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Research Report No. 17, Stand Structure and Yield of Slash Pine Plantations in East Texas, Update: 1987

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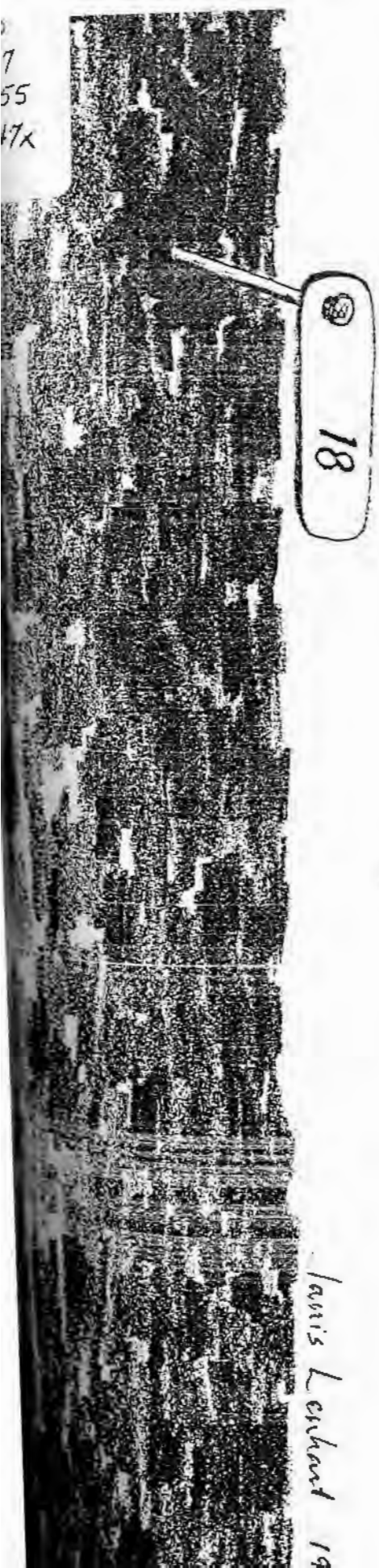

STAND STRUCTURE AND YIELD OF SLASH PINE PLANTATIONS IN EAST TEXAS, UPDATE: 1987

by
J. David Lenhart

REPORT NUMBER 17

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
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STAND STRUCTURE AND YIELD OF SLASH PINE PLANTATIONS IN EAST TEXAS, UPDATE: 1987

by

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ABSTRACT. An updated diameter distribution yield prediction system is presented for slash pine (*Pinus elliottii* Engelm.) plantations on non-old-fields in East Texas. The new revised system was developed using data from initial measurement (1982-84) and first remeasurement (1985-87) of the East Texas Pine Plantation Research Project permanent plots.

INTRODUCTION

With the completion of the first remeasurement cycle of the East Texas Pine Plantation Research Project (ETPPRP), it was possible to combine remeasured data with initial data and compute updated versions of several components of the diameter distribution yield prediction system presented in ETPPRP Report No. 12 (Lenhart 1986).

This report presents the updated procedure to estimate the stand structure and yield for slash pine plantations in East Texas.

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

PERMANENT PLOT MEASUREMENTS

A total of 79 ETPPRP permanent plots are located in slash pine plantations in 12 counties throughout southeast Texas. Each plot consists of two subplots--one for model development and the other for model evaluation. Initial measurement of planted pines within each plot occurred during installation 1982-84, and first remeasurement of the planted pines was completed 1985-87. Data from both points in time were available for analysis.

Observed stand parameters available for stand structure analysis were:

1. Number of completed growing seasons (A).
2. Average height ot the ten tallest trees (H).
3. Surviving number of trees per acre (T).
4. Surviving number of trees per acre by one-inch diameter classes (n).
5. Minimum diameter (DMIN).
6. Arithmetic mean diameter (DMEAN).
7. Quadratic mean diameter (DQMEAN).
8. Maximum diameter (DMAX).

In addition, site index (base age = 25 years) (S) values were calculated using an equation developed by Lenhart et al. (1986).

An exploratory analysis of fitting the Weibull distribution to the data indicated that for successful fitting, at least three of the observed diameter classes had to be occupied with trees. If only one or two diameter classes had trees (usually plots less than 3 or 4 years old), the fitting routine would fail to find a solution. As a result, the number of slash pine observations was reduced from 158 to 124.

On the average, the observations represent plantations that are young (8 years) and on productive sites (SI=71 feet), where the surviving number of trees per acre (408-415) indicates about 105 -107 square feet of growing space per tree, Table 1.

Table 1. Descriptive statistics of slash pine plantation observations by subplot type.

Stand Parameter	Type of Subplot	
	Development	Evaluation
Age (yrs)		
Mean	8.2	8.2
Range	3-18	3-18
Height (ft)		
Mean	27.8	27.8
Range	10-60	9-60
Site Index$_{25}$ (ft)		
Mean	71.1	71.0
Range	37-112	40-112
Surviving Trees per Acre		
Mean	408.2	415.4
Range	112-1007	116-1032
Min. Diameter (in.)		
Mean	1.13	1.11
Range	0-4.1	0-4.1
Arith. Mean Diameter (in.)		
Mean	3.66	3.64
Range	0.35-7.42	0.66-7.70
Quad. Mean Diameter (in.)		
Mean	3.79	4.04
Range	0.58-7.55	0.86-7.86
Max. Diameter (in.)		
Mean	5.75	5.83
Range	2.0-11.5	2.0-11.3
Tot. Stem Wood & Bark ft^3		
Mean	501.8	503.9
Range	1-3161	1-3546

PREDICTING STAND STRUCTURE AND YIELD

Several Weibull probability distribution parameter recovery procedures, which use stand level diameter values, have been developed (Burk and Burkhart 1984, Matney et al. 1987). The recovery procedure by Burk and Burkhart was used for these data. Location, shape and scale parameters for the Weibull distribution are obtained from estimates of minimum diameter, arithmetic mean diameter and quadratic mean diameter based on stand level values, such as age, height and trees per acre.

For slash pine plantations in East Texas, the revised and updated diameter distribution yield prediction method is:

1. Determine plantation age (number of growing seasons completed), number of surviving trees per acre at that age and average total height of the ten tallest trees in the plantation. If height is unknown, but site index is known, then estimate height as (Lenhart et al.1986):

$$H=5((1-EXP(-0.07488801A))/0.846215)^{1.4502401} \qquad (1)$$

2. Predict stand level diameter values as:

$$DMIN = -0.2933 + 0.0668H - 0.0011T \qquad (2)$$

$R^2 = 72\%$ SEE = 0.5781

If DMIN < 0, DMIN = 0.

$$DQMEAN = EXP(2.4641 - 25.8135/H - 0.0003T) \quad (3)$$

$R^2 = 95\%$ SEE = 0.1201

$$DMEAN = -0.1025 + 0.9917DQMEAN \quad (4)$$

$r^2 = 99.9\%$ SEE = 0.0570

3. Recover the Weibull parameters and compute the number of trees per acre by diameter class as:

   a. Weibull location parameter (a) is equal to DMIN.

   b. Weibull shape parameter (c) is computed by inserting DQMEAN, DMEAN and (a) in the equation:

$$DQMEAN^2 - a^2 - 2a(DMEAN-a) - (DMEAN-a)^2 \frac{(1+2/c)}{(\Gamma(1+1/c))^2} = 0 \quad (5)$$

   where: Γ = the complete gamma function.

   and solving for (c) using iterative procedures.

   c. Weibull scale parameter (b) is calculated using:

$$b = (DMEAN-a)/\Gamma(1+1/c) \quad (6)$$

The proportion (P) of T occurring between lower diameter bound (d_l) and upper diameter bound (d_u) in each diameter class is found as:

$$d_l < P < d_u = EXP(-((d_l-a)/b)^c - EXP(-((d_u-a)/b)^c) \quad (7)$$

For P of each diameter class, multiply by T to estimate the expected number of trees per acre in the diameter class.

4. Predict the total height (h) of each tree with diameter class mid-point (d) as (Dixon 1987):

$$h = EXP(\ln(H) + 0.006995 + (\ln(d) - \ln(DMAX))(0.212079 + 0.114747\ln(A) + 0.149298\ln(H/A) - 0.019744\ln(T))) \quad (8)$$

This equation updates earlier work by Blackard (1985).

5. Estimate the content of an individual tree representing the mid-point of each diameter class. Equations for predicting the cubic feet, green weight and dry weight in pounds for planted slash pines in East Texas have been developed by Lenhart et al. (1987).

6. Multiply the individual tree content for each diameter class by the expected number of trees per acre for that diameter class to obtain yield per acre. By summing across all diameter classes, the total yield per acre is calculated. By selectively summing across specified diameter classes, per acre yields can be determined for different products (pulp, lumber, plywood, etc.).

EVALUATION

The evaluation subplots, which are separated from development subplots by a 60-foot wide buffer zone, provided an opportunity to analyze the accuracy of the diameter distribution yield prediction system. After the diameter distribution yield prediction system was utilized to calculate the predicted cubic feet of wood and bark per acre in the total stem for each evaluation subplot, the estimated yields were compared to the observed actual yields. On the average, the system underpredicted volumes by 8.1%. Plottings of percent differences against stand level values indicated no adverse trends.

APPLICATION AND COMPARISON

An example illustrating predicted stand structure and yield for a slash pine plantation on site index 70 feet land and surviving trees per acre of 400 is presented on the eleven pages following the literature cited pages. Plantation age varies from 4 to 24 years by 2-year increments.

This is the same example plantation presented in ETPPRP Report No. 12 and, thus, provides an opportunity to compare the changes in predicted values between the initial diameter distribution yield prediction system and the new updated 1987 version.

For this example plantation, predicted DQMEAN and DMEAN values for the updated system exceed the old system for ages 4 and 6; are the same for ages 8 and 10; and from ages 12-24, the predicted values are 0.1" less than the old system values.

LITERATURE CITED

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PREDICTED

STAND STRUCTURE

PLUS

VOLUME AND WEIGHT PER ACRE BY DBH CLASS

FOR

SLASH PINE PLANTATIONS

ON

NON-OLD-FIELDS

IN

EAST TEXAS

****
* AGE = 4 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 4 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...

1) AVERAGE HEIGHT OF TEN TALLEST TREES = 13 FEET.
2) ARITHMETIC MEAN DBH = 1.3 INCHES.
3) QUADRATIC MEAN DBH = 1.4 INCHES.

PER ACRE VALUES

DBH (IN)	STRUCTURE: NUMBER OF TREES	STRUCTURE: BASAL AREA (SQFT)	STRUCTURE: AVG IND. TREE HT (FT)	VOLUME & WEIGHT - TOTAL STEM: WOOD & BARK: GREEN VOLUME (CUFT)	WOOD & BARK: GREEN WEIGHT (LBS)	WOOD ONLY: DRY VOLUME (CUFT)	WOOD ONLY: DRY WEIGHT (LBS)	DBH (IN)
1	260	1	8	6	283	3	99	1
2	129	3	11	15	474	9	275	2
3	11	1	13	3	81	2	63	3
4	0	0	0	0	0	0	0	4
5	0	0	0	0	0	0	0	5
6	0	0	0	0	0	0	0	6
7	0	0	0	0	0	0	0	7
8	0	0	0	0	0	0	0	8
9	0	0	0	0	0	0	0	9
10	0	0	0	0	0	0	0	10
11	0	0	0	0	0	0	0	11
12	0	0	0	0	0	0	0	12
13	0	0	0	0	0	0	0	13
14	0	0	0	0	0	0	0	14
15	0	0	0	0	0	0	0	15
TOTAL	400	5		24	838	14	437	

NOTE... BASED ON RESEARCH CONDUCTED IN THE
EAST TEXAS PINE PLANTATION RESEARCH PROJECT

SCHOOL OF FORESTRY
STEPHEN F. AUSTIN STATE UNIVERSITY
... BETWEEN 1982 - 1987.

PREDICTED
STAND STRUCTURE
PLUS
VOLUME AND WEIGHT PER ACRE BY DBH CLASS
FOR
SLASH PINE PLANTATIONS
ON
-NON-OLD-FIELDS
IN
EAST TEXAS

****
* AGE = 6 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 6 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...
1) AVERAGE HEIGHT OF TEN TALLEST TREES = 20 FEET.
2) ARITHMETIC MEAN DBH = 2.7 INCHES.
3) QUADRATIC MEAN DBH = 2.9 INCHES.

PER ACRE VALUES

STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
			WOOD & BARK		WOOD ONLY		
DBH (IN)	NUMBER OF TREES	BASAL AREA (SQFT)	AVG IND. TREE HT (FT)	VOLUME (CUFT)	GREEN WEIGHT (LBS)	VOLUME (CUFT)	DRY WEIGHT (LBS)	DBH (IN)
1	26	0	9	1	33	0	11	1
2	137	3	13	20	621	12	362	2
3	162	8	16	62	1539	39	1204	3
4	66	6	18	49	1021	31	984	4
5	9	1	20	11	207	7	235	5
6	0	0	0	0	0	0	0	6
7	0	0	0	0	0	0	0	7
8	0	0	0	0	0	0	0	8
9	0	0	0	0	0	0	0	9
10	0	0	0	0	0	0	0	10
11	0	0	0	0	0	0	0	11
12	0	0	0	0	0	0	0	12
13	0	0	0	0	0	0	0	13
14	0	0	0	0	0	0	0	14
15	0	0	0	0	0	0	0	15
TOTAL	400	18		143	3421	89	2796	

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PREDICTED
STAND STRUCTURE
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VOLUME AND WEIGHT PER ACRE BY DBH CLASS
FOR
SLASH PINE PLANTATIONS
ON
NON-OLD-FIELDS
IN
EAST TEXAS

****
* AGE = 8 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 8 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...
1) AVERAGE HEIGHT OF TEN TALLEST TREES = 28 FEET.
2) ARITHMETIC MEAN DBH = 4.0 INCHES.
3) QUADRATIC MEAN DBH = 4.1 INCHES.

PER ACRE VALUES

STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
			WOOD & BARK		WOOD ONLY		
DBH (IN)	NUMBER OF TREES	BASAL AREA (SQFT)	AVG IND. TREE HT (FT)	VOLUME (CUFT)	GREEN WEIGHT (LBS)	VOLUME (CUFT)	DRY WEIGHT (LBS)	DBH (IN)
1	1	0	10	0	1	0	0	1
2	30	1	15	5	163	3	95	2
3	102	5	18	45	1124	28	881	3
4	140	12	21	124	2629	81	2542	4
5	94	13	24	146	2717	98	3092	5
6	30	6	26	71	1189	49	1545	6
7	3	1	28	10	157	7	228	7
8	0	0	0	0	0	0	0	8
9	0	0	0	0	0	0	0	9
10	0	0	0	0	0	0	0	10
11	0	0	0	0	0	0	0	11
12	0	0	0	0	0	0	0	12
13	0	0	0	0	0	0	0	13
14	0	0	0	0	0	0	0	14
15	0	0	0	0	0	0	0	15
TOTAL	400	38		401	7980	266	8383	

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PREDICTED
STAND STRUCTURE
PLUS
VOLUME AND WEIGHT PER ACRE BY DBH CLASS
FOR
SLASH PINE PLANTATIONS
ON
NON-OLD-FIELDS
IN
EAST TEXAS

****
* AGE = 10 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 10 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...
1) AVERAGE HEIGHT OF TEN TALLEST TREES = 35 FEET.
2) ARITHMETIC MEAN DBH = 4.8 INCHES.
3) QUADRATIC MEAN DBH = 5.0 INCHES.

PER ACRE VALUES

STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
			WOOD & BARK		WOOD ONLY		
DBH (IN)	NUMBER OF TREES	BASAL AREA (SQFT)	AVG IND. TREE HT (FT)	VOLUME (CUFT)	GREEN WEIGHT (LBS)	VOLUME (CUFT)	DRY WEIGHT (LBS)	DBH (IN)
1	0	0	0	0	0	0	0	1
2	6	0	17	1	38	1	22	2
3	48	2	21	25	642	16	505	3
4	106	9	24	110	2354	73	2282	4
5	123	17	27	219	4122	150	4702	5
6	81	16	30	226	3844	159	5008	6
7	29	8	33	120	1861	86	2714	7
8	5	2	35	28	404	20	650	8
9	0	0	0	0	0	0	0	9
10	0	0	0	0	0	0	0	10
11	0	0	0	0	0	0	0	11
12	0	0	0	0	0	0	0	12
13	0	0	0	0	0	0	0	13
14	0	0	0	0	0	0	0	14
15	0	0	0	0	0	0	0	15
TOTAL	400	54		729	13265	505	15883	

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PREDICTED

STAND STRUCTURE

PLUS

VOLUME AND WEIGHT PER ACRE BY DBH CLASS

FOR

SLASH PINE PLANTATIONS

ON

NON-OLD-FIELDS

IN

EAST TEXAS

****
* AGE = 12 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 12 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...

1) AVERAGE HEIGHT OF TEN TALLEST TREES = 42 FEET.
2) ARITHMETIC MEAN DBH = 5.5 INCHES.
3) QUADRATIC MEAN DBH = 5.6 INCHES.

PER ACRE VALUES

DBH (IN)	STRUCTURE: NUMBER OF TREES	STRUCTURE: BASAL AREA (SQFT)	STRUCTURE: AVG IND. TREE HT (FT)	VOLUME & WEIGHT - TOTAL STEM: WOOD & BARK: GREEN VOLUME (CUFT)	WOOD & BARK: GREEN WEIGHT (LBS)	WOOD ONLY: DRY VOLUME (CUFT)	WOOD ONLY: DRY WEIGHT (LBS)	DBH (IN)
1	0	0	0	0	0	0	0	1
2	1	0	18	0	7	0	4	2
3	22	1	23	13	330	8	260	3
4	72	6	27	86	1854	58	1802	4
5	112	15	30	226	4285	157	4899	5
6	106	21	34	343	5886	245	7690	6
7	62	17	37	293	4593	213	6715	7
8	22	8	40	145	2105	107	3392	8
9	4	2	42	34	468	26	821	9
10	0	0	0	0	0	0	0	10
11	0	0	0	0	0	0	0	11
12	0	0	0	0	0	0	0	12
13	0	0	0	0	0	0	0	13
14	0	0	0	0	0	0	0	14
15	0	0	0	0	0	0	0	15
TOTAL	400	70		1140	19528	814	25583	

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PREDICTED

STAND STRUCTURE

PLUS

VOLUME AND WEIGHT PER ACRE BY DBH CLASS

FOR

SLASH PINE PLANTATIONS

ON

NON-OLD-FIELDS

IN

EAST TEXAS

****
* AGE = 14 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 14 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...

1) AVERAGE HEIGHT OF TEN TALLEST TREES = 48 FEET.
2) ARITHMETIC MEAN DBH = 5.9 INCHES.
3) QUADRATIC MEAN DBH = 6.1 INCHES.

PER ACRE VALUES

	STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
				WOOD & BARK		WOOD ONLY		
DBH (IN)	NUMBER OF TREES	BASAL AREA (SQFT)	AVG IND. TREE HT (FT)	VOLUME (CUFT)	GREEN WEIGHT (LBS)	VOLUME (CUFT)	DRY WEIGHT (LBS)	DBH (IN)
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	2
3	10	0	24	6	158	4	125	3
4	51	4	28	64	1374	43	1337	4
5	96	13	32	209	3982	146	4560	5
6	109	21	36	378	6503	272	8507	6
7	81	22	39	407	6411	298	9383	7
8	39	14	42	272	3967	203	6399	8
9	12	5	45	112	1530	85	2689	9
10	2	1	48	24	313	19	595	10
11	0	0	0	0	0	0	0	11
12	0	0	0	0	0	0	0	12
13	0	0	0	0	0	0	0	13
14	0	0	0	0	0	0	0	14
15	0	0	0	0	0	0	0	15
TOTAL	400	80		1472	24238	1070	33595	

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PREDICTED
STAND STRUCTURE
PLUS
VOLUME AND WEIGHT PER ACRE BY DBH CLASS
FOR
SLASH PINE PLANTATIONS
ON
NON-OLD-FIELDS
IN
EAST TEXAS

****
* AGE = 16 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 16 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...
1) AVERAGE HEIGHT OF TEN TALLEST TREES = 53 FEET.
2) ARITHMETIC MEAN DBH = 6.2 INCHES.
3) QUADRATIC MEAN DBH = 6.4 INCHES.

PER ACRE VALUES

STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
			WOOD & BARK		WOOD ONLY		
		AVG IND.		GREEN		DRY	
DBH (IN) NUMBER OF TREES	BASAL AREA (SQFT)	TREE HT (FT)	VOLUME (CUFT)	WEIGHT (LBS)	VOLUME (CUFT)	WEIGHT (LBS)	DBH (IN)
0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	2
4	0	25	3	67	2	53	3
38	3	29	49	1070	34	1042	4
85	12	33	192	3665	135	4199	5
107	21	37	383	6607	276	8648	6
90	24	41	480	7585	354	11113	7
51	18	44	375	5499	282	8880	8
19	8	47	187	2558	142	4501	9
5	3	50	64	824	49	1566	10
1	1	53	16	198	13	404	11
0	0	0	0	0	0	0	12
0	0	0	0	0	0	0	13
0	0	0	0	0	0	0	14
0	0	0	0	0	0	0	15
400	90		1749	28073	1287	40406	

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PREDICTED
STAND STRUCTURE
PLUS
VOLUME AND WEIGHT PER ACRE BY DBH CLASS
FOR
SLASH PINE PLANTATIONS
ON
NON-OLD-FIELDS
IN
EAST TEXAS

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*********************************************
*        AGE = 20 YEARS SINCE ESTABLISHMENT  *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS)  *
*        T/A =  400 SURVIVING AT AGE 20      *
*********************************************
```

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...
1) AVERAGE HEIGHT OF TEN TALLEST TREES = 62 FEET.
2) ARITHMETIC MEAN DBH = 6.7 INCHES.
3) QUADRATIC MEAN DBH = 6.9 INCHES.

PER ACRE VALUES

STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
			WOOD & BARK		WOOD ONLY		
		AVG IND.		GREEN		DRY	
NUMBER OF TREES	BASAL AREA (SQFT)	TREE HT (FT)	VOLUME (CUFT)	WEIGHT (LBS)	VOLUME (CUFT)	WEIGHT (LBS)	DBH (IN)
0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	3
21	2	32	31	669	21	653	4
68	9	37	176	3385	125	3888	5
100	20	41	404	7024	295	9215	6
96	26	45	571	9093	426	13350	7
66	23	49	552	8146	420	13186	8
33	15	52	365	5044	282	8895	9
12	7	56	175	2280	137	4343	10
3	2	59	55	681	44	1391	11
1	1	62	23	268	18	583	12
0	0	0	0	0	0	0	13
0	0	0	0	0	0	0	14
0	0	0	0	0	0	0	15
400	105		2352	36590	1768	55504	

** BASED ON RESEARCH CONDUCTED IN THE
EAST TEXAS PINE PLANTATION RESEARCH PROJECT

SCHOOL OF FORESTRY
STEPHEN F. AUSTIN STATE UNIVERSITY
... BETWEEN 1982 - 1987.

PREDICTED
STAND STRUCTURE
PLUS
VOLUME AND WEIGHT PER ACRE BY DBH CLASS
FOR
SLASH PINE PLANTATIONS
ON
NON-OLD-FIELDS
IN
EAST TEXAS

****
* AGE = 20 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 20 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...
1) AVERAGE HEIGHT OF TEN TALLEST TREES = 62 FEET.
2) ARITHMETIC MEAN DBH = 6.7 INCHES.
3) QUADRATIC MEAN DBH = 6.9 INCHES.

PER ACRE VALUES

STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
			WOOD & BARK		WOOD ONLY		
		AVG IND.		GREEN		DRY	
NUMBER OF TREES	BASAL AREA (SQFT)	TREE HT (FT)	VOLUME (CUFT)	WEIGHT (LBS)	VOLUME (CUFT)	WEIGHT (LBS)	DBH (IN)
0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	3
21	2	32	31	669	21	653	4
68	9	37	176	3385	125	3888	5
100	20	41	404	7024	295	9215	6
96	26	45	571	9093	426	13350	7
66	23	49	552	8146	420	13186	8
33	15	52	365	5044	282	8895	9
12	7	56	175	2280	137	4343	10
3	2	59	55	681	44	1391	11
1	1	62	23	268	18	583	12
0	0	0	0	0	0	0	13
0	0	0	0	0	0	0	14
0	0	0	0	0	0	0	15
400	105		2352	36590	1768	55504	

... BASED ON RESEARCH CONDUCTED IN THE
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PREDICTED
STAND STRUCTURE
PLUS
VOLUME AND WEIGHT PER ACRE BY DBH CLASS
FOR
SLASH PINE PLANTATIONS
ON
NON-OLD-FIELDS
IN
EAST TEXAS

****
* AGE = 24 YEARS SINCE ESTABLISHMENT *
* SITE INDEX = 70 FEET (INDEX AGE = 25 YRS) *
* T/A = 400 SURVIVING AT AGE 24 *
****

THREE PREDICTED PLANTATION CHARACTERISTICS ARE...
1) AVERAGE HEIGHT OF TEN TALLEST TREES = 69 FEET.
2) ARITHMETIC MEAN DBH = 7.0 INCHES.
3) QUADRATIC MEAN DBH = 7.2 INCHES.

PER ACRE VALUES

STRUCTURE			VOLUME & WEIGHT - TOTAL STEM				
			WOOD & BARK		WOOD ONLY		
DBH (IN)	NUMBER OF TREES	BASAL AREA (SQFT)	AVG IND. TREE HT (FT)	VOLUME (CUFT)	GREEN WEIGHT (LBS)	VOLUME (CUFT)	DRY WEIGHT (LBS)	DBH (IN)
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	2
3	0	0	0	0	0	0	0	3
4	9	1	35	15	321	10	314	4
5	58	8	41	169	3284	122	3781	5
6	96	19	45	433	7579	320	9963	6
7	98	26	50	661	10595	499	15592	7
8	73	25	54	684	10179	527	16511	8
9	41	18	58	517	7187	404	12706	9
10	18	10	62	296	3886	235	7419	10
11	6	4	66	126	1568	102	3210	11
12	2	2	69	52	613	42	1336	12
13	0	0	0	0	0	0	0	13
14	0	0	0	0	0	0	0	14
15	0	0	0	0	0	0	0	15
TOTAL	400	113		2953	45212	2261	70832	

NOTE... BASED ON RESEARCH CONDUCTED IN THE
EAST TEXAS PINE PLANTATION RESEARCH PROJECT

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