

TOPSOIL *and* PINE TREES



in

ALABAMA'S PIEDMONT

AGRICULTURAL EXPERIMENT STATION
of the ALABAMA POLYTECHNIC INSTITUTE

E. V. Smith, *Director*

Auburn, Alabama

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JAMES F. GOGGANS, *Assistant Forester*

IT IS now possible to estimate the early height growth that may be expected of slash and loblolly pine planted in Alabama's Piedmont.

The Alabama Agricultural Experiment Station recently completed a study of 5- to 13-year-old pine plantations in the Piedmont. It was found that the depth of topsoil can be used to estimate the height growth that may be expected 8, 10, or 12 years after planting. This study again brings out the fact that the fastest growing pines are on the best soils.

During the past few years, planting of pine trees has increased greatly. Today, it is a favored method of reforesting idle lands. Loblolly pine and slash pine are the two trees that have been planted most in the Piedmont. Loblolly pine is native to the region and is commonly known as "old field" pine. Slash pine, though not native to the Region, was introduced in large numbers during the period of the Civilian Conservation Corps.

HEIGHT GROWTH ESTIMATED *from* TOPSOIL

There are many things that affect tree growth. However, for young slash and loblolly pine in the Alabama Piedmont, a reasonable estimate of height growth may be made if the depth of the topsoil is known.

Cover . . . The color illustration is of a 12-year-old plantation on an Appling soil, having an 8- to 10-inch sandy loam top soil. The tallest trees were 37 to 39 feet when the color photograph was made.

The height growth that may be expected on a site indicates to a large extent the volume of timber products that may be expected from a timber stand over a period of years. The volume growth of pine trees is closely related to their height growth. In even-aged pine stands, the average total height of the tallest trees is the commonly used standard by which the quality of a site for growing trees is judged.

Figure 1 (slash pine) and Figure 2 (loblolly pine) show the estimated average height of the tallest trees in plantations for given ages and depths of topsoil. From the standpoint of early tree growth that can be expected, all sites can be divided into four classes. These classes are:

- (a) Poor site, less than 2 inches of topsoil
- (b) Fair site, 2 to 4 inches of topsoil
- (c) Good site, 4 to 8 inches of topsoil
- (d) Excellent site, more than 8 inches of topsoil; also included in this class are the well-drained bottom land soils.

Results of this study apply only to planting sites on the principal soils¹ of the Alabama Piedmont. These soils are well drained. They are easy to recognize because they have red, yellow, or brown compact clay subsoils. Original-

¹ These are soils of the Cecil, Appling, Madison, Lloyd, Coosa and Louisa series.

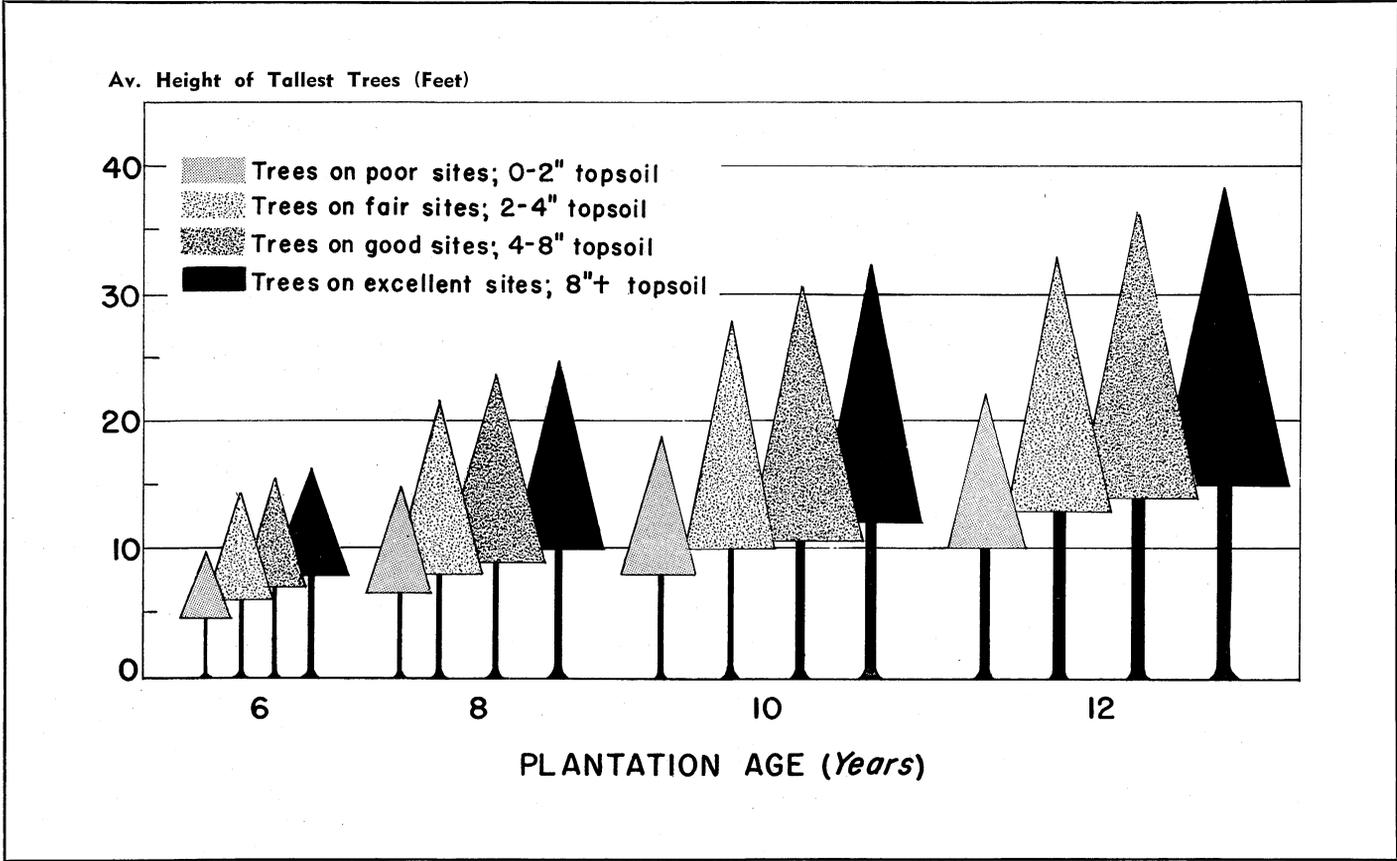


FIGURE 1. Estimated heights for young slash pine at different ages on poor to excellent sites.

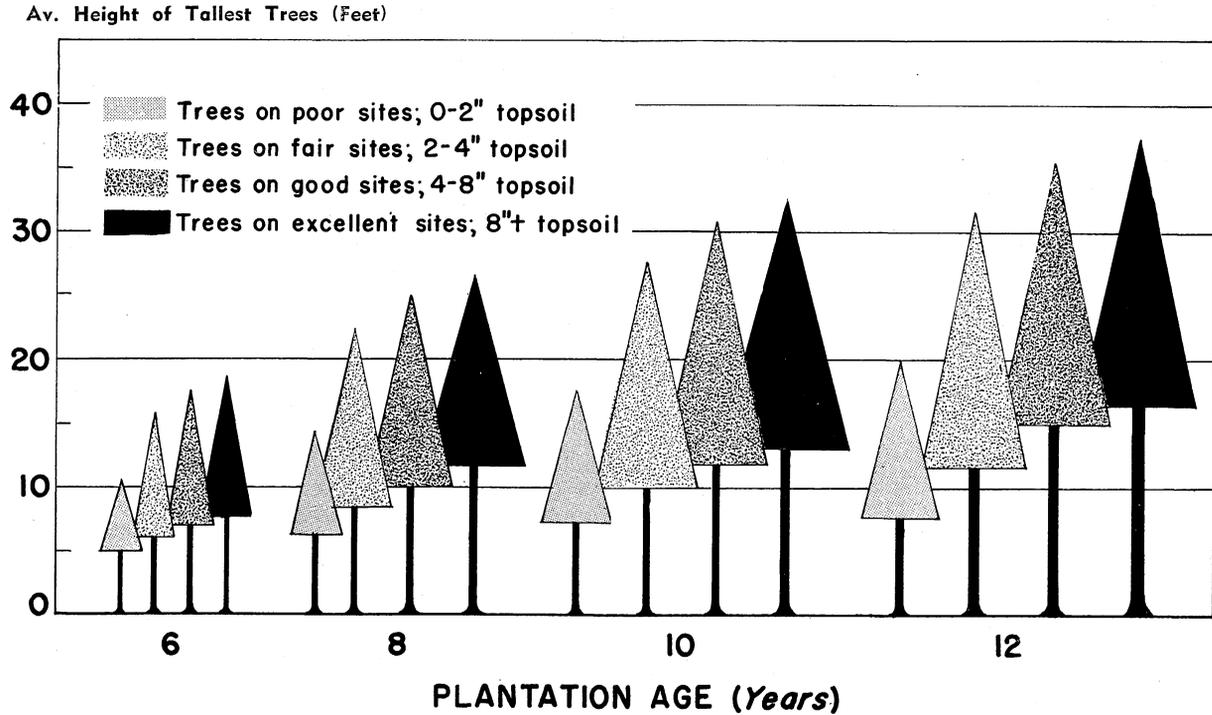


FIGURE 2. Estimated heights for young loblolly pine at different ages on poor to excellent sites.

ly these soils had a gray or brown sandy loam topsoil layer 12 to 14 inches deep. Because of erosion the topsoil layers are now extremely variable in texture, depth, and color.

HOW TO ESTIMATE EXPECTED GROWTH

The expected height growth of trees to be planted on any prospective planting site may be estimated by use of Figure 1 for slash pine and Figure 2 for loblolly pine. The tree height, which will be read at the tip of the trees in Figure 1 and Figure 2, is the average height of the tallest trees in a stand. These are the trees that have a full open top. Because their growth has been interfered with least by the other trees, they are the best trees to use in judging the quality of the site.

All estimates are made for small uniform areas; therefore, large areas are divided into small areas, the topsoil depths of which are approximately the same. If the average depth is to be determined accurately, numerous measurements of the topsoil depth must be made in each small area.

A measurement of the topsoil depth can be easily made as follows:

1. Use a ruler and a digging tool, such as a mattock or shovel
2. Dig through the topsoil layer until compact clay subsoil is reached
3. Measure the thickness of the topsoil layer.

In most instances the topsoil layer can be recognized easily from the subsoil by one or more of the following differences: (1) the topsoil is gray or light brown, whereas the subsoil is red or dark brown; (2) the topsoil has a different feel, it contains sand, and usually it varies from a sandy loam to a clay loam, whereas the subsoils are clays; and (3) the topsoil is loose structured as compared with the compact, tight subsoil. On old field sites where almost all of the topsoil has been lost

by erosion, the only noticeable difference between topsoil and subsoil is structure. The topsoil layer may consist of only 1 or 2 inches of slightly loose material on top of the hard, compact subsoil.

With the average depth of topsoil known, one may refer to Figures 1 or 2 to determine the expected height growth. Slash and loblolly pines less than 7 years old do not follow a definite trend of growth. To estimate expected height growth, ages 8, 10 or 12 may be used, although the latter two are the more reliable.

PRODUCTIVITY of DIFFERENT SITES

Merchantable volume of forest products produced over the years is the practical standard by which productivity of a site is judged. Merchantable volume refers to the volume of the trees large enough to be used for such products as pulpwood, poles, and sawlogs. Fence posts, fuel wood, and stack poles usually come from the smaller non-merchantable trees.

Trees in many of the young plantations studied in the Piedmont were too small to be cut for pulpwood. However, many were large enough for fence posts. Volume of wood produced in young plantations depends not only on height growth, which can be estimated, but on the survival, or number of trees, and diameter growth.

The total volume and merchantable volume in plantations studied did not give a true picture of the relative productiveness of the different sites because the plantations were too young. These volumes, however, did show what the sites had produced up to the time of the study and the differences in early growth caused by site.

A good example of such differences was found in the 10-year-old loblolly pine plantations studied. These plantations were originally planted at a spacing of approximately 6 by 6 feet, or

1,210 trees per acre. At 10 years of age, all averaged very close to 1,000 trees per acre, except those on the poor sites. The plantations on poor sites were extremely variable, with some having as few as 400 to 500 trees per acre.

No merchantable volume was calculated for the plantations on the poor sites, since very few trees were large enough to be merchantable. It will be a long time before the plantations on poor sites can be thinned.

The average merchantable volume of the plantations on fair sites was 9 cords of rough wood per acre, while that of the plantations on good sites was 10½ cords. None of these plantations was ready to be thinned.

Those plantations on excellent sites had an average merchantable volume of 13 cords of rough wood per acre. A few of the best plantations had grown enough to need thinning at the time of study. The remainder will need thinning within 2 or 3 years.

Thinning is necessary if these plantations are to produce the most wood possible on a particular site. The thinning must be done at the right time. During the early life of slash and loblolly pines and before reaching sawlog size, a live crown one-third of the height of the tree should be maintained.

Judging from general observations in the Piedmont, plantations spaced 6 by 6 feet with 80 per cent survival at 10 years on excellent sites will need thinning at 10 to 13 years of age. Those on good sites will need thinning in 13 to 16 years, whereas plantations on fair sites will need thinning in 16 to 20 years. The amount of wood that can be removed at the first thinning varies with each plantation. If the trees are crowded and a thinning is needed, the average amount that can be removed safely is about one-third of the merchantable volume. In the case of the 10-year-old loblolly pine plantations on excellent sites, a yield of about 4 cords per acre could be obtained. Where there is no knowledge of merchantable volume, a practical guide

is to remove about one-third of the trees above 4 inches in diameter breast high. The trees removed should include: (1) badly diseased and insect infested trees, (2) crooked and poorly formed trees, and (3) those trees that should be removed to give the other trees growing space.

CONSERVING SOIL IMPORTANT for TIMBER GROWING

Because of the rough topography of the Piedmont Region, soils without vegetative cover or terraces tend to erode rapidly. In fact, the soils of this region have been eroded more severely than the soils of any other region in the State.

It is very important that a vegetative cover be established as soon as possible after a field is no longer used for crops. An unprotected excellent site may erode to such an extent that it becomes only a fair or even a poor site within a few years. Figures 1 and 2 show what site means in terms of early height growth. However, early growth is not the only consideration. Planting costs are higher on a poor site than on a good site, and the cash returns are slower. Also, the differences in volumes of forest products that may be produced on the various sites are much larger than the differences in height might indicate. These differences in volume growth become greater as the stands get older. At 50 years of age, the loss due to erosion might mean the differences of 20 to 30 feet in the height of the trees and of 15,000 to 25,000 board feet of lumber per acre in the final harvest.

Topsoil means fast-growing trees that return money quickly. From an economic standpoint, conservation of topsoil is extremely important. A few inches of topsoil means the difference between a slow-growing, poor-yielding plantation and a vigorous, fast-growing plantation that will begin to return money at an early age.