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Research Report No. 2, Tree Quality

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TREE QUALITY

by

J. David Lenhart

and

Ellis V. Hunt, Jr.

REPORT NUMBER 2

TO

PARTICIPATING COMPANIES

IN THE

EAST TEXAS PINE PLANTATION RESEARCH PROJECT

A STUDY OF

LOBLOLLY AND SLASH PINE PLANTATIONS

IN

EAST TEXAS

CENTER FOR APPLIED STUDIES
SCHOOL OF FORESTRY
STEPHEN F. AUSTIN STATE UNIVERSITY
NACOGDOCHES, TEXAS 75962

December, 1985

This is the second report of a continuing series of reports describing results from the East Texas Pine Plantation Research Project.

Subject and content of each ETPPRP report will be regional in scope and of particular interest to loblolly and slash pine plantation owners in East Texas.

Any suggestions, ideas or comments will always be welcomed.

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Support from the participating companies...

Champion International Corporation,

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A manuscript describing the quality of planted pines in East Texas was submitted in September, 1985, to Forest Products Journal for consideration for publication.

J. David Lenhart

Project Director

December 6, 1985

TREE QUALITY

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ABSTRACT. One of two planted loblolly pine trees (*Pinus taeda* L.) and over one of three (36%) planted slash pine trees (*Pinus elliottii* Engelm.) on non-old-fields in East Texas have a poor quality stem. For both species, a poor quality stem is three times more likely to occur on trees with crowns in the upper canopy than in the lower canopy.

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INTRODUCTION

Since about 1970 approximately two million acres of mixed pine-hardwood stands in East Texas have been converted to planted stands of loblolly and slash pine trees by forest industry and other private landowners. About 150,000 acres are expected to be converted annually between now and the year 2000.

Even though principal utilization of these relatively young planted trees may be several years in the future, information on quality of the standing trees at this early stage of plantation management may assist plantation owners in determining how to optimally merchandize their planted trees at future thinnings and final harvests.

The two basic categories for describing the quality of planted loblolly and slash pine trees in this study are:

1. Stem Quality - Stem is forked or has a definite crook, twist or sweep.
2. Crown Quality - Crown consists of multi-terminal leaders or has a broken top.

These attributes could affect the grading and merchandizing of logs at a lumber or plywood mill.

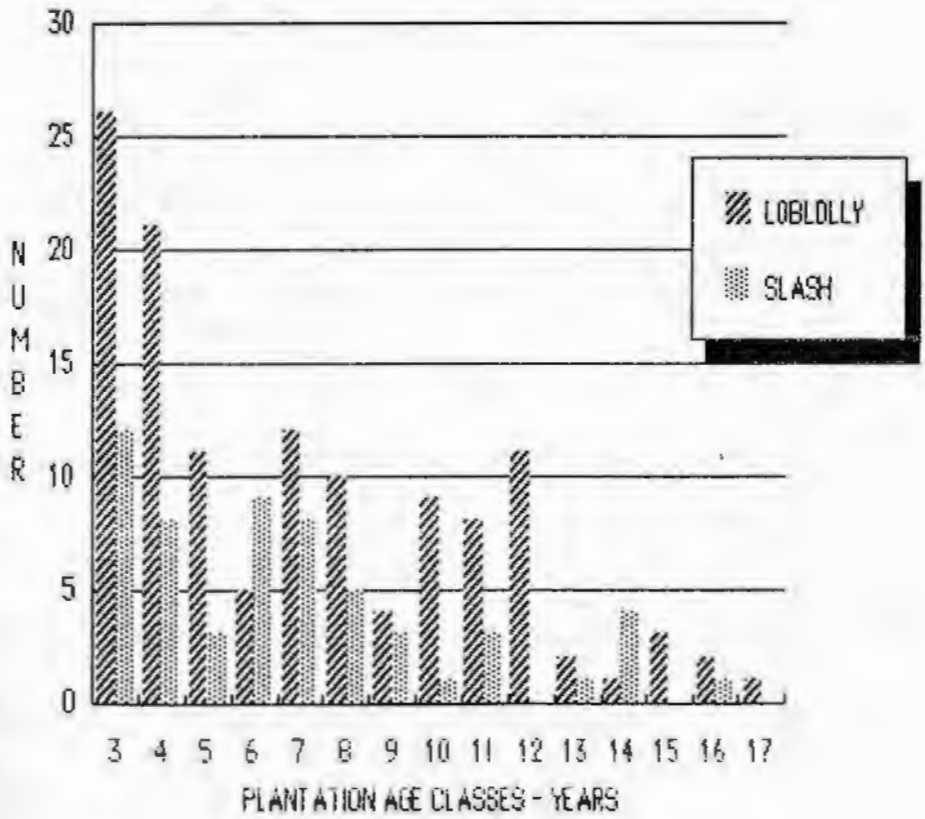
THE DATA

During 1982, 1983 and 1984, permanent monumented growth and yield plots were installed in unthinned planted loblolly and slash pine stands on non-old-field sites throughout East Texas (Lenhart et al. 1985).

Each of the 256 plots consists of two subplots -- one to remain unthinned and the other to receive thinning treatments. Within each subplot all planted pines were tagged and numbered for tracking future development. Several attributes and characteristics of each planted pine were measured. If a tree was 3 years or older, it was possible to also evaluate it for stem and crown quality. As a result, 126 loblolly and 58 slash pine plots were available for quality analysis, Figure 1.

Only values from the subplots to-remain-unthinned were analyzed in this study.

FIGURE 1. NUMBER OF PERMANENT PLOTS BY SPECIES AND AGE CLASSES.



OVERALL TREE QUALITY

On the average at least one of two (52%) loblolly pine trees had a downgrade due to a poor quality stem and/or crown, while almost two of five (37%) slash pine trees were of similiar poor quality.

Only 2% and 1% of loblolly and slash pines, respectively, had a good quality stem with a poor quality crown.

Thus, 50% of the loblolly pines had a poor quality stem, of which, 5% also had a poor quality crown. Thirty-six percent of the slash pines had a poor quality stem, and, in addition, 2% of those had a poor quality crown.

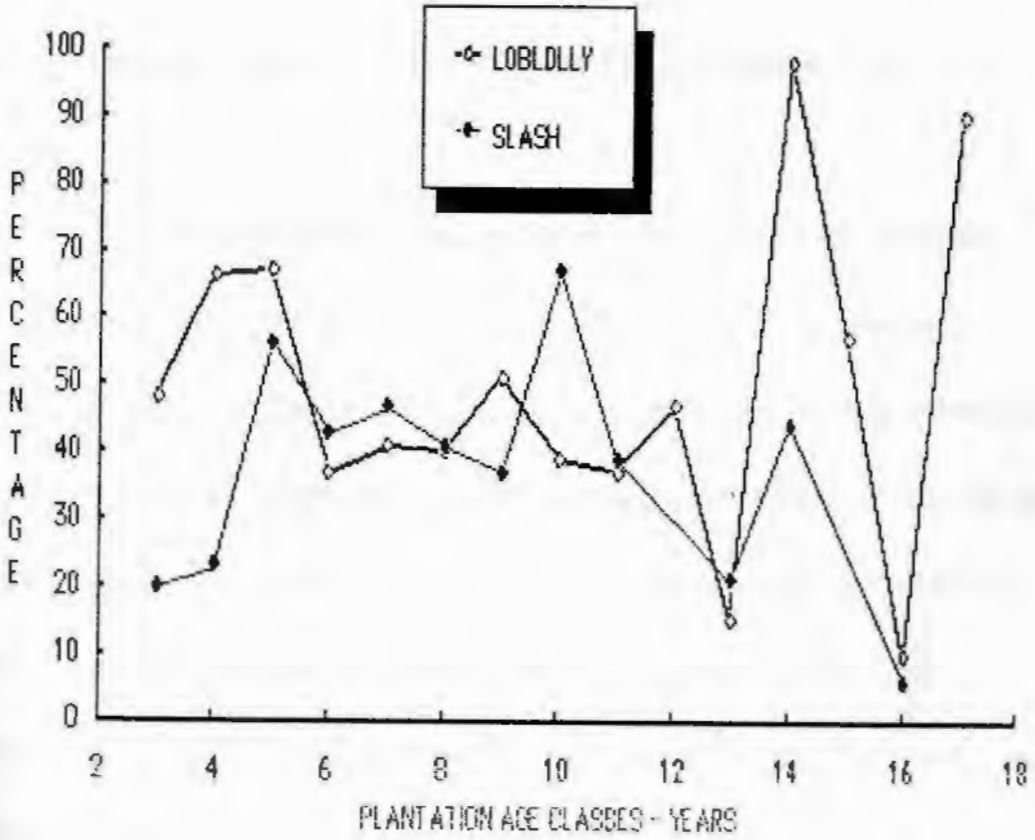
If a planted pine tree in East Texas is of poor quality, the downgrade is more likely to be caused by a crooked or forked stem than a poor crown. Since stem quality problems of this nature may cause downgrade from sawlog or plylog product to pulpwood, the occurrence of poor stem quality will be examined in detail.

STEM QUALITY BY PLANTATION AGE CLASSES

Average poor stem quality percentages by plantation age classes for each species are shown in Figure 2. Except for the older age classes, where there are few observations (Figure 1), stem quality appears to be improving with increasing age.

This relationship is a reasonable trend, even in these unthinned stands. As the planted loblolly and slash pine trees grow older, excessive stem branching and forking may disappear due to natural pruning, crooked stems may become less extreme, and twisted stems may appear acceptably straight.

FIGURE 2. PERCENTAGE OF POOR QUALITY STEMS
BY SPECIES AND PLANTATION AGE CLASSES.

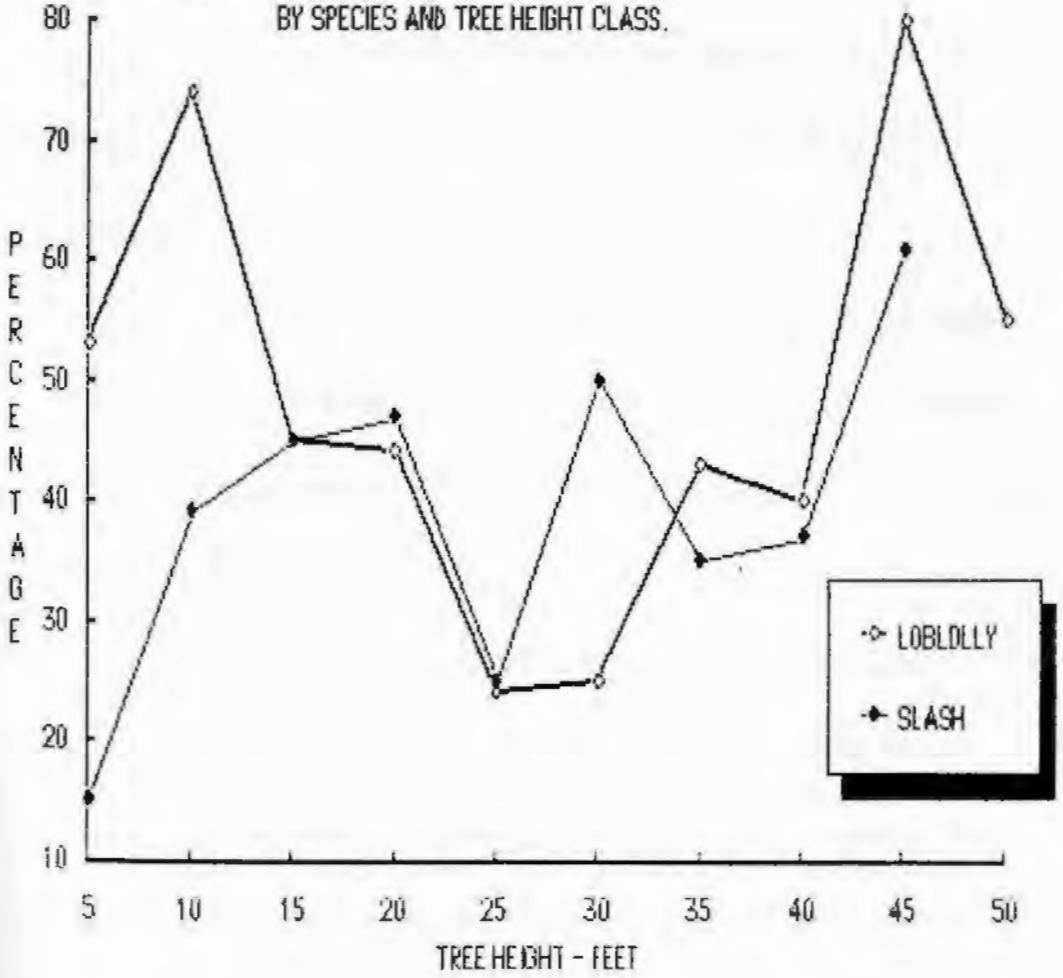


STEM QUALITY BY HEIGHT CLASSES

Average poor quality stem percentages by total tree height classes for each species are shown in Figure 3. Each species displays a different trend. For loblolly, as height increases, poor stem quality percentages tend to follow an "U-shaped" trend, while in contrast, poor stem quality percentages for slash pine tend to increase as tree height increases.

A possible explaination for these trends might be different growth, habitat and form characteristics between the two species. Loblolly pine in young plantations is commonly affected by Nantucket pine tip moth (*Rhyacionia frustrana*), which can cause excessive branching and deformed stems. Planted slash pine in East Texas is often devastated by fusiform rust (*Cronartium quercuum* (Berk.) Miyabe ex Shirai f. sp. *fusiforme*), which can deform or girdle the tree stem, and the stem may be subject to wind breakage.

FIGURE 3. PERCENTAGE OF POOR QUALITY STEMS BY SPECIES AND TREE HEIGHT CLASS.



STEM QUALITY BY POSITION IN CROWN CANOPY

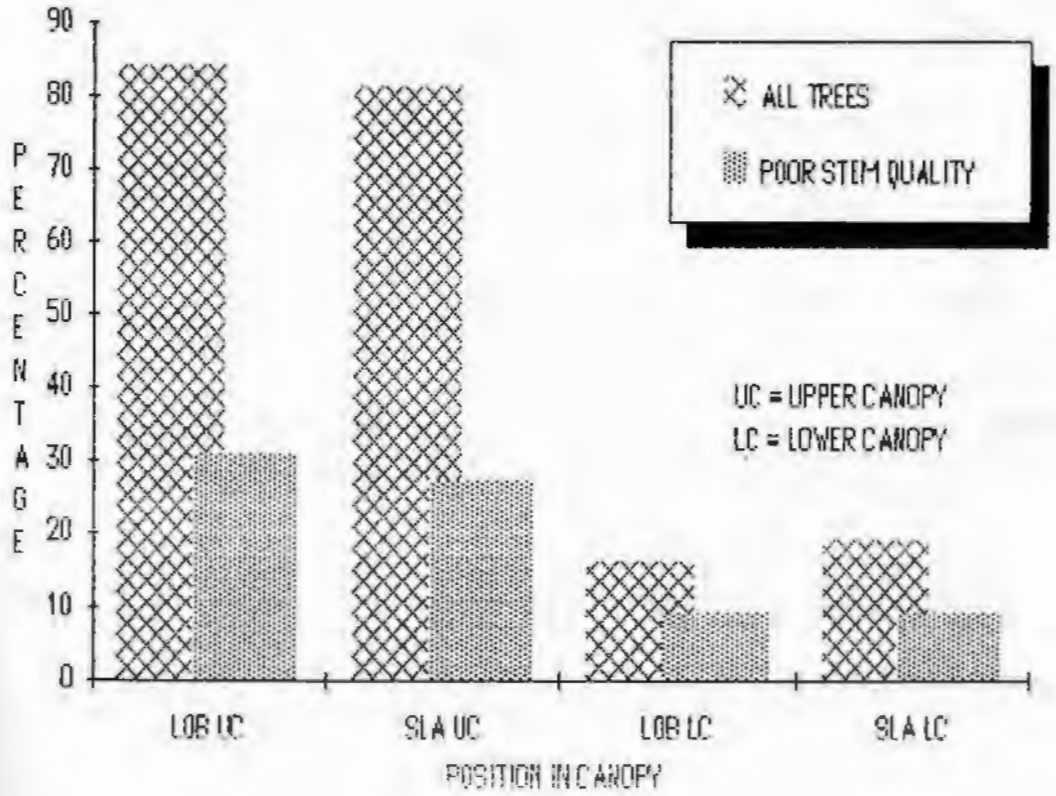
On 61 of the loblolly pine plots and 22 of the slash pine plots, enough crown competition was occurring, so that the field crew was able to classify the planted pine trees by dominant and co-dominant classes (upper canopy) or by intermediate and suppressed classes (lower canopy). The percentages of all trees and the percentage of trees with poor stem quality by position in crown canopy are shown in Figure 4.

Over 4 of 5 trees for both species have crowns in the upper canopy. Of the trees in the upper canopy, about 1 in 3 have poor quality stems. For the remaining trees in the lower canopy, approximately 1 in 2 have poor quality stems.

An application of these stem quality values could be:

1. A plantation has 1000 surviving trees per acre.
2. Of these 1000 trees, 800 have crowns in the upper canopy.
3. Of the 800 trees in the upper canopy, 267 have poor stem quality.
4. Of the 200 trees in the lower canopy, 100 have poor stem quality.
5. Of the 367 trees per acre with poor stem quality, almost 75 percent are larger trees in the upper canopy.
6. Thus, a typical tree with poor stem quality is probably relatively large, with size potential to be utilized in the future as a plylog or sawlog, but may be downgraded to pulpwood utilization due to quality characteristics.

FIGURE 4. PERCENTAGE OF TREES BY POSITION IN CANOPY
FOR ALL TREES AND FOR POOR STEM QUALITY TREES.



STEM QUALITY AND FUSIFORM RUST

On 77 of the loblolly pine plots and 38 of the slash pine plots, the field crew was able to evaluate the trees for both quality and the occurrence of fusiform rust.

Based on this sample, loblolly pine tree characteristics are:

1. Almost 1 in 2 (48%) stems are good quality and free of rust infection.
2. A few (4%) stems are both poor quality and rust-infected.
3. One in 33 (3%) stems are good quality and rust-infected.
4. Two in 5 (40%) stems are poor quality and free of rust infection.

Conclusion: Apparently fusiform rust is not a principal factor affecting loblolly pine stem quality.

Also based on this sample, slash pine tree characteristics are:

1. About 3 in 10 (29%) stems are good quality and free of rust infection.
2. Less than 3 in 10 (28%) stems are both poor quality and rust-infected.
3. Almost 1 in 5 (18%) stems are good quality and rust-infected.
4. Approximately 1 in 7 (13%) stems are poor quality and free of rust infection.

Conclusion: Fusiform rust may be affecting slash pine stem quality.

SUMMARY

A large percentage of the planted loblolly and slash pines in East Texas have poor quality stems -- 50 percent for loblolly and 36 percent for slash. Apparently stem quality does improve as the trees grow older, however, in a given plantation more trees with poor stem quality occur in the upper canopy than in the lower canopy.

It will be a challenge to make correct decisions on how to manage these plantations in order to optimally produce wood of the highest value at future thinnings and final harvests. Should a plantation owner remove his poor quality trees in a thinning? If so, when to thin and how much wood to remove? Or should the owner not thin and instead have a short rotation?

As the permanent plots in the ETPPRP are remeasured during future years, and a thinning experiment installed, additional data will be collected, which after analysis should provide information on how to manage East Texas pine plantations in an optimal manner.

LITERATURE CITED

Lenhart, J. D., E. V. Hunt, Jr. and J. A. Blackard. 1985. Establishment of permanent growth and yield plots in loblolly and slash pine plantations in East Texas. p. 436-437 In Eugene Shoulders (ed.) Proc. Third Biennial South. Silv. Research Conf, U.S.D.A. For. Ser. Gen. Tech. Rep. SO-54.