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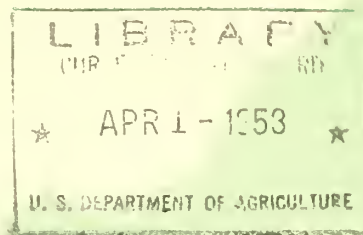
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Silvical Characteristics of Cherrybark Oak

by

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SILVICAL CHARACTERISTICS OF CHERRYBARK OAK

(Quercus falcata var. pagodaefolia Ell.)

by

Thomas Lotti

Santee Research Center

Cherrybark oak (Quercus falcata var. pagodaefolia Ell.), also known as bottomland red oak, Elliot oak, red oak, swamp red oak, and swamp Spanish oak, is found in the Coastal Plain from New Jersey and Maryland south to northern Florida and eastern Texas, and north in the Mississippi Valley to southeastern Missouri, and southern Indiana (6).

HABITAT CONDITIONS

CLIMATIC

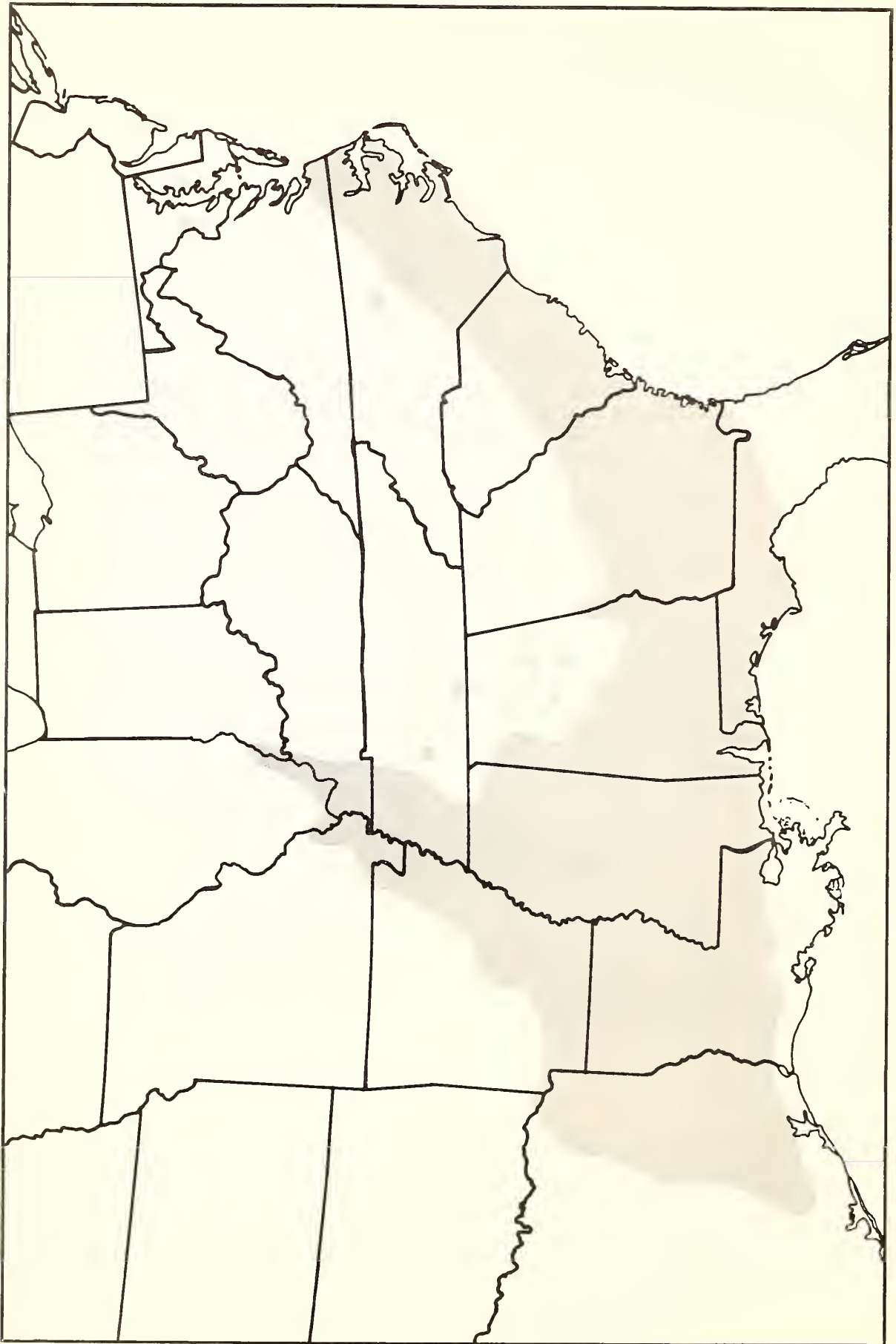
Cherrybark oak grows in a humid, temperate climate characterized by hot summers and mild, short winters (11). Through a major part of the tree's commercial range, the growing season extends from 230 to 290 days, average annual temperature from 65^o to 70^o F., and average annual precipitation from 50 to 60 inches. Within this same area the average annual maximum temperature is about 100^o F., and the average annual minimum approximates 15^o. About half the rainfall occurs during the period April to September, inclusive. Average noonday relative humidity is about 60 percent in mid-July (12).

EDAPHIC AND PHYSIOGRAPHIC

The tree is widely distributed on the best loamy sites in first bottoms and on well drained terraces and colluvial sites associated with both large and small streams of the Southeastern Coastal Plain and the Mississippi Delta (8). It develops best on a loamy well-drained soil. Although uncommon on clay soils, it is generally of good form and quality on the better drained locations but very inferior where drainage is poor (9).

BIOTIC

Cherrybark oak is represented in two cover types as defined by the Society of American Foresters (10). One of these is the beech-southern magnolia type, a transitional climax (2). In this association American beech (Fagus grandifolia) is the indicator species and is often the most abundant. Southern magnolia (Magnolia grandiflora) and a great variety of other moist-site hardwoods occur, among which the most common, in addition to cherrybark oak, are sweetgum (Liquidambar styraciflua), blackgum (Nyssa sylvatica), yellow-poplar (Liriodendron tulipifera), white oak (Quercus alba), white ash



Botanical range of cherrybark oak.

(Fraxinus americana), miscellaneous hickories (Carya sp.) and southern red oak (Quercus falcata). This widely distributed type is often found on loess ridges and in ravines and branch bottoms intersecting many of the pine lands in Louisiana, Arkansas, and Mississippi. It is also found in hammocks in southern Louisiana and elsewhere in the Coastal Plain where these occur (10).

The other cover type is named the swamp chestnut oak-cherrybark oak type. Typically the composition varies widely. Cherrybark oak and swamp chestnut oak (Quercus michauxii) are often only indicator species, although they may be the most abundant of the oaks which are predominant. Other prominent associates are white ash, shagbark hickory (Carya ovata), shell-bark hickory (Carya laciniosa), mockernut hickory (Carya tomentosa), and bitternut hickory (Carya cordiformis). Chief associates are blackgum, white oak, Delta post oak (Quercus stellata var. mississippiensis), Shumard oak (Quercus shumardii), and on first bottom ridges sweetgum may be important. Minor associates include southern red oak, southern magnolia, yellow-poplar, American beech, willow oak (Quercus phellos), water oak (Quercus nigra), post oak (Quercus stellata), American elm (Ulmus americana), winged elm (Ulmus alata), swamp hickory (Carya leiodermus), and nutmeg hickory (Carya myristicaeformis) and occasionally loblolly pine (Pinus taeda) and spruce pine (Pinus glabra). The type is widely distributed within the alluvial flood plains of the major rivers, occurring on all ridges in the terraces, and on the best, most mature, fine sandy loam soils on the highest first bottom ridges. It extends on first bottom ridges to a few well drained soils other than sandy loam. The site is seldom covered with standing water and rarely, if ever, overflowed although it may be hummocky and wet between the hummocks (10). The type becomes predominantly white oak on the most matured terrace soils. In very limited situations it is found with loblolly pine on terraces, and with spruce pine on terraces and on ridges in the first bottoms of small streams of the Coastal Plain east of the Mississippi River. It is found with yellow-poplar and beech only in the second bottoms of small secondary streams (10).

Among noncommercial trees or plant associates of cherrybark oak are red buckeye (Aesculus pavia), devils walking stick (Aralia spinosa), American hornbeam (Carpinus caroliniana), eastern redbud (Cercis canadensis), flowering dogwood (Cornus florida), witch hazel (Hamamelis virginiana), American holly (Ilex opaca), red mulberry (Morus rubra), southern bayberry (Myrica cerifera) and Carolina basswood (Tilia caroliniana) (5). In some localities such as the Delta region, pawpaw (Asimina triloba) and eastern hophornbeam (Ostrya virginiana) are also associates.

LIFE HISTORY

SEEDING HABITS

Flowering and Fruiting

The tree's flowers are unisexual, appearing with the leaves in March and April. The stamens are in hairy catkins 3 to 5 inches long, and the pistils solitary or in few-flowered spikes borne on short, stout hairy stalks (3).



A group of veneer-quality cherrybark oak from 24 to 30 inches d. b. h. growing on a second-bottom site adjoining a small stream in Berkeley County, South Carolina.



A fine specimen of cherry bark oak 56 inches d. b. h. and 120 feet tall, growing in the Santee Experimental Forest, near Charleston, South Carolina. This tree is about 70 years old.

The acorn fruit is solitary or in pairs; the nut is hemispherical or nearly globular, $\frac{1}{2}$ inch long, averaging about 750 per pound, often striate, orange brown; the cup is thin, saucer-shaped or sometimes toplike, and encloses about a third of the nut (3, 13). Ripening from September to November of the second year, the seed falls during this period (13). As in most of the oaks, the acorn is subject to damage by nut or acorn weevils such as Curculio baculi, Curculio longidens, Curculio pardalis, and Conotrachelus posticatus, and the filbert worm (Melissopus latiferreanus) (1). Acorn collections at the Santee Experimental Forest in South Carolina showed that insect-damaged acorns are readily distinguished from sound ones by the color of the cup scar: good acorns have a light, almost lemon color, while the bad acorns are a dull brown.

The domestic hog, which ranges in large numbers over the bottomlands of the South, probably consumes a major part of the annual crop of cherry-bark oak acorns. Within the botanical range of this oak, certain other animals and birds include acorns as a substantial part (10 percent or more) of their diets (7). Among these the heaviest eaters are the gray squirrel (Sciurus carolinensis), wild turkey (Meleagris gallopavo), and the blue jay (Cyanocitta cristata), followed by the wood duck (Aix sponsa), red-bellied woodpecker (Centurus carolinus), red-headed woodpecker (Melanerpes erythrocephalus), white-breasted nuthatch (Sitta carolinensis), common grackle (Quiscalus quiscula), racoon (Procyon lotor), white-tailed deer (Odocoileus virginianus), and the eastern fox squirrel (Sciurus niger) (7). Because crops are frequent and the acorns are small in size, there is reason to assume that cherrybark oak acorns form a proportionate share of the total acorn diet.

Seed Production and Dissemination

Seed bearing probably follows the same pattern as southern red oak, beginning when trees are about 25 years old and attaining optimum production between 50 and 75 years of age. Good crops are frequent, occurring at 1 or 2 year intervals, with light crops in intervening years (13). A freeze in April, 1955, after the flower buds opened, resulted in a complete crop failure over much of the tree's range in 1956. Dissemination largely depends on hoarding activity of animals, especially squirrels. In certain situations (first bottoms) dissemination by flooding is possible. Gravity is a minor means of dissemination on the steeper terrace margins.

VEGETATIVE PROPAGATION

The tree is reported to sprout fairly efficiently from the stump when the shoot has been killed or cut back (8). However, this sprouting is not considered a dependable means for obtaining desirable natural regeneration. Like most oaks, this species is considered difficult to propagate by cuttings.

SEEDLING DEVELOPMENT

Establishment

Cherrybark oak regenerates naturally on areas protected from fire and grazing. Being an intolerant species, it requires full light for development (8). It often reaches its best development in old fields on well-drained loamy soils (9).

One test indicated that cherrybark oak acorns have an average germinative capacity of about 38 percent, which may be too low in view of the fact that two tests with southern red oak showed a high germination capacity of 91 percent (13). Typically, the seed remains dormant, germinating in the spring following seedfall.

The propagation of cherrybark oak by seeding or planting, like that of many hardwoods, has not been adequately explored. Studies in progress at the Santee Experimental Forest show third-year survival of 82 percent for planted 1-0 nursery stock, and 30 percent for direct seeded acorns on sandy loam soils associated with the first and second bottoms of small streams in Coastal South Carolina. It is understood that similar results have been obtained in the Mississippi Delta.

Early Growth

Indicative of early seedling growth of natural regeneration is the average total height of 20 inches attained in 3 years in the direct seeding tests. Sowings in the open were best, with an average height of 23 inches compared with only 17 inches under a forest cover.

As is common to most bottomland hardwoods, the sunlight necessary for seedling growth induces heavy competition from annual weeds, vines, briars, and brush, and this in turn may retard the early development of cherrybark oak unless released by weeding.

Insects known to attack and destroy reproduction of southern red oak, such as the hickory spiral borer (Agrilus arcuatus var. torquatus) and the oak borer (Aneflomorpha subpubescens) (1), probably affect cherrybark oak also.

SAPLING STAGE TO MATURITY

Growth and Yield

Cherrybark oaks often attain heights and diameters of 100 to 130 feet and 3 to 5 feet respectively, which classes them with the largest of the southern red oaks (3). It is one of the hardiest and fastest-growing of the oaks, or even of hardwoods in general, and grows well on a wider variety of sites than any other bottomland oak except willow and water oaks (9). Diameter growth will average from 3 to 6 inches in 10 years (3). In the

absence of extensive pure natural stands of cherrybark oak, area-wise volume and yield values are not available for the species. In mixtures with other hardwoods, under present day forest conditions, a total volume in excess of 8,000 board-feet per acre for all species is classed as a heavy sawtimber stand; a heavy pole stand is one which exceeds 175 stems per acre of all species ranging from 5 to 11 inches d.b.h. (8). In the virgin forest, mixed stands ranged up to 30,000 board-feet per acre.



A good stand of cherrybark oak seedlings at beginning of fourth growing season since sowing of acorns. Spacing 4 x 4 feet on second bottom soil associated with a small stream in Coastal South Carolina.

Reaction to Competition

After release from suppression or if injured, the tree is apt to produce small adventitious limbs which result in many pin knots. But this is usually not too serious, and the grade yield of the species is generally high.

Principal Enemies

Fire is its chief enemy but fire damage is usually no more severe than in other species. Borers often cause much damage in badly fire-scarred veterans and in overmature timber. On poor sites, as on poorly drained clay flats, the mature trees are often infested with borers or mineral streaked. On these and other sites, fires and hurricane winds seem instrumental in introducing the borers and mineral streaks (9).

Insects identified as attacking southern red oak and probably also attacking cherrybark oak are: the orange-striped oak worm (Anisota senatoria) and the spiny oakworm (Anisota stigma), both defoliators; the two-lined chestnut borer (Agrilus bilineatus), Columbian timber-beetle (Corthylus columbianus), and pecan carpenter worm (Cossula magnifica), all wood borers (1).

Rot fungi attacking southern red oak and possibly cherrybark oak are Hydnum erinaceous, Polyporus hispidus, Polyporus sulfureus, and Daedalea quarcina (4). Leaf blister caused by Taphrina coerulescens is common.

SPECIAL FEATURES

Cherrybark oak is readily distinguishable from southern red oak by its more uniform 6- to 11-lobed leaves and its gray-black flaky or scaly bark which superficially resembles that of large black cherry (Prunus serotina) (11). The wood of cherrybark ranks high in texture and working qualities. It is usually firm to hard but straight-grained and workable even at its hardest. Its color is uniformly light red or a pink shade comparable to that of northern red oaks (9). Lumber is used to a great extent for high-grade products such as face veneer and factory lumber as well as for general utility.

RACES AND HYBRIDS

There are no known races or hybrids of cherrybark oak. However, cherrybark is a variety of southern red oak, which has a number of hybrids.

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