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Research Report No. 27, Site Index Equations for Loblolly and Slash Pine Plantations in East Texas, Update: 1993

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SITE INDEX EQUATIONS
FOR
LOBLOLLY AND SLASH PINE PLANTATIONS
IN
EAST TEXAS

UPDATE: 1993

BY
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REPORT 27

FROM
THE

EAST TEXAS PINE PLANTATION RESEARCH PROJECT
COLLEGE OF FORESTRY
SFASU
NACOGDOCHES, TX 75962

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SITUATION

In 1986, equations to estimate site index in loblolly and slash pine plantations in East Texas were published[1]. These equations were developed using data collected from East Texas Pine Plantation Research Project (ETPPRP) permanent plots distributed throughout East Texas. The site index prediction equations were designed to estimate tree height 25 years from planting, ie., index age = 25 years.

In the 1986 study, only data recorded during the first measurement cycle of the ETPPRP (1982-1984) were available for analysis. Pairs of observed plantation age and average total height of the ten tallest trees values were accessible from 150 permanent plots in loblolly pine plantations and 75 sample plots in slash pine plantations. For both species, approximately 85% of the data pairs were 10 years or younger.

In this update, new versions of site index prediction equations are presented for these two pine species based on information from repeated measurements of the ETPPRP permanent plots during 1982-1992. To date, almost all the ETPPRP plots have been measured four times. The loblolly pine site index equation is based on the analysis of 608 age-height pairs, and the slash pine site index prediction equation is derived from 264 age-height pairs. Original data pairs from the 1986 study are included in this new expanded data set, which represents a 3 to 4 fold increase in data size.

As a result, the updated equations should quantify the productivity of the East Texas planted areas in a more accurate and reliable manner.

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[1] Lenhart, J. D., E. V. Hunt, Jr. and J. A. Blackard. 1986. Site index equations for loblolly and slash pine plantations on non-old-fields in East Texas. South. J. Appl. For. 10(2):109-112.

PREDICTING HEIGHT

The same height prediction function used in the 1986 site index study was utilized in this updated work. As a result of fitting the Richards' function, using non-linear regression analysis, to the age and height pairs from the development subplots, height can estimated as:

LOBLOLLY
$$H = 84.19431[1-EXP(-0.08630(A))]^{1.59587} \tag{1}$$

SLASH
$$H = 112.04141[1-EXP(-0.05261(A))]^{1.31659} \tag{2}$$

A residual analysis of equations (1) and (2) compared the predicted and observed heights for the evaluation subplot data sets and indicated no bias or adverse trends for either species.

PREDICTING SITE INDEX

Using procedures described by Clutter et al. (1983)[2], the height estimation or guide curves (1) and (2) can be converted into equations to estimate site index with index age = 25 years as:

LOBLOLLY
$$S = H\{0.88439/[1-EXP(-0.08630(A))]\}^{1.59587} \tag{3}$$

SLASH
$$S = H\{0.73156/[1-EXP(-0.05261(A))]\}^{1.31659} \tag{4}$$

Equations (3) and (4) were rearranged to estimate H for a given A and S, and anamorphic site index curves were developed for each species (next two pages).

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[2] Clutter, J. L., J. C. Fortson, L. V. Pienaar, G. H. Brister and R. L. Bailey. 1983. Timber Management: A Quantitative Approach. John Wiley & Sons, New York. 333 p.

LOBLOLLY PINE PLANTATIONS ... EAST TEXAS

SITE INDEX CURVES

(BASED ON ETPPRP DATA ... 1982-92)