Sabal palmetto (Walt.) Lodd. ex J. A. & J. H. Schult.
Cabbage Palmetto

Palmae Palm family

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Cabbage palmetto *(Sabal palmetto)* is the most northerly and abundant of the native tree palms. Other names sometimes used are Carolina palmetto, common palmetto, palmetto, and cabbage-palm. This medium-sized unbranched evergreen palm commonly grows on sandy shores, along brackish marshes, in seacoast woodlands of Southeastern United States and throughout peninsular Florida. It can tolerate a broad range of soil conditions and is often planted as a street tree. Abundant fruit crops provide a good supply of food to many kinds of wildlife.

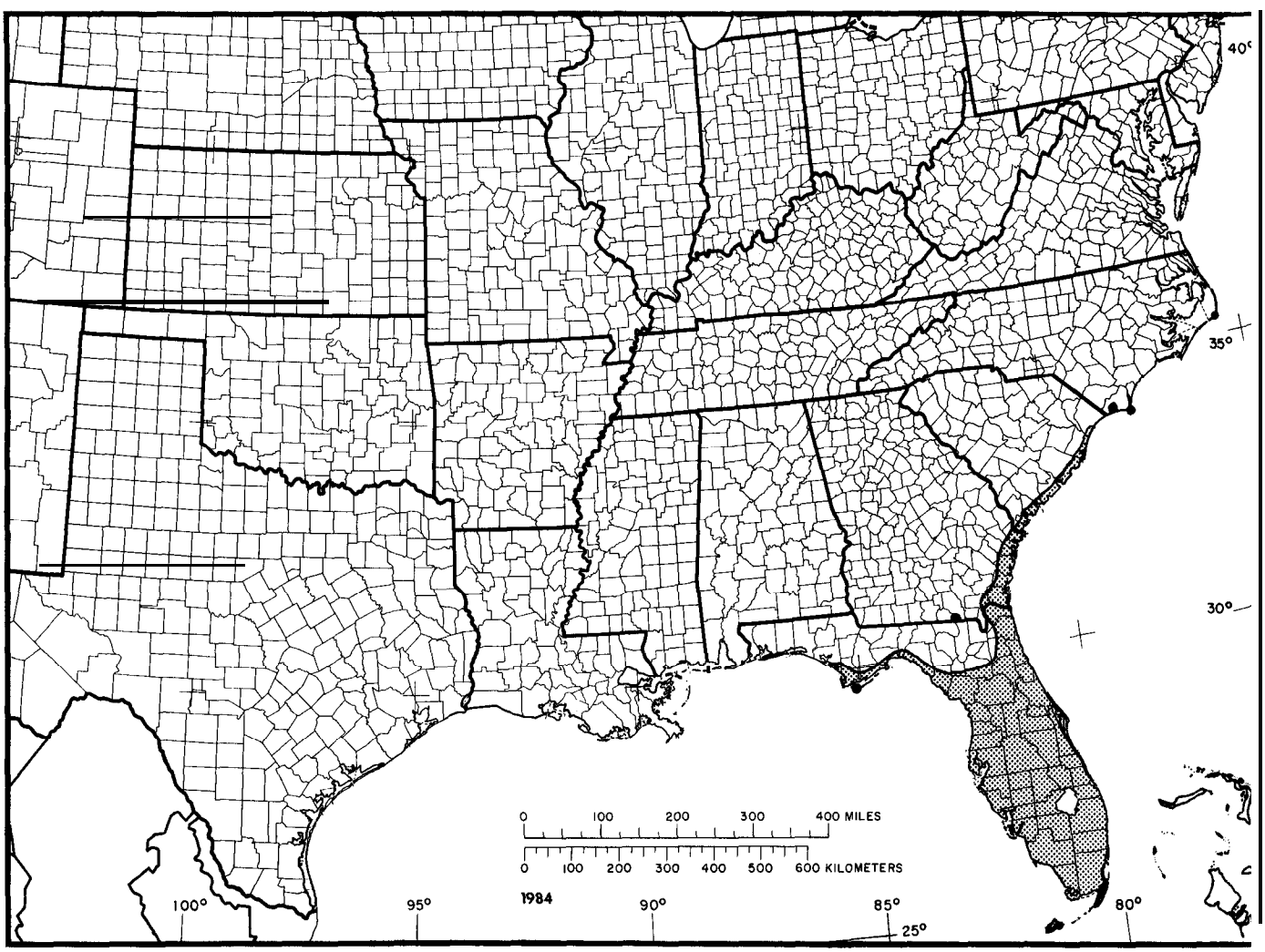

Figure *l-The native range of cabbage palmetto.*

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Habitat

Native Range

Cabbage palmetto (fig. 1) is the most widely distributed of our native palm trees. Its range extends northward from the Florida Keys through its epicenter in south-central Florida to Cape Fear, NC. A disjunct population has been reported at Cape Hatteras, NC (16). From North Carolina south to the Florida line it hugs the coastline, usually occurring within 20 km (12 mi) of the ocean. In Florida, its northern boundary turns west through Gainesville and follows an ancient shoreline across the peninsula to the Gulf Coast. It then follows the shoreline westward to St. Andrews Bay where its range is slowly extending (3). Outside the United States, it is found in the Bahama Islands (23).

Climate

The climate within the natural range of cabbage palmetto is principally subtropical to warm temperate, humid, with an average annual rainfall of 1000 to 1630 mm (39 to 64 in) and average annual minimum and maximum temperatures from about -4" to 36" C (25" to 97" F). Low winter temperatures apparently limit the horticultural range of the species, which now extends more than 160 km (100 mi) north and inland of its natural range (3).

Soils and Topography

Cabbage palmetto can tolerate a broad range of soil pH, salinity, and drainage but prefers neutral to alkaline soils characterized by near-surface or exposed calcareous sands, marls, or limestone *(10,15)*. Although it grows at the edges of both saline and freshwater areas, it cannot survive lengthy tidal inundations (8) but can withstand fluctuations of 2 m (6 ft) in freshwater levels by developing extensive adventitious rootlets along its trunk up to the high-water mark. This cylindrical root mass may reach diameters of 1.8 to 2.4 m (6 to 8 ft) (24).

In the northern part of its range, cabbage palmetto is primarily found on the bay side of coastal dunes and adjacent mainland. Farther south in Georgia, it extends up the flood plains of major rivers. In central Florida, the tree is often found on fine sandy soils with subsoils of limestone or marl on periodically flooded lowlands, and on relic inland dune ridges below 30 m (100 ft), an elevation that defines the approximate shoreline of the Wicomico Sea of the Pleistocene *(7)*. With the construction of drainage ditches in south-central Florida, it has colonized the once seasonally inundated interhammock glades.

The species is found on a wide range of soils including those in the orders Entisols, Alfisols, Ultisols, and Spodosols in south Florida. Drainage tends to be restricted, ranging from somewhat poorly to very poorly drained. All soils appear to have one characteristic in common, a high calcium content, which is indicated by either a high base saturation (Alfisols) or limestone, phosphatic rock, or sea shells in the profile. Soil series typical of the Alfisols are Boca, Bradenton, Parkwood, and Riviera. Typical Entisols are exemplified by the Pompano series. Charlotte, Oldsmar, and Wabasso soil series are typical Spodosols on which the species is found.

The species often forms pure stands up to about 10 ha (25 acres) in freshwater areas, called river hammocks if they lie along a river, and cabbage-palm hammocks or palm savannas if they are on inland prairies.

Associated Forest Cover

In the forest cover type Cabbage Palmetto (Society of American Foresters Type 74), the species usually makes up a plurality of the stocking *(11)*. Because cabbage palmetto can accommodate a wide range of sites, it is found in association with many plant species, especially in south Florida. It is found on severe sites such as dunes, salt flats, barrier islands, cactus thickets, and wet prairies. It is a common component of such diverse communities as freshwater cypress swamps, relic inland dune ridges, and rockland pine forests, where it grows with South Florida slash pine *(Pinus elliottii* var. *dense)* and various tropical hardwoods on limestone outcrops. Other coniferous associates include typical slash pine *(P. elliottii* var. *elliottii),* pond pine *(P. serotina),* and loblolly pine *(P. taeda)* at edges of marshes; longleaf pine *(P. palustris)* on dry sites such as xeric hammocks; and eastern redcedar *(Juniperus virginiana)* in hydric hammocks. Cabbage palmetto is also a component of both temperate and subtropical hardwoods, which include species such as the various evergreen oaks *(Quercus* spp.), loblolly-bay *(Gordonia lasianthus),* redbay *(Persea borbonia),* magnolias *(Magnolia* spp.), sweetgum *(Liquidambar styraciflua)*, red maple *(Acer rubrum)*, baldcypress *(Taxodium* spp.), pignut hickory *(Carya glabra)*, gumbo-limbo *(Bursera simaruba),* cocoplum *(Chrysobalanus icaco)*, Florida strangler fig *(Ficus aurea)*, Florida poisontree *(Metopium toxiferum),* and wild tamarind *(Lysiloma latisiliquum)*. The abundance of cabbage palmetto within a given community is often related to the site's fire history. Cabbage palmetto (fig. 2) can survive fires that kill other arborescent vegetation be-

Figure 2—*Cabbage palmetto, shown dominating a cypress-south Florida slash pine forest following frequent fires. Note the fire-killed cypress snags in the background (Collier County, FL).*

cause of its deeply embedded bud and fire-resistant trunk; it thus tends to form pure stands with periodic burning *(19,27,30)*.

Associated understory vegetation includes gallberry *(Ilex glabra)*, huckleberries *(Gaylussacia* spp.) blueberries *(Vaccinium* spp.), lyonias *(Lyonia* spp.), waxmyrtle *(Myrica cerifera)*, holly *(Ilex* spp.), saw-palmetto *(Serenou repens)*, greenbriar *(Smilax* spp.), bracken *(Pteridium* spp.), blackberry *(Rubus* spp.), poison-ivy *(Toxicodendron radicans)*, bluestem *(Andropogon* spp.), sawgrass *(Cladium jumuicensis)*, beak-rush *(Rhynchosporu* spp.), and such epiphytic plants as the common tree orchid *(Tillandsia* spp.), and various bromeliads in the subtropical hammocks.

Several naturalized exotics, namely casuarina *(Casuarina* spp.), melaleuca *(Melaleuca quinquenervia)*, coconut *(Cocos nucifera)*, and Brazil pepper-tree *(Schinus terebinthifolia)*, are now commonly associated with cabbage palmetto-apparently at its expense-but it is too early to judge the extent of their competition.

Life History

Reproduction and Early Growth

Flowering and Fruiting-Flowers are perfect, about 6 mm (0.25 in) in diameter by 3 mm (0.125 in) long, and creamy to yellowish white *(19,29)*. The showy flowers are borne in profusion in arching or drooping clusters 1.5 to 2.5 m (5 to 8 ft) long, from April through August in south Florida but for only a 4- to 6-week period beginning in the middle of July in North Carolina *(3,31)*. The fragrant flowers are pollinated by bees, although other insects may be of local importance *(3)*. The fruits are black, fleshy, drupelike berries, 5 to 13 mm (0.2 to 0.5 in) in diameter and averaging about 10 mm (0.4 in), each containing a single, hard, brown, spherical seed *(2,3)*.

Seed Production and Dissemination-The fruits mature in the fall and persist on the spadix until removed by wind, rain, or birds such as ring-billed gulls, fish crows, cardinals, and blue jays. Once on the ground, the fruits are eaten by numerous animals or cached by rodents; such caches result in dense patches of seedlings *(3,14,19)*. In near-coast situations, however, the major means of dissemination appears to be by water. The distribution of cabbage palmetto along the Atlantic shoreline is attributed to the seed's buoyancy and tolerance of saltwater. Thus, the range of cabbage palmetto is a function of the speed and direction of estuarine and littoral currents along a shoreline. This fact explains the species spread northward along the Atlantic Coast and its expansion westward along the Gulf Coast *(3)*.

Cabbage palmetto produces large numbers of fruits and seeds each year. In a cabbage-palm hammock in southwest Florida, an estimated 1,530,000/ha of ripe fruits (620,000/acre) were produced per year, of which 9 percent contained intact seeds after 6 months, 1 percent were infested by beetles, and 89 percent had been totally consumed or removed from the site *(19)*.

Predation of cabbage palmetto seeds by a bruchid beetle *(Caryobruchus gleditsiae)* is the major cause of seed loss and regeneration failure *(3,32)*. When seeds are carried off by animals, the probability of predation by this insect is greatly reduced. Seeds falling into water also escape this predation because they tend to be covered by sand or organic debris, so that germination occurs when temperature and moisture conditions become favorable. However, infestation of the fruit while still on the tree is substantial and can reach 98 percent *(5)*. Seeds exposed to the sun for long periods do not germinate well (3).

Germination of cabbage palmetto seeds is hastened by stratification in moist sand for 30 days at 3" C (37" F) *(18)*. Dormancy is also broken if the micropyle cap is removed. For example, germination of untreated seed was 36 percent in 100 days but was increased to 84 percent or more in 4 days by removal

of the micropyle cap (29). Moisture and temperature requirements for germination are satisfactorily met throughout its range. Although the species does not reproduce on the fore dune or beach face, substrate salinity levels encountered on the lee side of dunes or in upper reaches of tidal creeks and marshes do not represent an establishment problem (3).

Seedling Development-Germination of cabbage palmetto is hypogeal. Like other palms, it grows upward from a single terminal bud and outward from the fibrovascular bundles distributed throughout its trunk. Because seeds germinate from middle to late summer, seedling growth the first year normally consists of a primary root, one fully expanded leaf with stem growth obliquely downward forming the rhizome. Ecotypic differences between northern and southern seed sources in seedling photosynthetic and biomass growth rates have been observed *(3)*.

Figure ***S-Cabbage palmetto with boots still attached (Lee County, FL).***

Vegetative Reproduction-No information available.

Sapling and Pole Stages to Maturity

Growth and Yield-Since palms do not have a cambium as such, they do not produce annual growth rings. Cabbage palmetto reaches its maximum development in south-central Florida, but good growth also occurs along the Gulf Coast to the Apalachicola River. Mature trees are straight, unbranched, with heights from 10 to 25 m (33 to 82 ft) and diameters of 30 to 61 cm (12 to 24 in) (21). A dense well rounded crown is almost always formed. On many trees the leaf bases or "boots" remain securely attached while on others they slough off, leaving a fairly smooth trunk (fig. 3). Diameters are exaggerated when these boots remain attached to the trunk. Average growth rates are unknown. One specimen, planted as an ornamental in south-central Florida, grew to a height of 9 m (30 ft) and a diameter including boots of about 76 cm (30 in) in 16 years (6).

Few stand measurements of cabbage palmetto have been made; stem counts, in the rockland pine forest of Everglades National Park (28) and in the sandy marl pine-palm association *(4)* and the mixed swamp forest of the Big Cypress National Preserve *(27)*, showed cabbage palm to be rather abundant, with stems numbering 900/ha (364/acre), 500/ha (202/acre), and 180/ha (73/acre), respectively. In a cabbage-palm hammock just north of the Big Cypress Swamp, the count of cabbage palmetto was 1,010/ha (409/acre), with a basal area of 53.0 m^2/ha (231 ft^2/acre); there were 7,150 palm seedlings per hectare (2,895/acre) under breast height *(19)*.

Rooting Habit-The underground stem of cabbage palmetto is short and bulbous, surrounded by a dense mass of contorted roots commonly 1.2 to 1.5 m (4 to 5 ft) in diameter and 1.5 to 1.8 m (5 to 6 ft) deep. From this mass, tough, light-orange roots often almost 13 mm (0.5 in) in diameter penetrate the soil for a distance of 4.6 to 6.1 m (15 to 20 ft) (22).

Reaction to Competition-Cabbage palmetto is classed as shade tolerant and is probably a climatic climax as well as a fire climax. Since intensive

management of cabbage palmetto has not been tried, the effects of various silvicultural treatments are conjectural. But its management would appear to be simple and straightforward, with the tree managed in either pure or mixed stands under either an even- or all-age management system.

Damaging Agents-In its native environment, only a rising sea level, hurricanes, and organic soil fires are harmful to this species. It is apparently free of damaging insects and most other pathogens, although bole cankers have been reported *(26)*. Seed predation by the bruchid beetle, as previously discussed, would be a major problem but for the large number of seed produced each year.

South of the Tamiami Trail, which crosses the lower part of south Florida, cabbage palmetto mortality is significant because extensive drainage schemes, resulting in a reduced freshwater head, have combined with a rising sea level to produce increased salinities *(1,8)*. Cabbage palmetto has been rated the most wind-resistant south Florida tree but it nevertheless suffered extensive damage from Hurricane Donna in 1960, particularly on Palm Key in Florida Bay (9). Cabbage palmetto growing on organic soil or deep humus deposits are killed by fire burning in this organic layer because of root mortality and loss of mechanical support. The extensive use of these trees in urban landscaping is depleting native stands of mature cabbage palmetto, suggesting a future need to manage stands for this use.

Special Uses

Cabbage palmetto is so called because of its edible terminal bud which tastes somewhat like that vegetable. The bud, also called swamp cabbage, is good both raw and cooked and is commercially canned and sold. Removal of the bud kills the tree, however. Cabbage palmetto was an important tree to the Seminole Indians, who often made their homes on cabbage-palm hammocks (23). They made bread meal from the fruit, which has a sweet, prunelike flavor, and they used the palm fronds to thatch their chickees (huts) and to make baskets *(10,22,25)*. Many other uses of this tree are documented *(17,22,26)*: pilings for wharfs because they resist attacks by seaworms, stems, hollowed out to form pipes for carrying water, ornamental table tops from polished stem cross-sections, canes, scrub brushes from the bark fibers and leaf sheaths, and logs for cribbing in early fortifications because they did not produce lethal splinters when struck by cannonballs.

Currently, young cabbage palmetto fronds are collected and shipped worldwide each spring for use on Palm Sunday. This tree is in flower when many other plants are not and is a significant source of a strong but delicious dark-amber honey.

Perhaps the most important uses are as an ornamental and as wildlife food. The sheer magnitude of its annual fruit crop is such that it provides a substantial part of the diet of many animals such as deer, bear, raccoon, squirrel, bobwhite, and wild turkey *(12,13,18,19,20)*.

Genetics

The only available information on varieties pertains to growth differences between seedlings at Smith Island, NC, and Miami, FL. Both the biomass and the photosynthetic rate of the Miami seedlings were more than twice that of the Smith Island plants, differences that were statistically significant *(3)*.

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