Quercus *laevis* Walt. **Turkey Oak**

Fagaceae Beech family

Richard F. Harlow

Turkey oak ***(Quercus laevis)***, also called Catesby oak or scrub oak, is a small, moderately fast to fast-growing tree found on dry sandy soils of ridges, pinelands, and dunes, often in pure stands. This oak is not commercially important because of its size, but the hard, close-grained wood is an excellent fuel. The acorns are an important food to wildlife. Turkey oak is so named for its 3-lobed leaves which resemble a turkey's foot.

Habitat

Native Range

Turkey oak (figs. 1, 2) is limited to the dry pinelands and sandy ridges of the southeastern Coastal Plain from southeast Virginia to central Florida and west to southeast Louisiana (14). It reaches its maximum development in a subtropical climate. This

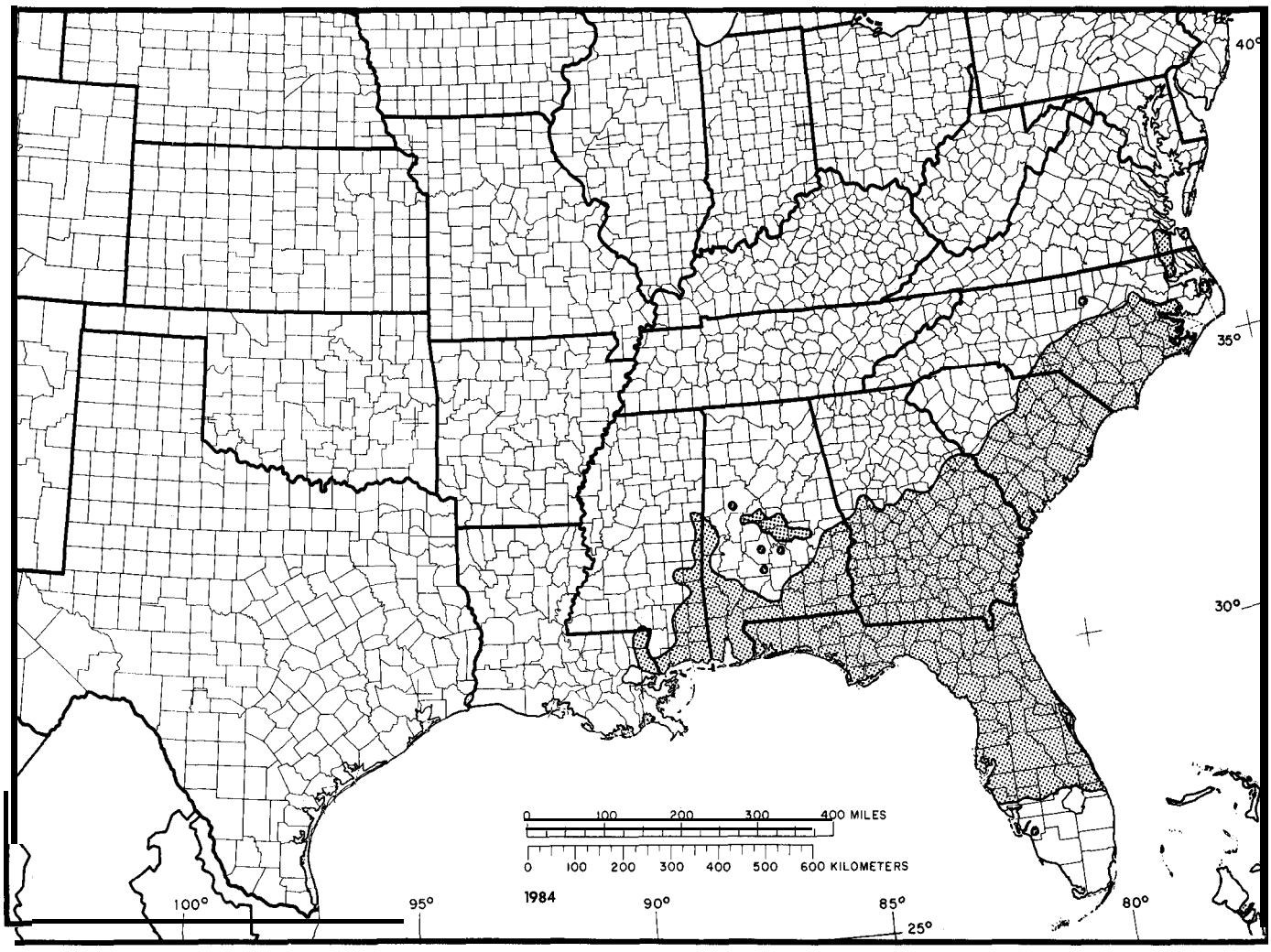

Figure *1-The native range of turkey oak.*

The author is Research Wildlife Biologist (retired), Southeastern Forest Experiment Station, Asheville, NC.

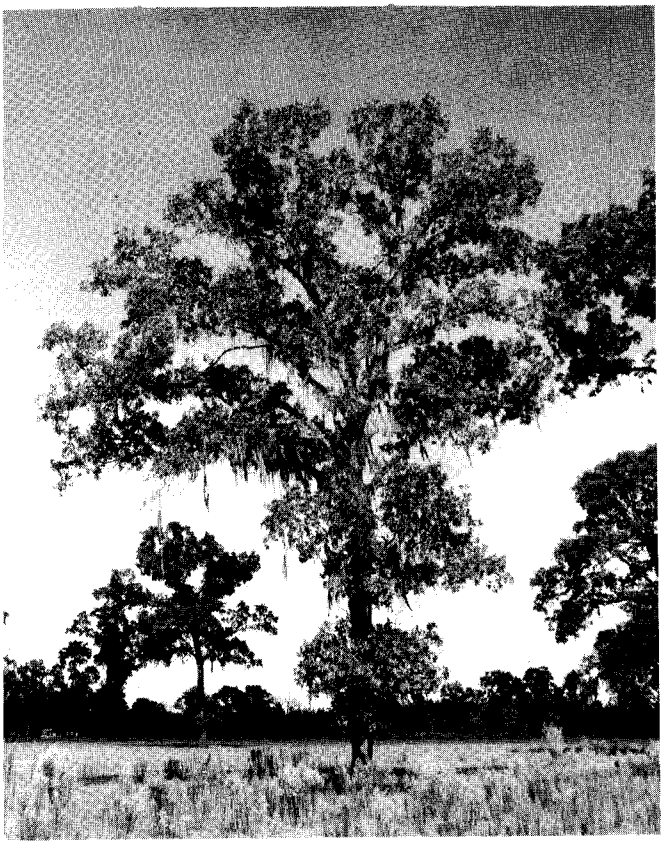

Figure 2—*Turkey oak.*

oak grows on approximately 3.5 to 4 million ha (9 to 10 million acres) of land in Florida alone (27).

Climate

Temperatures average 7" to 16" C (45" to 60" F) during January and 27" to 28" C (80° to 82" F) during July. Rainfall ranges from 1040 to 1780 mm/yr (41 to 70 in), averaging 1350 mm (53 in). Growing season precipitation ranges from 250 to 460 mm (10 to 18 in) during March, April, and May; 300 to 660 mm (12 to 26 in) during June, July, and August; and from 200 to 460 mm (8 to 18 in) during September, October, and November. The mean length of the frost-free period ranges between 270 and 330 days *(18).*

Soils and Topography

Turkey oak grows on dry pinelands and sandy ridges or high dunes. These hilly regions lie primarily in the central peninsula of Florida and the sandhills of the two Carolinas. Soils of these droughty sites are Entisols; they often lack clay-size particles within 3.0 m (10 ft) of the surface, are low in organic matter, and are strongly acid. Depth to water table is more than 152 cm (60 in) ***(18,211.***

Associated Forest Cover

Turkey oak is commonly associated with longleaf pine *(Pinus palustris)*, bluejack oak ***(Quercus incana)***, and sand (dwarf) post oak ***(Q. stellata*** var. ***margaretta).*** Depending on location it can also be associated with sand pine *(Pinus clausa)*, laurel oak ***(Quercus laurifolia),*** southern red oak ***(Q. falcata)***, live oak ***(Q. virginiana),*** blackjack oak ***(Q. marilandica)***, sand hickory ***(Carya pallida)***, mockernut hickory ***(C. tomentosa),*** and black cherry ***(Prunus serotina).*** Understory, depending on the part of the range considered, can include sassafras ***(Sassafras albidum)***, persimmon ***(Diospyros virginiana),*** pawpaw ***(Asimina*** spp.), dwarf huckleberry, deerberry, and tree sparkleberry *(Vaccinium* spp.), ***New*** Jersey tea ***(Ceanothus americanus),*** gopher-apple ***(Geobalanus oblongifolius)***, blackberry *(Rubus* spp.), crooked wood ***(Lyonia*** spp.), scrub hickory ***(Carya floridana)***, myrtle oak ***(Quercus myrtifolia)***, Chapman oak ***(Q. chapmanii),*** sand live oak ***(Q. virginiana*** var. ***geminata),*** and poison-sumac ***(Toxicodendron vernix)***. Common ground cover plants include wiregrass ***(Aristida*** spp.), bracken ***(Pteridium aquilinum), Heterotheca*** spp., and legumes *(10,21,24).*

Three forest cover types include turkey oak *(6)*—Longleaf Pine-Scrub Oak (Society of American Foresters Type 71), Southern Scrub Oak (Type 72), and Sand Pine (Type 69).

Life History

Reproduction and Early Growth

Flowering and Fruiting-Turkey oak is monoecious; staminate flowers are borne in naked aments and pistillate flowers in flowered spikes on the same tree (23). The flowers appear in April or late spring. The fruit (a nut, called an acorn) requires 2 years to mature *(25).*

Seed Production and Dissemination-In central Florida, turkey oak seed production was sampled on 40 trees over a 7-year period *(10).* The trees failed to produce fruit only 1 year. Average fruit production, based on an average weight per fallen acorn of 2.55 g (0.09 oz) and an average stand density of 178 trees per hectare (72/acre), was 150 ± 27 kg/ha (134 ± 24 lb/acre). Production ranged from a high of 312 ± 76 kg/ha (278 ± 68 lb/acre) to a low of 24 ± 8 kg/ha (21 ± 7 lb/acre).

Acorn production for two turkey oak stands and 10 open-grown trees was studied at Georgetown, SC *(8).*

Average annual acorn production for open-grown trees, 13 cm (5 in) in d.b.h. and larger, was 0.18 to 0.54 kg (0.4 to 1.2 lb) per tree and 0.05 to 0.23 kg (0.1 to 0.5 lb) per tree for those of similar size growing under stand conditions. Average weight of green, fresh acorns varied from 4.6 to 6.0 g (0.16 to 0.21 oz). Variation in acorn crops occurred annually between stands and individual trees.

Stand density has a minimum influence on acorn production of individual trees. A mature, unthinned stand of 370 trees per hectare (150/acre) may be thinned up to 50 percent without significantly reducing acorn production when the best producers are left in the stand *(10)*.

The heavy fruits do not roll far from their source. Small animals do not help their dissemination to any marked degree; instead they prevent dispersion by eating the fruits. Rodents are the worst offenders *(21)*.

Seedling Development-Based on two samples, average germinative capacity was 82 percent after a cold stratification period of 60 to 90 days (21). Seeds were placed in medium sand with a day temperature equal to 27" C (81° F) and a night temperature of 23" C (73" F). For one sample, cleaned seeds per kilogram totaled 871 (395/lb) *(23)*.

In the sandhills, acorns are subjected to great extremes of temperature if they are not buried under litter. If conditions are favorable, germination takes place the following spring. Germination is hypogeal. Studies of dormancy and afterripening indicated that turkey oak acorns required an outdoor afterripening of only 2 months. This may make it possible for them to become established during the very early spring before they are faced with the summer heat and high temperature.

Vegetative Reproduction-Oak root collars sprout freely. Fire kills the aboveground stem but stumps sprout vigorously, resulting in an increased number of stems (25).

Sapling and Pole Stages to Maturity

Growth and Yield-Turkey oak is a moderately fast to fast-growing tree with a relatively short life span. It grows to a height of 6 to 15 m (20 to 50 ft), rarely to 20 m (65 ft) *(5)*. The largest turkey oak on record, growing near Branford, FL, measured 25 m (83 ft) in height, with a d.b.h. of 66 cm (25.8 in), and a crown spread of 20 m (67 ft) *(19)*. In northwest Florida, the density of turkey oak in a stand of large hardwoods, 9 cm (3.5 in) in d.b.h. or larger, ranged from 7,351 to 7,467 stems/ha (2,975 to 3,022 stems/acre), while in another stand of small hardwoods, 9 cm (3.5 in) in d.b.h. or smaller, density ranged from 8,107 to 8,261 stems/ha (3,281 to 3,343/acre). Turkey oak accounted for 75 percent of the hardwood stems in the stand of large hardwoods and 72 percent in the stand of smaller hardwoods *(2)*.

The relative abundance of noncommercial species in 57 study plots located in the sandhills of northwest Florida, based on stems per hectare (acre), was as follows: turkey oak, 4,584 (1,855) or 47 percent of the total; sand post oak, 1,735 (702); bluejack oak, 1,527 (618); saw-palmetto *(Serenoa repens)*, 1,273 (515); and persimmon, 566 (299) *(4)*.

A volume table (table 1) was developed from data on turkey oaks growing on a deep sand ridge in Putnam County, FL *(7)*. Measurements of 20 mature turkey oaks growing on the Ocala National Forest in central Florida, averaging 38.9 years in age and ranging from 24 to 49 years, was as follows *(10)*:

Item	Average	Range
Age, yr	39.9	24 to 49
Height, m	10.3	7.6 to 12.5
D.b.h., cm	18.5	15.7 to 24.6
Radial wood growth for 10 years, cm	2.3	1.4 to 5.1
Ground area covered by crown, m^2	21.55	7.6 to 36.9
Height, ft	33.9	25 to 41
D.b.h., in	7.3	6.2 to 9.7
Radial wood growth for 10 years, in	0.92	0.56 to 2.02
Ground area covered by crown, ft^2	232	82 to 397

Table l-Merchantable volume for turkey oak (adapted from *7*)[1]

D.b.h.	Total height 5.0 m or 16 ft	10.0 m or 33 ft	15.0 m or 49 ft	20.0 m or 66 ft
cm		m^3		
10	—	0.02	0.05	0.09
14	0.02	0.06	0.10	0.13
18	0.08	0.12	0.18	0.19
22	0.16	0.19	0.23	0.26
26	0.25	0.28	0.32	0.35
30	0.35	0.39	0.42	0.46
34	0.47	0.51	0.54	0.58
38	0.60	0.64	0.67	0.71
in		ft^3		
3.9	—	0.6	1.8	3.0
5.5	0.9	2.1	3.4	4.6
7.1	3.0	4.2	5.5	6.7
8.7	5.6	6.9	8.1	9.3
10.2	8.8	10.0	11.2	12.5
11.8	12.4	13.7	14.9	16.2
13.4	16.6	17.9	19.1	20.4
15.0	21.3	22.6	23.8	25.0

[1]The table was constructed from the regression: merchantable volume in ft^3 = 0.1057 $(d.b.h.)^2$ $^{0.757}$ (total height) = 3.57. Standard error of the estimate = $^{2}1.00$ ft^3. Each volume represents the merchantable portion of the stem from a 0.3 m (1 .O ft) stump to the top of the last 1.2 m (4.1 ft) section with a minimum diameter outside bark of 10.2 cm (4.0 in).

Rooting Habit-Initially, the young turkey oak seedling develops a long taproot. As the seedling grows, the root system develops much more extensively in comparison with the aboveground stem. This well-developed root system provides the plant with a greater absorbing surface for possible contact with minerals and remote supplies of water as the surface sand dries out. Roots from separate trees will graft together *(21,22)*.

Reaction to Competition-The effects of logging are favorable to turkey oak which is classed as intolerant of shade. Fire favors the dominance of more fire-resistant pine. Where fire is an almost yearly occurrence, the herbaceous understory does not become thick enough to support fire of sufficient severity to seriously retard turkey oak. When the understory has accumulated for 3 to 4 years it will carry fire hot enough to kill even large turkey oaks *(13)*.

Establishment of pine plantations on the sandhills of northeast Florida necessitates almost complete removal of oaks and grass that compete for soil moisture on these dry sites *(3,4)*.

The following characteristics of turkey oaks have contributed to their predominance on sandhill sites: short afterripening period of the acorns with subsequent germination before adverse conditions of summer; vertical leaf orientation, a phototropic response, which may act as a protective mechanism against intense light and high temperature; and development of a deep, extensive root system in seedlings *(21)*.

Damaging Agents--Turkey oak was found to be susceptible to oak wilt ***(Ceratocystis fagacearum)*** in north-central South Carolina (26). In central Florida curculionid weevils *(Curculio* spp.) were found in 81.2 percent of the acorn crop from 40 turkey oak trees in 1960 and in 36.2 percent of the crop from the same trees in 1962 *(10)*.

Special Uses

The seasoned wood of turkey oak is excellent fuel and widely used as a firewood. The bark and twigs contain valuable materials for tanning leather. The light-brown to light reddish-brown wood is close-grained, hard, and heavy, but the trees do not grow large enough, on the average, to have timber value *(5,16,23,24)*.

Turkey oak acorns have been identified as a major food source for black bear, white-tailed deer, northern bobwhite, and wild turkey in Florida *(9,11,17,20)*. Site preparation decreased game-food plants by virtually eliminating the scrub oak and the acorns and browse they produce, and, except for the first few years after chopping, substituted no food plants of comparable value *(12)*. In longleaf pine-turkey oak habitat in central Florida, complete removal of all turkey oaks on 259-ha (1-mi^2) plots caused a pronounced reduction in deer use, especially during the fall *(1)*.

Genetics

Turkey oak hybridizing with southern red, bluejack, laurel, and water ***(Q. nigra)*** oaks results in the following hybrids *(15)*: ***Quercus falcata (Q. x blufftonensis*** Trel.), ***Q. incana (Q. x asheana*** Little), ***Q. laurifolia (Q. x mellichamp*** Trel.), and ***Q. nigra (Q. x walteriana*** Ashe).

Literature Cited

1. Beckwith, S. L. 1967. Effect of site preparation on wildlife and vegetation in the sandhills of central Florida. *In* Proceedings, Eighteenth Annual Conference Southeastern Association Game and Fish Commissioners, October 1964, Clearwater, FL. p. 3946.
2. Burns, R. M., and R. D. McReynolds. 1973. Heavy vs. medium choppers for preparing sandhill sites for pine. Tree Planters' Notes 24(3):34–37.
3. Burns, R. M., and R. D. McReynolds. 1972. Scheduling and intensity of site preparation for pine in west Florida sandhills. Journal of Forestry 70(12):737–740.
4. Dumbroff, E. B. 1960. Aerial foliage sprays fail to eradicate scrub oaks on Florida sandhills. Journal of Forestry 58(5):397–398.
5. Elias, Thomas S. 1980. The complete trees of North America: field guide and natural history. Outdoor Life/Nature Books. Van Nostrand Reinhold, New York. 948 p.
6. Eyre, F. H., ed. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, DC. 148 p.
7. Frazier, P. W., and R. L. Barnes. 1955. Cubic foot volume table for turkey oak ***(Quercus laevis*** Walt.). School of Forestry Research Notes 2. University of Florida, Gainesville. 1 p.
8. Goebel, N. B. 1973. Acorn production and periodicity for selected oak species. *In* 1973 Annual Report, The Belle W. Baruch Research Institute. p. 49. Clemson University, Clemson, SC.
9. Harlow, R. F. 1961. Characteristics and status of the Florida black bear. *In* Transactions, Twenty-sixth North American Wildlife and Natural Resources Conference. p. 481-495.
10. Harlow, R. F., and R. L. Eikum. 1965. The effect of stand density on the acorn production of turkey oaks. *In* Proceedings, Seventeenth Annual Conference Southeastern Association Game and Fish Commissioners, September 1963, Hot Springs, AR. p. 126-133.
11. Harlow, R. F., and F. K. Jones. 1965. The white-tailed deer in Florida. Florida Game and Fresh Water Fish Commission, Technical Bulletin 9. Tallahassee, FL. 240 p.

12. Hebb, E. A. 1971. Site preparation decreases game food plants in Florida sandhills. Journal of Wildlife Management 35 (1):155–162.
13. Laessle, A. M. 1942. The plant communities of the Welaka Area. University of Florida Biological Science Series, vol. 4, no. 1. Gainesville. 143 p.
14. Little, E. L., Jr. 1976. Atlas of United States trees. vol. 4. Minor eastern hardwoods. U.S. Department of Agriculture, Miscellaneous Publication 1342. Washington, DC. 17 p., 230 maps.
15. Little, E. L., Jr. 1979. Checklist of United States trees (native and naturalized). U.S. Department of Agriculture, Agriculture Handbook 541. Washington, DC. 375 p.
16. Mattoon, W. R. 1967. Forest trees of Florida: how to know them. 9th ed. Florida Forestry Service, Tallahassee. 94 p.
17. Murray, R. W., and 0. E. Frye, Jr. 1957. The bobwhite quail and its management in Florida. Florida Game and Fresh Water Fish Commission, Game Publication 2. Tallahassee. 56 p.
18. Nelson, T. C., and W. M. Zillgitt. 1969. A forest atlas of the South. USDA Forest Service, Southern and Southeastern Forest Experiment Stations, New Orleans, LA, and Asheville, NC. 27 p.
19. Pardo, R. 1978. National register of big trees. American Forests 84(4):17–45.
20. Powell, J. A. 1965. The Florida wild turkey. Florida Game and Fresh Water Fish Commission, Technical Bulletin 8. Tallahassee. 28 p.
21. Raff, P. J. 1953. Aspects of the ecological life history of turkey oak (*Quercus laevis* Walter). Thesis (M.A.), Duke University, Durham, NC. Unpaged.
22. Snedaker, S. C., and A. E. Lugo. 1969. Ecology of the Ocala National Forest. USDA Forest Service, Southern Region 24, Atlanta, GA. 271 p.
23. U.S. Department of Agriculture, Forest Service. 1974. Seeds of woody plants in the United States. C. S. Schopmeyer, tech. coord. U.S. Department of Agriculture, Agriculture Handbook 450. Washington, DC. 883 p.
24. West, E. 1948. The oaks of Florida. Journal of New York Botanical Gardens 49 (588):273–283.
25. West, E., and L. E. Arnold. 1952. The native trees of Florida. University of Florida Press, Gainesville. 212 p.
26. Witcher, W. 1969. Oak wilt in South Carolina. Plant Disease Reporter 53(11):843–920.
27. Woods, F. W. 1959. Converting scrub oak sandhills to pine forests in Florida. Journal of Forestry 57(2):117–119.