SCAEVOLA (GOODENIACEAE) IN SOUTHEASTERN UNITED STATES

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ABSTRACT

Two species of *Scaevola* (Goodeniaceae) occur in southeastern United States: *S. plumieri* (L.) Vahl, a native strand plant, and *S. sericea* Vahl, a shrub used as an ornamental and sparingly escaped and naturalized. Notes on biology, and keys to and descriptions of taxa, including two varieties of *S. sericea*, are given.

Two species of *Scaevola* (Goodeniaceae)—a genus of about 80 species—are littoral plants widely distributed in warm regions. The Indo-Atlantic *S. plumieri* (L.) Vahl (Fig. 1) occurs from Ceylon and India west through the Mascarenes (Guillaumet 1976) and eastern, southern, and western Africa (Somalia to Cape Province to São Tomé) (Davies 1978) to Florida, Louisiana, Texas, the West Indies, the Galápagos, and continental tropical America. The Indo-Pacific *S. sericea* Vahl (Fig. 2) is native from eastern Africa (Kenya, Tanzania, and Natal) (Davies 1978), Madagascar, the Mascarenes, and the Seychelles east through India, southeastern Asia, Malaysia, and tropical Australia to Melanesia, Micronesia, and Hawaii; it is naturalized elsewhere, e.g., in Florida and in the Bahamas (Correll and Correll 1982). Thus, as Guppy (1917) pointed out, the two taxa divide between them the tropical shores of the world.

Scaevola plumieri and *S. sericea* owe their wide distribution primarily to the ocean-current-dispersed stones of their fruits. The stones of *S. sericea* are buoyant because of a corky outer layer; in contrast, those of *S. plumieri* lack such a layer but usually have one empty, watertight locule (Brizicky 1966; Guppy 1906, 1917). Stones of the former species can float in sea water for at least a year (Guppy 1890, 1906, 1917); those of the latter, for only 4 or 5 months (Guppy 1917).

Fruits of *S. sericea* float with or without their fleshy outer layer; this portion, if not worn off by beach sand before the fruits reach the water, is

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Figure 1. *Scaveola plumieri*: flowering-fruiting branch, × 1; upper left, flower, adaxial view, × 2.

Figure 2. *Scaevola sericea*: flowering-fruiting branch, × 1; upper left, flower, adaxial view, × 2.

said to disintegrate "during the early days of . . . immersion" (Guppy 1890). Fresh drupes of *S. plumieri*, upon getting into the sea, will, according to Guppy (1917), "sink in two days, the buoyant stone, on being freed from the decaying fruit, soon floating to the top," an observation somewhat at variance with ours. Drupes we placed in sea water on 23 July 1985 never did sink but remain, 15 months later, as buoyant as ever. The fleshy portion is still intact (but barely so), doubtless because the fruits have been in still water in a beaker rather than in the moving, often turbulent sea.

Lesko and Walker (1969) found that stones of *S. sericea* showed no "significant loss" in viability after 50 days of floating in sea water. Indeed, such fruits germinated 1 − 2 weeks sooner than dry ones when placed in non-saline environments.

Dispersal of the two taxa may also be accomplished by frugivorous birds. Indeed, the fruits seem as well suited for ornithochory as for hydrochory; Guppy (1917) and Schimper (1891) suggested the agency of birds for local dispersal, that of ocean currents for long distances. A note on a specimen of *S. plumieri* from Barbuda (*J. S. Beard 367*, GH) reads: "fruit said to be eaten by gulls" (Altschul 1973). Julia F. Morton (pers. comm.) was told in 1982 by D. S. Correll that, on Pine Key in the Caicos Islands, he watched seagulls devouring all the fruits on *S. plumieri*, coming in great flocks to feast on them. Millspaugh (1907), in his paper on the Florida Keys, stated that "the black, pulpy fruits of [*S. plumieri*] form a very attractive food for land birds; it thus becomes scattered far throughout the Antillean region." Louda and Zedler (1985) wrote that, among the four Pacific atoll species whose fruit and seed predation they studied, *S. sericea* (as *S. taccada*) had the highest rate of fruit disappearance, due to hermit crabs and, possibly, birds.

Scaveola sericea is apparently a recent introduction to the naturalized flora of Florida. It is mentioned as a plant "confined to the Eastern Hemisphere," but not as one cultivated or spontaneous in the southeast, by Brizicky (1966) and is absent from Long and Lakela (1971). It is not included in Shelter and Skog (1978) or in the "United States and Canada" section of *National List of Scientific Plant Names* (Soil Conservation Service, U.S.D.A. 1982) (it is listed, of course, in the "Hawaii" section). Kartesz and Kartesz (1980) listed the species—in four varieties—but there is no way to tell from their listing which, if any, of the varieties was known to them from conterminous United States as opposed to Hawaii, where all four varieties occur (Hawaiian plants are accounted for in the Kartesz and Kartesz work). Finally, the presence of the species—but only the sericeous variety—in Florida is acknowledged in Wunderlin's (1982) central Florida manual.

Scaevola sericea is cultivated as an ornamental in southern Florida, where its use is increasing. We have seen it as a hedge plant on Sanibel Island and on Key Biscayne. With its glossy, bright green leaves, its white to lavender flowers, and its white fruits, it is indeed attractive. The appearance of the fruits is recalled in one common name we heard for the plant, "hailstones" (see also Neal 1965).

In Florida, *S. sericea* spreads from cultivation—presumably by seeds—to nearby thickets, woodland borders, canal banks, and waste places, as on Sanibel Island. Its stones are obviously dispersed by ocean currents, too. For example, on the foredune near Marathon High School, Key Vaca, Monroe County, both varieties of *S. sericea* grow with *S. plumieri*—all certainly spontaneous—just 2 or 3 meters from waters of the Straits of Florida. We noted, on Key Biscayne, an individual of *S. sericea* var. *sericea* about 40 cm tall rooted in sand between beached sailboats on the upper strand; we suspect that it could have originated from a washed-up stone or from a fruit produced on a hedge of *S. sericea* about 100 m away. It certainly was *not* deliberately planted where it was growing.

The pollen-presentation mechanism of Goodeniaceae is an outstanding feature of the flowers (Brizicky 1966; Carolin 1960; Krause 1912; Kugler 1973). The style bears at its apex a pollen-collecting cup (or "cupular indusium") within which is the stigma. The anthers, more or less coherent, release their pollen introrsely while the flower is still in bud; the pollen collects in the cup as the style elongates. At anthesis, the enlarging stigma pushes at least some of the pollen out of the cup onto the trichomes of the cup's apex and exterior. Pollen from the cup and the trichomes is then dusted onto visiting insects (bees, wasps, beetles, and butterflies; perhaps only the first two mentioned are effective pollinators). The stigma finally becomes receptive after the pollen is all or mostly gone from the cup. Hairs of the cup then brush pollen off visitors, bringing it to the stigma.

The nomenclature of *S. plumieri* and *S. sericea* has been reviewed by Jeffrey (1980). It is hoped that his conclusion that *S. sericea* is indeed the correct name of this species will lay to rest the long-standing controversy and confusion over the matter.

Jeppesen (1981) wrote that *S. plumieri* and *S. sericea* (as *S. taccada*) are "very similar and . . . may prove to be one polymorphous pantropical species," a suggestion that seems to us untenable. The taxa are, at least in Florida, certainly easily separable. Guppy (1917) noted: "The two plants, as was evident to me when I first met *Sc. plumieri* in the West Indes, are quite distinct, and could not be mistaken by any one with both before him." To the other features that characterize the two should be added the

fact that *S. sericea* is frequently grown as an ornamental and *S. plumieri* is not—at least we have not seen it so, although the species is offered by at least one southern Florida nursery specializing in native plants. *Scaevola sericea* is propagated with ease by cuttings; *S. plumieri*, only with difficulty by this means (A. Sprunt, Jr., pers. comm.).

TAXONOMIC ACCOUNT

The account below follows, in general, the format established for *Vascular Flora of the Southeastern United States*.

SCAEVOLA L.

Evergreen, monoclinous shrubs. Leaves simple, alternate, often crowded at branch tips, blade tapering to a sessile or subpetioled base. Inflorescence cymose, axillary, bracteate. Flowers perfect, zygomorphic, epigynous; calyx of 5 sepals; corolla of 5 united petals, split to base adaxially, tube woolly inside, limb 1-lipped, spreading, resembling an outstretched hand, lobes more or less equal, narrowly ovate, apex acute, margins with thin, induplicate wings; stamens 5, free, the pollen subprolate to prolate, 3-colporate (Dunbar 1975; Moreira and Belem 1978); carpels 4 but appearing as 2 (Carolin 1959, 1966); stigma within a ciliate, pollen-collecting cup; style elongate; ovary inferior, 2-loculed, ovule 1 per locule. Fruit a fleshy drupe, 1 – 2 seeded.

Cyme with central flowers sessile, laterals pedicelled; calyx more or less obsolete to clearly 5-lobed, the lobes broadly ovate to broadly triangular, 0.2 – 1 mm long; drupe black ..... 1. *S. plumieri*

Cyme with all flowers pedicelled; calyx 5-lobed, the lobes linear to narrowly obovate or narrowly elliptic, 3.5 – 5 mm long; drupe white to yellowish-white ..... 2. *S. sericea*

1. S. PLUMIERI (L.) Vahl. Beachberry, inkberry. Shrub 15 – 150 cm tall, often colonial; stems glabrous or essentially so, often glandular, the leaf axils white-pilose with hairs 0.5 – 2 mm long. Blades narrowly to broadly elliptic or obovate, 2.5 – 10 cm long, 0.5 – 5 cm wide, glabrous or nearly so, sometimes minutely glandular, apex rounded to obtuse, sometimes apiculate, margin entire. Cymes simple to 1-compound, or 1-flowered by reduction; central flowers sessile, laterals pedicelled. Calyx more or less obsolete to clearly 5-lobed, the lobes broadly ovate to broadly triangular, 0.2 – 1 mm long, glabrous, rounded to obtuse; corolla white to pinkish-white adaxially, pale greenish to pale yellowish abaxially, 1.8 – 2.4 cm long. Drupe subglobose to ellipsoid, 1 – 1.8 cm long, 1 – 1.6 cm wide, black. (n = 8; Kausik 1939). Spring-fall. Coastal dunes and beaches; cp.

Fla (all coastal counties north to and including Hillsborough and Pinellas on the west coast and Brevard on the east); La (Jefferson Parish [Timbalier Island], where collected in 1937: *E. B. West 123*, LSU; Brown 1945); and Tex (Kleberg County, where collected in 1954: *F. B. Jones 1082*, SMU). The Louisiana and Texas (?) populations may be "one-time" introductions and possibly not persistent.

2. S. SERICEA Vahl. Beach naupaka, hailstones. Shrub 0.5 – 2 m tall (7 m maximum recorded in *Flora Malesiana*; Leenhouts 1957); stems glabrous or essentially so or lightly to heavily sericeous or glandular-sericeous, the leaf axils conspicuously white-pilose with hairs 1.5 – 7 mm long. Blades elliptic to spatulate or obovate, 4 – 21 cm long, 1.8 – 9 cm wide, often minutely glandular, apex truncate or slightly emarginate to obtuse, sometimes apiculate, margin entire to shallowly crenate. Cymes usually 2 – 4 compound; all flowers pedicelled. Calyx 5-lobed, the lobes linear to narrowly obovate or narrowly elliptic, 3.5 – 5 mm long, acute to obtuse; corolla white to pale lavender adaxially, pale greenish-yellow abaxially, 1.8 – 2 cm long. Drupe subglobose to ellipsoid, 1 – 1.7 cm long, 1 – 1.5 cm wide, white to yellowish-white. (n = 8; Carr 1978; Skottsberg 1953). Spring-summer. Coastal dunes, beaches, woodland borders, thickets, canal banks, and waste places; cp. Fla [*S. frutescens* Krause; *S. koenigii* Vahl] The two taxa below are cultivated in Fla; both are sparingly escaped and extending their ranges as naturalized plants.

Leaves lightly to heavily sericeous (Fig. 3a) ..... 2a. var. *sericea*
Leaves glabrous or essentially so (Fig. 3b) ..... 2b. var. *taccada*

2a. var. SERICEA. Stem lightly to heavily sericeous; inflorescence sericeous. Fla: Dade, Lee, and Monroe counties.

2b. var. TACCADA (Gaertn.) Thieret & Lipscomb. Stem glabrous or essentially so; inflorescence glabrous to sericeous. [*S. taccada* (Gaertn.) Roxb.] Fla: Monroe County.

The status of the infraspecific taxa of *S. sericea*, a most variable species, is subject to verification following study of the plant throughout its natural range.

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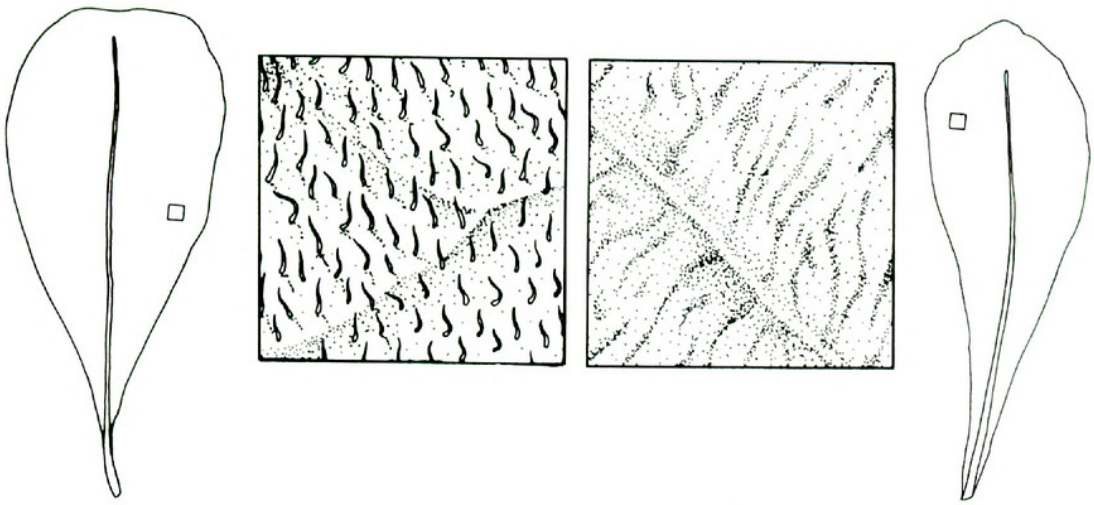

Figure 3. *Scaevola sericea*, leaves, showing vestiture: left, var. *sericea*, leaf, × 1/2, inset, × 20; right, var. *taccada*, leaf, × 1/2, inset, × 20.

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