***Hibiscus pernambucensis* Arruda** seaside mahoe
MALVACEAE

Synonyms: *Hibiscus tiliaceus* var. *pernambucensis* (Bertol.) I.M. Johnston
Hibiscus tiliaceus ssp. *pernambucensis* (Arruda) Castell
Hibiscus arboreus Ham.
Paritium pernambucense (Bertol.) Don

General Description.—Seaside mahoe is also known as sea hibiscus and rope mangrove in English, emajagua and majagua in Spanish, and mahoe doux, mahaut, and bois flot in French (Howard 1989, Liogier 1994). It is a large shrub or occasionally a small tree. The species normally grows in tangled thickets formed by stems that sag until they touch the ground and form roots. Simultaneously, sprouts arise from the horizontal stems and grow upward until they in turn become prostrate. Occasionally, especially on dry ground, open-grown individuals grow in a tree-like habit. Adult plants have an aggressive lateral root system with abundant fine roots. The bark of the limbs and trunks is gray and smooth, but can become furrowed and scaly in old stems. The leaves are nearly round (10 to 15 cm in diameter) except for a deeply cordate base and a pointed tip. The petioles are long (6 to 9 cm). Seaside mahoe produces large yellow flowers that change to orange or red as they age. Soon after, 2-cm long, hairy, cone-shaped capsules develop, and upon drying, split open along five lines to release their seeds.

Range.—Seaside mahoe is native to coastal areas of Bermuda, southern Florida, the Bahamas, the Greater and Lesser Antilles, and from Mexico through Brazil on the Atlantic Coast and in Pacific coastal areas from Mexico to Peru (Little and Wadsworth 1964). Seaside mahoe is similar to and once was classified as a variety of *Hibiscus tiliaceus* L. All the New World natives are now thought to be *H. pernambucensis* (Howard 1989).

Ecology.—Seaside mahoe usually grows just inland of mangroves around brackish lakes and along rivers in the lower reaches of their floodplains. Thickets have formed from planted individuals in abandoned subsistence farms in rainy (usually above 2000 mm of precipitation) upland sites with poorly drained soils. It also grows as a beachfront tree in association with *Terminalia catappa* L. (Malavasi and Malavasi 1999). Seaside mahoe grows on hummocks and sand dunes in southern Florida (West and Arnold 1952). The sandy habitat probably has a water table within reach of the roots. Seaside mahoe suffers when there are droughts and appears to require poorly drained sites to form the characteristic thickets. Although the species grows near brackish lakes, it is definitely less tolerant of saline conditions than the mangroves. All textures of soil with a wide range of mineral fertility are represented in seaside mahoe habitat. The northern extent of the range is limited by the frost line.

Seaside mahoe grows in nearly pure stands. Even artificially established stands in upland areas maintain themselves for many decades. This can probably be attributed to its rapid growth, profuse sprouting, and the dense crowns that are formed. Seedlings of other species rarely survive for long. A number of insects have been collected from seaside mahoe (Martorell 1975). Although no insect seriously threatens the species, aphids (Aphidoidea), white flies (Aleyrodidae), and mealy bugs (Pseudococcideae) sometimes cause chlorosis and slower growth.

Reproduction.—The principal means of reproduction is by the layering and sprouting of prostrate stems. The old prostrate stems eventually die and rot, leaving the sprouts as new, isolated individuals. Seeds are produced in relative abundance and occasionally result in seedlings that can eventually establish new clones. Streams and floodwaters are the only known effective vector of seed dispersal.

In wetter habitat, seaside mahoe flowers continuously throughout the year (Little and Wadsworth 1964). The species flowers seasonally in habitat with drought stress during part of the year. The flowers are pollinated by insects, and yield mature seeds about 1 month later. Fruits can potentially produce at least 40 seeds per fruit. In one collection from upland habitat in Puerto Rico, fruits averaged only 7.7 filled seeds per fruit. In two other Puerto Rican collections from upland habitat, the seeds averaged 0.018 $\pm$ 0.006 and 0.024 $\pm$ 0.003 g/seed. These seed collections yielded 41 and 53 percent germination, which occurred between 15 and 220 days after sowing. Germination is epigeal. Seedlings are easily raised in the nursery from seed using traditional techniques. Plants can be established from cuttings and air layers (Workman 1980). In one small planting in Puerto Rico, 40 of 140 untreated cuttings (45 cm long and 2.5 cm minimum diameter) placed directly in the planting site rooted and grew aggressively. Plants can also be started from very large cuttings as living fence posts (Little and Wadsworth 1964).

Growth and Management.—Seaside mahoe grows rapidly from sprouts and can extend its leader 3 m or more per year. Seedlings grow slowly at first. A group of 6-month-old seedlings averaged only 17 cm in height. Probably, 1 year is required before nursery seedlings are ready for outplanting. Seaside mahoe may occasionally reach 12 to 15 m in height (Workman 1980), but more typically reaches only 6 m in height and 15 cm in stem diameter. Because the species is mainly valued in natural stands for environmental protection and because it aggressively maintains nearly pure stands, little or no management is required once it is established. One unwanted upland stand was converted to timber species by slashing the seaside mahoe, piling the slash between the planting spots, and planting seedlings of *Eucalyptus grandis* Hill ex Maiden, *Terminalia ivorensis* L., and *Hibiscus elatus* Sw. in the small cleared planting spots with no other treatment. The fast-growing species that were planted overtopped the sprouting seaside mahoe and eventually suppressed them.

Benefits.—The fibrous inner bark was formerly used to make ropes, cords, fish nets, floats, cloth, and mats. It is still used for emergency ties and lashings. The wood is used for fuel in underdeveloped areas (National Academy of Sciences 1983). The flowers make a colorful and tasty addition to salads and can be cooked as a vegetable (Workman 1980). The young leaves, bark, and roots were reportedly used for food during famines in former times (Little and Wadsworth 1964). Bees make honey from the nectar. The plant is used as an ornamental and to stabilize stream banks (Workman 1980).

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