Quercus *michauxii* Nutt. Swamp Chestnut Oak

Fagaceae Beech family

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Swamp chestnut oak *(Quercus michauxii)* is known also as basket oak, for the baskets made from its wood, and cow oak because cows eat the acorns. One of the important timber trees of the South, it grows on moist and wet loamy soils of bottom lands, along streams and borders of swamps in mixed hardwoods. The high quality wood is used in all kinds of construction and for implements. The acorns are sweet and serve as food to wildlife.

Habitat

Native Range

Swamp chestnut oak (figs. 1, 2) extends along the Atlantic Coastal Plain from New Jersey and extreme eastern Pennsylvania, south to north Florida, and west to east Texas; it is found north in the Mississippi River Valley to extreme southeast Oklahoma,

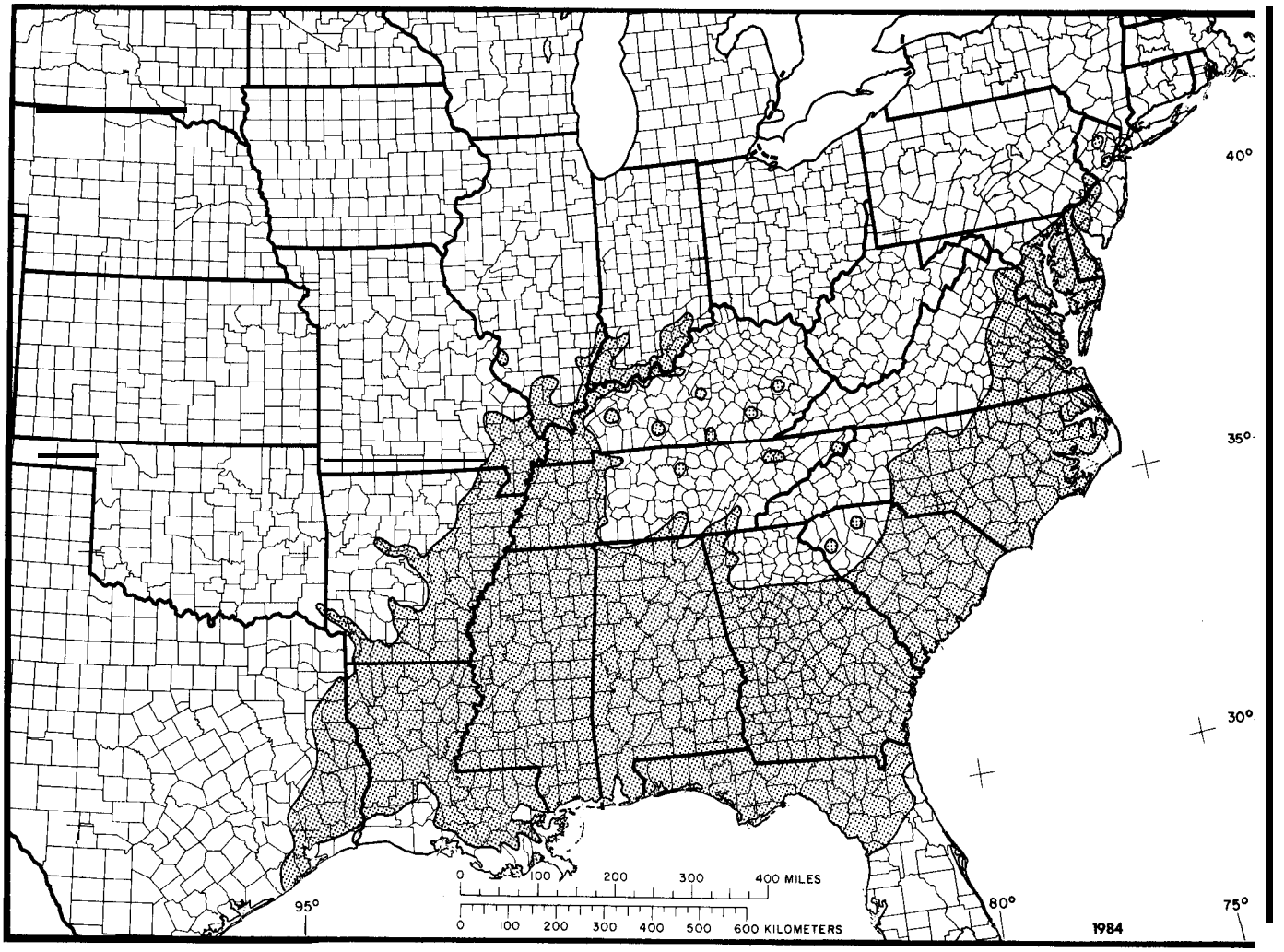

Figure *l-The native range of swamp chestnut oak.*

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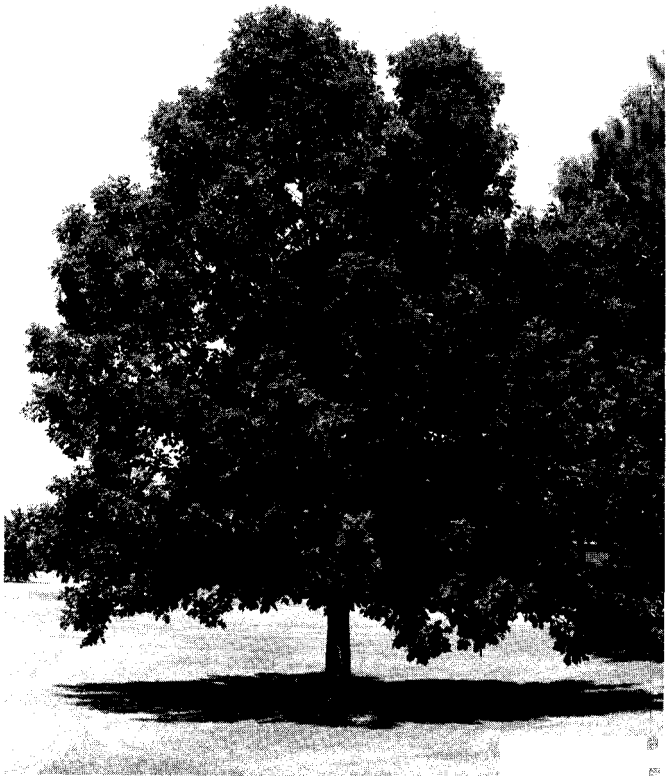

Figure *2-Swamp chestnut oak.*

Arkansas, southeastern Missouri, southern Illinois, southern Indiana, and locally to southeast Kentucky and eastern Tennessee (6).

Climate

Swamp chestnut oak grows in a humid, temperate climate characterized by hot summers, mild and short winters, and no distinct dry season. The growing season usually averages from 200 to 250 days through the main section of its commercial range. Average annual temperature ranges from 16" to 21" C (60" to 70" F) with an average annual precipitation of 1270 to 1520 mm (50 to 60 in). The average annual maximum temperature is 38" C (100° F) and the average annual minimum is about -9" C (15" F). Approximately 50 percent of the rainfall occurs from April to September. The average noonday relative humidity is about 60 percent in mid-July.

Soils and Topography

The species is distributed widely on the best well-drained loamy first-bottom ridges but is principally found on well-drained silty clay and loamy terraces and colluvial sites in the bottom lands of large and small streams. Bayboro clay loam is representative of the edaphic condition that promotes the best growth of swamp chestnut oak in coastal South Carolina (4). These soils are found in the orders Alfisols and Inceptisols.

Associated Forest Cover

Swamp chestnut oak is found in the forest cover type Swamp Chestnut Oak-Cherrybark Oak (Society of American Foresters Type 91), which varies widely in composition (2). Often swamp chestnut oak and cherrybark oak *(Quercus falcata* var. *pagodifolia)* make up a majority of the stocking although if many species are in the mixture, they may account for only a plurality, Other hardwoods are white ash *(Fraxinus americana),* shagbark *(Carya ovata),* shellbark *(C. Zaciniosa),* mockernut *(C. tomentosa),* and bitternut *(C. cordiformis)* hickory Chief associates are white oak *(Quercus alba),* Delta post oak *(Q. stellata* var. *paludosa),* Shumard oak *(Q. shumardii),* and blackgum *(Nyssa sylvatica).* Occasionally, sweetgum *(Liquidambar styraciflua)* is important on first-bottom ridges. Minor associates include willow oak *(Quercus phellos),* southern red oak *(Q. falcata* var. *falcata),* post oak *(Q. stellata),* American elm *(Ulmus americana),* winged elm *(U. alata),* southern magnolia *(Magnolia grandiflora),* yellow-poplar *(Liriodendron tulipifera),* American beech *(Fagus grandifolia),* loblolly pine *(Pinus taeda),* and spruce pine *(P. glabra).*

Among the noncommercial trees or plant associates are devils-walkingstick *(Aralia spinosa),* painted buckeye *(Aesculus sylvatica),* pawpaw *(Asimina triloba),* American hornbeam *(Carpinus caroliniana),* swamp dogwood *(Cornus stricta),* dwarf palmetto *(Sabal minor),* Coastal Plain willow *(Salix caroliniana),* American snowbell *(Styrax americanus),* southern arrowwood *(Viburnum dentatum),* and possumhaw viburnum *(V. nudum).*

Life History

Reproduction and Early Growth

Flowering and Fruiting-Flowers of swamp chestnut oak appear about the same time as the leaves, from April to May. Swamp chestnut oak is monoecious. The fruit or acorn is nearly sessile and may be solitary or paired. Its cup is broad based and covers about one-third of the acorn. Scales on the cup are free to the base and are pubescent. Its dimensions are 1.9 to 3.2 cm (0.75 to 1.25 in) wide by 2.5

to 3.8 cm (1 to 1.5 in) long. The acorns ripen and fall during September and October.

Seed Production and Dissemination-Trees begin to produce seed at about age 20 to 25 and attain their optimum production around age 40. Good seed crops can be expected every 3 to 5 years with poor to fair production the balance of the time. There are about 187 cleaned seeds per kilogram (85/lb), with a range of 77 to 430 (35 to 195) (7). The acorn is very palatable and is eaten by white-tailed deer, wild hogs, and squirrels. Squirrels are perhaps the most helpful animals in disseminating the acorns because they hoard far more than they can actually eat.

Seedling Development-Animal activity greatly inhibits regeneration of swamp chestnut oak from seed. Germination, which is hypogeal, usually starts soon after seedfall, with little or no period of dormancy. A moist, well-drained loam, covered with a light litter layer, provides an excellent seedbed. First-year height growth is related to soil type and drainage. Second-year growth is only related to soil type. This suggests that the species is site sensitive (4).

The stem of the l-year-old seedling is generally smooth but is covered near the terminal bud with hairs. At first it is reddish brown but becomes gray after the first year, especially at the base. Small, round, inconspicuous lenticels are found on the upper stem. The terminal bud is about 6 mm (0.25 in) long and light brown. The lateral buds are of the same color but are only about 3 mm (0.125 in) long. A cluster of lateral buds around the terminal bud is common.

Vegetative Reproduction-Swamp chestnut oak sprouts, though not prolifically, from roots and stumps.

Sapling and Pole Stages to Maturity

Growth and Yield-Swamp chestnut oak is a medium-size tree and may attain a height of 30.5 m (100 ft) at maturity on better sites. Heights of 18 to 24 m (60 to 80 ft) with trunk diameters of 61 to 91 cm (24 to 36 in) are normal for average sites. The trunk is often free of branches for 15 to 18 m (50 to 60 ft). Stout branches ascend at sharp angles to form a very strong crown. Volume of growing stock on commercial forest land in north Georgia for all diameter classes was 5.97 million m^3 (211 million ft^3). It has also been reported that where swamp chestnut grows with other hardwoods, a total volume in excess of 112 m^3/ha (8,000 fbm/acre) is classed as a heavy sawtimber stand. A heavy pole stand is considered to have more than 432 stems/ha (175 stems/acre) ranging from 13 to 28 cm (5 to 21 in) in diameter at breast height.

Rooting Habit-No information is currently available.

Reaction to Competition-Swamp chestnut oak is classed as intolerant of shade and requires openings for establishment. It normally receives heavy competition from vines, annuals, and brush that are common to most bottom-land hardwood sites. It is reported that when mature, however, this species retards the growth of understory vegetation, probably due to an allelopathic effect *(5)*.

Damaging Agents-Numerous fungi and insects damage swamp chestnut oak. The fungi include wood-decaying species of ***Fomes, Polyporus,*** and ***Stereum.*** Oak leaf blister ***(Taphrina*** *caerulescens)* is sporadic in occurrence, as is oak anthracnose *(Gnomonia* ***veneta) (3).***

Swamp chestnut oak acorns are attacked by weevils such as ***Curculio pardalis, Conotrachelus naso,*** and ***C. posticatus,*** which consume the seed. Insect defoliators that attack the swamp chestnut are June beetles ***(Phyllophaga*** spp.), orangestriped oakworm *(Anisota* ***senatoria),*** fall cankerworm *(Alsophila* ***pometaria),*** spring cankerworm ***(Paleacrita vernata),*** forest tent caterpillar ***(Malacosoma*** *disstria),* yellownecked caterpillar *(Datana* ***ministra),*** variable oakleaf caterpillar ***(Heterocampa manteo),*** and the redhumped oakworm ***(Symmerista canicosta).***

Borers that attack healthy trees are the red oak borer ***(Enaphalodes*** *rufulus)* in cambium and outer sapwood; carpenterworms ***(Prionoxystus*** spp.), in heartwood and sapwood; and the Columbian timber beetle *(Corthylus* ***columbianus),*** in the sapwood. Those attacking weakened trees include the twolined chestnut borer *(Agrilus* ***bilineatus),*** in cambium; and the tilehorned prionus ***(Prionus imbricornis),*** in roots. Dying trees are attacked by the oak timberworm ***(Arrhenodes minutus) (1).***

The golden oak scale ***(Asterolecanium variolosum)*** kills reproduction and tops in older trees. The gouty oak gall ***(Callirhytis quercuspunctata)*** and horned oak gall *(C.* ***cornigera)*** injure small limbs, while the basswood leafminer ***(Baliosus*** *ruber)* attacks the leaves.

Special Uses

Wood from swamp chestnut oak is commercially useful for lumber in all kinds of construction, for

agricultural implements, cooperage, fenceposts, baskets, and fuel.

Acorns from swamp chestnut oak serve as mast for various species of birds and mammals.

Genetics

Swamp chestnut oak hybridizes with ***Quercus alba*** (*Q. x beadlei* Trel. ex Palmer); Q. ***lyrata*** (*Q. x tottenii* Melvin); and Q. ***mucrocurpu*** (*Q. x byarsii* Sudw.) (6).

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