SOUTHERN FOREST EXPERIMENT STATION

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TREE DIAMETER GROWTH IN ALABAMA

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How fast do Alabama's trees grow? Measurements taken on 2,872 trees resurveyed in Alabama during 1962-63 provide answers to this question.

The sample trees were on plots established in 1951-53 on a systematic grid covering the State. Species and diameters were sampled in proportion to occurrence. Growth was computed for all growing-stock trees that were at least 5.0 inches in diameter breast high at the first measurement. D.b.h. was taken outside bark in both inventories. Thus diameter growth, wood and bark, was gaged directly, and the problems of making estimates from increment borings were avoided.

Diameter increase of each tree was divided by the interval between measurements to arrive at periodic annual diameter growth. Because the growth interval varied among trees, the statistics are reported on an annual basis. Nevertheless, the interval was about 10 years. Hence, decadal growth can be approximated by multiplying the annual rates by 10. This note summarizes growth rates by species, tree diameter class, site, and geographic area.

Pines.—Data for the major southern pines, loblolly, shortleaf, longleaf, and slash, and for the minor species (Virginia and spruce pines combined) are given in table 1. The table indicates average growth capabilities over the range of sites each species occupies in the State.

Table 1.—*Annual diameter growth of pine species*

Species group	Sample trees	Mean growth	Standard deviation
	Number	*Inch*	*Inch*
Shortleaf	415	0.18	0.11
Longleaf	246	.22	.11
Slash	65	.24	.11
Loblolly	445	.26	.15
Minor species	39	.25	.17

A Duncan's 5-percent multiple range test showed that shortleaf was the slowest grower. Loblolly had the fastest growth, but its margin was not great enough to separate it from slash and the minor pines. The results of the test

appear below; the means for any species not enclosed by the same bracket are significantly different:

Shortleaf
Longleaf
Slash
Minor species
Loblolly

Hardwood species.—Among the hardwoods, yellow-poplar was the fastest-growing species, and the red oaks were next (table 2).

Upland trees grew significantly (0.01 level) slower than bottom-land trees. The contrast was most pronounced in the oaks and the group of other hard species. Sweetgum and the group of other soft species were least affected by site.

Duncan's test was applied to the differences between species means in both upland and bottom-land sites:

For uplands—

Tupelos
Other hard hardwoods
Hickories
Other soft hardwoods
White oak group
Sweetgum
Red oak group
Yellow-poplar

For bottom lands—

Tupelos
Other soft hardwoods
Hickories
Other hard hardwoods
Sweetgum
White oak group
Red oak group
Yellow-poplar

As the bracketing shows, yellow-poplar and the red oaks were superior on both sites. On the uplands, the tupelos, represented by blackgum, were distinctly slower than the other species. On the bottom lands, where the group included additional species, growth was similar to that of the other soft hardwoods and the hickories.

Pine versus hardwood.—Neither for pines nor for hardwoods did growth vary much by diameter class (table 3). The difference between the Statewide means of 0.22 inch for pine and 0.13 inch for hardwood was significant (0.01 level). The lack of a definite trend in growth by diameter reflects the moderate stocking common over the State.

The diversity of hardwood species represented, and the wide range of sites they occupy, causes them to vary more in growth rate than do the pines. The coefficient of variation

Table 2.—*Annual diameter growth of hardwoods by physiographic site*

Species group	All sites		Uplands			Bottom lands		
	Sample trees	Mean growth	Sample trees	Mean growth	Standard deviation	Sample trees	Mean growth	Standard deviation
	Number	*Inch*	*Number*	*Inch*	*Inch*	*Number*	*Inch*	*Inch*
Red oaks	311	0.18	264	0.17	0.10	47	0.25	0.16
White oaks	292	.13	271	.12	.07	21	.19	.10
Hickories	249	.10	238	.10	.07	11	.14	.06
Other hard hardwoods	183	.13	102	.10	.08	81	.16	.10
Yellow-poplar	47	.24	33	.22	.15	14	.29	.17
Sweetgum	198	.15	157	.14	.10	41	.16	.15
Tupelos (inc. blackgum)	249	.08	151	.07	.06	98	.10	.08
Other soft hardwoods	133	.12	94	.12	.08	39	.13	.10

Table 3.—*Annual diameter growth by d.b.h. class*

D. b. h. class (inches)	Pine			Hardwood		
	Sample trees	Mean growth	Standard deviation	Sample trees	Mean growth	Standard deviation
	Number	*Inch*	*Inch*	*Number*	*Inch*	*Inch*
6	522	0.22	0.13	733	0.13	0.10
8	352	.23	.13	416	.13	.11
10	179	.24	.12	255	.13	.10
12	88	.22	.12	122	.14	.10
14	40	.24	.14	66	.14	.10
16	11	.26	.19	40	.13	.09
18	10	.21	.09	18	.16	.10
20+	8	.18	.09	12	.15	.13
All diameters	1,210	.22	.13	1,662	.13	.10

is 76 percent for hardwoods and 58 percent for pine.

Survey regions.—Growth of pines and hardwoods within the six regions recognized by the Forest Survey (fig. 1) was subjected to Duncan's test:

For pine:

Survey region	6	5	1	4	2	3
Annual diameter growth	.16	.19	.23	.23	.24	.25

For hardwood:

Survey region	1	5	2	6	4	3
Annual diameter growth	.12	.12	.13	.13	.14	.15

Pine growth is slowest in the more mountainous northern units, where shortleaf is heavily represented. Loblolly predominates in the southeast, where pine diameter growth reaches 0.25 inch.

The narrow range of hardwood growth by units results from the combining of many species and sites in arriving at unit means.

Figure 1.—*Forest Survey regions in Alabama.*