TALLER LOBLOLLY PINE SEEDLINGS GROW FASTER IN A TEXAS PLANTATION

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Do large seedlings grow faster and survive better than those of medium and small size? Much research has dealt with this subject, but there seems to be no clear conclusions.

Several studies conducted with southern pines indicate that the larger seedlings had the best height growth *(1, 14, 13, 3, 10).* Similar results were also reported by several authors studying red pine (5, 9, 4).

In contrast, Ellersten (6) and Fougler (8), working with southern pines, and other researchers (7), (2), (11), (12), with pines in other regions of the United States, concluded that differences in height growth were not significant, or that such differences were of no practical consequence.

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The Study

During the winter of 1958 the Southwestern Settlement and Development Company of Jasper, Tex., lifted from their nursery ungraded loblolly pine *(Pinus taeda L.)* seedlings ranging in top height from about 3 to more than 24 inches. These seedlings were then machine planted near Denning, Tex.

The site consisted of a deep sandy soil with a ridgetop, east and north slope exposures of from 5 to 20 percent. The pine stand was harvested just prior to planting, and the residual cull hardwood overstory was destroyed by tree injection the following year.

Three plots of about 1,400 trees each were established, and each tree was numbered with a metal tag. All trees were measured for total height one month after planting. The measurements were in tenths of feet from the average ground line around the base of the tree to the top of the terminal bud. Heights were measured at the end of each of the first four growing seasons following planting, and the data were transferred to punched cards. In addition, all dead trees were recorded each year to determine the percent survival.

Dead tree cards in each height class were sorted out, the survival percentages were calculated by plot, and height regressions were computed on the IBM 1620 computer, using initial height as the independent variable and the subsequent heights as the dependent variable.

The computer yielded four equations for each of three plots for a total of 12 regressions. The graphical solutions of the equations may be seen in figures 1, 2, and 3, and in table 2. All equations were significant at the 99 percent level.

Percent survival for each height class was deter-

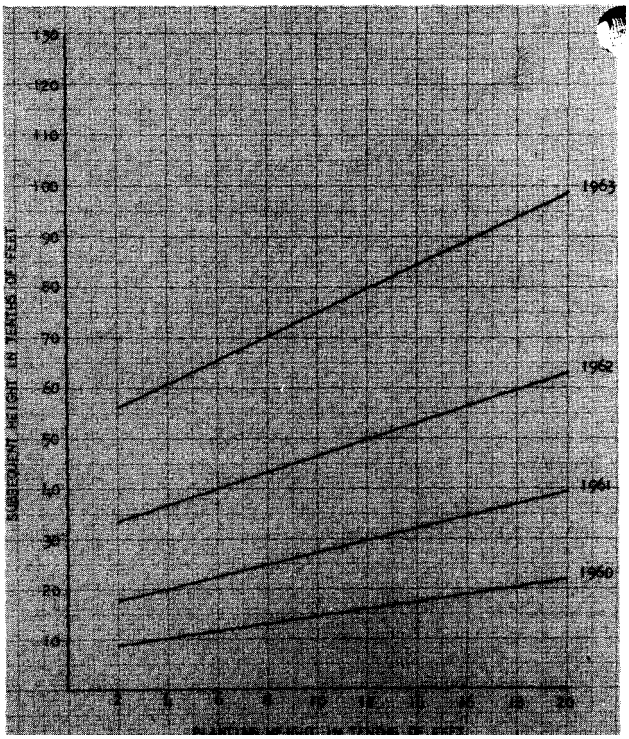

Figure 2.—Regression solutions of tree height for Plot II.

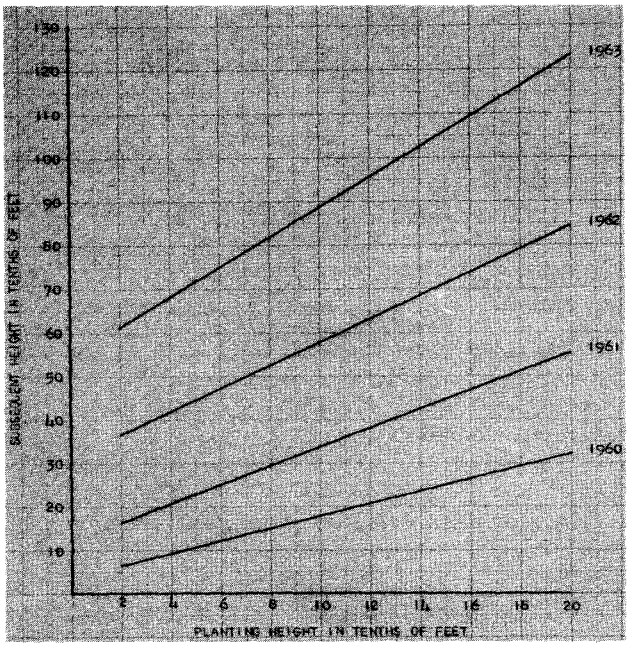

Figure 1.—Regression solutions of tree height for Plot I.

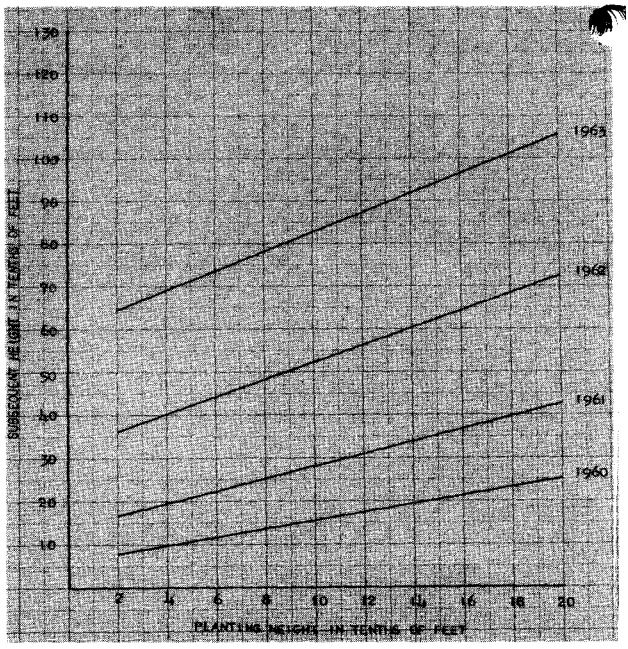

Figure 3.—Regression solutions of tree height for Plot III.

TABLE 1.—*Survival by height classes at the end of the first year*

Height (0.10 ft.)	Plot I		Plot II		Plot III	
	Total Number	Percent Survival	Total Number	Percent Survival	Total Number	Percent Survival
3 & less	60	73.3	141	65.2	41	39.0
4	99	70.7	122	58.2	99	57.6
5	143	77.6	166	60.2	150	56.0
6	174	79.9	218	62.4	213	61.0
7	182	74.2	190	66.3	260	54.4
8	205	79.5	172	55.8	207	58.9
9	145	86.2	120	57.7	152	60.5
10	162	81.5	114	57.0	139	62.6
11	89	84.3	91	64.8	81	50.6
12	92	81.2	80	45.0	68	48.5
13	37	81.3	47	44.7	27	40.7
14 & taller	36	75.0	23	47.8	19	42.1
All seedlings	1424	79.1	1484	59.4	1356	56.6

TABLE 2.—*Straight line regression solutions*[1]

Year	Plot I	Plot II	Plot III
1960	$Y^2 = 1.45X + 3.28$	$Y = 0.74X + 7.08$	$Y = 0.98X + 5.65$
1961	$Y = 2.16X + 11.80$	$Y = 1.22X + 15.00$	$Y = 1.50X + 13.35$
1962	$Y = 2.65X + 31.25$	$Y = 1.69X + 29.78$	$Y = 2.00X + 32.39$
1963	$Y = 3.40X + 54.69$	$Y = 2.36X + 51.27$	$Y = 2.34X + 59.49$

[1] The correlation coefficient of each equation was significant at the 99% level.
[2] Y is subsequent seedling height; X is planting height.

mined at the end of the first growing season (table 1).

Conclusions

Examination of the curves reveals that larger initial height gave faster growth. It may be noted that, on every plot, the slope of the line increases with each succeeding regression. This indicates faster growth for the larger seedlings than for the smaller ones.

Further examination reveals that the larger seedlings on plots I and 2 are increasing their growth rate more rapidly each year. This was also true for plot 3 during the first two years, but during the last two years the larger trees have been increasing their height advantage at a decreasing rate.

From table 1, it appears that the survival of the larger is as good as that of the smaller, but not quite as good as that of the medium size seedlings. This could be due in part to the inability of the planting machines to handle the oversized planting stock. However, on plot 1 survival was high for all height classes. Survival between plots followed the same pattern as did growth, with plots 2 and 3 about equal while plot I had the best survival of the three plots.

The fact that plot I is the best in both growth and survival tends to indicate that seedling size is of more consequence on a better site, because it

was on this plot that the larger seedlings established themselves and showed the most growth superiority.

It has been shown that on good sites larger seedlings can grow faster and survive equally as well as medium and small size seedlings. This concurs with the majority of the work cited earlier.

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