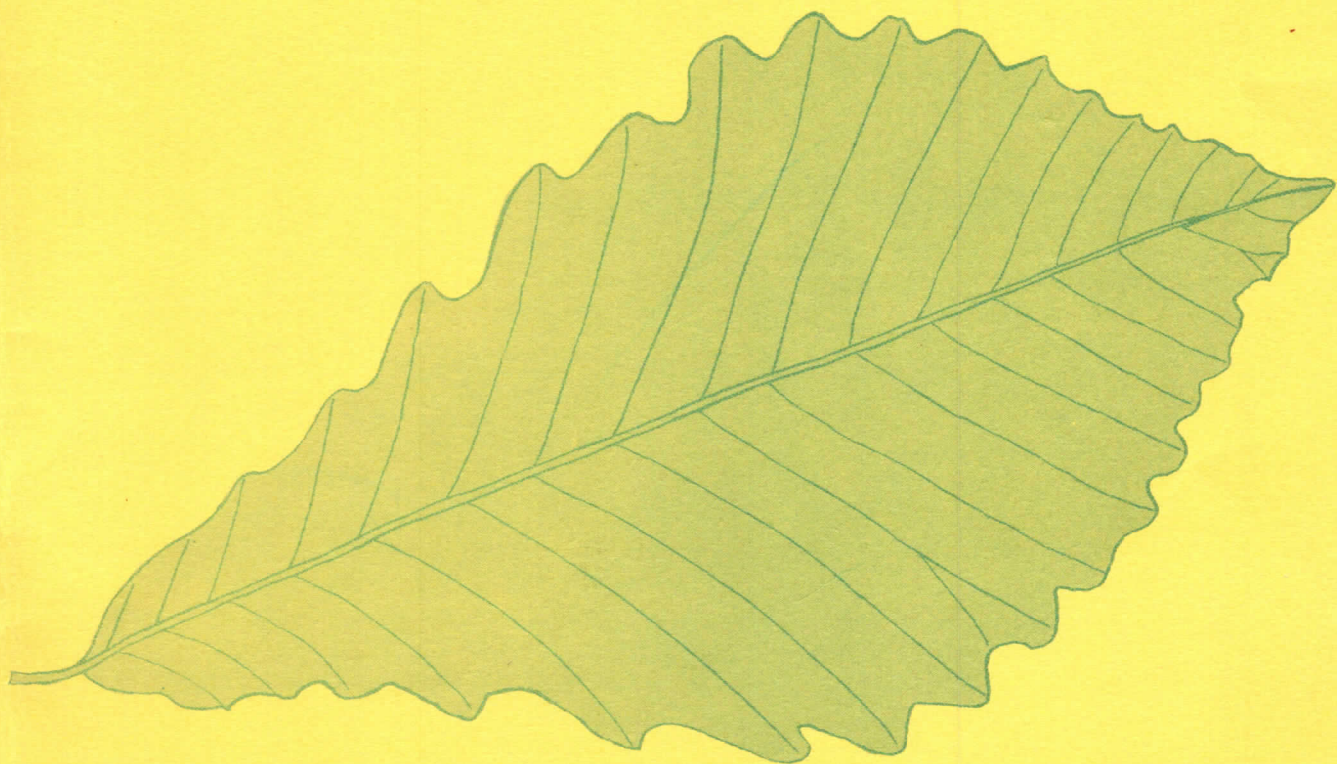
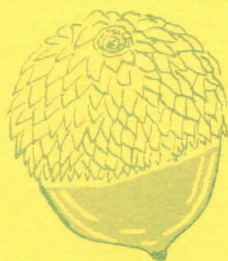
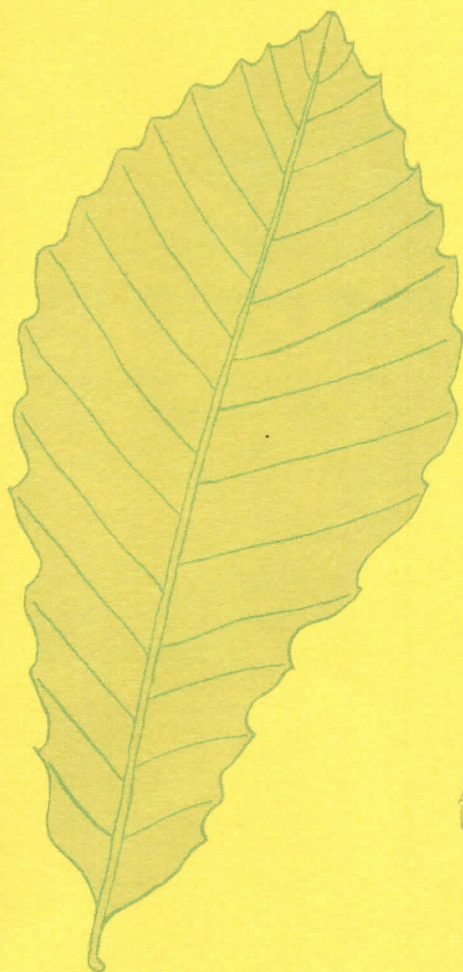


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Silvical Characteristics of Swamp Chestnut Oak

(Quercus michauxii Nutt.)

by

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Swamp chestnut oak, also known as cow oak or basket oak, is found along the Atlantic Coastal Plain from New Jersey south to central Florida and eastern Texas, and north in the Mississippi Valley to southeastern Missouri, central Illinois, southwestern Ohio, and eastern Kentucky (5) (fig. 1).

HABITAT CONDITIONS

CLIMATIC

Swamp chestnut oak grows in a humid temperate climate characterized by hot summers, mild and short winters, and no distinct dry season (9). Through the main part of the tree's commercial range, the growing season averages from 200 to 250 days, with an average annual temperature from 60° to 70° F. and an average annual precipitation from 50 to 60 inches. Within this same area the average annual maximum temperature is about 100° F. and the average annual minimum approximates 15° F. About half the rainfall occurs during the period of April to September. The average noonday relative humidity in mid-July is about 60 percent (10).

EDAPHIC AND PHYSIOGRAPHIC

The species is widely distributed on the best well-drained loamy first bottom ridges, but it is principally found on well-drained silty clay and loamy terraces and colluvial sites in the bottomlands of both large and small streams (6).

BIOTIC

Swamp chestnut oak is included in the swamp chestnut-cherrybark oak type, which varies widely in composition (8). Often swamp chestnut oak and cherrybark oak (Quercus falcata var. pagodaefolia) are only indicator species, although they may be the most abundant of the oaks which are predominant. Other prominent hardwoods are white ash (Fraxinus americana), shagbark hickory (Carya ovata), shellbark hickory (Carya laciniosa), mockernut hickory (Carya tomentosa), and bitternut hickory (Carya cordiformis). Chief

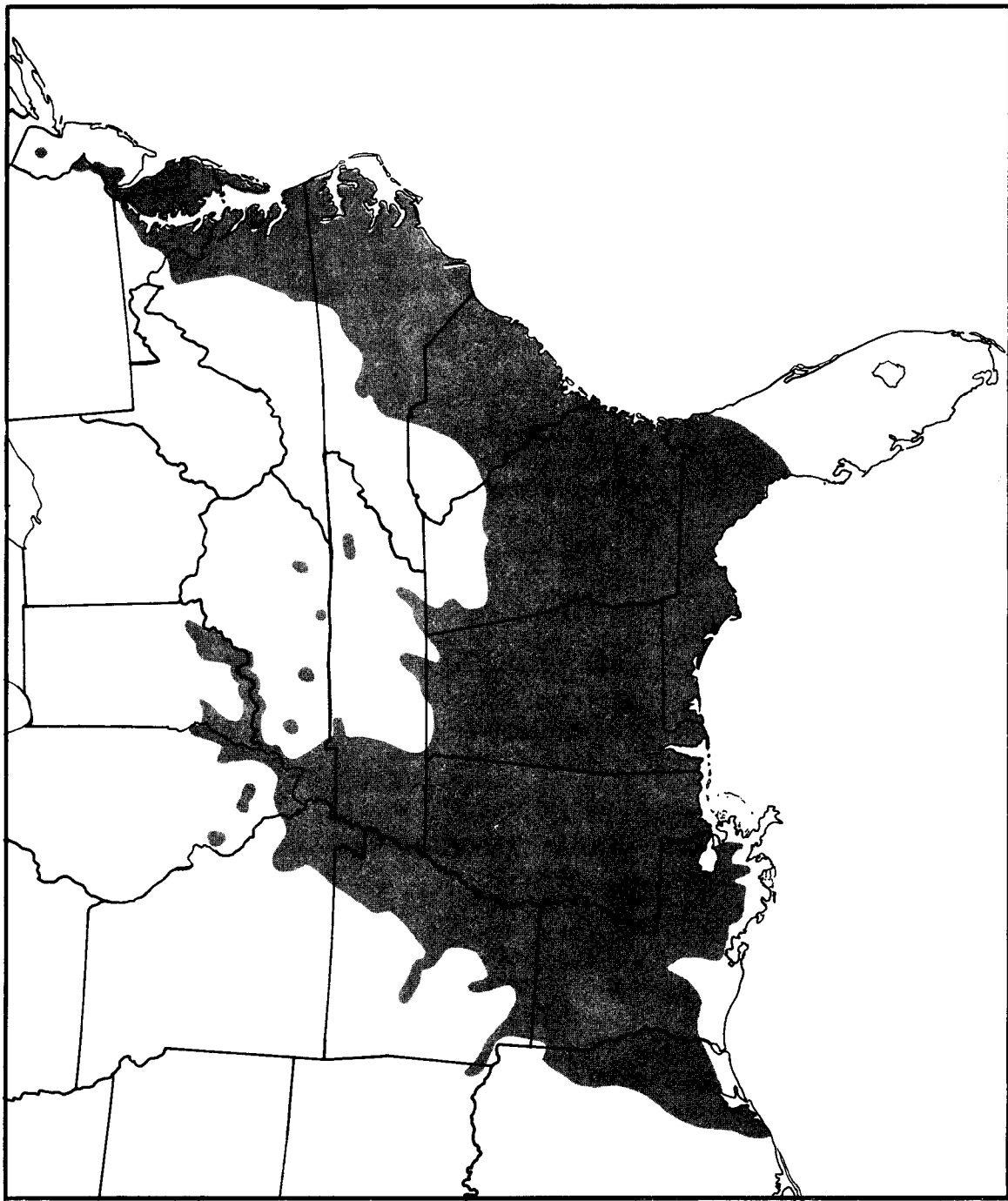


Figure 1. --Botanical range of swamp chestnut oak.

associates are white oak (Quercus alba), (fig. 2), Delta post oak (Quercus stellata var. mississippiensis), Shumard oak (Quercus shumardii), and blackgum (Nyssa sylvatica). Occasionally sweetgum (Liquidambar styraciflua) is important on first bottom ridges. Minor associates include willow oak (Quercus phellos), water oak (Quercus nigra), southern red oak (Quercus falcata), post oak (Quercus stellata), American elm (Ulmus americana), winged elm (Ulmus alata), swamp hickory (Carya leiodermis), nutmeg hickory (Carya myristicaeformis), southern magnolia (Magnolia grandiflora), yellow-poplar (Liriodendron tulipifera), American beech (Fagus grandifolia), sassafras (Sassafras albidum), loblolly pine (Pinus taeda), and spruce pine (Pinus glabra).

Among the non-commercial trees or plant associates are devils-walking-stick (Aralia spinosa), painted buckeye (Aesculus sylvatica), pawpaw (Asimina triloba), American hornbeam (Carpinus caroliniana), stiff cornel dogwood (Cornus foemina), dwarf palmetto (Sabal minor), Coastal Plain willow (Salix caroliniana), snowbell (Styrax americana), arrowwood (Viburnum dentatum) and possumhaw (Viburnum nudum) (4).

LIFE HISTORY

SEEDING HABITS

Flowering and fruiting. --The tree's flowers are unisexual, appearing with the leaves (mostly April to May), the staminate in slender hairy catkins 2 to 3 inches long, the pistillate in short-stalked, few flowered spikes (3).

The fruit is an acorn, a solitary or paired nearly sessile nut $\frac{3}{4}$ to $1\frac{1}{4}$ inches wide and 1 to $1\frac{1}{2}$ inches long, and a lustrous brown; the cup is thick, bowl-shaped, with wedge-shaped scales, enclosing up to one-third of the nut (3) (fig. 3). Ripening occurs from September to October of the first year and seedfall is during this period (11). Damage from nut weevils is heavy in many localities, at least in poor to fair seed years. Curculio pardalis, Curculio rectus, Conotrachelus naso, and Conotrachelus posticatus are among the weevils attacking swamp chestnut oak acorns. Blemishes on the acorn shell, ranging in size from a pin point to large blotches, usually indicate the presence of weevil activity.

Seed production and dissemination. --Seed bearing begins when trees are about 25 years of age, with optimum production commencing at about 40 years. Good crops occur at intervals of 3 to 5 years, with poor to fair production in between. A freeze in April after flower buds opened resulted in a complete crop failure in the Carolinas in 1955. Cleaned seed will range from 55 to 195 acorns per pound, averaging about 100 (11). Dissemination depends largely on hoarding activity of animals, especially squirrels. Gravity may be of minor importance on the steeper terrace margins.

VEGETATIVE REPRODUCTION

Swamp chestnut oak is reported to sprout effectively (6), but this is not generally considered a dependable means for obtaining desirable natural regeneration.



Figure 2. --Swamp chestnut oak (left) and white oak (right), each about 50 years old, as found in the swamp chestnut-cherrybark oak type on the Santee Experimental Forest.

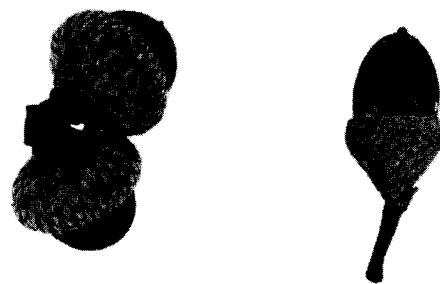


Figure 3. --Typical bark, fruit, twig and bud, and leaves of swamp chestnut oak.

SEEDLING DEVELOPMENT

As the nut is highly palatable and much sought after by animals, regeneration from seed is often very sparse. Propagation by direct seeding or with nursery stock has not been adequately explored.

Studies in progress at the Santee Experimental Forest in the South Carolina Coastal Plain point to good survival and early growth of swamp chestnut oak from planted acorns and 1-0 nursery stock on sandy loam soils in the bottomland of smaller streams.

Limited tests indicate a germinative capacity averaging 87 percent and a 30-day period of germination (11). Like most of the white oaks, germination begins soon after seedfall with little or no period of dormancy. The best seedbed is a moist, well-drained, sandy loam with a light cover of leaves or litter.

The species is classed as moderately intolerant but is easily established in openings (6).

As is common to most bottomland hardwoods, the sunlight necessary for seedling growth induces heavy competition from annual weeds, vines, briars, and brush which limit early development of the swamp chestnut oak unless it is released by weeding.

SAPLING STAGE TO MATURITY

Swamp chestnut oak usually ranges from 60 to 80 feet in height, with a trunk diameter of 24 to 36 inches; rare specimens may attain heights up to 120 feet and diameters of 7 feet (3). Diameter growth is classed as medium to good, averaging 2 to 4 inches in 10 years for dominant and codominant trees on average or better sites (6). In the absence of pure natural stands of swamp chestnut oak, areawise volume and yield values are not available. In mixtures with other hardwoods, a total volume in excess of 8,000 board feet per acre is classed as a heavy sawtimber stand; a heavy pole stand is considered to have in excess of 175 total stems per acre ranging from 5 to 11 inches d. b. h. (6).

The primary uses of swamp chestnut oak are essentially the same as white oak, such as face veneer, tight cooperage, factory lumber, ties, and timbers. Compared with white oak it has a coarser grain and wider sapwood due to more rapid growth; both features slightly handicap swamp chestnut oak for face veneer and tight cooperage (6).

Swamp chestnut oak timber is unusually sound, clear, and dependably uniform. One of its chief defects is a tendency toward sap limbs above the first log. Bird peck is occasional. Hidden defects are uncommon and it usually cuts out as well as it looks (7).

Among the more important wood-decaying fungi attacking swamp chestnut oak are species of Fomes, Polyporus, and Stereum. Oak leaf blister, caused by Taphrina caerulescens, is common some years, as is oak anthracnose which results from infection by Gnomonia veneta. Oak wilt, caused by Ceratocystis fagacearum, may also attack this species (1).

The list of insects affecting the oaks is almost endless. Among the most important which probably attack swamp chestnut oak, in addition to the aforementioned nut weevils, are the following (2):

Defoliators. --June beetles (Phyllophaga spp.), orange-striped oakworm (Anisota senatoria), canker worms (Alsophila pometaria) and (Paleacrita vernata), forest tent caterpillar (Malacosoma disstria), yellow-necked caterpillar (Datana ministra), variable oak leaf caterpillar (Heterocampa manteo), and the red-humped oakworm (Symmerista albicosta).

Borers attacking healthy trees. --Red oak borer (Romaleum rufulum), attacking the cambium and outer sapwood; carpenter worms (Prionoxystus spp.), attacking both the heart and sapwood; and the columbian timber beetle (Corthylus columbianus), which works in the sapwood.

Borers attacking weakened trees. --Two-lined chestnut borer (Agrilus bilineatus), found in the cambium, and tile-horned prionus (Prionus imbricornis), found in the roots.

Borers attacking dying trees. --Oak timberworm (Arrhenodes minuta).

Scales. --Pit making oak scale (Asterolecanium variolosum), which kills reproduction and tops on older trees.

Galls. --Gouty oak gall (Callirhytis punctata), horned oak galls (Callirhytis cornigera) and (Andricus clavigerus).

Leaf Miners. --Basswood leaf miner (Baliosus ruber).

RACES AND HYBRIDS

Reported natural hybrids (5) are Quercus beadlei Trel. (Q. alba X Q. michauxii) and Quercus byarsii Sudw. (Q. macrocarpa X Q. michauxii).

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