter classes were hand-planted on a recently abandoned pasture that was disk-plowed prior to planting. No fertilizer or other treatment was applied.

Bed-run seedlings were sorted into four classes based on root collar diameters (table 1). Only three diameter classes are represented in this study. All seedlings whose root collar diameters fell in the 0.41- to 0.50-inch class were used in a fertilization experiment on the same field. Two untreated plots of these seedlings averaged 5.0 feet in total height and 3.7 feet in height growth the first year. Although these mean values, as expected, fall between those for the medium and large classes of this study, differences in spacing, plot size, and weed control preclude rigorous comparisons.

TABLE 1.--Distribution of seedlings by root collar diameter classes

Root collar diameter (inch)	Seedlings received	Size distribution
	Number	*Percent*
Less than 0.30.....	410	14
0.31 to 0.40.....	1,368	46
0.41 to 0.50.....	1,043	35
Greater than 0.51.....	133	5

Survival was good in all diameter classes, but the large seedlings had a significantly better rate of survival (100 percent) than the small (95 percent) and medium-size seedlings (97 percent). All 0.41- to 0.50-inch class seedlings from the check plots in the adjacent study survived. These small differences may be deceiving. Rainfall during the growing season at Athens measured about 9 inches above normal. It is possible that differences in survival would be greater during a growing season with average rainfall. Differences in height growth among all three classes are statistically significant at the 5-percent probability level (table 2).

TABLE 2.--Mean total height and first-year height growth of sycamore seedlings

Root collar diameter at planting time (inch)	Mean height at planting time	Mean height at end of growing season	Mean height growth
	Feet	*Feet*	*Feet*
Less than 0.30.....	1.15	3.74	2.59
0.31 to 0.40.....	1.54	4.54	3.00
Greater than 0.51.....	1.99	7.89	5.90

Planting large seedlings of sycamore, as measured by root collar diameter, appears to be an effective method of achieving maximum first-year survival and growth. Rapid first-year height growth is a definite advantage on good bottom-land sites in the piedmont because weed competition is severe (fig. 1). Weed growth on these plots ranged from 4 to 8 feet, with some nearby patches even taller. Seedlings whose root collar diameters measured less than 0.30 inch were overtopped by weeds during the growing season. Medium-size seedlings (0.31- to 0.40-inch) generally held their own, except in one block where competition was most severe; the large seedlings outgrew weeds in all blocks.

Figure 1.--Left, Medium-size sycamore seedlings (0.31- to 0.40-inch root collar diameter) kept up with weeds (chest high before trampling); right, large seedlings outgrew weed competition.

Large seedlings, however, have large roots (fig. 2) and present considerable difficulties in handling, shipping, and planting. A two-man planting crew can plant roughly three times as many small seedlings as large per hour. It may be further noted (table 1) that only 5 percent of the seedlings in this particular shipment fell in the large diameter class. Other means of improving early growth are available, of course, such as cultivation to control weed competition and fertilization. The land manager must consider relative costs and risks in working out-the details of his planting, program.

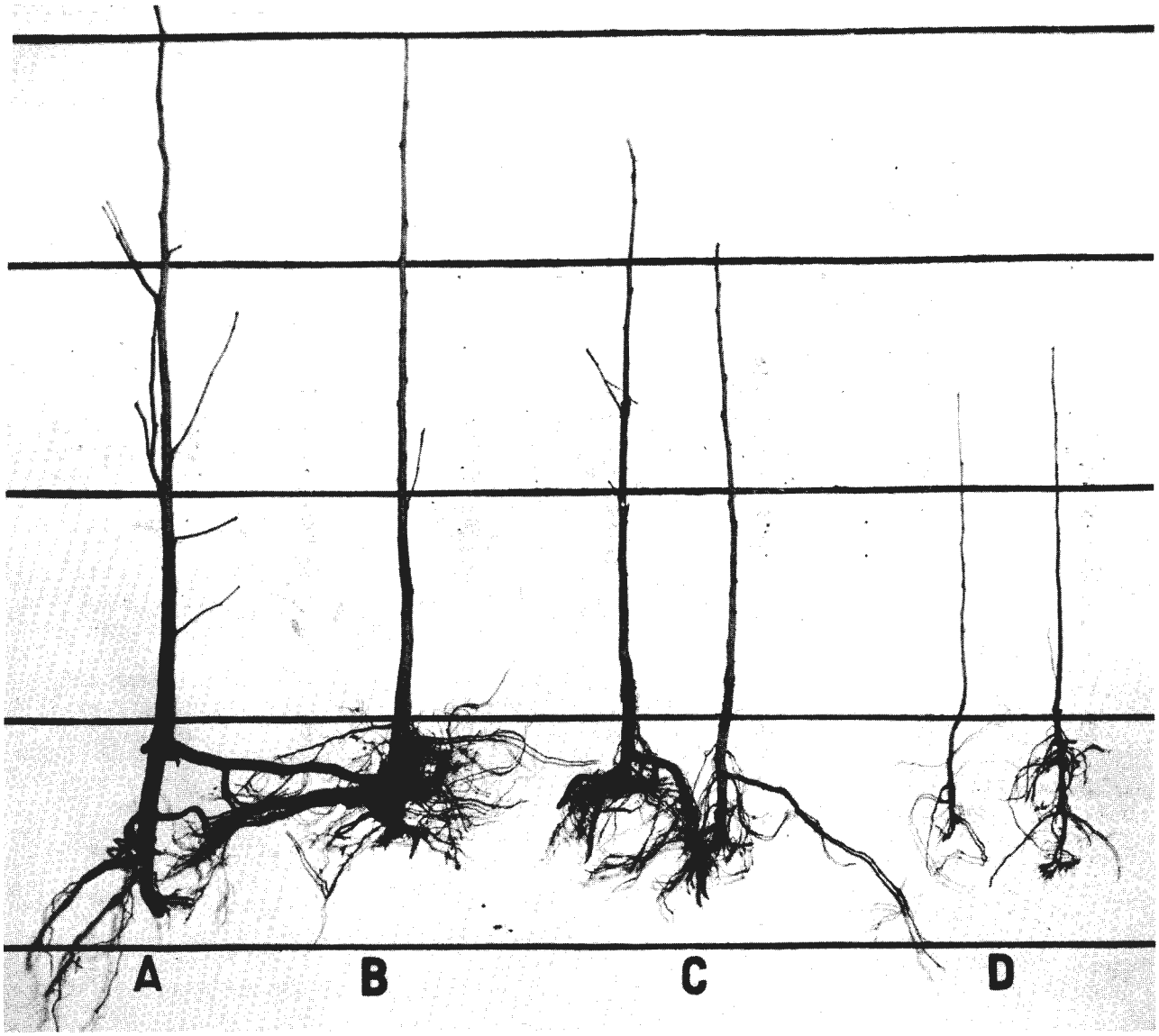

Figure 2.--Sycamore seedlings arranged by root collar diameter class: A, Large (greater than 0.51 inch); B, intermediate (0.41 to 0.50 inch); C, two medium (0.31 to 0.40 inch); and D, two small (less than 0.30 inch).