

WHICH TO PLANT—LOBLOLLY OR SLASH PINE?

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In the last two decades, tree planters from Texas to Georgia have changed their preference from slash to loblolly pine. In response to this trend, nurseries in these states produced 123 percent more loblolly than slash pine seedlings in 1974. They had grown about 60 percent more slash than loblolly seedlings during the mid- and late 1950's.

Although research has not provided final answers to the question of which of the southern pine species grows best on what sites, 15-year results of a comprehensive site-species study in Louisiana and Mississippi indicates that the odds are with those planters who choose slash over loblolly pine for flat, wet sites. On intermediate and dry sites, the two species often performed equally well, and the choice between the two is not clearcut.

The Study

From 1954 through 1958, 113 multiple species outplantings were established on a wide variety of sites in Louisiana and Mississippi (figure 1). The typical outplanting contained three plots each of slash, loblolly, and longleaf pine. About one-half of them also contained three shortleaf pine plots. In no case has longleaf or shortleaf pine outgrown in height or out yielded both slash and loblolly pine. Therefore, this article compares only slash and loblolly performance.

All planting was by hand at a 6-by 6-foot spacing.

When the installations were established, or soon thereafter, the sites were classified as wet, intermediate, or dry on the basis of field exami-

nation of the soils. Wet site soils lacked prominent, abrupt changes in color or texture within the surface 3 to 4 feet. These soils remain submerged or saturated with water during wet periods, especially in winter. They range in internal drainage from very poor to moderately good. The main distinguishing characteristic of intermediate sites was that the soils had well-defined horizons which differed from each other in both texture and color. These soils are moderately well to well drained. The dry sites had a thick surface layer of coarse sand to sandy loam soil which might or might not grade into somewhat heavier material below a depth of 3 feet. The soils have good to excessive internal drainage and a very limited capacity to store readily available moisture.

All installations supplied information on first-year survival. But wildfire, hurricanes, and other disasters subsequently destroyed several installations and individual plots in others. Thus, 87 installations provided data on height of the dominant stand, and 72 provided information on fusiform rust infection in the main bole and growth through age 15 years.

First-Year Survival

For all installations, first-year survival averaged 77 percent for loblolly pine and 69 percent for slash pine. The slash pine seedlings in 15 outplantings were from overdense nursery beds and consequently had a reduced potential to survive outplanting. Where other slash pine nursery stock

In volume and height through age 15, slash has grown at least as well as loblolly pine on level or nearly level sites with imperfectly or less well drained soils. They usually grow equally well in most other situations.

was used, however, statistical analyses showed that loblolly survived significantly (0.05 level) better than slash on 7 percent of wet site installations, 17 percent of intermediate site installations, and 14 percent of dry site installations; slash survived better than loblolly on one intermediate site.

Both species survived best on wet and poorest on dry sites (figure 2). For the two species combined, first-year survival averaged 80 percent on wet sites, 72 percent on intermediate sites, and 54 percent on dry sites.

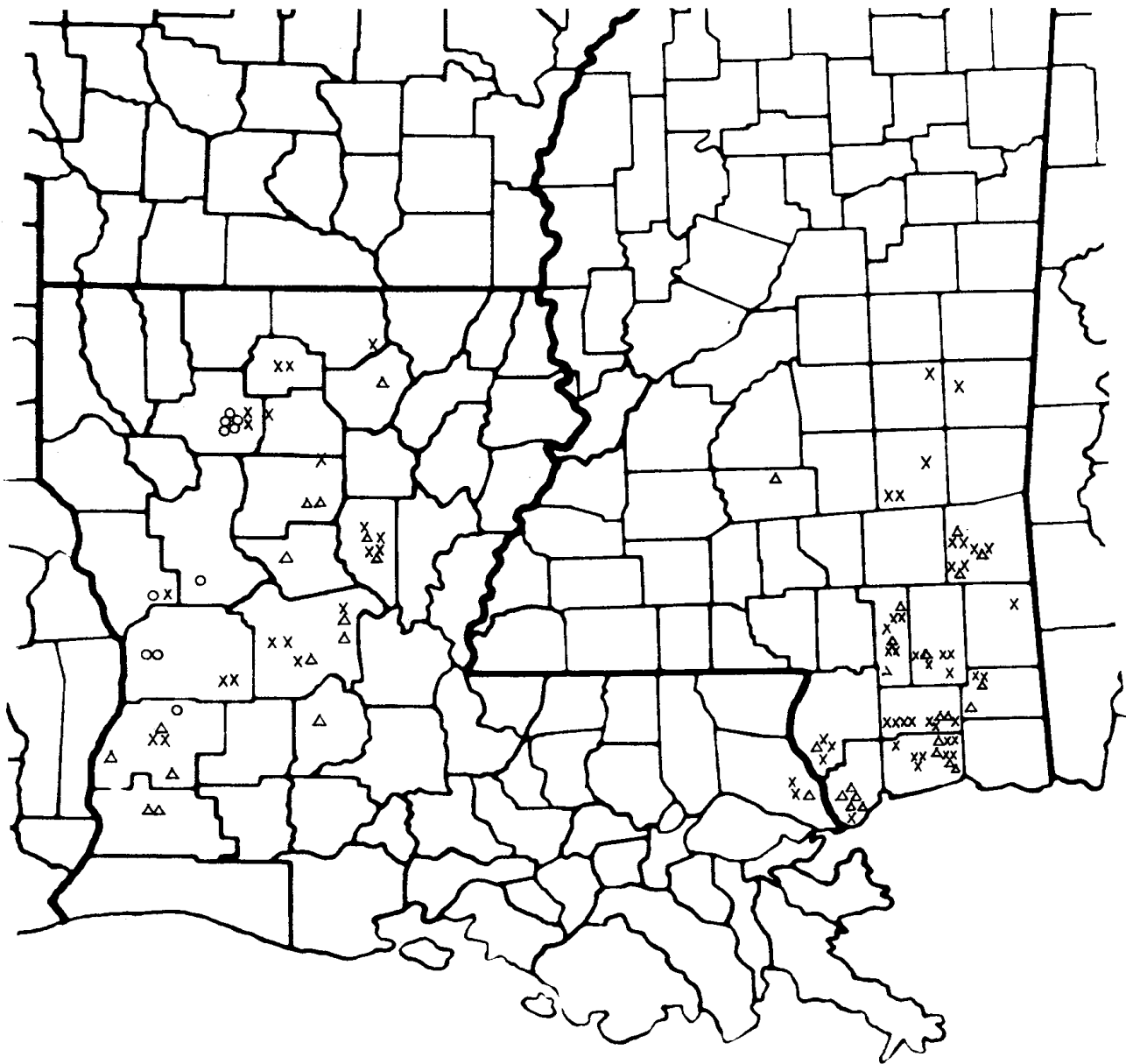
To minimize survival effects on yield, mortality was replaced after 1 year, as follows. In Louisiana west of the Mississippi River, individual dead or missing seedlings were replaced with 1-0 nursery stock, or the entire outplanting was destroyed and replanted. In Mississippi and the Florida Parishes of Louisiana, survivors on inadequately stocked plots were destroyed, and the plots were replanted.

Fusiform Rust

Overall, 31 percent of the slash pine present at age 2 or 3 developed one or more stem infections of fusiform rust by age 15 years, compared to only 21 percent for loblolly pines.

In 36 percent of the installations containing two or more plots of each species, significantly fewer loblolly than slash stems developed cankers; slash never had a lower incidence of infected stems than loblolly.

Comparisons within species indicated that seed source influenced rust infection of both species. Georgia slash



- Δ WET SITES
- X INTERMEDIATE SITES
- O DRY SITES

Figure 1.—Locations of outplantings.

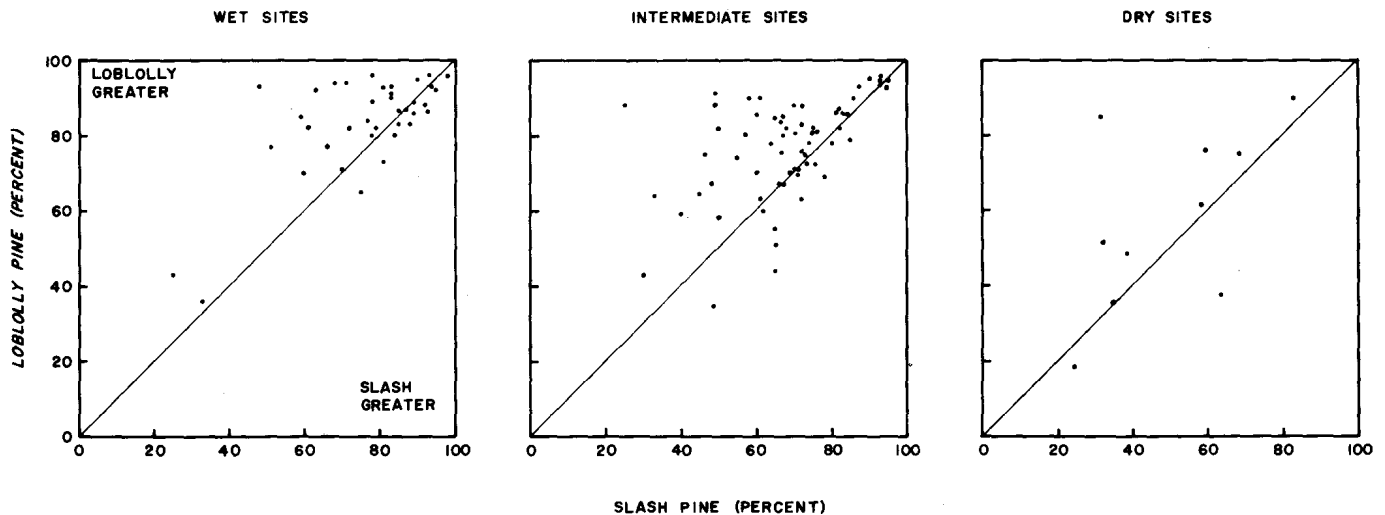


Figure 2.—First-year survival of loblolly and slash pines. (In this and other figures, diagonal lines represent equal performance by the two species.)

appeared to be less susceptible than south Mississippi slash to rust invasion of the bole. Similarly, Louisiana loblolly was less susceptible than Mississippi loblolly to the disease.

Both species were more severely infected on intermediate than on wet or dry sites (figure 3). This difference arose in part because Louisiana loblolly was planted less frequently on intermediate than on other sites, but other unidentified factors also contributed.

By age 15 years, stem infections were about equally lethal in the two species and had killed about one-third of the trees that developed them. Because slash pine was infected more frequently than loblolly, it sustained higher mortality from the disease.

Height

By age 15 years, slash was signifi-

cantly taller than loblolly pine in 57 percent of the installations on wet sites. In the remaining 43 percent, the species did not differ significantly in average height of dominant and codominant trees. Overall, slash averaged 35 feet in height on these sites, 7 feet taller than loblolly.

Differences between species were less prominent on intermediate and dry sites than on wet sites (figure 4). Slash pine was significantly taller than loblolly in about 10 percent of the installations on intermediate and dry sites. But neither species excelled significantly in height in 90 percent of the installations. Slash and loblolly averaged 40 and 39 feet, respectively, in height on intermediate sites, and 42 and 40 feet on dry sites.

Projections of heights of the dominant stand to age 25 years (by means

of Farrar's¹ equations for USDA Misc. Publication 50 site index curves) indicated that slash pine will maintain a 5-foot or greater height advantage over loblolly in 52 percent of the installations on wet sites, and the species will differ less than 5 feet in 44 percent of them. Loblolly is projected to be 5 feet or more taller than slash in 36 percent of the installations on intermediate sites and 5 feet or more shorter than slash on 12 percent. On dry sites, dominant and codominant loblollies are expected to average 5 or more feet taller than slash trees in 20 percent of the installations and to differ from slash by less than 5 feet in 80 percent.

Mean Annual Volume Growth

Species differences in mean annual cubic volume increment were similar whether volumes were computed for trees

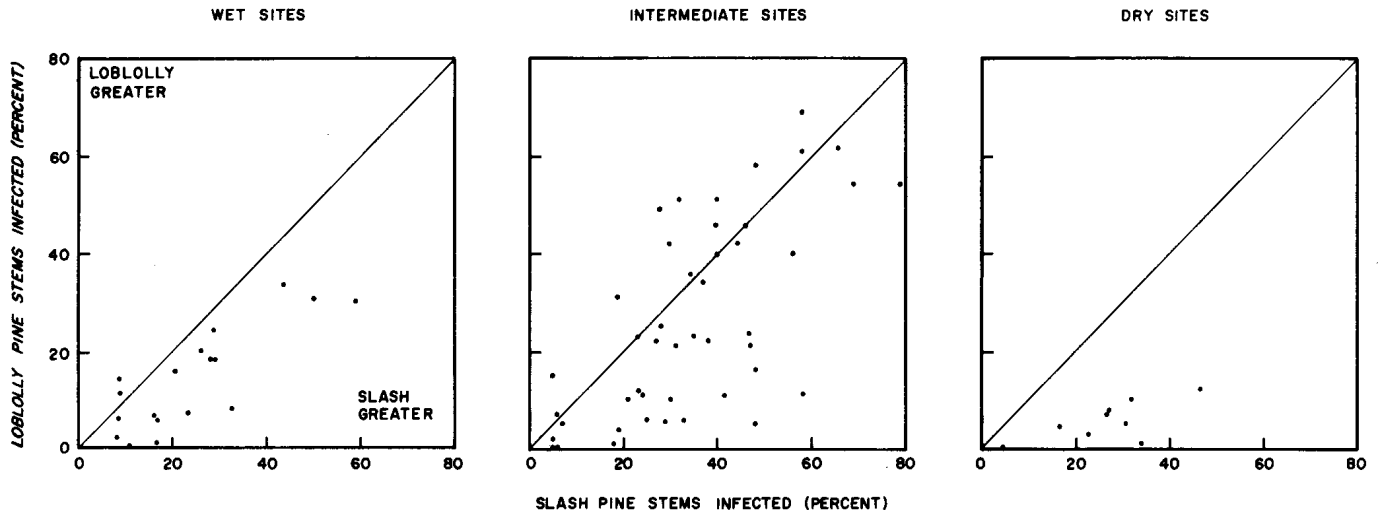


Figure 3.—Loblolly and slash pine boles infected with fusiform rust through age 15 years.

≥ 0.6 inch in d.b.h. to 0-inch top (figure 5) or for trees ≥ 4.6 inches in d.b.h. to a 4.0-inch top. Total volumes averaged about 54 percent greater

then merchantable volumes for loblolly and 42 percent greater for slash pine, indicating that loblolly plots contained more trees below the 4.6-inch d.b.h.

threshold. Since trees were planted at a 6- by 6-foot spacing, total mean annual increment to age 15 probably indexes productivity of the sites more precisely

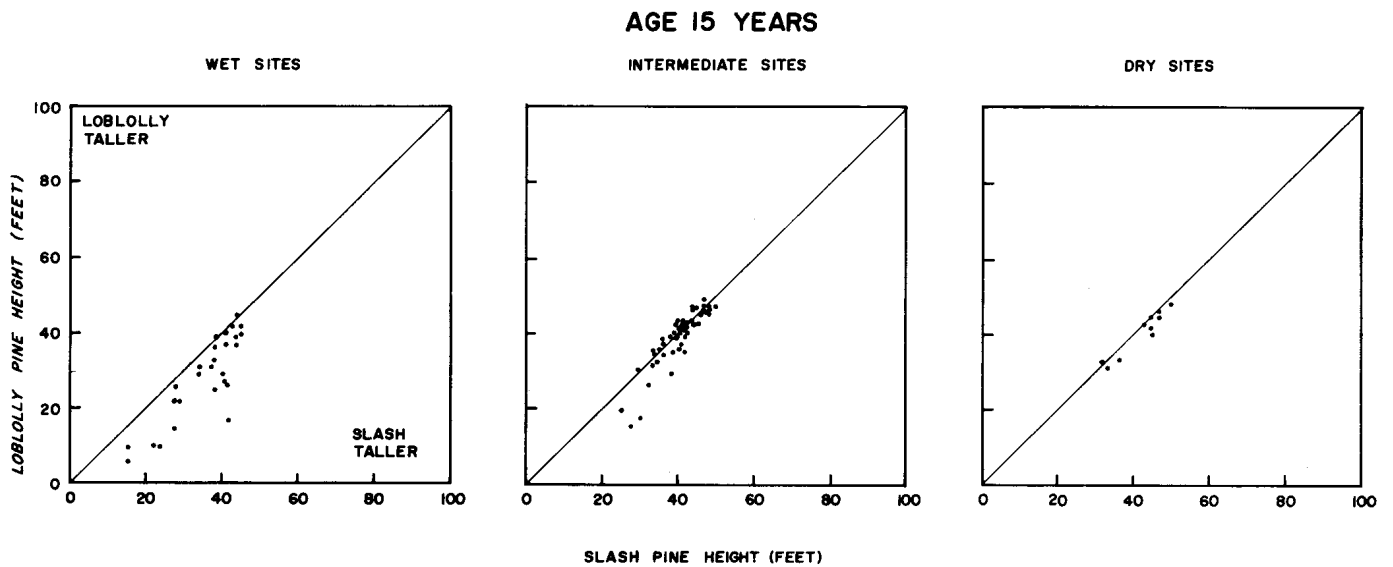


Figure 4.—Heights of dominant and codominant trees at age 15 years.

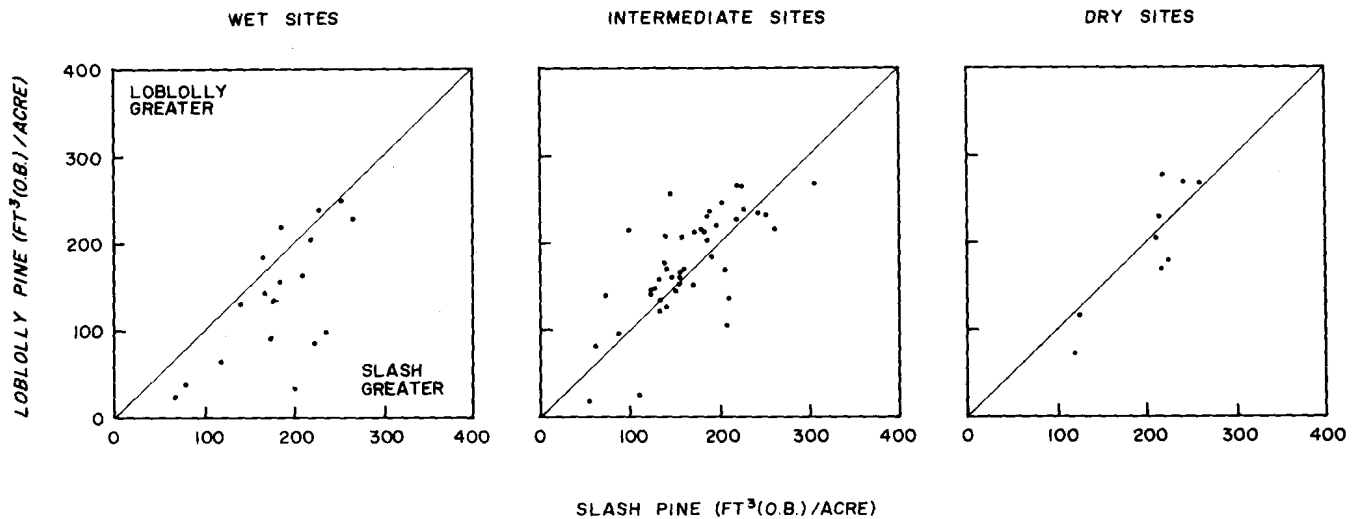


Figure 5.—Mean annual cubic-foot increment of loblolly and slash pine to age 15 years in trees ≥ 0.6 inch in d. b. h. to 0-inch top.

than merchantable mean annual increment. For this reason, only total annual increments will be discussed.

In one-fourth of the installations on wet sites that were analyzed for differences in volume, slash grew at a significantly greater annual rate and averaged 122 ft^3 (o.b.) per acre per year more growth than loblolly. Differences between species were not significant in the remaining analyses of wet site installations. Overall, slash averaged 183 ft^3 (o.b.) growth per acre per year and loblolly 138 ft^3 .

For intermediate site installations, slash pine volume growth was significantly greater than loblolly in 11 percent of the analyses, and loblolly growth was significantly greater in 6 percent. For all installations on intermediate sites, total mean annual in-

crement averaged 177 ft^3 for loblolly and 165 ft^3 for slash.

The analyses of dry site data produced only one significant difference between species in total mean annual increment. In that installation slash pine excelled. Volume growth was surprisingly good on dry sites; loblolly averaged 197 ft^3 and slash averaged 205 ft^3 (o.b.) per acre per year in trees 0.6 inch in d.b.h. and larger. Possibly, the young stands had not yet suffered unduly from these soils' limited capacities to supply moisture.

Discussion and Conclusions

The small advantage of loblolly over slash pine in initial survival is easily overcome by planting about 10 percent more slash than loblolly pine seedlings per acre. Similarly, the tendency of

more slash pine stems to develop fusiform rust infections can be overcome by planting more trees or planting rust resistant trees that otherwise perform at least as well as trees from local seed.

In volume and height through age 15 years, slash has grown as well as, or better than, loblolly pine on level or nearly level sites having imperfectly or less well drained soils. In most other situations the two species have usually grown equally well. Here too, however, slash has outperformed loblolly in a small proportion of the outplantings.

If the 10-year projected heights are reliable indicators of the species performance to age 25 years, then slash pine probably will maintain its advantage over loblolly on flat, wet sites. But loblolly should equal or surpass

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slash in growth and yield on most intermediate and dry sites.

More details on results of this study are contained in "Site Characteristics Influence Relative Performance of Loblolly and Slash Pines," U.S. Dept. Agric. For. Serv., Res. Pap. SO-115, available from the Southern Forest Experiment Station, New Orleans, La.

¹ Farrar, R.M., Jr. 1973. Southern pine site index equations. J. For. 71:696-697.