SOUTHERN FOREST EXPERIMENT STATION

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SEASONAL TWIG GROWTH OF SOUTHERN BROWSE PLANTS

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SOUTHERN FOREST EXPERIMENT STATION

After rapid growth in spring, twig elongation practically ceased for 12 of 16 browse species. A few species responded to increased moisture and grew through the summer, and two continued on into fall. Most vines died back somewhat in late summer and fall.

Five species fruited in the summer, others in the fall.

The purpose of the study reported here was to learn the rate and season of twig elongation for 16 species of browse plants that are major sources of deer forage in southern forests. Similar information has been collected for the more common trees of eastern forests *(2, 3, 5, 6, and 7)* [2] and for some browse plants in the West *(1, 4, and 9)*, but little or none is available for the shrubs, vines, and the understory trees of southern forests.

PROCEDURES

Three ungrazed, medium-sized plants of each species were located in a well-stocked shortleaf-loblolly pine-hardwood stand on the Stephen F. Austin Experimental Forest, near Nacogdoches, Texas. In February 1963, one terminal and one lateral branch of each plant were marked at the base of the bud with a small band of yellow paint. Twig elongation was measured from the outer edge of this band. Measurements were made semiweekly from the time growth began until the end of June, and monthly thereafter until January. Length of all twigs that formed above the paint mark was included in the measurements. Observations also included the beginning dates of flowering and fruiting and the average length of time that flowers and fruit persisted.

The same procedures were followed in 1964 except that measurements were taken only on twigs that grew from the terminal branches. Laterals were excluded because the 1963 data showed their growth patterns to be similar to those of terminals.

Weather data were recorded at a station less than a half mile from the study site.

Rainfall averaged well below normal (table 1). During the 2 years there were 17 periods of 10 days or more when under 0.1 inch of rain

[1] The authors are on the staff of the Wildlife Habitat and Silviculture Laboratory, which is maintained at Nacogdoches, Texas, by the Southern Forest Experiment Station in cooperation with Stephen F. Austin State College.

[2] Italic numbers in parentheses refer to Literature Cited, page 5.

was recorded. The longest droughts were in March and from late August to November of 1963, and in May and from late June to mid-August of 1964.

Average temperatures were below normal during both winters and above normal during both summers.

Table 1.—*Weather data at Stephen F. Austin Experimental Forest, 1963-1964*

RAINFALL

Month	1963	1964	65-year average [1]
	Inches	*Inches*	*Inches*
January	1.76	3.27	3.81
February	2.67	2.02	3.72
March	1.41	4.07	4.10
April	4.41	8.18	4.94
May	1.70	.89	5.22
June	5.35	4.16	3.42
July	4.72	.50	3.98
August	3.59	3.44	2.39
September	1.38	3.21	2.74
October	.00	1.86	2.90
November	5.15	3.71	4.13
December	3.63	3.30	4.88
Total	35.77	38.61	46.23

FREEZING DATES AND FROST-FREE SEASON

Last freeze in spring	Mar. 27	Mar. 26	Mar. 22
First freeze in fall	Nov. 4	Oct. 20	Nov. 13
Frost-free season (days)	222	208	236

[1] From records at Nacogdoches, approximately 12 miles from study area.

RESULTS

A spring flush was characteristic of all species. Thereafter differences developed and growth patterns fell into three groups.

American beautyberry, blackgum, fringetree, parsley hawthorn, rusty blackhaw, and sassafras formed one general pattern that was very similar in both years (fig. 1) and resembles that common to many trees *(8)*. After the rapid flush in early spring, stems ceased to elongate and terminal buds formed. Except on American beautyberry, twig elongation had essentially ceased by June 1, even when rain was ample. Only rarely was there a recurrence of stem growth or formation of new twigs from lateral or terminal buds during the remainder of the season. In a few instances insects destroyed the tips, causing negligible decreases in twig length. For these species it appears that temperature and soil moisture in early spring have the strongest effect on the yields of forage and that the quantity available later in the year is relatively unaffected by low rainfall and high temperature during summer and fall.

Twigs of yaupon and flowering dogwood (fig. 2) elongated rapidly during spring, and thereafter made some growth whenever moisture was adequate. Thus, forage yields continued to increase until late summer or early fall, the quantity depending somewhat on the amount of rain.

Dogwood continued to grow through August in both years and through October in 1964, when fall rains kept moisture levels high. Most growth after May was by formation of new twigs rather than by elongation of those that had developed earlier.

Yaupon elongated rapidly in April and was relatively quiescent through June in both years. From June 17 through August 15, 1963, rainfall was 13.5 inches and yaupon developed new twigs from recently formed buds. Essentially the same pattern evolved in 1964 but about 1 month later, presumably because July was dry and August and September had ample rain. This response indicates that yaupon may form new twigs throughout the frost-free season when soil moisture is adequate.

The eight vines (fig. 3) formed the third set of growth patterns. Following the period of rapid growth and relative quiescence the new twigs often wilted and died back to a well-formed lateral bud (usually the last) which then became the new terminal. The reasons for dieback were not always obvious but drought, insects, and disease appeared to be contributing causes. Occasionally twig dieback and formation of new twigs occurred concurrently on different plants of the same species. Most vines made essentially all their growth in early spring during both years, but the percent of maximum twig length that remained in late summer and fall varied considerably among species and between years. For example, in 1963 most vines suffered little dieback, but in 1964 a large proportion of growth was lost on all except saw greenbrier.

Yellow jessamine grew through July in 1963, when soil moisture was reasonably good, but practically ceased in May of 1964, when rainfall was much below normal. Later in the summer of 1964 dieback occurred on two of

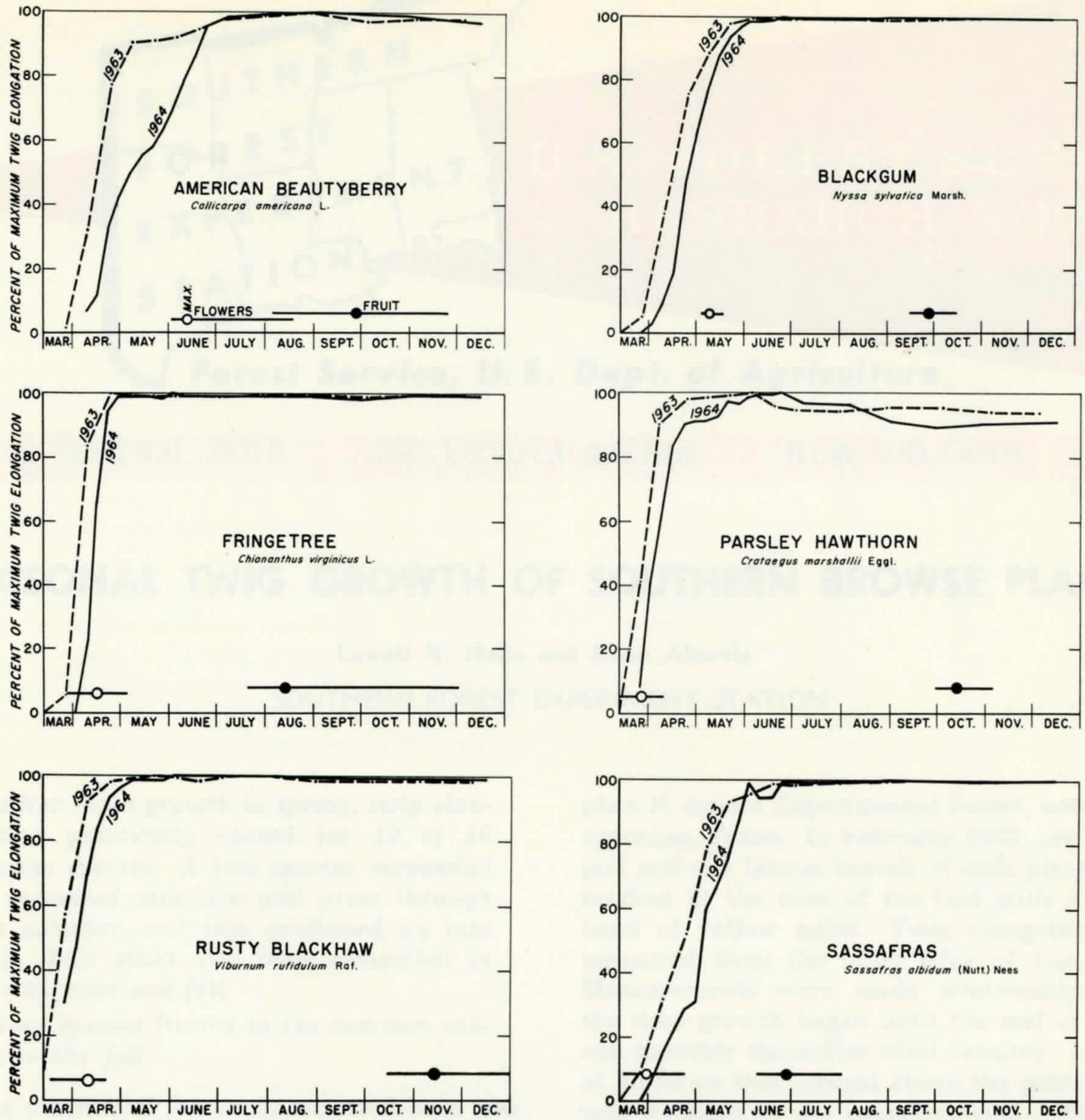

Figure 1.—*For several important species twig length remained essentially unchanged after the early flush had ended. Here, and in the following figures, horizontal lines show average period when flowers and fruit were on the plants, and circles indicate height of the season.*

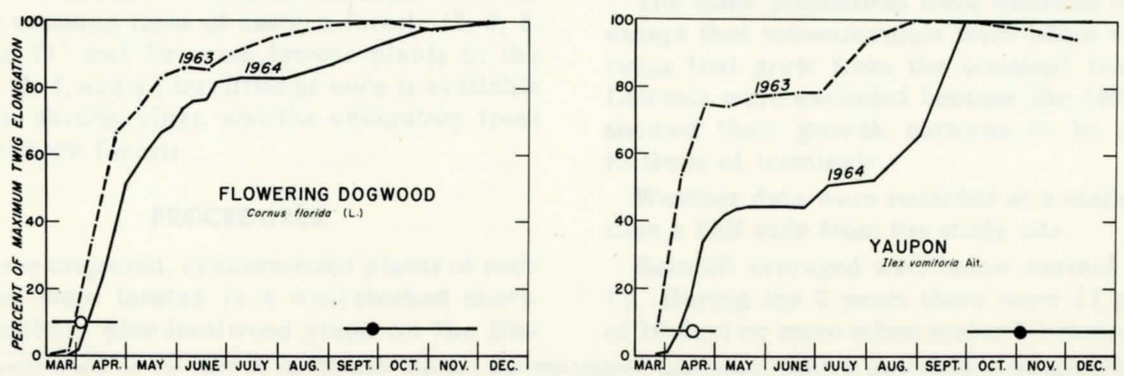

Figure 2.—*Twigs of dogwood and yaupon elongated rapidly in early spring but did not attain maximum length until early fall.*

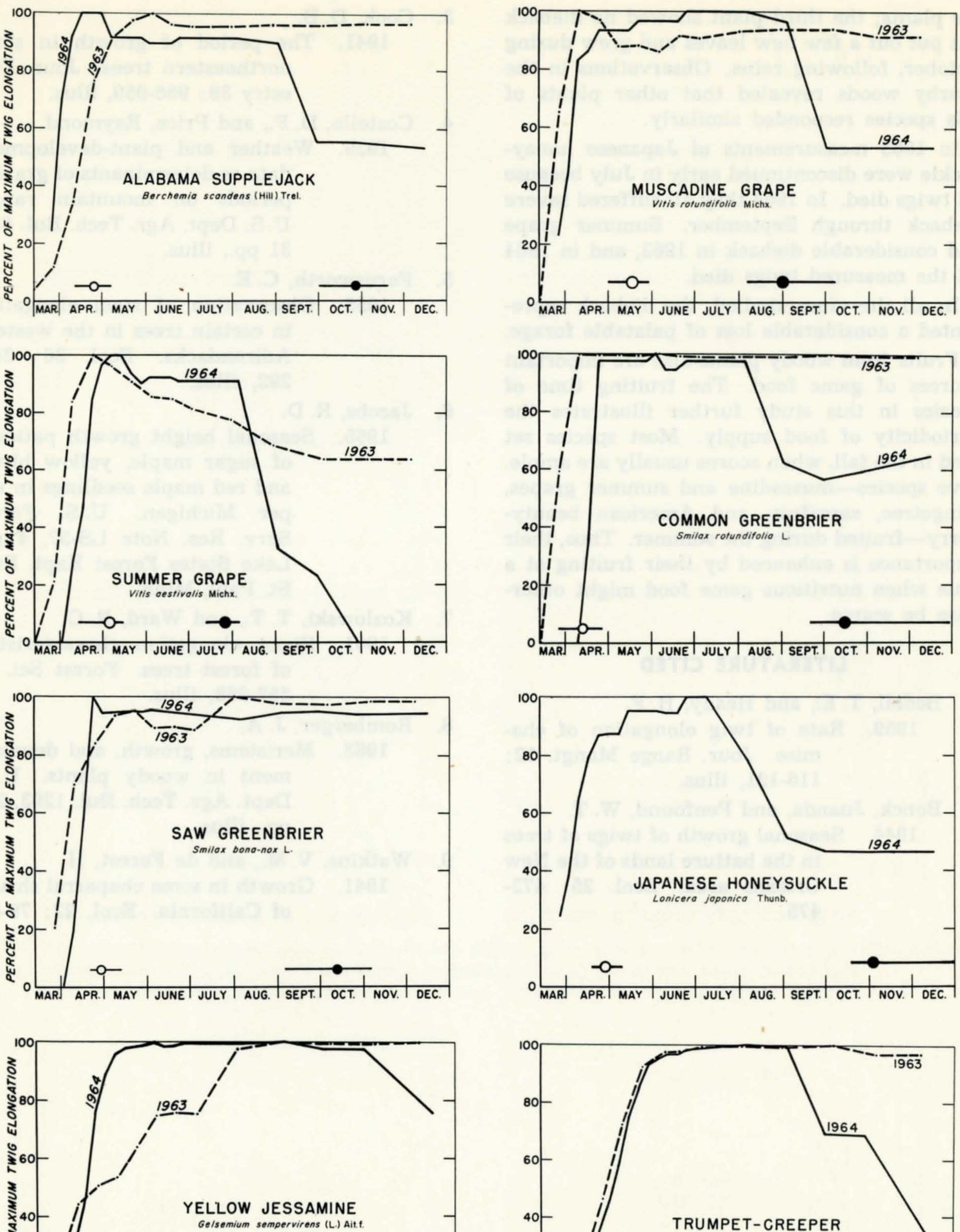

Figure 3.—*Vines grew rapidly in spring but frequently died back in summer and fall.*

the plants; the third plant showed no dieback but put out a few new leaves and grew during October, following rains. Observations in the nearby woods revealed that other plants of this species responded similarly.

In 1963 measurements of Japanese honeysuckle were discontinued early in July because all twigs died. In 1964 they all suffered severe dieback through September. Summer grape had considerable dieback in 1963, and in 1964 all the measured twigs died.

In all the vines studied, the dieback represented a considerable loss of palatable forage.

Fruits from woody plants also are important sources of game food. The fruiting time of species in this study further illustrates the periodicity of food supply. Most species set seed in the fall, when acorns usually are ample. Five species—muscadine and summer grapes, fringetree, sassafras, and American beautyberry—fruited during the summer. Thus, their importance is enhanced by their fruiting at a time when nutritious game food might otherwise be scarce.

LITERATURE CITED

1. Bedell, T. E., and Heady, H. F.
   1959. Rate of twig elongation of chamise. Jour. Range Mangt. 12: 116-121, illus.
2. Bonck, Juanda, and Penfound, W. T.
   1944. Seasonal growth of twigs of trees in the batture lands of the New Orleans area. Ecol. 25: 473-475.
3. Cook, D. B.
   1941. The period of growth in some northeastern trees. Jour. Forestry 39: 956-959, illus.
4. Costello, D. F., and Price, Raymond.
   1939. Weather and plant-development data as determinants of grazing periods on mountain range. U. S. Dept. Agr. Tech. Bul. 686, 31 pp., illus.
5. Farnsworth, C. E.
   1955. Observation of stem elongation in certain trees in the western Adirondacks. Ecol. 36: 285-292, illus.
6. Jacobs, R. D.
   1965. Seasonal height growth patterns of sugar maple, yellow birch, and red maple seedlings in upper Michigan. U. S. Forest Serv. Res. Note LS-57, 4 pp. Lake States Forest Expt. Sta., St. Paul, Minn.
7. Kozlowski, T. T., and Ward, R. C.
   1961. Shoot elongation characteristics of forest trees. Forest Sci. 7: 357-368, illus.
8. Romberger, J. A.
   1963. Meristems, growth, and development in woody plants. U. S. Dept. Agr. Tech. Bul. 1293, 214 pp., illus.
9. Watkins, V. M., and de Forest, H.
   1941. Growth in some chaparral shrubs of California. Ecol. 22: 79-83.