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YELLOW -POPLAR SITE INDEX CURVES

Yellow-poplar (<u>Liriodendron tulipifera</u> L.) occurs naturally throughout the eastern and central United States from southern New England west to Michigan and south to Florida and Louisiana. Because of its wide occurrence, yellow-poplar grows under a variety of climatic, edaphic, and biotic conditions. Combinations of these different environmental conditions are associated with several broad physiographic regions such as the central valleys, northern and southern Appalachians, Piedmont Plateau, and coastal plain.

The existing site index curves were constructed for the entire yellow-poplar range. [1] However, they may not accurately reflect the height-age relationships in certain physiographic regions within the range. This note presents height -age equations and site index curves prepared for the southern Appalachian Mountains and the Piedmont Plateau.

The height-age equation for mountain stands was based on data from 267 sample plots in western North Carolina and northern Georgia. Height-age determinations were made on 4 to 6 dominant and codominant trees on each l/5-acre plot. The stands ranged in age from 20 to 82 years, and in height from 36 to 134 feet. Site index, or height at the index age of 50 years, ranged from 58 to 123 feet, with an average of 87 feet for all mountain plots. The regression of the logarithm of total height on the reciprocal of age was computed and is expressed in terms of site index:

$$\text{Logarithm site index} = \text{logarithm height} - 9.158 \,(1/50 - 1/\text{age}) \qquad (1)$$

Height-age determinations on 117 sample plots in the Piedmont of the Carolinas and Virginia were used to derive equation 2 below. Stands sampled ranged in age of dominants and codominants from 22 to 94 years, while height ranged from 46 to 119 feet. Average site index for the Piedmont plots was 82 feet, ranging from 55 to 122 feet.

The regression of the logarithm of height on the reciprocal of age is expressed in terms of site index as:

$$\text{Logarithm site index} = \text{logarithm height} - 6.503 \,(1/50 - 1/\text{age}) \qquad (2)$$

The slope coefficients of equations 1 and 2 were tested and found to be significantly different. This indicates that yellow-poplar height -age relationships are different in the mountains from those in the Piedmont (fig. 1). Accordingly, separate families of site index curves were developed for the two regions (figures 2 and 3). Both sets of curves were compared with Technical Bulletin 356. The mountain curves were significantly different, but the Piedmont curves were not different. In general, Technical Bulletin 356 underestimates site index in the younger ages and overestimates site index in the older ages when applied to mountain stands.

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[1] McCarthy, E. F. Yellow-poplar characteristics, growth and management. U. S. Dept. Agr. Tech. Bul. 356, 58 pp., illus. 1933.
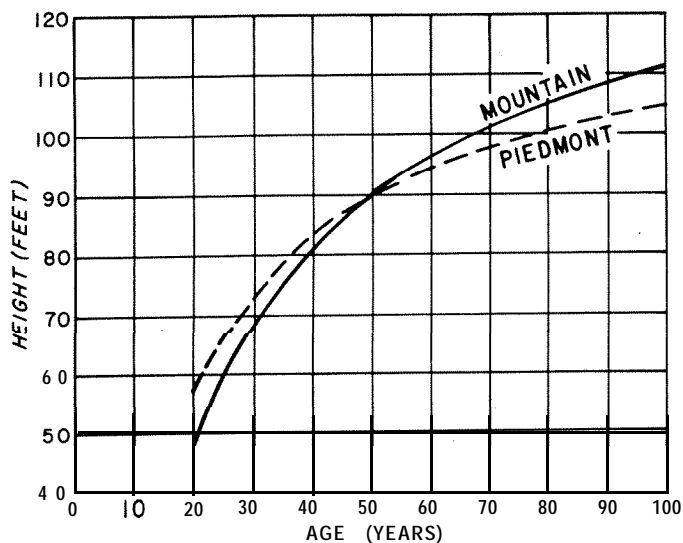
Figure 1. --Yellow -poplar height age
curves for site index 90.

It is recommended that the new mountain curves be used in the southern Appalachians. Technical Bulletin 356 curves or the Piedmont curves can be applied with equal accuracy to stands in the Piedmont of the Carolinas and Virginia. However, the Bulletin curves extend only to 50 years of age. In stands older than 50 years the Piedmont curves given here should be used.
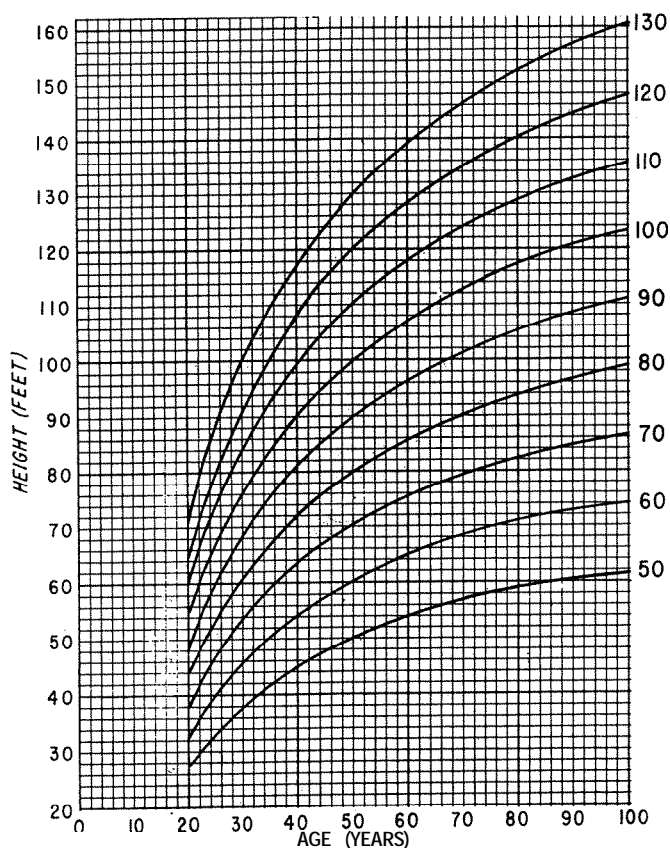

Figure 2. --Site index curves at an index
age of 5'0 years for yellow-poplar in the
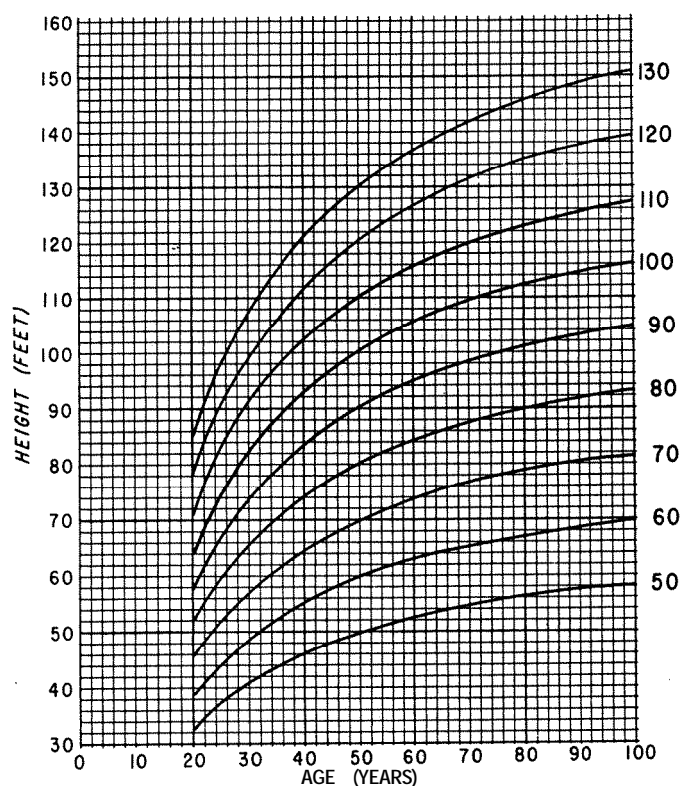southern Appalachian Mountains.

Figure 3. --Site index curves at index age of
50 years for yellow-poplar in the Piedmont
of Virginia and the Carolinas.

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