

Planting Hardwoods On The Santee Experimental Forest

By JACK STUBBS

For centuries lumbermen have grappled logs out of the hardwood forests of the Carolina Coastal Plain. Varied finished products generally capitalize on the beautiful or unique characteristics of sturdy, warm-brown oak for flooring and furniture, fine-grained and easily worked yellow poplar for veneer cores and general use, tough straight-grained ash for handle stock, and hardwood pulp for fine-finish paper. A conservationist of the pessimistic mold might conclude that heavy production has thoroughly mined these hardwood stands, leaving them in a dismal condition. Happily, this is not the usual case, since rich soils and congenial climate favor rapid stand recuperation. But hardwoods have generally had to "root or die" without any silvicultural assistance whatever, resulting in too many run-down woodlands dominated by culls and brush without adequate seed source for regeneration. These stands

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need a drastic treatment to bring them back into full production.

One method of rejuvenating poor stands is through planting; and to evaluate species performance, a series of tests have been carried out on the Santee Experimental Forest, near Charleston, S. C. Here hardwood sites consist of stream bottomlands and associated terraces. The results discussed in this paper are limited to terrace plantings not subject to flooding. Soil types include Coxville loam and phosphatic variants of Bayboro clay loam and Chastain very fine sandy loam. These sites once supported fine mixed stands of cherry-bark and Shumard oaks, yellow-poplar, sweet gum, white and swamp chestnut oaks, white ash, also loblolly pine, beech, and assorted hickories.

Some of the better species (Table 1) from a growth and value standpoint were chosen for planting during two consecutive years, 1956 and 1957. All merchantable wood was logged from several terrace sites, and remaining culls were deadened with 2,4,5-T in oil. Planting was done during winter months, using the conventional 10-inch planting bar and root-pruned one-year-old seedlings (Figure 1). Survival after one growing season was gratifyingly high, averaging 76 per cent for all species combined, but we decided that results after five growing seasons would be more realistic. The delay was well taken, since the survival of several species dropped markedly the first few years.

Species Performance

Yellow poplar's performance is characterized by extreme variability. Some plots, particularly in the 1956 planting, have prospered re-



FIGURE 1.—Planting conditions after logging and deadening of cull trees. US Forest Service Photo.



FIGURE 2.—One of the better yellow-poplar plots in the middle of its fourth growing season. US Forest Service Photo.

markably, with 89 per cent survival and dominants 15 feet tall (Figure 2). Other plots on heavy wet soils are near failures. Yellow poplar has been long known to be a demanding species, and in general, planting success will be limited to fairly well-drained soils with deep topsoils. We may be certain that some good yellow poplar sites do occur in the study areas, because some fine specimens were harvested, including one with six logs. White

ash is outstanding for high survival, particularly in the 1956 planting. Growths compares favorably with the other hardwoods except yellow poplar. Ash looks particularly good on the heavier and wetter soils, in comparison with other species.

Survival and early growth of swamp chestnut oak is generally better than that of the red oaks tested. Height growth compares favorably with the average for yellow poplar, but cannot match the best yellow poplar plots. Still, swamp chestnut oak was more consistent than yellow poplar, tending to do well on most plots. The red oaks, cherry-bark and Shumard, showed extreme variation in individual seedling height growth. While one seedling may have reached a 14-foot height, its neighbor may be little if any taller than when planted. This is an extreme case but this curious phenomenon has been observed in other red oak plantings. The causes are a continuing mystery. A more

normal growth situation is shown in Figure 3. Red oak height growths listed in Table 1 may seem rather modest, but they exceed oak planting results in more northerly climes by two or three times. Apparently these red oaks demand our patience; judging by mature red oaks well represented in our woods, they may start slowly but accelerate to highly satisfactory growth rates. Trees exceeding 40 inches in diameter at about 70 years age are not rare, growing in stands never benefited by thinning.

In summary, yellow poplar plantations can do well on terrace sites if the sites are picked with care. White ash is an accommodating species over a much wider site range. Sweet gum was not included in these plantings because seedlings were not available. However, it will do very well on terrace sites, conspicuously better than Shumard oak in a planting test already reported.¹ Of the oaks, swamp chestnut looks espec-



FIGURE 3.—Planted Shumard oak during its fourth growing season.

Table 1.—Fifth year survival and growth of selected hardwood species planted on the Santee Experimental Forest

Species	Survival			Average height		both years Average
	1956 planting	1957 planting	Average both years	1956 planting	1957 planting	
	Per cent			Feet		
Yellow poplar	51	48	49	7.9	5.5	6.7
White ash	90	72	81	5.6	5.5	5.5
Swamp chestnut oak ¹	73	—	—	7.6	—	—
Shumard oak	51	74	62	4.2	6.3	5.2
Cherry-bark oak	30	62	46	4.3	5.0	4.6
Grand averages	59	64	61	5.9	5.6	5.7

¹Swamp chestnut oak was not planted in 1957.



FIGURE 4.—Five years after being planted, the area looks like a sea of blackberries and bushes but most of the planted cherry-bark oak have their "heads above water."

ially promising, particularly in the first five years, but planting this otherwise admirable species is often limited by infrequent acorn crops. Cherry-bark and Shumard oak acorns are generally easier to get, and these oaks have performed reasonably well.

Poor cherry-bark oak planting stock probably caused low survival in 1956. Large, healthy seedlings are absolutely essential, because after these fertile sites are opened up they

rapidly produce an amazingly rank jungle of briars and brush (Figure 4). Unless seedlings are capable of a good start they may be overwhelmed. For this reason, it is well to grow seedlings from local seed, and not as we did with the 1957 yellow poplar seedlings, which came from seed grown 250 miles distant. Within plots of this species, local volunteer yellow poplars are often growing considerably faster than the planted stock. Although there are

instances where distant seed source has proved better, the odds are very heavily in favor of local seed doing best. It is also necessary to kill competing woody vegetation, both brush and cull trees, before planting. It is a sheer waste of money either to underplant brush or use poor planting stock.

¹Stubbs, Jack. Survival and growth of sweet gum, Shumard oak, and spruce pine planted on a creek bottom site in the Carolina Coastal Plain Jour. Forestry 61:386-388. 1963

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