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OUR MISUNDERSTOOD MAHOGANY AND ITS PROBLEMS

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Abstract. **The mahogany tree (*Swietenia mahagoni* (L.) Jacq.), of the family Meliaceae, is native to southern Florida (including the Keys, where it is also called "madeira"), Cuba, the Bahamas, Hispaniola and Jamaica. It is being increasingly used in landscaping in southern Florida without sufficient awareness of its requirements and weaknesses; has even been mistakenly planted on open beaches. It develops a tall, straight trunk and hard, dark wood in hammocks on outcroppings of limetone on the Upper Keys. If close to the shore, it is protected by a fringe of mangroves. On the more humid mainland and poorly drained soil, the wood is pale and not as hard; limb breakage is common. During rainstorms, the tree becomes top-heavy and may topple over. The shootborer, *Hypsipyla grandella* Zeller, attacks the terminus of seedlings in nurseries, causing weak, low, forked and excessively crowded branching, conditions which invite fungal diseases. Large growths caused by *Sphaeropsis* sp. have been observed at the base of thick branches that have split off from the trunk which is usually coated with sooty mold growing on the gummy exudate caused by larvae of the weevil *Copturus floridanus (Lechriops floridanus)* feeding under the bark. The adult weevils feed on the leaves. The mahogany webworm, *Macalla thrysisalis* Walker, shrouds and defoliates mahoganies in spring and the Cuban May beetle, *Phyllophaga bruneri,* scallops and destroys the leaves. The leaf miner, *Phyllocnistis* sp., disfigures the foliage. Various organisms induce leaf spot, witches' broom, canker, gall and root-rot (*Alternaria* sp., *Calonectria hederae* Arn., *Colletotrichum gloeosporioides* Penz., *Cylindrocarpon* sp., *Cytospora* sp., *Diplodia* sp., *Fusicladium* sp., *Gloeosporium* sp., *Helminthosporium* sp., *Hypoxylon rubiginosum* Pers. ex Fr., *Mycosphaerella* sp., *Nectria swieteniae-mahagonii* Chen, *Oidium* sp., *Pestalotia swieteniae* Frag. & Cif., *Phyllachora swieteniae* Petr. & Cif., *Phyllosticta* sp., *Pseudocercospora subsessilis* H. & P., *Pythium splendens* Braun, and *Rhizoctonia* sp.) If culled in the nursery, set out in limestone, 50 ft apart, and regularly sprayed, mahogany trees, with their rounded canopies, give elegance to streets. But defective, neglected mahoganies in unfavorable sites, become ugly and dangerous.**

In the family Meliaceae, there are seven or eight species of *Swietenia,* nearly all of tropical America and including the lofty *caoba,* or Honduras mahogany (*S. macrophylla* King) ranging from southern Mexico to Panama and south to the Amazon regions of Brazil and Peru. This is today the leading commercial source of mahogany timber though its wood is not as fine-grained and hard as that of the best of *S. mahagoni* (28, 35, 39). The latter, often called simply mahogany, or true mahogany, West Indian mahogany, Cuban mahogany, Spanish mahogany, *caoba antillana, acajou* (in Haiti), or madeira (in the Bahamas and the Florida Keys), is native only to Jamaica, Hispaniola, Cuba, the Bahamas, the Florida Keys and a limited area of the southern Florida mainland (4, 7, 15, 19, 26, 27, 31, 37, 41, 46). This is the species that gave mahogany wood its worldwide fame and it has been introduced into many warm areas (including several islands of the West Indies, Bermuda, Costa Rica, Venezuela, Hawaii, Africa, Malaya, Java, Ceylon, India, the Philippines, etc.) (1, 5, 6, 8, 13, 14, 16, 18, 21, 24, 28, 29, 30, 43, 49) as an ornamental or shade for cacao, or for timber.

Description

Swietenia mahagoni is a tree of medium size, usually 30 to 60 ft, sometimes to 75 ft, and all of its parts are smaller than those of *S. macrophylla.* The deciduous, alternate, pinnate leaves, 4 to 8 inches long, have three to four pairs of pointed, unequal-sided leaflets 1 to 4 inches long. Inconspicuous, fragrant, tiny, white, five-petalled flowers are borne in terminal and axillary panicles as early as May and as late as August. The woody, gray-brown, erect, rounded-conical fruit (a five-valved capsule) 3 to 5 inches long, splits from the base upwards in midwinter, pausing like a little open umbrella to release the massed, brown-winged seeds, then falls apart, its sections littering the ground (15, 23, 35, 42, 46).

The tree is slower-growing than *S. macrophylla* (36) but seedlings volunteer readily, springing up (at the rate of 1 to 2 ft per yr) in hedges or amongst other shrubbery where the ground has been disturbed. It has been determined that the tree, grown under 63% shade, goes through 3 distinct growth phases in fall and winter (9). It is hardy at least as far north as Ft. Myers (33).

Habitat

Our mahogany grows naturally in hammocks and forests where it develops a straight, strong trunk, and it is commonly found on limestone (10, 28, 35, 44). Its native habitat in southern Florida was picturesquely portrayed by John Gifford in his book *Living by the Land* (20): "It is common . . . in very low, limestone swamps close to the sea, where it produces wood of exceptional quality. It grows in little groups, often surrounded by red mangroves, and although spots where it grows are a trifle above the surrounding land, it thrives within a few feet of very salt water, flooded at times by storm and often actually sprinkled with salt spray . . . This tree is native to the Madeira Hammock . . . close to the Bay of Florida. Trees which have been there for a long time have on many occasions been flooded with salt water to a depth of several feet, and the land is more or less salty at all times, except when leached by heavy downpours of rain . . . It grows in the midst of the mangrove swamps, on jagged coral rock so rough and full of potholes that walking there is difficult and even dangerous. I know of one bunch of virgin mahogany swamp on Key Largo which we first saw from an airplane. When we finally reached it on foot, we were surprised beyond expectation. It was mixed with a few

other trees, with a deep mass of stuff on the surface, harboring rats that were feeding on the seeds, and a rattlesnake or two feeding on the rats. These trees were soon cut by the owner and may be the last of their kind in this part of the world."

Oldmsted *et al.* (34) say of Madeira Hammock: "This is probably the most extensive hammock type in the mangrove zone. The term 'madeira hanock' has been historically used for these forests apparently because of the past abundance of large mahogany trees (*Swietenia mahagoni*). (Madeira stems from 'madera', wood in Spanish.) Descriptions of dead mahogany stumps from the coastal area and reported salvage lumbering after the 1935 hurricane (Glen Simons and Dr. Taylor Alexander, pers. comm.) suggest larger mahoganies than those currently existing. Although mahogany hammocks further inland have huge mahoganies dominating the forest (34), very few large mahoganies remain in the coastal madeira hammocks, probably because of past fire, logging and hurricanes . . . Madeira hammocks are not flooded except during major storms. The madeira hammocks are underlain by marl and have a 10-15 cm organic layer (leaf mold) which intergrades with the marl layer. The largest living mahoganies encountered during groundtruthing were at Alligator Bay and measured 37-42 cm in diameter and just under 8 m in height."

While mostly found at near sea level, the mahogany ranges up to 2500 ft in Jamaica (35). Fawcett & Rendle (19) quote Browne (1756): "This tree grew formerly very common in Jamaica, and while it could be had in the low lands, and brought to market at an easy rate, furnished a very considerable branch of the exports. It thrives in most soils, and varies both its grain and texture with each; that which grows among the rocks is smaller, but very hard and weighty, of a close grain and beautifully shaded, while the product of the low and richer lands is observed to be more light and porous, of a paler colour and open grain . . . The most beautiful part of the wood is that obtained by sawing across the bottom of the stem and root." Record and Hess quote similar words from Long's *History of Jamaica* (1774) and they (39) and Howard (25) relate much of the fascinating background of the mahogany and its role in the timber trade of the past. Leon and Alain, in *Flora de Cuba* (26) confirm that the wood varies with ecological conditions and is accordingly given different names such as *caoba de perdiz, caoba caracolillo,* or *caobilla.*

Milton Scott, an experienced and well-known wood collector and turner of Miami, provided the wood samples and stemmed cups in Fig. 1 to demonstrate the difference between the dark, strong mahogany of the Florida Keys (madeira) and the pale, less dense mahogany typical of the mainland.

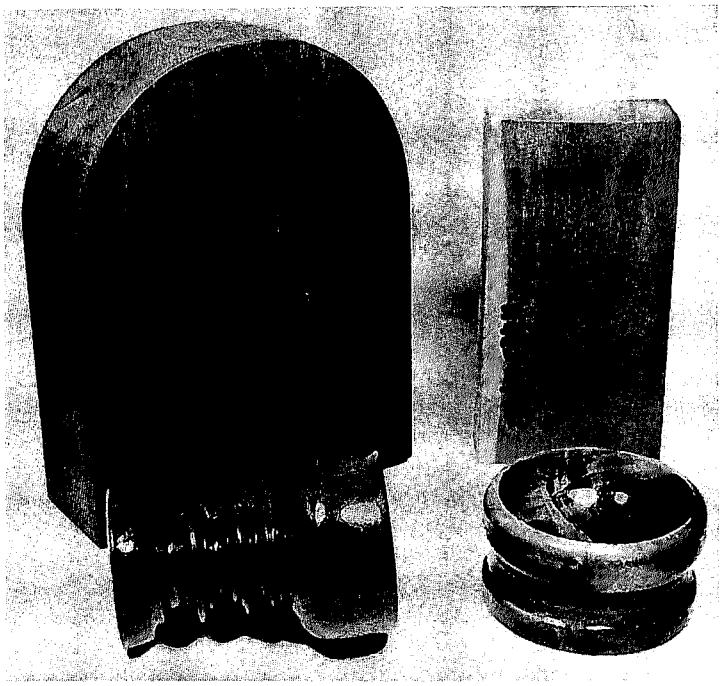
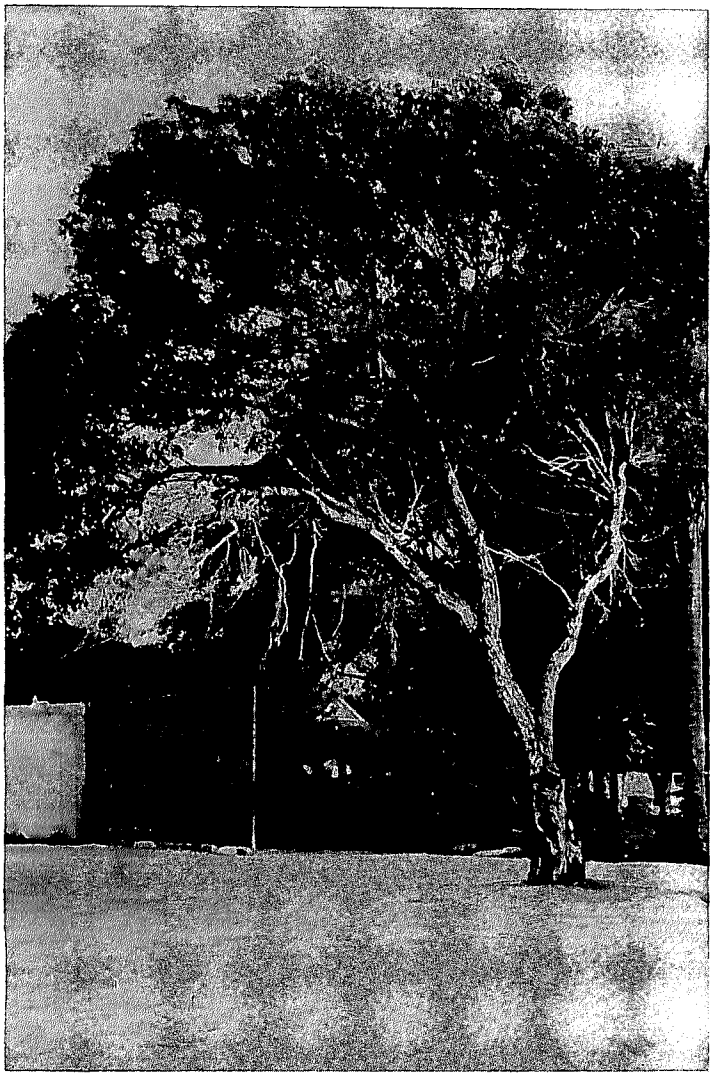


Fig. 1. Milton Scott, master wood-collector and turner of Miami, maintains these samples to demonstrate the contrast between the dark mahogany (madeira) of the Florida Keys and the pale wood of the mainland. Photo by Julia Morton

Perishability of the Mahogany as a Street Tree

Nixon Smiley, Garden Editor of the *Miami Herald,* wrote in 1953 (45): "Several years ago the various parks departments planted these trees in large numbers along roadsides. One of the longest avenues of mahoganies in Florida is on Red Road [SW 57th Avenue]. The planting extends for over four miles, ending beyond the U. S. Plant Introduction Garden . . . The mahogany, incidentally, is the 'tree of the month' at the Miami municipal nursery. Some 1,000 mahogany trees will be given away to city residents during March—provided the trees are planted according to directions." Apparently about the same time mahoganies were planted also on both sides of Le Jeune Road South, from US #1 to Cartagena (formerly Cocoplum) Plaza. These trees and those on Red Road (probably all carefully and unwisely placed in deep holes filled with enriched soil), and individual specimens elsewhere, have suffered much damage over the years. Small branches and frequently very large limbs split off and fall across the highway, not just during hurricanes (17), but whenever there are heavy rains at any time of year. As examples: In February 1983 a large mahogany in the yard of the Alexander School on Red Road fell over during a heavy rain, and at the same time two trees on Old Cutler Road near Ludlam Road snapped off about 3 or 4 ft from the ground and blocked the highway. This past August, a tree on the opposite side of Old Cutler, with a trunk over 2 ft thick, broke off 4.5 ft from the ground and the top fell over the U. S. Departmentof Agriculture fence. In mid-September a branch about 20 ft long split from the lower trunk of a tree about 2 miles further east.

It seems that the crown accumulates so much water that the tree becomes top-heavy and the trunk is too weak to support it. The trunks of these last-mentioned trees seemed externally intact but they were rotten within and even partly hollow. It is increasingly evident that there are physiological problems that render the soft-wooded mainland mahogany so injury-prone, though George Allen, one of the first nurserymen to specialize in native trees, has told me that he has seen heartrot in mahogany trees on the Keys, and Oris Russell, CMG, OBE, took these pictures of a tree that lost a branch, exposing heartrot, during a normal rain in Nassau, Bahamas (Fig. 2 and 3).



Figs. 2 and 3. Mahogany tree in Nassau, Bahamas, that lost a low branch during an ordinary rain, revealing extensive heartrot.
Courtesy Oris S. Russell, CMG, OBE

Pests and Diseases

An obvious major weakness of our mahoganies is low-forking which may begin only a few inches or 1 to 5 ft from the ground. Most of the street trees show evidence of low branch removal in efforts to improve the tree form in early years. Extensive studies over a period of more than 20 yrs in Peru and especially at the Instituto Interamericano de Ciencias Agricolas in Costa Rica (22, 47, 48) have revealed that a shootborer, *Hypsipyla grandella,* is a common cause of low-forking in nursery plots and young plantations of timber trees of the family Meliaceae, particularly *Swietenia mahagoni, S. macrophylla* and *Cedrela odorata* L. It feeds on the seeds in the immature pods, but, more seriously, the larvae attack the terminus of seedlings giving rise to premature forking, consequently short trunks and excessive proliferation of congested branches (Fig. 4 and 5). In the words of Grijpma (48), "Main damage is caused by the larvae, which destroy the succulent terminal shoots by boring into the tip and tunneling in the juvenile stems of saplings and seedlings. Resprouting of the plants, followed by repeated attacks of the insect, generally results in the development of numerous side branches and consequently in badly formed trees, unsuitable for timber production." This pest is active nearly all year.

A prime cause of decline and death of mahoganies seems to be the mahogany notcher, *Copturus floridanus,* a weevil discovered by Seymour Goldweber of the University of Miami in 1954 and identified at the Smithsonian Institution as *Lechiops floridanus* with the help of specimens received from Key Largo and Elliott's Key in 1906. The Florida State Plant Board reported that it had found such weevils on mahogany imported from Cuba in 1937.

The adults are dark brown and hard to detect because they remain motionless for a long time on the bark or in joints between twigs and branches. They feed on the leaves, perforating the leaflets with numerous tiny holes and lay their eggs under the bark. The larvae burrow extensively beneath the bark and feed voraciously on the cambium, all the while excreting resinous gum and reddish frass. Sooty mold growing on this exudate causes the bark of mahogany trees to appear black over most of the trunk and in broad streaks on the branches. Goldweber commented that the weevil, formerly rare, was well established in the greater Miami area in 1956 (11). Now, over 30 years

Fig. 4. Low-forking in young mahogany trees planted too densely on the campus of the University of Miami. Such deformed trees should be culled in the nursery. Photo by Julia Morton

later, it is hard to find a really healthy mahogany in Dade County, and yet apparently nothing is being done to control these weevils.

Residents generally are conscious only of the common mahogany webworm, *Macalla thrysisalis* (40) which often shrouds the tree with a silky net in spring and causes severe or complete defoliation unless controlled by an effective insecticide.

Some people become aware of the Cuban may beetle, *Phyllophaga bruneri* when heavy infestations devour the foliage and are attracted in large numbers by indoor and outdoor lights (12).

A lesser pest is the leaf miner, *Phyllocnistis* sp., which lays eggs on the leaves. The larvae bore into the leaves and make cocoons in the tunnels (12).

I once asked Dr. Robert McMillan, plant pathologist at the University of Florida's Tropical Research and Education Center, Homestead, to look at the trunk of a mahogany on Red Road near 80th Street that had broken off about 3 ft from the ground during a rainstorm. He

Fig. 5. Excessive, congested branching, sooty mold and crotch canker commonly seen on mahogany trees in Dade County, Florida, whether under power lines or not. Photo by Julia Morton

told me that he found termites in it; a result rather than a cause of the heartrot that is now common in our mahoganies. Healthy mahogany wood is highly termite-resistant (3). In humid southern Florida, mahogany crotches are breeding places for the prevalent fungus, *Sphaeropsis* sp. or perhaps *Nectria* sp., which, as the tree grows, forms masses as large as watermelons; such as I saw at the base of a huge branch that suddenly fell off a tree possibly 45 yrs old on the campus of the University of Miami in August, 1986 (Fig. 6). The fracture showed decay and is now oozing much gum, and the low fork is splitting.

According to Alfieri *et al.* (2), the mahogany is subject to various fungal diseases: anthracnose (*Colletotrichum gloeosporioides*), witches' broom (*Diplodia* sp.), leaf spot (*Fusarium* sp., *Fusicladium* sp., *Helminthosporium* sp., *Mycosphaerella* sp., *Pestalotia swieteniae, Phyllosticta* sp., and *Pseudocercospora subsessilis*); root rot (*Fusarium* sp., *Pythium splendens* Braun and *Rhizoctonia* sp.); canker (*Cytospora* sp., *Hypoxylon rubiginosum; Nectria swieteniae-mahogani;* and stem canker and gall (*Cylindrocarpon* sp.).

With all of these problems, it is clear that the mahogany needs more care than it is getting in Florida. The planting

Fig. 6. This heavy branch split off from an approximately 45-yr-old mahogany at the University of Miami during a rainstorm. Note the massive fungal growth on the underside. Photo by Julia Morton

of substandard seedlings should be prohibited and regular spraying should be done to reduce the weevil infestations. Pesticides have made little headway against the shootborer but biological control may be possible for it is parasitized by a species of *Trichogramma* and species of a half-dozen other genera.

In the early 1970's a program was introduced in Central America for the distribution and utilization of certain of these parasites, since many forestry plantations have had to be abandoned because of shootborer depredations (22, 47, 48).

Over-exploited and Vanishing Mahogany

According to Howard (25), mahogany timber was first carried to England as ballast in ships trading with the West Indies. It was at first considered too hard to be useful. Reluctantly a cabinetmaker fashioned a candle-box from mahogany planks sent to a Dr. Gibbons in 1724. The box was beautiful, greatly impressed the Duchess of Buckingham and her enthusiasm created a demand for the wood which, by 1750, was the prime material for Chippendale (25) and Sheraton (32) furniture. From that time on, mahogany of good quality has been prized around the world for boat-building, furniture, cabinetwork and carving. So much was exported from Puerto Rico and Hispaniola that, by 1931, all the marketable supply was exhausted and buyers turned to Cuba where the wood is light-colored at first, darkening after exposure to light. The time came when Cuba, the Dominican Republic and Haiti had to ban the export of mahogany logs (29).

Handicraft from local mahogany has been a source of revenue for Haitians for many years but the trees are now so scarce that wood of *S. macrophylla* has to be imported from Honduras to sustain the industry.

Florida's hobby woodworkers eagerly seek fallen or pruned branches for turnery. In most cases, the honey-colored wood gradually darkens with age to a deep reddish-brown. Wood that is dark-brown at the outset becomes nearly black over a long period of time. In pioneer days, manual-training pupils at the Redlands High School were required to go out and cut their own mahogany timber and fashion it into furniture. I have seen in some of the old southern Florida homesteads handsome suites, now priceless reminders of the days when the mahogany was our pride.

Useful By-product

Residents of southern Florida sometimes complain about the mahoganies in parkways in front of their homes during the season when the hard seedpod segments litter the ground. I have pointed out that these woody parts can be salvaged and used in decorative handicraft. Tropical foresters who extract the seeds for planting accumulate large piles of the empty pods. Ramacharan and Gerber (38) have reported that the crushed shells can serve as a potting medium, alone or mixed with sand. This is of economic importance in small islands of the West Indies where commercial materials (peat, perlite, sand and potting soil) must be imported.

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PURSLANE: A UBIQUITOUS GARDEN WEED WITH NUTRITIONAL POTENTIAL

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Portulaca (purslane) from the family Portulacaceae, which consists of about 16 genera and about 500 species (11), contains over 100 species of low (about 1 foot high), fleshy and often trailing, mostly annual herbs, with reddish stems (2). Its spatulate leaves, approximately 1/2 to 1-1/2 inches or less, are alternate, thick, sometimes cylindrical; the upper forming a leafy involucre subtending the often showy and variously colored flowers, usually with five distinct petals and with several to many stamens (2). The flowers open in direct sunshine but close in shade (2). The fruit is a round capsule 1/8 inch long, containing many small black seeds. A characteristic of the seed capsule is its transverse dehiscence, the top coming away as a little cap (17).

The names are legion: The most graphic are those used in Malawi, all of which mean the same, namely "the buttocks of the wife of a chief"—from the shape of the leaf (8).

Purslane is a succulent herb, found as a weed throughout the tropical and subtropical regions. In the United States, it is most abundant in the Northeastern states: However, in Florida this disease resistant plant flourishes throughout the state—in hammocks, pinelands, sandy fields and cultivated ground (9). *Portulaca grandiflora* is a common ornamental ground cover grown in Florida. Its thick, succulent leaves and roots enable it to withstand hot and dry weather. Because of its high tolerance for different light intensities, temperature ranges, and soil types, purslane, a prolific seed producer, can become a serious weed pest in vegetable fields and ornamental nurseries.

Whether an abundant weed or common pot-herb obtained from plants which come up in cultivated and waste ground (4), purslane is, nevertheless, a highly nutritional vegetable for both animal (fodder) and human consump-