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Research Report No. 18, Fusiform Rust Occurrence in East Texas Pine Plantations, 1969-1987

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Lenhart, J. David and Hackett, Terry L., "Research Report No. 18, Fusiform Rust Occurrence in East Texas Pine Plantations, 1969-1987" (1988). *Informal Project Reports*. Paper 56.

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FUSIFORM RUST OCCURRENCE
IN
EAST TEXAS PINE PLANTATIONS:
1969-87



by

J. David Lenhart

Terry L. Hackett

REPORT NUMBER 18

TO

PARTICIPATING COMPANIES

IN THE

EAST TEXAS PINE PLANTATION RESEARCH PROJECT

A STUDY OF

LOBLOLLY AND SLASH PINE PLANTATIONS

IN

EAST TEXAS

J. David Lenhart 1987

CENTER FOR APPLIED STUDIES

SCHOOL OF FORESTRY

STEPHEN F. AUSTIN STATE UNIVERSITY

NACOGDOCHES, TEXAS 75962

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

Subject and content of each ETPPRP report is 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.

* * * * *

Support from the participating companies...

Champion International Corporation,
International Paper Company,
Louisiana-Pacific Corporation and
Temple-EasTex, Inc.

is gratefully appreciated.

* * * * *

This report is based on work by J. David Lenhart, Professor and Mr. Terry L. Hockett, Statistician, Indian River International, Nacogdoches, TX. Mr. Hockett received an MSF degree from SFASU in 1987.

J. David Lenhart
Project Director
February 8, 1988

FUSIFORM RUST OCCURRENCE
IN
EAST TEXAS PINE PLANTATIONS: 1969-87

by

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ABSTRACT. Information from five surveys of slash pine (*Pinus elliotti* Engelm.) and loblolly (*Pinus taeda* L.) pine plantations in East Texas between 1969 and 1987 indicated that infection rates for fusiform rust (*Cronartium quercuum* (Berk.) Miyabe ex Shirai f. sp. *fusiforme*) have increased to about 50% for slash pine and are continuing to increase for loblolly pine to current levels of 10-15%.

INTRODUCTION

As the planted stands of loblolly and slash pines on non-old-fields (site-prepared land) in East Texas approach possible intermediate and final harvest, the occurrence of fusiform rust cankers may affect decisions on managing the plantations in an optimum manner. Completion of the second measurement cycle for the East Texas Pine Plantation Research Project (ETPPRP) in 1987 has provided additional information on fusiform rust trends in East Texas.

As a result, five fusiform rust surveys between 1969-1987 for loblolly and slash pine stands in East Texas were included in the rust incidence analysis:

1. Mason and Griffin (1970) described a 1969 survey of loblolly and slash pine plantations throughout East Texas. The study considered only stem infections.
2. A 1976 survey sampled natural and planted stands of loblolly and planted stands of slash pine throughout East Texas (Walterscheidt and Van Arsdale 1976). No infection differentiation by stem or branches was made in this study.
3. Loblolly and slash pine plantations in Southeast Texas (southern half of East Texas) were surveyed in 1980 by the Texas Forest Service (1982). Stem and branch infections were tallied separately.
4. Information from the completion of the first measurement cycle in 1984 of the ETPRP permanent plots (Hunt and Lenhart 1985, 1986). Stem and branch infections were tallied separately.
5. In 1987, the second measurement cycle of the ETPRP plots was completed. Once again, stem and branch infections were tallied separately.

Some of the material in this report has been submitted to the Southern Journal of Applied Forestry for consideration for possible publication.

THE ETPPRP FUSIFORM RUST DATA

When the ETPPRP permanent plots were remeasured for the first time during the summers of 1985-87, the occurrence of fusiform rust on each planted pine was recorded following the same format used during the 1982-84 initial measurement period:

1. Infected stem--Gall on stem or on a live branch within 12 in. of the stem.
2. Infected branch--Gall on a live or dead branch more than 12 in. from the stem.

The requirement that a plantation had to be at least 5 years old for detecting fusiform rust galls with confidence was also maintained.

Since the initial measurement, many additional ETPPRP plots crossed the 5-year threshold. As a result, two data sets for each species were available for trend analysis:

1. For loblolly pine, 71 of 79 original plots were still available for analysis and were remeasured for an original data set, and 65 plots that came of age were added to the original 71 for 136 plots as a combined data set.
2. For slash pine, all 38 original plots were still available for analysis and were remeasured for an original data set, and 28 plots that came of age were added to the original 38 for 66 plots as a combined data set.

RUST INCIDENCE

Using information from the combined data sets, Table 1 presents average infection rates for the five survey periods. For both geographic areas, the occurrence of galls on slash pine stems has increased since 1969 until rust infections appear to be currently stabilized at rates of 48-51%. Since 1976, rust infections on slash pine stems and/or branches appears to be fairly constant with current rates of 52-54%.

In contrast, the occurrence of galls on loblolly pine stems may be increasing. Current infection rates are 10-12%. For East Texas, occurrence of galls on stems and/or branches is also increasing to a current rate of 14%, while for the counties in Southeast Texas, the rate decreased for awhile then may be increasing again to a current rate of 15%.

Using information from the original data sets, Table 2 was compiled to show changes in rust incidence for the same ETPPRP plots during a 3-year period. Over this relatively short period of time, a dramatic increase in the number of infected trees occurred. For each of the 8 categories, the infection rates increased. For slash pine trees, three years ago about 1 of every 2 trees had a gall, now almost 2 of every 3 trees has a gall. For loblolly pine trees, over the three year period the infection rates have increased by factors of 1.5 to 5.

Table 1. Average fusiform rust incidence in loblolly and slash pine plantations by survey year and geographic location in Texas.

Species and rust location	Survey year				
	1969	1976	1980	1984	1987
	%				
 East Texas ^a				
Slash					
Stem ^b	8	-	-	46	48
Stem and/or branches	-	30	-	57	52
Loblolly					
Stem ^b	6	-	-	7	10
Stem and/or branches	-	9	-	11	14
 Southeast Texas				
Slash					
Stem ^b	19	-	32	47	51
Stem and/or branches	-	43	55	54	54
Loblolly					
Stem ^b	-	-	8	3	12
Stem and/or branches	-	6	18	9	15

^a Includes counties in Southeast Texas.

^b May or may not also have rust-infected branches.

Table 2. Average changes in fusiform rust incidence over a three-year period for the original 1984 survey plots.

Species and rust location	Survey year	
	1984	1987
 %	
..... East Texas ^a		
Slash		
Stem ^b	46	61
Stem and/or branches	57	67
Loblolly		
Stem ^b	7	12
Stem and/or branches	11	17
..... Southeast Texas		
Slash		
Stem ^b	47	66
Stem and/or branches	54	71
Loblolly		
Stem ^b	3	14
Stem and/or branches	9	18

^a Includes counties in Southeast Texas.

^b May or may not also have rust-infected branches.

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