

Magnolia grandiflora L. Southern Magnolia

Magnoliaceae Magnolia family

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Southern magnolia (*Magnolia grandiflora*), also called evergreen magnolia, bull-bay, big-laurel, or large-flower magnolia, has large fragrant white flowers and evergreen leaves that make it one of the most splendid of forest trees and a very popular ornamental that has been planted around the world. This moderately fast-growing medium-sized tree

grows best on rich, moist, well-drained soils of the bottoms and low uplands of the Coastal Plains of Southeastern United States. It grows with other hardwoods and is marketed as magnolia lumber along with other magnolia species to make furniture, pallets, and veneer. Wildlife eat the seeds, and florists prize the leathery foliage.

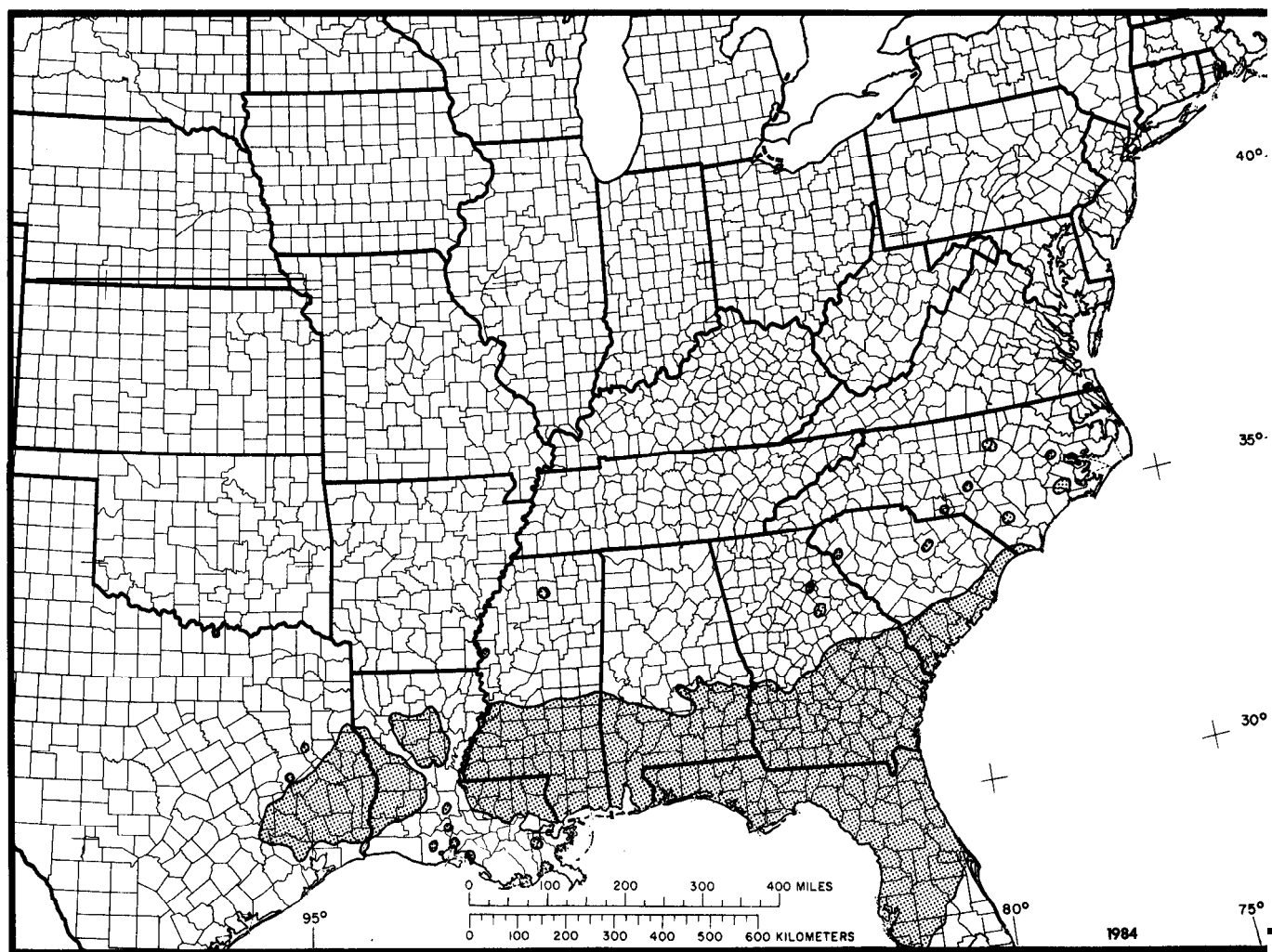


Figure 1-The native range of southern magnolia.

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Habitat

Native Range

The range of southern magnolia (fig.1) extends from eastern North Carolina, south along the Atlantic Coast to the Peace River in central Florida, then westward through roughly the southern half of Georgia, Alabama, and Mississippi, and across Louisiana into southeast Texas. It is most prevalent in Louisiana, Mississippi, and Texas (12,14).

Climate

Southern magnolia grows in warm temperate to semitropical climates (2). The frost-free period is at least 210 days and is more than 240 days for much of the range. Average January temperatures along the coast are 9° to 12° C (49° to 54° F) in South Carolina and Georgia and 11° to 21° C (52° to 70° F) in Florida. Coastal temperatures average 27° C (80° F) during July. Temperatures below -9° C (15° F) or above 38° C (100° F) are rare within the species natural range.

Annual rainfall averages 1020 to 1270 mm (40 to 50 in) in the northeastern portion of the range and 1270 to 1520 mm (50 to 60 in) in other areas. A small area along the Gulf Coast receives 1520 to 2030 mm (60 to 80 in) yearly. In the Atlantic Coastal Plain, summer is usually wettest and autumn driest. Periodic summer droughts occur in the western part of the range.

Soils and Topography

Southern magnolia grows best on rich, loamy, moist soils along streams and near swamps in the Coastal Plain (2,14). It also grows on mesic upland sites where fire is rare. Although primarily a bottomland species it cannot withstand prolonged inundation. Thus, it does not appear in the first bottoms but grows mostly on the oldest alluvium and outwash sites.

Southern magnolia is found on a number of different soils including those in the orders Spodosols, Alfisols, Vertisols, and Ultisols. Along the coast it grows primarily on soils of the Leon, Bladen, Coxville, Portsmouth, Lake Charles, and Crowley series. Farther inland in central Florida, Georgia, and States to the west, it is found on the Norfolk, Ruston, Greenville, Memphis, Grenada, Caddo, and Beauregard soils.

No part of its natural range is higher than 150 m (500 ft) in elevation and most of it is less than 60 m (200 ft). Coastal areas within its range are all less

than 30 m (100 ft) above sea level. In the northern parts of the range in Georgia and Mississippi, it is found at elevations of 90 to 120 m (300 to 400 ft).

Associated Forest Cover

Southern magnolia rarely forms pure stands but is usually associated with a variety of mesic hardwoods. It is a minor component of the following forest cover types (7): Southern Redcedar (Society of American Foresters Type 73), Cabbage Palmetto (Type 74), Loblolly Pine-Hardwood (Type 82), Live Oak (Type 89), Swamp Chestnut Oak-Cherrybark Oak (Type 91), and Sweetbay-Swamp Tupelo-Redbay (Type 104). Other trees commonly associated with southern magnolia are beech (*Fagus grandifolia*), sweetgum (*Liquidambar styraciflua*), yellow-poplar (*Liriodendron tulipifera*), southern red oak (*Quercus falcata*), white oak (*Q. alba*), mockernut hickory (*Carya tomentosa*), and pignut hickory (*C. glabra*).

Understory associates include a wide variety of species. Typical examples are devils-walkingstick (*Aralia spinosa*), flowering dogwood (*Cornus florida*), swamp dogwood (*C. stricta*), beautyberry (*Callicarpa americana*), strawberry-bush (*Euonymus americanus*), southern bayberry (*Myrica cerifera*), Virginia creeper (*Parthenocissus quinquefolia*), poison-ivy (*Toxicodendron radicans*), sweetleaf (*Symplocos tinctoria*), greenbriers (*Smilax* spp.), and muscadine grape (*Vitis rotundifolia*).

Life History

Reproduction and Early Growth

Flowering and Fruiting-The large, white, fragrant flowers are perfect (19) and appear from April to June. The fleshy cone-like fruit matures from September through the late fall. When the fruit matures and opens, seeds 6 to 13 mm (0.25 to 0.5 in) long emerge and hang temporarily suspended by slender, silken threads before dropping (2).

Seed Production and Dissemination-The seeds are drupelike, with a soft, fleshy outer seedcoat and an inner stony portion. Southern magnolia is a prolific seed producer and good seed crops normally occur every year (14). Trees as young as 10 years old can produce seed, but optimum seed production under forest conditions usually does not occur until age 25. Cleaned seeds range in number from 12,800 to 15,000/kg (5,800 to 6,800/lb) and average 14,200/kg (6,450/lb) (19). Seed viability averages about 50 percent. The relatively heavy seeds are dis-

seminated mostly by birds and mammals, but some may be spread by heavy rains.

Seedling Development-Seeds usually germinate the first or second spring following seedfall. Germination is epigeal (19). The best natural seedbed is a rich, moist soil protected by litter. Even though viable, seeds rarely germinate under the parent tree because of reported inhibitory effects (3).

Seedlings are very susceptible to frost damage, and even a light freeze can cause mortality. Partial shade is beneficial for the first 2 years of seedling growth. Under favorable conditions growth is quite rapid. In nurseries, seedlings usually grow 46 to 61 cm (18 to 24 in) the first year (2).

Vegetative Reproduction-Mature southern magnolia commonly develops root and stump sprouts (3). Portions of lower limbs of saplings often become imbedded in the forest floor where they develop roots, eventually producing separate trees. Air-layering, stem cuttings, and grafts have all been used to propagate the species for ornamental plantings.

Sapling and Pole Stages to Maturity

Growth and Yield-On good sites, southern magnolia trees (fig. 2) average 18 to 24 m (60 to 80 ft) tall and 61 to 91 cm (24 to 36 in) in d.b.h. in 80 to 120 years. Heights of 30 to 38 m (100 to 125 ft) have been reported in Florida (2). Annual diameter growth for large mature trees in an east Texas stand was .24 cm (.09 in) (8). In unmanaged natural stands in the Florida panhandle, trees without overtopping competition will average .76 cm (.3 in) of diameter growth and 0.46 m (1.5 ft) of height growth per year through age 50. Under natural conditions, many trees spend 10 to 20 years in the understory before they reach the upper canopy. Annual diameter growth for these trees is .51 cm (.2 in) and average height growth is .31 m (1.0 ft) to age 50 years.

Rooting Habit-Southern Magnolia is a deep-rooted species, except on sites with a high water table. Seedlings quickly develop one major taproot. As trees grow the root structure changes. Trees of sapling stage and beyond have a rather extensive heart root system (i.e. several to many sunken roots grow down from the root collar of the tree trunk). Older trees may develop a fluted base with the ridges corresponding to the attachment of major lateral roots.

Reaction to Competition-Overall, southern magnolia is tolerant of shade. It can endure consid-



Figure 2 Southern magnolia grown as an ornamental in Florida.

erable shade in early life (8), but needs more light as it becomes older (2). It will invade existing stands and is able to reproduce under a closed canopy (3,8). Once established, it can maintain or increase its presence in stands by sprout and seedling production that grows up through openings, which occur sporadically in the canopy.

Southern magnolia is considered to be one of the major species of the potential climax forest of the southeastern Coastal Plains (3,6,15,16,20). In the past, regular burning restricted the species to the wetter sites, as seedlings are easily killed by fire. Older trees, however, due to bark characteristics, are quite fire resistant (3,10) and even if the tops are killed, they sprout vigorously. Since the advent of improved fire control, southern magnolia has been migrating onto mesic upland sites and establishing itself, along with associated hardwoods, as part of the climax forest.

Damaging Agents—Young southern magnolia are susceptible to fire-caused injury and mortality. Winter droughts can cause extensive dieback and mortality. A number of fungi, including species of *Cladosporium*, *Colletotrichum*, *Glomerella*, *Phyllosticta*, and *Septoria* cause leaf spots but these seldom result in any significant damage (2). A leaf spot caused by *Mycosphaerella milleri* can be a problem on nursery seedlings. A number of *Fomes* and *Polyporus* fungi can cause heartrot in southern magnolia. Heavy infestations of magnolia scale (*Neolecanium cornuparyum*) can kill branches or entire trees (18). Oleander pit scale (*Asterolecanium pustulans*) and tuliptree scale (*Toumeyella liriodendri*) attack and injure southern magnolia, but rarely cause mortality (1). A variety of other pests, including tuliptree aphid (*Illinoia liriodendri*), striped mealybug (*Ferrisia virgata*), leaf weevil (*Odontopus calceatus*), magnolia leafminer (*Phyllocnistis magnoliella*), and spider mite (*Tetranychus magnoliae*) feed on this species (18). *Euzophera magnolialis*, a wood borer, can injure or kill nursery seedlings.

Special Uses

Because of its showy flowers and lustrous evergreen foliage, southern magnolia is a valuable and extensively planted ornamental. In many urban areas where other species do poorly, this magnolia can grow because of its resistance to damage by sulfur dioxide. The seeds are eaten by squirrels, opossums, quail, and turkey (9). The leaves, fruits, bark, and wood yield a variety of extracts with potential applications as pharmaceuticals (4,5).

Genetics

No work has been done to characterize individual populations. Extensive breeding has been done to develop races of southern magnolia for ornamental use (13). Common varieties include *Magnolia grandiflora lanceolata* with a narrow pyramidal habit and *M. grandiflora gallissoniensis*, reported to be cold hardy (17).

Southern magnolia has been hybridized with sweetbay (*Magnolia virginiana*) and *M. guatemalensis*.

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