

Populus heterophylla L. Swamp Cottonwood

Salicaceae Willow family

R. L. Johnson

Swamp cottonwood (*Populus heterophylla*) is of secondary importance among bottom-land hardwoods. The species, sometimes referred to as black cottonwood, river cottonwood, downy poplar, or swamp poplar, may grow on sites that are too wet for other native poplars. It is a difficult species to grow from cuttings, a characteristic that limits its commercial value.

Habitat

Native Range

Swamp, cottonwood (fig. 1) inhabits the wet bottom lands and sloughs of the Coastal Plain from Connecticut and southeastern New York to Georgia and

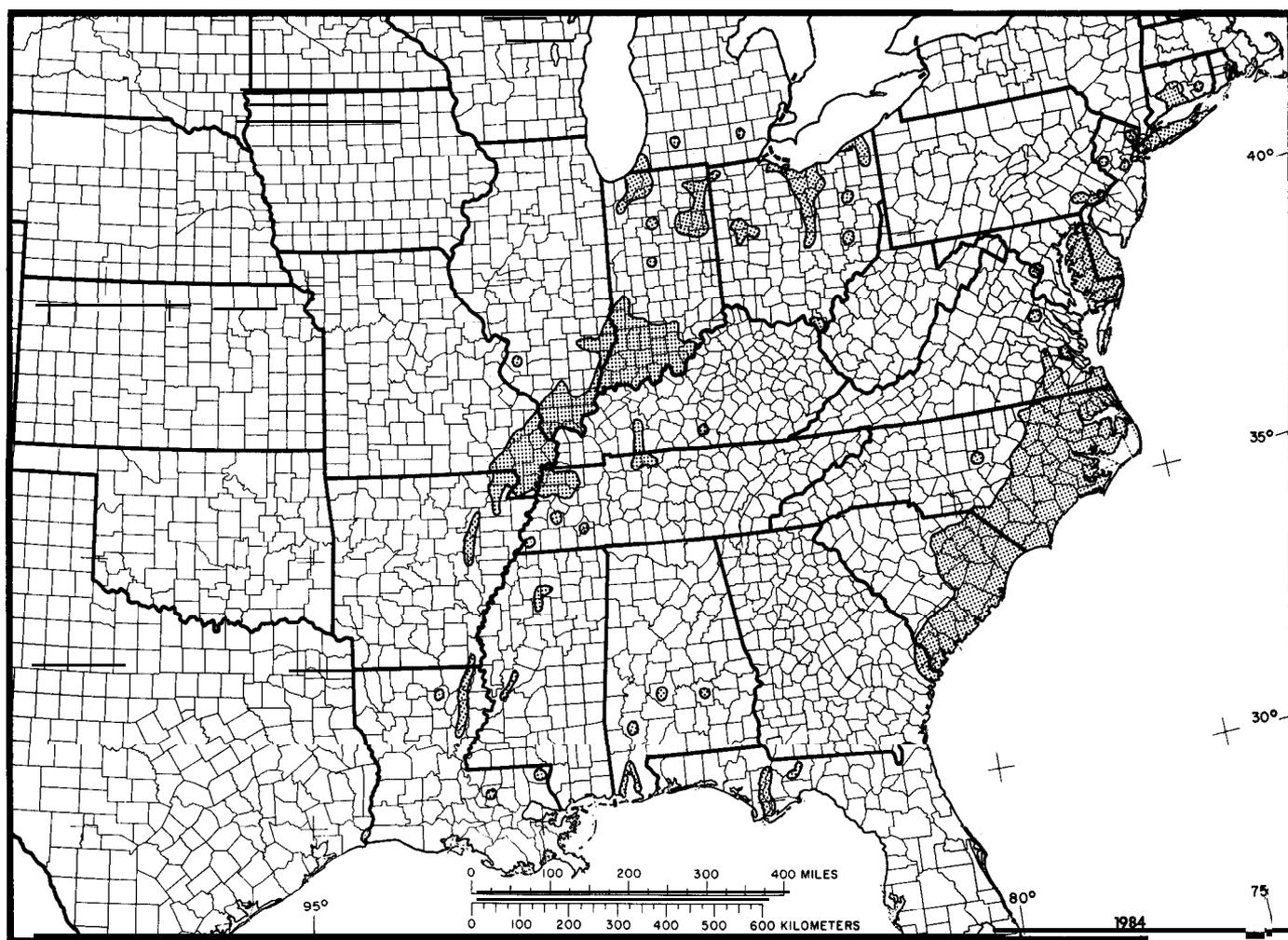


Figure 1—The native range of swamp cottonwood.

The author is Principal Silviculturist, Southern Forest Experiment Station, New Orleans, LA.

northwestern Florida, west to Louisiana. It grows north in the Mississippi Valley to southeastern Missouri, western Tennessee, Kentucky, southern Illinois, Indiana, Ohio, and southern Michigan (5).

Climate

The climate is humid throughout the range of swamp cottonwood. Average annual rainfall varies from about 890 mm (35 in) in northern Indiana to 1500 mm (59 in) in southern Louisiana. Approximately 1140 to 1240 mm (45 to 49 in) of rain falls annually along the Atlantic coast, nearly half of it from April through August. Yearly temperatures average 10° to 13° C (50° to 55° F) in the North to 18° C (65° F) along the south Atlantic coast and 21° C (70° F) on the gulf coast. Minimum annual temperatures range from -29° C (-20° F) in the North to -1° C (30° F) in the South. Frost-free days range from 180 to 300.

Soils and Topography

Though most often found on heavy clays, swamp cottonwood also grows on the edges of, but not in, the muck swamps of the Southeast. Optimum growth and development is in the deep, moist soils of shallow swamps and low-lying areas near tidewater (4).

Sites that are too wet for eastern cottonwood (*Populus deltoides*) will support swamp cottonwood. Examples are shallow swamps, sloughs, and very wet river bottoms where the water table remains near the soil surface for all but 2 or 3 months in the summer and early fall. In the southern part of its range, low, wet flats provide the driest sites occupied by swamp cottonwood. However, in southern Illinois it is a dominant or codominant tree on soils with available moisture varying from 3 to 21 percent for the 61- to 76-cm (24- to 30-in) layer (4).

Swamp cottonwood grows naturally on at least eight major soil types common to the Midsouth: Alligator, Amagon, Arkabutla, Forestdale, Perry, Rosebloom, Sharkey, and Tensas. The soils represent several families and the orders Alfisols, Inceptisols, and Entisols. They range from 4.6 to 5.9 in pH and from 24 to 65 percent clay in the surface 0.3 m (1 ft) (1).

Associated Forest Cover

Swamp cottonwood is sparse throughout its range and is not a major species in any forest cover type. It is most often found in the following types (2): Baldcypress (Society of American Foresters Type

101), Baldcypress-Tupelo (Type 102), and Water Tupelo-Swamp Tupelo (Type 103).

Common tree associates include sandbar willow (*Salix exigua*), black willow (*S. nigra*), peachleaf willow (*S. amygdaloides*), green ash (*Fraxinus pennsylvanica*), water hickory (*Carya aquatica*), sycamore (*Platanus occidentalis*), sugarberry (*Celtis laevigata*), red maple (*Acer rubrum*), American elm (*Ulmus americana*), pumpkin ash (*I? profunda*), Carolina ash (*I? caroliniana*), waterlocust (*Gleditsia aquatica*), persimmon (*Diospyros virginiana*), and overcup oak (*Quercus lyrata*).

Major small tree and shrub associates are water-elm (*Planera aquatica*), buttonbush (*Cephalanthus occidentalis*), swamp-privet (*Forestiera acuminata*), and possumhaw (*Ilex decidua*).

Life History

Reproduction and Early Growth

Flowering and Fruiting-Swamp cottonwood is dioecious. Flowers are proteranthous, appearing from March to May. Staminate catkins are rather stiffly pendant, oblong, cylindrical, and 5 to 10 cm (2 to 4 in) long; pistillate catkins are 5 to 15 cm (2 to 6 in) long, pendulous, slender, and raceme-like. Pollination is by wind. Fruits ripen and the seeds fall from April through July.

Seed Production and Dissemination--Trees start seed production at about 10 years. Reddish-brown obovoid seeds number about 330,700/kg (150,000/lb) (9). Seeds are very small, light in weight, and tufted with hairs, features that allow them to be blown over 100 m (330 ft) by wind and to float for a considerable distance in water. Water is an important transporting agent since the bottom lands normally flood during the seedfall period. Numerous seeds are produced annually, but under natural field conditions they remain viable for no more than a week or two.

Seedling Development-Germination is epigeal. Best seedling establishment is from seeds that quickly settle on unshaded, moist mineral soil in shallow swamps, deep sloughs, and along often-flooded creeks or rivers. Seedlings require nearly full sunlight to survive and grow. They also need an abundance of moisture, especially during the early part of the growing season. Seedlings usually occur in groups but seldom cover a large area (4). Early growth is relatively rapid but will not match that of eastern cottonwood. On a well-drained soil in

southern Illinois, swamp cottonwood seedlings grew at about the same rate as silver maple seedlings.

Vegetative Reproduction-Cuttings from juvenile plants will root but probably not as well as those of eastern cottonwood (4). Stumps less than 30 cm (12 in) in diameter are likely to produce sprouts.

Sapling and Pole Stages to Maturity

Growth and Yield-The largest swamp cottonwood trees on record are 35 to 40 m (115 to 130 ft) tall and 165 to 190 cm (65 to 75 in) in d.b.h. (3,8). Trees are considered mature at about 30 m (100 ft) tall and 75 to 90 cm (30 to 36 in) d.b.h. Annual height growth on poorly drained sites is slightly faster over a 30-year period than that of green ash, about 0.8 m (2.5 ft). Diameter growth on a good site in the South may approach 20 cm (8 in) in 10 years (4). Swamp cottonwood grows little after 40 or 50 years and sel-



Figure 2—Swamp cottonwood tree on bottom-land site in Leflore County, MS.

dom remains sound after 80 years (4). Large trees often are crooked and short boled. Trees with three merchantable logs are exceptional.

Per-hectare volumes are unknown for this species since it is nearly always a single tree or grows in very small patches (fig. 2). Based on known volumes for eastern cottonwood (6), a pure stand of mature swamp cottonwood would likely yield 280.0 to 350.0 m³/ha (20,000 to 25,000 fbm/acre, Doyle log rule).

Rooting Habit-The root system of swamp cottonwood is probably shallow like that of eastern cottonwood and most other lowland species. Poplars in general have strong horizontal surface roots from which vertical plunging roots develop. Length of horizontal roots can be considerable. Plunging roots are limited in development by the water table or soil condition.

Reaction to Competition-Swamp cottonwood is classed as intolerant of shade, though probably less so than eastern cottonwood. Individuals may survive partial shade when they are young, but older trees require full sunlight.

Damaging Agents-There are no reported insect or disease problems associated specifically with swamp cottonwood. But the ones that attack eastern cottonwood probably also damage swamp cottonwood. Important insect enemies include the cottonwood leaf beetle (*Chrysomela scripta*), cottonwood twig borer (*Gypsonoma haimbachiana*), poplar borer (*Saperda calcarata*), and the cottonwood borer (*Plectrodera scalator*). Among the more important diseases are *Melampsora* leaf rust (*Melampsora medusae*) and a number of canker diseases, including *Septoria*, *Cytospora*, and *Fusarium* (7).

Special Uses

There is no market specifically for the small volume of swamp cottonwood harvested. The wood resembles that of eastern cottonwood and is generally sold as such. Among the uses for cottonwood lumber and veneer are boxes, crates, and interior parts for furniture. Pulpwood is used in high-grade book and magazine paper.

To date, few other uses have been found for the species. It is rarely cultivated for ornament, does not produce important wildlife food, and is important to flood or erosion control only in very small, localized areas. Instead of swamp cottonwood, a closely related species, eastern cottonwood, is chosen for planting because it outperforms swamp cottonwood on all except the wettest sites.

Genetics

The species is rare in tree collections and has received little attention from geneticists. There are no reported races or hybrids.

Literature Cited

1. Broadfoot, Walter M. 1976. Hardwood suitability for and properties of important **Midsouth** soils. USDA Forest Service, Research Paper SO-127. Southern Forest Experiment Station, New Orleans, LA. 84 p.
2. Eyre, F. H., ed. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, DC. 148 p.
3. Gaddy, L. L. 1977. Notes on the flora of the Congaree River Floodplain, **Richland** County, South Carolina. *Castanea* 42(2):103-106.
4. Johnson, R. L., and W. R. Beaufait. 1965. Swamp cottonwood (*Populus heterophylla* L.). In *Silvics of forest trees of the United States*. p. 535-537. H. A. Fowells, **comp.** U.S. Department of Agriculture, Agriculture Handbook 271. Washington, DC.
5. Little, Elbert L., Jr. 1979. Checklist of United States trees (native and naturalized). U.S. Department of Agriculture, Agriculture Handbook 541. Washington, DC. 375 p.
6. M&night, J. S. 1971. Cottonwood. USDA Forest Service, American Woods-FS-231. Washington, DC. 8 p.
7. Morris, R. C., T. H. Filer, J. D. Solomon, and others. 1975. Insects and diseases of cottonwood. USDA Forest Service, General Technical Report SO-8. Southern Forest Experiment Station, New Orleans, LA, and Southeastern Area State and Private Forestry, Atlanta, GA. 37 p.
8. **Pardo**, Richard. 1978. National register of big trees. *American Forests* 84(4):18-47.
9. Schreiner, Ernst J. 1974. *Populus* L. Poplar. In *Seeds of woody plants in the United States*. p. 645-653. C. S. Schopmeyer, **tech. coord.** U.S. Department of Agriculture, Agriculture Handbook 450. Washington, DC.