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Establishment of permanent growth and yield plots in loblolly and slash pine plantations

J. David Lenhart
Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University

Ellis V. Hunt Jr.
Stephen F. Austin State University

Jock A. Blackard

ESTABLISHMENT OF PERMANENT GROWTH AND YIELD PLOTS IN LOBLOLLY AND SLASH PINE PLANTATIONS IN EAST TEXAS [1/]

J. David Lenhart

Ellis V. Hunt, Jr.

Jock A. Blackard [2/]

Abstract.--Permanent plots have been established in 178 loblolly and 78 slash pine plantations throughout East Texas to study the development of stand structure over time. Analysis of the data will provide methods of estimating growth and yield, mortality, and site productivity to assist managers of these plantations.

In August, 1984, after three years of work, the School of Forestry at Stephen F. Austin State University and participating East Texas forest industries finished installing an array of 178 permanent growth and yield plots in loblolly pine plantations and 78 permanent growth and yield plots in slash pine plantations throughout East Texas.

The need for this comprehensive sample arose because about 15 years ago, many forest landowners started converting mixed pine-hardwood stands to planted pine stands. By 1984, approximately 2 million acres of loblolly and slash pine plantations were established on these non-old-field stands (usually site-prepared) in East Texas. Systems and procedures are needed to predict the future stand structures of these plantations.

In 1981, several participating industrial forest landowners in East Texas and the School of Forestry started a comprehensive long-term study of growth and yield - The East Texas Pine Plantation Research Project.

OBJECTIVES

The basic objectives of the project are:

1) Develop individual tree content prediciton equations.
2) Quantify site productivity.
3) Determine tree survival equations.
4) Develop basal area growth functions.
5) Compute individual tree height growth equations.
6) Develop procedures to recover stand structure parameters.
7) Determine effects of thinning on stand structure.

In addition, several adjunct research projects are being conducted as part of the East Texas study as:

1) Determine the role of non-planted vegetation.
2) Quantify the occurrence of fusiform rust.
3) Characterize the soil.
4) Describe the quality of the planted trees.

Since this is a long-term project, modifications and changes in project goals and objectives will probably occur.

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[2/] Professor, Associate Professor and Graduate Assistant, respectively, School of Forestry, Stephen F. Austin State University, Nacogdoches Texas, 75962.

DESIGN OF EXPERIMENT

For each of the two species, the permanent plots are distributed over East Texas, so that they comprehensively sampled:

1) Geographic range.
2) Soil classes.
3) Age classes.
4) Site productivity classes.
5) Surviving trees per acre classes.

When a plantation was located that filled a "niche" in the above list, it also had to meet the following sampling criteria:

1) Recognizable as a plantation.
2) Not an old field.
3) Pure species.
4) Not replanted.
5) Unthinned.

When that list of requirements was met, the plot itself was located within the plantation so that:

1) There were no imbedded windrows.
2) There were no "unusually large" openings.
3) It was free of overtopping residual trees.

A plot consists of two adjacent subplots - 60 feet apart. Each subplot was 100 feet square (10,000 square feet). One subplot will remain unthinned throughout the life of the plantation, and the other subplot will eventually receive operational thinnings. A flip of a coin decided which subplot-to-remain-unthinned. A 30-foot buffer will be painted around the subplot-to-remain—unthinned to protect it against inadvertent harvest or disturbance.

Each planted tree within a subplot was tagged with a numbered aluminum tag and evaluated to find:

1) Dbh (tenth of inch).
2) Total tree height (feet).
3) Height to live crown (feet).
4) Crown class.
5) Tree quality characteristics.
6) Incidence of fusiform rust.

For very young plantations, it was not possible to obtain all the values for each tree.

These values were combined with general information about the plantation to obtain:

1) Plantation age (years).
2) Planted trees per acre.
3) Surviving trees per acre.
4) Average total tree height (feet).
5) Site preparation methods.
6) Topography.
7) Drainage.

FUTURE PLANS

In the future, each plot will be remeasured several times to analyze the changing stand structure over time. Beginning in 1985, the plots installed in 1982 will be remeasured. Then, the 1983 plots will be remeasured in 1986 and this sequence will continue until final harvest.

The remeasurement data will be used to classify site productivity and develop stand structure parameters. Moreover, when operational thinnings occur, "before and after" observations will be recorded. A continuous effort will be needed to prevent the premature destruction of these permanent plots.

As the data files become more and more comprehensive due to the collection of remeasurement data, appropriate analyses will be conducted to meet the objecives of the project. To achieve these goals, a long-term commitment by the School of Forestry and the participating forest industries in East Texas must be maintained.