WILDLIFE SESSION

MAST PRODUCTION OF CERTAIN OAK SPECIES IN LOUISIANA

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This phase of the project was initiated due to the increased attention given "scrub oak" control in the longleaf pine region of the southeast, by the United States Forest Service, state forestry orginizations, and private timber companies. As a result of the "Timber Stand Improvement" work, a controversy over the merits of the practice, particularly as it relates to wildlife, has arisen. Sportsmen's groups, other organizations interested in wildlife, and the free-range hog owners, are among those questioning the "Timber Stand Improvement" work.

A study, to determine the mast production and value of acorns to wildlife, was undertaken in October, 1950. The Pittman-Robertson Section of the Louisiana Wildlife and Fisheries Commission, and the United States Fish and Wildlife Service Branch of Research, are cooperating in the study, which is being conducted on the Kisatchie Unit, of the Kisatchie National Forest, in west-central Louisiana. Insects were identified by M. R. Smith, Bureau Entomology and Plant Quarantine, United States Department of Agriculture.

METHODS

To determine the mast yields, acorn traps were employed. The trap frames were constructed of 1 inch by 6 inch boards. The frames were constructed so that the inside area was ¼ millacre in size. Specifications for the original trap was 3.3 by 3.3 feet. In using 36 inch hardware cloth, it was found that by changing the inside dimensions to 36 inches by 43.56 inches, a more economical trap could be constructed. This eliminates piecing the wire, and will give the same area, which is 1568.16 square inches or ¼ millacre. The bottom of the frame was covered with ¼ inch mesh hardware cloth, and the top with 2 inch mesh poultry wire. The traps were placed on lighterwood pine posts, and supported approximately 30 inches above the ground.

The traps were placed under the trees, at a distance of ⅔ the crown radius. Depending upon the crown diameter, one or two were used per tree.

Traps were visited weekly. The acorn catch was collected, tallied, and dry stored. From the total trap catch for each tree, a calculation was made to determine the number of acorns produced. The formula, based on the principle of parabela, as advanced by Downs and McQuilkin (1944), was employed to make this calculation.

At the end of the acorn falling season, the acorn catch for each tree was weighed. From the weight of the trap catch, the total weight of acorns produced by the tree was calculated.

1

The density of the tree stands on the acre study plots, was secured by a count of the trees. The crown class for the trapped trees was recorded, and the diameters (dbh) of the trees were measured with a diameter tape. Tree heights were taken by use of the Abney hand level, and the ages of the trees were obtained by increment borings.

To obtain information on wildlife utilization of the acorns, open ground quadrats (¼ millacre in size) were staked out adjacent to the traps. The acorns in the open quadrats were counted, and scattered back on the plot, at each trap visit. The wildlife utilization of these exposed acorns was interpreted by sign.

A cutting test was employed to determine the soundness of the acorns produced.

To determine the food value, a sample of acorns from each tree species was collected for analysis. The chemical analysis was determined, by the Foods and Seed Laboratory of the State Agricultural Experiment Station, Louisiana State University, Baton Rouge, Louisiana.

In the acorn mast study, the scrub oaks were separated from the bottomland hardwood oaks. Scrub oaks included in the study are blackjack *(Quercus marilandica)*, bluejack *(Quercus incana)*, and post oak *(Quercus stellata)*. These oak species are found in the understory of second growth longleaf pine, and on cutover pine areas. They flourish in solid and mixed stands.

Oaks in the bottomland hardwoods included in the study are cow oak *(Quercus prinus)*, southern red oak *(Quercus falcata)*, willow oak *(Quercus phellos)*, white oak *(Quercus alba)*, and water oak *(Quercus nigra)*.

Four scrub oak plots were selected for trapping, in an attempt to determine acorn production for various stand densities.

Three of the four plots were trapped on a selected tree basis, while the fourth was trapped on production per acre basis. These plots were designated as plot A, B, C and D, repsectively.

Bottomland oaks were selected on an individual tree basis, with the exception of the two willow oak plots at Catahoula, which were laid off in two, one-acre samples. However, individual trees, on the plots, were selected for trapping. Some trees were released by thinning, to study the effects of this silvicultural operation.

RESULTS

The scrub oak segment will be discussed, first in this paper. A total of 9 blackjacks, 7 bluejacks, and 4 post oak trees were trapped on plot A. The stem density by species on this one-acre sample were as follows: Blackjack 113, bluejack 576, post olk 25, loblolly *(Pinus taeda)* 42, longleaf *(Pinus palustris)* 9, and shortleaf *(Pinus echinate)* 33. A total of 793 stems to the acre were recorded for this plot.

The top producer in plot A was a 24 year old bluejack 6.5 inches in diameter. This tree produced 5,257, 5,491, and 1,343 acorns in 1950, 1951, and 1952 respectively. The best mast production on bluejack oak occurred on trees with diameters over six inches. Two bluejacks with diameters over 6 inches produced an average of 5,507 acorns and/or 5.75 pounds over the three year study period, as compared to an average of 656 acorns over the same study period, on four bluejacks under 6 inches in diameter.

Post oak was the next highest producer of this plot, with best production for the species, occurring on a dominant tree 20 years old, and 5.1 inches in diameter.

This one tree produced 442, 1,345 acorns and/or 1.40 and 4.81 pounds in 1950 and 1951 respectively. Only one post oak, a 30 year old co-dominant tree 4.6 inches in diameter, produced any mast on this plot in 1952.

The highest mast producing tree among the 9 blackjacks trapped on this plot was a 40 year old dominant tree, with a 104 inch diameter. This tree produced only 658 acorns over the three year study period, as compared to the runner up, a 28 year old dominant blackjack 6.9 inches dbh, which produced 652 acorns for the same study period. The larger diameter trees appeared to be the better producers, as indicated by the average production over a three-year period. Three blackjacks, 6.9 inches in diameter or better, produced an average of 618 acorns over the three-year study period, as compared to an average of 141 acorns on six blackjacks; less than 6.9 inches dbh, for the same study period.

Bluejack was found to be consistently the best producer of the scrub oaks, with post oak next, and blackjack last.

Plot B, located adjacent to plot A, was divided into four equal quadrats, and five traps placed at random in each quadrat. This dense scrub oak plot had a tree stand of 842 stems on the acre. Species by number are as follows: Blackjack 21, bluejack 763, post oak 35, hickory *(Carya spp.)* 2, loblolly pine *(Pinus taeda)* 12, longleaf *(Pinus palustris)* 1, and shortleaf *(Pinus echinata)* 8. As indicated in the stem enumeration, this plot is predominantly a bluejack thicket.

Acorn production, in this area, has been on the decline since 1950. This acre produced 45,016 and/or 68.58 pounds of acorns in 1950 as compared to 11,163 and/or 25.76 pounds, and 10,400 of 2.36 pounds of acorns in 1951 and 1952 respectively. It is interesting to note that the variation in number of acorns produced in 1951 and 1952 was not nearly as pronounced as was the descrepency in the weight. It is believed that the drought preceeding the mast crop was responsible, for the light weight acorns collected in 1952.

Only six trees, two bluejacks, two blackjacks, and two post oaks, were selected for trapping on plot C. In general, these were good, healthy, full crowned trees, as compared to the small stunted trees on plots A, B, and D. Stem density per acre totaled 444 stems, composed of the following species by number: Blackjack 17, bluejack 123, post oak 29, southern red oak 6, hickory 50, shortleaf pine 1, and longleaf pine 39. The best producing blackjack in this plot was an intermediate 25 year old tree 10.5 inches in diameter. The top producing bluejack and post oak in this plot were dominant trees 22 years old with a dbh of 8.4 inches, and 27 years of age, with a dbh of 8.6 inches respectively. Blackjack oak, in a not too crowded condition, apparently produces better than it does, where a crowded condition exists.

Plot D had the least number of stems per acre, with a total of 268 stems as follows: Blackjack 193, bluejack 32, post oak 5, loblolly 7, shortleaf 10, and longleaf 21.

The best production for the plot came from a dominant bluejack, 25 years of age with a diameter of 10.1 inches. A 29 year old dominant blackjack, 20.6 inches in diameter, was by far the best acorn producer, for that species, over the three-year study period on plot D. No post oaks were studied on this plot.

In general, bluejack oak is the best acorn producer, of the three scrub oaks studied. Best mast production on bluejack was obtained on trees 6.5 inches in dbh

3

or over. Twenty to thirty years of age seem to give the optimum production. However, bluejack production began at approximately 14 years of age.

The best blackjack production was made by trees, over eight inches dbh and under 40 years of age. The most acorns 3,108 were produced by a tree 20.6 inches dbh and 29 years old. Blackjack acorn production began at 14 years of age, and began to taper off at about 40 years of age.

Post oaks, down to 4.6 inches dbh, showed good mast production. The most acorns, 1,495, were produced by a tree 8.6 inches dbh and 27 years old. For the three species of scrub oaks studied (Table 1) over a three year period, the year 1951 showed the best mast production.

The open ground quadrats, ¼ millacre in size, located adjacent to each trap were checked weekly, at the time of the trap visits. An attempt was made, to segregate the unsound acorns from the sound ones. The unsound acorn will usually collapse when squeezed between the forefinger and thumb. Unsound acorns were discarded, and the sound acorns were tallied, and scattered back over the open quadrat.

Notation was made as to sign on each visit, in an attempt to determine the utilization.

Rodents and birds, chiefly squirrels and jays, accounted for the heaviest utilization. The unsound acorns, for the most part, were insect damaged. The white magot-like larva of the acorn weevil *(Balaninun spp.)* was observed in many of these acorns. The Texas leaf-cutting ant *(Atta texana)* was observed entering acorns, and carrying away portions of acorn meat. Shed builder ants *(Crematogaster laeviuscula)* were also noted entering partly eaten, and empty acorn hulls.

The chemical analysis of the three scrub oaks were about the same, with bluejack having the highest protein content, followed closely by blackjack. Post oak was slightly lower, than the other two.

Post oak had a considerable higher percentage of sound acorns, as determined by a cutting test, than blackjack and bluejack. Bluejack ran second highest in percent acorn soundness and blackjack last. See Table 2, 3, 4 for chemical analysis, percent sound acorns, and utilization based on percent quadrat visits.

Traps are usually run from September to about the second week in January, or whenever the acorns quit falling. The same type of traps and same method of checking was employed in trapping the bottomland hardwood oaks, as that already described for the scrub oak species.

The peak of the acorn fall was the second week of October in 1950. The peak of the acorn fall in 1951 occurred between October 26, and November 2, 1951. The peak of the acorn fall, in 1952, occurred the fourth week of October.

Water Oak

Of the bottomland hardwood oak species studied, water oak proved to be consistently the better mast producer. The top produing water oak for 1950, 1951, and 1952 was tree number 56, with an acorn production of 1,500, 9,900, and 24,000, respectively. This was a dominant tree, 57 years old, with an 18.0 inch diameter.

Dominant, vigorous trees, with large dbh measurements were the best producers in all three years of study. Generally, those trees, over 50 years of age, and with diameters over 9 inches, were the better producers.

4

Table 1. Summary of acorn production (number) by species for plots A, C, and D, on Red Dirt Game Management Area, 1950, 1951, and 1952.

Plot	Blackjack			Bluejack			Post Oak			Total		
	16 Trees		16 Trees	14 Trees		16 Trees	6 Trees		6 Trees	36 Trees		38 Trees
	No. of acorns			No. of acorns			No. of acorns			No. of acorns		
	1950	1951	1952	1950	1951	1952	1950	1951	1952	1950	1951	1952
A	814	1,091	374	8,221	9,419	4,170	749	2,849	26	9,784	13,359	4,570
C	985	1,874	2,937	2,619	1,313	4,222	0	1,495	304	3,604	4,682	7,463
D	513	5,937	1,082	2,657	2,116	1,237	0	0	0	3,170	8,053	2,319
Total	2,312	8,902	4,393	13,497	12,848	9,629	749	4,344	330	16,558	26,094	14,352

5

Table 2. Chemical analysis of scrub oak acorns.

Species	% Protein	% Fat	% N-Free Extract	% Crude Fiber	% Water	% Ash
Blackjack	5.1	5.6	50.4	22.8	13.7	2.4
Bluejack	5.9	13.8	49.5	14.9	13.7	2.2
Post Oak	4.7	4.2	60.0	14.3	14.3	2.5

Table 3. Soundness of trapped scrub oak acorns as determined by cutting test.

Species	Percent sound		
	1950	1951	1952
Blackjack	34	34	49
Bluejack	56	48	63
Post Oak	24	81	100

Table 4. Utilization of south oak acorns.

Species	Percent quadrat visit	
	1951	1952
Rodents	3.1	7.7
Birds	1.7	5.0
Ants	1.1	0.5
Hogs	1.0	0.6
Deer	0.1	0.3
Acorn weevil		2.2
Unknown	0.6	1.3

White Oak

Average production for white oaks in 1952 was very low. Average production for the 11 white oaks trapped, in 1951 was 1,363 acorns, as compared to 362 acorns for 7 white oaks in 1950. The average production for the same 11 white oaks, in 1952, was 76.3 acorns. Dominant or co-dominant white oaks, with diameters of 15 inches or more, were the best mast producers in the three study years. One old tree, estimated at 200 years, was the second largest producer in 1951, but the acorns were of an inferior quality. This same tree produced no acorns in 1952. Seemingly, there is a deterioration in the quality of acorns produced by aged white oaks. The youngest white oak to produce acorns in 1951 was 24 years old. However, this tree did not produce any mast in 1952. The youngest tree to produce acorns in 1952 was 42 years old, while the oldest was 74. In general the best white oak producers are over 40 years of age, with diameters 15 inches and better.

Southern Red Oak

Eight Southern red oaks were trapped, in 1950, 1951, and 1952. Tree number 70, with a co-dominant crown class, 30 years old, and a dbh of 12.8 has been consistently the best producer over the three year period. However, this tree

showed a decline in mast production in 1952 and 1951, as compared with 1950. Dominant and co-dominant trees, above 11 inches in diameter, were the best mast producers. These trees ranged in age, from 30 to 43 years.

Cow Oak

No cow oaks were trapped in 1950. Five trees were trapped in 1951 and 1952. The top producer among the cow oaks, in 1951, was a co-dominant tree 100 years old, with a dbh of 30 inches. However, this tree produced no acorns in 1952. The top producer for 1952 was a 61 year old co-dominant tree 17 inches in diameter. Trees producing acorns ranged in age from 40 to 100 years of age and 12 to 30 inches dbh. One tree 38 years old produced no acorns in any of the study years.

Willow Oak

Eleven willow oak trees were trapped on the Cathaola Refuge in 1950, and 28 trees were trapped in 1951 and 1952. All 11 trees produced acorns in 1950. Fourteen of the 28 trees which were trapped produced acorns in 1951 while 23 trees produced acorns in 1952. The mast production in 1950 and 1951 was about the same, but a sharp decline was noted in 1952. Dominant and co-dominant trees above 13 inches dbh were, in general, the best mast producing trees. Producing trees ranged from 17 to 75 years of age. Best production, for the three year period, was made by trees over 35 years of age. Apparently, mast yields begin to taper off when willow oaks reach 70 years or more.

The released trees have shown no increase in production, as yet. However, most of these were young trees, with relatively small diameters, and the experiment has not progressed far enough for any conclusion to be drawn on release cutting.

An example of acorn production correlated with dbh is given for water oak. In general, this holds true for all bottomland hardwood oaks studied.

Seven water oaks over 10 inches dbh produced an average of 38, 312, and/or 49.26 pounds of acorns for the years 1951 and 1952. In comparison, nine water oaks ranging in diameter from 3.7 to 9.9 inch dbh produced an average of 339 and/or 0.337 pounds of acorns for the same period. Production figures for 1950 were purposely left out, because trapping operations did not occur on the same number of trees in that year, as in 1951 and 1952.

The protein content of the bottomland hardwood oaks studied was about the same for all species. The percentage of sound acorns for each species varied from year to year. Southern red oak was relatively consistent with white oak producing the greatest percentage of sound acorns over the three year study period as illustrated in Tables 5 and 6.

Table 5. Soundness of bottomland oaks as determined by cutting test.

Species	Percent sound		
	1950	1951	1952
Cow Oak		97	18
Southern Red Oak	33	43	54
Willow Oak	7	46	52
White Oak	44	84	25
Water Oak	8	46	45

Table 6. Chemical analysis of bottomland oak acorn.

Species	% Protein	% Fat	% N-Free Extract	% Crude Fiber	% Water	% Ash
White Oak	3.9	2.9	57.1	14.1	19.5	2.5
Southern Red Oak	3.6	5.6	48.3	26.6	13.1	2.8
Willow Oak	3.3	8.1	49.2	21.4	16.2	1.8
Cow Oak	3.1	1.8	58.9	12.9	21.3	2.0

In general, the larger diameter trees of all species were the best producers. Best mast production seemed to occur on dominant and co-dominant trees between the ages of 25 and 70 years old.

The peak of the acorn fall occurred the fourth week of October, in 1950; the second week of November, in 1951; and the third week of October, in 1952.

Wildlife utilization was not figured in percent of quadrats visits, but essentially the same disposition of acorns in the open quadrat was similar to that of the scrub oak plots. Squirrels and jays were the chief users of the acorn crop. Hog sign was found quite frequently on Catahoula. Deer sign was noted on more than one occasion and, of course, some acorns were found to have been damaged by insects.

SUMMARY

1. Bluejack oak seems to be the best acorn mast producer of the three species, of scrub oaks studied.
2. Blackjacks produced best in light timber stands, on loamy soils. Bluejacks produced best in heavy timber stands, on dry sandy soils, and post oak production was about the same, irrespective of timber stand density or soil type.
3. Best blackjack production was made by trees over eight inches dbh and under 40 years of age. Best bluejack production was obtained on trees 6.5 inches dbh or over, while post oaks down to 4.6 inches dbh showed good mast production.
4. Best production of the bottomland hardwood oaks occurred on water oak.
5. For all species concerned, the larger diameter trees were the best producers. Generally, these trees, with dbh measurements 10 inches or over, were the best producers.
6. Best production on all species studied was obtained on trees with dominant or co-dominant crown classifications.
7. Peak of the acorn fall was in October.
8. Bird, squirrel, and hog signs were most common on the open ground quadrats.

Although the scrub oak trees showed less production in acorn mast as compared to the bottomland oak production, the food content of the scrub oak acorns were higher in nutrition as illustrated in Table 7.

Additional information is provided in the appendices.

Table 7. Comparison of chemical analysis on scrub oak and bottomland oak.

	%	%	% N-Free	% Crude	%	%
Blackjack	5.1	5.6	50.4	22.8	13.7	2.4
Bluejack	5.9	13.8	49.5	14.9	13.7	2.2
Post Oak	4.7	4.2	60.0	14.3	14.3	2.5
White Oak	3.9	2.9	57.1	14.1	19.5	2.5
Southern Red Oak	3.6	5.6	48.3	26.6	13.1	2.8
Willow Oak	3.3	8.1	49.2	21.4	16.2	1.8
Cow Oak	3.1	1.8	58.9	12.9	21.3	2.0

LITERATURE CITED

Downs, Albert, and William E. McQuilkin. 1944. Seed production of Southern Appalachain Oaks. Journal of Forestry. Volume 42. Number 12. December 1944.

Appendix 1. Calculated number and weight of acorns produced by 11 water oaks in 1950 and 16 water oaks in 1951 on Red Dirt Refuge.

Tree no.	DBH (in.)	Age (years)	Height (feet)	Crown class	No. acorn 11 trees 1950	No. acorn 16 trees 1951	Lbs. acorn 11 trees 1950	Lbs. acorn 16 trees 1951	Remarks
86 [a]	24.0 [a]	50 [a]	75 [b]	D	[c]	3435	[c]	5.71	
47	20.1	56	78	D	422	703	0.57	0.99	
54	19.8	54	82	D	757	8400	0.46	10.20	
56	18.9	57	88	D	1500	9900	3.33	12.56	
62	17.8	54	71	D	0	1040	0.00	1.03	
59	13.6	31	60	D	469	562	0.52	0.25	
88 [a]	10.4 [a]	22 [a]	68 [b]	CD	[c]	1645	[c]	1.61	Release
89 [a]	9.9 [a]	21 [a]	72 [b]	CD	[c]	574	[c]	0.58	Release
72	8.6	21	55	I	33	0	0.07	0.00	
52	8.1	28	46	S	29	0	0.07	0.00	Release
68	7.4	23	48	S	75	0	0.08	0.00	Release
50	6.6	28	49	S	58	0	0.06	0.00	Release
98 [a]	6.2 [a]	16 [a]	60 [b]	CD	[c]	0	[c]	0.00	Release
87 [a]	5.2 [a]	19 [a]	41 [b]	CD	[c]	0	[c]	0.00	Release
49	5.1	26	34	S	22	44	0.05	0.04	Release
58	3.7	12	23	S	0	0	0.00	0.00	Release
X̄					305	1642	0.46	2.06	

[a] New trees added in 1951. DBH and age measurements taken in 1951.
[b] Height measurements made in 1952.
[c] No trapping activity in 1950.

10

Appendix 2. Calculated number and pounds of mature acorns produced by selected trees in Plot A.

Tree No.	Species	DBH[a] (inches)	Age[a] (years)	Ht.[a] (feet)	Crown class	No. mature acorns 1950	No. mature acorns 1951	Wt. mature acorns 1950	Wt. mature acorns 1951
1	Blackjack	10.4	40	33	D[b]	0	526	0.00	0.250
6	Blackjack	8.3	23	32	D	441	52	1.15	0.006
12	Blackjack	6.9	28	37	D	84	442	0.23	0.810
3	Blackjack	6.5	28	31	CD[c]	0	0	0.00	0.000
14	Blackjack	5.8	21	29	D	249	50	0.37	0.220
5	Blackjack	5.6	22	27	D	21	0	0.05	0.000
15	Blackjack	4.8	24	27	CD	19	21	0.04	0.020
17	Blackjack	3.5	13	21	D	0	0	0.00	0.000
18	Blackjack	3.1	12	15	S[d]	0	0	0.00	0.000
X̄						90	110	0.20	0.150
11	Bluejack	6.8	21	32	D	1184	2018	1.46	2.000
8	Bluejack	6.5	24	33	D	5257	5491	6.49	5.970
13	Bluejack	5.3	25	31	D	710	37	0.41	0.060
20	Bluejack	4.1	22	21	D	789	52	1.27	0.001
19	Bluejack	3.8	16	23	D	19	10	0.01	0.001
7	Bluejack	3.6	21	23	CD	249	1811	0.18	1.270
16	Bluejack	2.9	14	24	CD	13	0	0.03	0.000
X̄						1173	1345	1.40	1.550
9	Post Oak	5.9	20	30	CD	100	116	0.26	0.340
4	Post Oak	5.1	20	24	D	442	1345	1.40	4.810
10	Post Oak	5.0	20	32	CD	51	661	0.11	1.400
2	Post Oak	4.6	30	28	CD	156	727	0.57	0.970
X̄						184	712	0.58	1.880

Density of tree stand in scrub oak plot A

Species	Blackjack	Bluejack	Post Oak	Loblolly	Longleaf	Shortleaf	Total
No. trees	113	576	25	42	9	33	793

[a] DBH, age and height measurements taken in 1950.
[b] Dominant.
[c] Co-dominant.
[d] Suppressed.

11

Appendix 3. Calculated number and weight of acorns produced by sampled white oaks on Red Dirt Game Management Area in 1950 and 1951.

Tree No.	DBH (in.)	Age (years)	Height (feet)	Crown Class	No. acorns		Lbs. acorns		Remarks
					7 trees 1950	11 trees 1951	7 trees 1950	11 trees 1951	
90 [a]	25.6 [a]	200 [a]	83 [b]	D [d]	c	4138	c	2.05	
57	18.1	74	60	D	1696	5338	3.48	18.19	
48	18.1	60	71	CD [e]	0	691	0	0.76	
65	15.0	42	58	D	0	3620	0	18.50	
53	15.0	67	71	CD	841	589	3.73	0.97	
51	10.3	38	59	CD	0	0	0	0	
55	8.9	39	45	S [f]	0	0	0	0	Release
94 [a]	8.5 [a]	30 [a]	66 [b]	I [g]	c	0	c	0	Release
91 [a]	6.2 [a]	24 [a]	45 [b]	CD	c	636	c	2.26	Release
93 [a]	6.2 [a]	24 [a]	56 [b]	I	c	0	c	0	Release
60	3.3	10	26	S	c	0	c	0	Release
X̄					362	1363	0.83	3.89	

[a] New trees added in 1951. DBH and age measurements taken in 1951.
[b] Height measurements made in 1952.
[c] No trapping activity in 1950.
[d] Dominant.
[e] Co-dominant.
[f] Suppressed.
[g] Intermediate.

Appendix 4. Number and weight of mature acorns taken in 20 ¼ mil acre traps on scrub oak plot B.

Trap No.	Species	No. mature acorns trapped		Weight of mature acorns in lbs.	
		1950	1951	1950	1951
21	Open	0	0	0.000	0.000
22	Open	0	0	0.000	0.000
23	Bluejack	3	0	0.010	0.000
24	Bluejack	2	1	0.010	0.006
25	Bluejack	2	0	0.002	0.000
26	Bluejack	3	1	0.010	0.004
27	Post Oak	3	3	0.010	0.017
28	Bluejack	2	10	0.002	0.002
29	Bluejack	4	0	0.010	0.000
30	Bluejack	0	0	0.000	0.000
31	Bluejack	22	5	0.050	0.004
32	Bluejack	53	6	0.070	0.003
33	Bluejack	53	7	0.080	0.004
34	Bluejack	45	3	0.050	0.003
35	Bluejack	24	18	0.030	0.006
36	Open	0	0	0.000	0.000
37	Bluejack	0	0	0.000	0.000
38	Open	0	0	0.000	0.000
39	Bluejack	4	11	0.010	0.101
40	Bluejack	0	0	0.000	0.000
Total		226	65	0.344	0.150

Density of tree stand in scrub oak plot B

Species	Blackjack	Bluejack	Post Oak	Hickory	Loblolly	Longleaf	Shortleaf	Total
No. trees	21	763	35	2	12	1	8	842

Appendix 5. Calculated number and pounds of mature acorns produced by selected trees in plot C.

Tree No.	Species	DBH (inches)	Age (years)	Ht. (feet)	Crown Class	No. mature acorns 1950	No. mature acorns 1951	Wt. mature acorns 1950	Wt. mature acorns 1951
46	Blackjack	10.5	25	34	I[a]	935	1781	0.97	3.17
44	Blackjack	9.4	24	35	D[b]	50	93	0.21	0.10
X̄						492	937	0.59	1.63
42	Bluejack	8.4	22	38	D	935	565	0.39	0.36
43	Bluejack	8.3	17	27	D	1684	748	0.67	0.75
X̄						1309	656	0.53	0.55
41	Post Oak	8.6	27	34	D	0	1495	0.00	2.66
45	Post Oak	6.2	12	27	D	0	0	0.00	0.00
X̄						0	747	0.00	1.33

Density of tree stand in scrub oak plot C

Species	Blackjack	Bluejack	Post Oak	S. Red Oak	Hickory	Longleaf	Shortleaf	Total
No. Trees	17	123	29	6	50	39	1	444

[a] Intermediate.
[b] Dominant.

Appendix 6. Calculated number and pounds of mature acorns produced by selected scrub oaks in plot D.

Tree No.	Species	DBH (inches)	Age (years)	Ht. (feet)	Crown Class	No. mature acorns 1950	No. mature acorns 1951	Wt. mature acorns 1950	Wt. mature acorns 1951
75	Blackjack	20.6	29	37	D[a]	172	3108	0.20	6.8400
78	Blackjack	16.8	41	39	D	0	675	0.00	0.5500
77	Blackjack	13.6	14	26	D	237	1605	0.26	3.3700
82	Blackjack	6.5	40	26	CD[c]	98	234	0.06	0.2600
83	Blackjack	6.1	24	25	CD	0	315	0.00	0.5300
X̄						102	1187	0.10	2.3100
74	Bluejack	10.1	25	32	D	2460	1581	2.10	2.0600
76	Bluejack	6.4	20	27	CD	23	12	0.03	0.0005
85	Bluejack	4.0			CD		247		0.2200
80	Bluejack	3.7	20	21	I[b]	116	138	0.11	0.1700
		3.6	19	14	S[d]	11		0.01	
81	Bluejack	3.1			I		94		0.0100
84	Bluejack	3.5			I		28		0.0200
79	Bluejack	3.5	20	19	I	47	16	0.09	0.0100
X̄						531	302	0.45	0.3600

Density of tree stand in scrub oak plot D

Species	Blackjack	Bluejack	Post Oak	Loblolly	Shortleaf	Longleaf	Total
No. Trees	193	32	5	7	10	21	268

[a] Dominant.
[b] Intermediate.
[c] Co-dominant.
[d] Suppressed.

Appendix 7. Calculated number and weight of acorns produced by sampled willow oaks on the Catahoula Game Management Preserve 1950 and 1951.

Tree [a] No.	DBH (in.)	Age (years)	Ht. (feet)	Crown Class	No. acorns 11 trees 1950	No. acorns 28 trees 1951	Lbs. acorns 11 trees 1950	Lbs. acorns 28 trees 1951
23	25.3	75	86	D		528		0.37
22	19.6	70	65	CD		379		0.17
17	18.5	65	68	D		4083		2.47
25	17.7	60	66	CD		3634		2.08
18	17.6	68	67	D		4631		2.81
20	17.0	55	72	CD		1421		1.04
2	15.7	26	95	D	1538	0	0.83	0.00
1	15.4	62	90	D	1454	0	1.73	0.00
14	14.5	50	42	CD		486		0.18
24	14.4	58	72	CD		6852		5.03
26	14.0	63	61	CD		1782		1.12
3	13.9	56	102	CD	4374	0	2.40	0.00
7	13.1	56	39	CD	93	0	0.20	0.00
19	13.0	35	64	D		1500		0.94
9	12.9	59	92	CD	652	0	0.57	0.00
21	12.8	45	58	I		175		0.06
13	12.8	38	62	CD		181		0.09
8 new tree	12.5	49	80	CD		0		0.00
10	12.3	47	79	I	75	0	0.21	0.00
8 tree died	12.0	47	77	CD	175	0	0.48	0.00
6	11.2	56	90	CD	142	0	0.26	0.00
5	11.2	50	105	CD	292	0	0.77	0.00
12	10.8	52	65	CD		1710		0.94
16	10.4	17	58	CD		76		0.04
4	9.8	40	87	I	8	0	0.01	0.00
11	8.6	49	63	S	75	0	0.21	0.00
15	6.8	18	45	I		0		0.00
27	5.9	28	45	I		0		0.00
28	5.4	23	39	I		0		0.00
X̄					985	980	0.69	0.62

[a] On trees 12 through 28 measurements were taken in September, 1952.

Appendix 8. Calculated number and pounds of acorns produced by selected blackjack oaks on the Red Dirt Game Preserve 1950 and 1951.

Tree No.	DBH[a]	Age (years)[a]	Ht. (feet)[a]	No. of acorns 1950	No. of acorns 1951	Lbs. of acorns 1950	Lbs. of acorns 1951	Remarks
75	20.6	29	37	178	3108	0.20	6.840	
78	16.8	41	39	0	675	0.00	0.550	
77	13.6	14	28	237	1605	0.26	3.370	
46	10.5	25	34	935	1781	0.97	3.170	
1	10.4	40	33	0	526	0.00	0.250	
44	9.4	24	35	50	93	0.21	0.100	
6	8.3	23	32	441	52	1.15	0.006	
12	6.9	28	37	84	442	0.23	0.810	
3	6.5	28	31	0	0	0.00	0.000	
82	6.5	40	26	98	234	0.06	0.260	
83	6.1	24	25	0	315	0.00	0.530	
14	5.8	21	29	249	50	0.37	0.220	
5	5.6	22	27	21	0	0.05	0.000	
15	4.8	24	27	19	21	0.04	0.020	
17	3.5	13	21	0	0	0.00	0.000	
18	3.1	12	15	0	0	0.00	0.000	Suppressed
Total number acorns				2312	8902	3.54	16.126	
Number of trees				16	16	16.00	16.000	
X̄ number acorns per tree				144	556	0.22	1.010	

[a] Measurements made in 1950.

Appendix 9. Calculated number and pounds of acorns produced by selected bluejack oaks on the Red Dirt Game Preserve 1950 and 1951.

Tree No.	DBH[a]	Age (years)[a]	Ht. (feet)[a]	No. of acorns 1950	No. of acorns 1951	Lbs. of acorns 1950	Lbs. of acorns 1951	Remarks
74	10.1	25	32	2460	1581	2.10	2.0600	
42	8.4	22	38	935	565	0.39	0.3500	
43	8.3	17	27	1684	748	0.67	0.7500	
11	6.8	21	32	1184	2018	1.46	2.0000	
8	6.5	24	33	5257	5491	6.49	5.9700	
76	6.4	20	27	23	12	0.03	0.0005	
13	5.3	25	31	710	37	0.41		Unknown – container broken; acorns lost.
20	4.1	22	21	789	52	1.37	0.0600	
85	4.0[b]	19[b]	23[a]		247		0.7200	New tree added, 1951.
19	3.8	16	23	19	10	0.01	0.0010	
80	3.7	20	21	116	138	0.11	0.1700	
7	3.6	21	23	249	1811	0.18	1.2700	
81	3.6	19	14	11		0.01		1950 tree died.
81	3.1[b]	14[b]	21[a]		94		0.0100	New tree.
84	3.5[b]	18[b]	21[a]		28		0.0210	New tree.
79	2.5	20	19	47	16	0.04	0.0100	
16	2.9	14	24	13	0	0.03	0.0000	
Total number of acorns				13497	12846	13.30	13.3925	
Number of trees				14	16	14.00	15.0000	
X̄ production per tree				964	803	0.95	0.8900	

[a] Measurements made in 1950.
[b] Measurements made in 1951.

Appendix 10. Calculated number and pounds of acorns produced by selected post oaks on the Red Dirt Game Preserve 1950 and 1951.

Tree No.	DBH [a]	Age (years) [a]	Ht. (feet) [a]	No. of acorns 1950	No. of acorns 1951	Lbs. of acorns 1950	Lbs. of acorns 1951
41	8.6	27	34	0	1495	0.00	2.66
45	6.2	12	27	0	0	0.00	0.00
9	5.9	20	30	100	116	0.26	0.34
4	5.1	20	24	442	1345	1.40	4.80
10	5.0	20	32	51	661	0.11	1.40
2	4.6	30	28	156	727	0.57	0.97
Total number of acorns				749	4344	2.34	10.19
Number of trees				6	6	6.00	6.00
$\overline{X}$ production per tree				124	724	0.39	1.69

[a] Measurements made in 1950.