

Planting Turkey Oak Sites with Slash Pine May Not Pay¹

In the South thousands of old fields have been successfully planted with trees. Now that many of the "easy-to-plant" old fields have been reforested, attention is being given to more difficult planting chances such as turkey oak (*Quercus laevis* Walt.) lands of the Carolina sandhills. The sandhills region is a nearly continuous, irregular narrow strip 10 to 40 miles in width and 420 miles long. Over one-third of the area is in coarse, deep sands covered with scrub oak. The prevailing notion is that these scrub oak sites will be as productive as old fields if cleared and planted to pine. Unfortunately, this assumption is not entirely correct. A recent study by the Southeastern Forest Experiment Station and Duke University School of Forestry shows that the deep sand soils (ten feet or more to a clay subsoil) of prepared turkey oak sites are considerably poorer than the deep sand soils of old fields.

Growth observations for this study were taken in 88 slash pine plantations between 5 and 22 years of age, mostly planted on deep sands of the Lakeland, Eustis, and Kershaw series in North and South Carolina. Fifty-two plantations were on old fields and 36 were on former turkey oak land that had received a high degree of site preparation before planting. A few furrowed areas were included, as well as several sites where the oaks were controlled by poisoning. However, 23 of the oak sites had been completely cleared and plowed, and after clearing, watermelons were grown on 12 of them for one season prior to planting. The ground cover on old fields was largely herbaceous weeds, broomsedge (*Andropogon* spp.) and other grasses, while low cover on turkey oak sites



FIG. 1.—A typical scrub oak site in the South Carolina sandhills prior to site preparation.

prior to site preparation was principally wiregrass (*Aristida stricta* Michx.), and reindeer moss (*Cladonia* spp.) (Fig. 1).

Age and height of dominant slash pine trees were measured on a 1/10-acre plot in each plantation, and average height-age relationships for each type of plantation were computed by regression methods (Fig. 2). Results show that slash pine planted on scrub oak land had a markedly lower rate of height growth than trees planted on old fields. Although growth rates are comparable for

the first 5 years, by the twenty-fifth year dominant pine trees on the scrub oak conversion areas may average 23 feet less than old field dominants. Accordingly, site index for old field and scrub oak slash pine plantations in the deep sands of the Carolina sandhills averaged 52 and 29 feet respectively.²

Other researchers also have found that growth of trees planted on cutover lands usually does not measure up to growth on old fields. For instance, Kittredge found growth of a number of planted species was distinctly superior on Lake States soils that had been cultivated (5). In the South, Allen observed longleaf making height growth earlier on old fields than on cutover lands (1). Likewise, Bennett found that slash pine plantings had definite growth advantages on old fields and he also observed that when the period of abandonment was short the growth advantage was even greater (3). Barnes and Ralston in a study of slash pine

²All site values are based on an index age of 25 years.

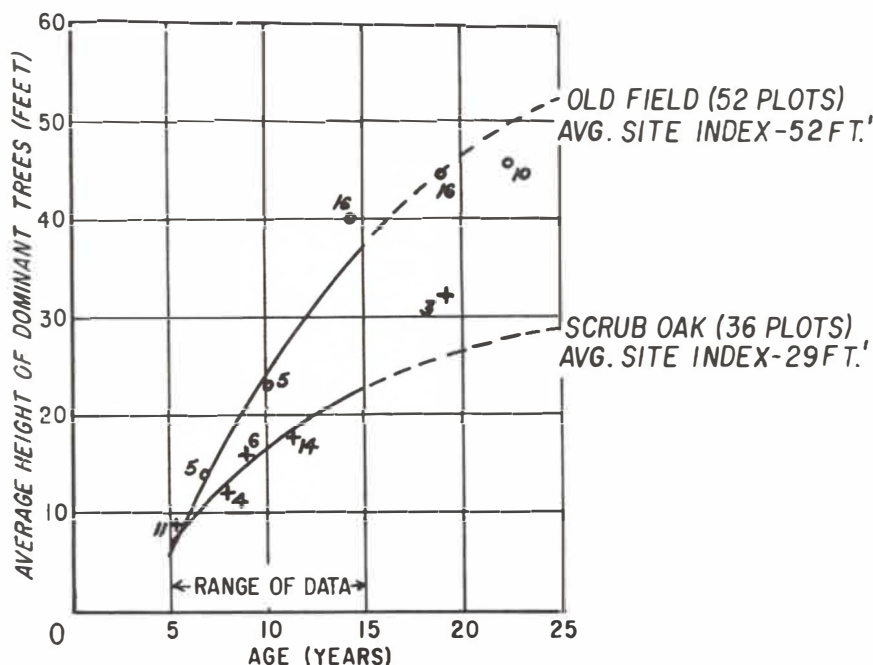


FIG. 2.—Average height of dominant trees at various ages for slash pine planted in deep sand on scrub oak and old field sites in the Carolina sandhills.

¹D. G. Benedict, School of Forestry, Duke University, assisted in the collection and compilation of study data.

growth in Florida found a seven-foot difference in site index between old field and forest plantings (2). In a similar study in Georgia, McGee observed a 12-foot growth differential between woods and fields plantings on the Kershaw soil series (a deep sand) (6). These studies indicated similar soil conditions on both cutover forest lands and old fields, and several of the authors assumed that adequate site preparation would equalize the growth potential of the areas (1, 3, 5).

Good site preparation is needed to establish pine on deep-sand scrub oak sites in the sandhills area. However, reduction of competition will not raise the timber-production capacity of *average* scrub oak land to that of the *average* old field. Observable differences in soil characteristics are associated with variation in productivity of slash pine. Soil measurements made on each plot reveal that average thickness of the A_1 horizon is 6.5 inches on old fields and only 3.9 inches on scrub oak sites. Several soil-site studies of slash pine (6, 7) have shown that thickness of the A_1 horizon is an index of site potential. The 2.6-inch difference in thickness of the top soil may account for most of the height-growth differential between the scrub oak and old field pine plantations. For example, McGee found that a difference of 2 inches in top soil thickness was associated with a 13-foot site index reduction in slash pine plantation on moderately deep sand in Georgia (6). It is possible that some of the better growth on old fields is due to residual fertilizer on these areas, but this hypothesis has not been substantiated by current exploratory studies of soil chemical properties. Moreover, twelve of the scrub oak sites had been treated with 1,000 pounds of fertilizer per acre during watermelon operations without any obvious effect on juvenile growth of pine. A small reduction in growth on former scrub oak sites may be attributed to effects of competition; however, statistical comparisons of growth among plots of different residual

cover classes gave no indication of significant growth inhibition due to competing vegetation.

This circumstance is not particularly surprising, as most of study areas had received a high degree of site preparation at the time of planting, and at a number of locations oak sprouts had been removed in periodic cleanings. Full effect of scrub oak competition may be observed where slash pine is underplanted on poor sites. On the few such areas of this type that could be located, survival was extremely poor and pines were stunted in height—in one instance, 12-year-old slash pines were less than three feet tall.

It should be emphasized that many sandhill soils supporting scrub oak have a high potential for growth of slash pine (7). Plantations found on soils with a clay layer within ten feet of the surface or on soils with thick A_1 horizons (5-8 inches) attained an average height of 63 feet in 25 years. Examination of soil survey maps and soil profiles of proposed planting areas will aid selection of suitable sites for slash pine in the Carolina sandhills.

It is apparent that landowners should use discretion in scrub oak clearing and planting. Lands with a site index of 30 feet, the average for deep-sand turkey oak areas, are submarginal for growing slash pine at the present time. Yield study surveys in the sandhill area (4) found few such plantations producing appreciable quantities of pulpwood in 20 years.

Even on 40-foot sites the indicated yield at 20 years is about $\frac{1}{4}$ cord per acre per year. On 50-foot sites, the average for deep sand old field plantations, yield is one cord per acre per year—obviously a much better investment opportunity. In some cases it may not be feasible to delete small areas of even the poorest deep sand ridges from the planting program. However, if these dry sands containing almost no organic matter are planted, the owner should realize that yield values may not even cover initial establishment costs.

C. W. RALSTON

*Duke University
Durham, N. C.*

and C. E. MCGEE

*Southeastern Forest Expt. Sta.,
Forest Service, U. S. Dept. Agric.,
Asheville, N. C.*

Literature Cited

1. ALLEN, R. M. 1955. Growth of planted longleaf pine on cutover land and old fields. *Jour. Forestry* 53:587.
2. BARNES, R. L., and C. W. RALSTON. 1955. Soil factors related to growth and yield of slash pine plantations. *Univ. Fla. Agric. Expt. Sta. Bul.* 559. 23 pp.
3. BENNETT, F. A. 1956. Growth of planted slash pine on cutover lands and old fields. *Jour. Forestry* 54:267-268.
4. ———, C. E. MCGEE, and J. L. CLUTTER. 1959. Yield of old-field slash pine plantations. U. S. Forest Service, Southeastern Forest Expt. Sta. Paper 107. 19 pp.
5. KITTREDGE, JOSEPH, JR. 1929. Forest planting in Lake States. U. S. Dept. Agric. Bul. 1497. 88 pp.
6. MCGEE, C. E. 1961. Soil site index for Georgia slash pine. U. S. Forest Service, Southeastern Forest Expt. Sta. Paper 119. 9 pp.
7. ROW, CLARK. 1960. Soil-site relations of old-field slash pine plantations in Carolina sandhills. *Jour. Forestry* 58:704-707.

Reprinted from
Journal of Forestry 60(10): 719-720,