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Scaevola rialagartensis (Goodeniaceae), a new species from coastal sand dunes of Rio Lagartos, Yucatan, Mexico

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Abstract

A new species, *Scaevola rialagartensis* Cast.-Campos is described and illustrated from coastal shrubland and vegetation bordering mangroves in Rio Lagartos, Yucatan, southeastern Mexico, where it is considered endemic. The new species is similar to *S. plumieri, S. taccada* and *S. wrightii*, all of which grow in similar environments, but can be differentiated from these in the size of shrubs, shape of axes, and nerves along leaves.

Keywords: Yucatan, Rio Lagartos, endemic, coastal dunes, Flora de México, Goodeniaceae

Resumen

Se describe e ilustra a *Scaevola rialagartensis* Cast.-Campos como una nueva especie. Este nuevo taxón forma parte del estrato arbustivo del matorral de dunas costeras y bordes del manglar en la zona de Río Lagartos, Yucatán, México de donde se considera endémica. La nueva especie tiene similitud con *S. plumieri, S. taccada* y *S. wrightii,* las cuales habitan en ambientes similares. Sin embargo, se distingue de estas especies por el tamaño de los arbustos, forma del ápice y tipo de nerviación de las hojas.

Palabrasclave: Yucatán, Río Lagartos, especie endémica, dunas costeras, Flora de México, Goodeniaceae

Introduction

The family Goodeniaceae R. Br., is represented by 11–12 genera and about 380–440 species worldwide (Avendaño-Reyes 2008, Howarth *et al*. 2003, Grande & Nozawa 2010, Márquez *et al*. 2013). The genus *Scaevola* L. is one of the most diverse in the world, with approximately 130 species. This genus is characterized by flowers either solitary or arranged in terminal or axillary inflorescences, with or without involucral bracts, hermaphrodite, small or medium-sized, very irregular, zygomorphic, pentamerous; perianth 2-verticillate; chalice generally small or reduced to a small ring; gamosepalous; ovary superior or inferior, 1–2 up to four locules; placentation axillary; style single; 1–3 papillate stigmas. Fruit a drupe, capsule, or nut; fleshy or not; dehiscent or indehiscent (Avendaño-Reyes 2008).

Scaevola species are found in arid or periodically arid locations, with a low plant cover (Grande & Nozawa 2010). In the Americas, the only three *Scaevola* species (*S. plumieri* (L.) Vahl, *S. taccada* (Gaertn.) Roxb. and *S. wrightii* (Griseb.) Maza) are typically coastal and can be found on the beach and in coastal thickets (Gutiérrez-Báez *et al*. 2013). Until now, *S. plumieri* was considered to be the only *Scaevola* species native to the Americas (Thieret & Brandenburg 1986; Howard *et al*. 2003).

The three American *Scaevola* species are located along the Atlantic and Pacific coasts. The distribution of *S. plumieri* and *S. taccada* ranges from the Hawaiian Islands in the north to Venezuela in the south. The third American species, *S. wrightii* is endemic to Cuba (Howarth *et al*. 2003).

In Mexico, the family is represented by the species *S. plumieri* (L.) Vahl, which is distributed in some states of

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the Pacific coast and along the Gulf of Mexico and the Yucatan Peninsula (Avendaño-Reyes 2008, Gutiérrez Báez *et al.* 2013; Parra-Tabla *et al*. 2018). The distribution of *Scaevola rialagartensis* sp nov. is restricted to sand dunes in beaches of Rio Lagartos, Municipality of Rio Lagartos, located within the Ria Lagartos Biosphere Reserve (ANP, *Área Natural Protegida*), Yucatan, Mexico (Fig. 1). Consequently, considering the species described in this paper and the one already known, two species of the genus *Scaevola* are currently known in the state of Yucatan in particular, and in Mexico in general.

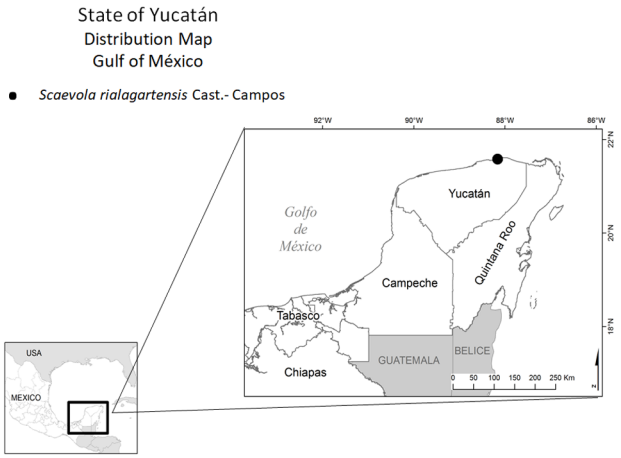

FIGURE 1. Location map of *Scaevola rialagartensis* Cast.-Campos sp. nov.

Material and Methods

During the exploration of the coast of the Ria Lagartos Biosphere Reserve, specimens of the genus *Scaevola* (Goodeniaceae) were collected; some clearly belonged to *S. plumieri*, but others showed morphological traits that differed from those of the species already described. The differences between these specimens and the species distributed in the American continent clearly support the definition of a new taxon, *Scaveola rialagartensis* (Figs. 2 and 3 a, b, Table 1). In order to make a detailed comparison of the characters between *S. plumieri* and *S. rialagartensis*, we reviewed specimens of the genus *Scaevola* collected in Mexico and deposited in the largest herbaria in Mexico (CHAPA, ENCB, MEXU, and XAL), using a Carl Zeiss microscope (Stemi 2000-C, Barrington, USA).

Taxonomic treatment

Scaevola rialagartensis Cast.-Campos, **sp. nov.** (Figs. 2–3)

Type:—MEXICO. Yucatan: Rio Lagartos, Rio Lagartos beaches, east of the town of Rio Lagartos 21°30’54”–87°41’05”, 0 m, 9 October 2018, *G. Castillo-Campos & J.J. Pale P. 29321* (holotype XAL!; isotypes CICY!, ENCB!, MEXU!).

Diagnosis.—This taxon is similar to *S. taccada*, a species used as an ornamental plant in hotel areas across the American continent; the new taxon grows sympatrically with *S. plumieri* on the beaches of Rio Lagartos, Yucatan, Mexico. However, *S. rialagartensis* differs in the size of shrubs, shape of leaf apex, and type of leaf venation (Table 1).

Shrubs 1–2.3 m in height, usually prostrate. *Stem* 4 cm in diameter at the base of the main trunk, cylindrical, succulent; brown, occasionally yellow or greenish; with numerous foliar scars on branches. *Branches* prostrate on the sand. *Leaves* alternate, arranged spirally around the stem, often revolute; lower leaves deciduous, upper or terminal leaves mostly clustered near the apex of branches; ovate to broadly spatulate, 7.1–22 × 4.5–8.1 cm; fleshy; margin entire, apex slightly obcordate to truncate; base narrow; bearded-canescent axillary, glabrous on the upper and under surfaces; glands at some tips of secondary venation that reaches the margins when fresh but lost upon drying; venation reticulate with 8–13 pairs of lateral nerves; midrib prominent on the lower surface, printed in the upper surface; secondary venation prominent on the lower surface, visible on the upper surface; petiole winged, 5–12 mm long. *Inflorescences* paniculate, 4–6 cm long. *Involucral bracts* triangular, 2 × 0.5 mm, glabrous externally, bearded-canescent axillary.

Peduncles axillary, 20–25 mm long, 1 mm thick, glabrous. *Flowers* 3–12 per inflorescence, pedicels 1.5–6.5 mm long, 0.3–0.5 mm thick. *Chalice* perennial, 5 sepals separated from the base, occasionally inserted, subulate, 2–3 × 0.5–1 mm, glabrous. *Corolla* white, woolly internally, 1.5–2.3 cm long; lobes 5(6), whitish, divided by the upper half of the corolla tube, linear to lanceolate, subacute, 7–8 × 1–1.8 mm; margin wide, membranous, crenulated; tube 8–9 mm long, 1.5 mm thick, villous internally, glabrous externally, open laterally from its base. *Stamens* 5, 10 mm long, 0.2–0.3 mm thick. *Anthers* separate or connivent, attached at base, 2–2.5 mm long, 0.5 mm wide. *Style* 10 mm long, greenish, pubescent, incurved, with cup-shaped indusium surrounding the stigma; villous-canescent, 1–1.5 mm in diameter. *Fruit* a drupe, ovate or globose, fleshy, glabrous, 0.8–1.7 cm long, white when ripe, succulent. *Seeds* nut-shaped, brown, 0.6–0.7 cm long, 0.4–0.5 cm wide; raphe surrounding the seed lengthwise; testa woody, muriculate, covered by two layers: the outer fleshy; the inner, by a spongy aril.

TABLE 1. Comparison between the morphological characters of *Scaevola rialagartensis* sp. nov. with known species distributed in America (*S. taccada, S. plumieri*, and *S. wrightii*)

Character	*S. rialagartensis*	*S. plumieri*	*S. taccada*	*S. wrightii*
Habit	Shrub, 1–2.3 m high	Shrub, 0.30–0.75 m high	Shrub or small tree, 1–7 m high	Shrub, 1–2 m high
Leaf length and width (cm)	7.1–22 × 4.5–8.1	2–8 × 2–7	10–22 × 4–8	2.5–7 × 1–2
Leaf apex	Slightly obcordate to truncate	Rounded	Obtuse to rounded, truncate to emarginate	Obtuse to acute, mucronate
Venation	Reticulate	Hyphodromous	Eucamptodromous	Unknown
Leaf shape	Ovate to broadly spatulate, with margin revolute	Obovate to broadly spatulate	Spatulate to obovate, with margin revolute	Spatulate to oblong-oblanceolate
Number of flowers per inflorescence	3–12	3	5–13	1–2
Flower length (cm)	1.5–2.3	2.0–2.5	2	1.7–2.5
Distribution	Yucatan, Mexico, endemic	Widespread in America and tropical Africa	Widespread in the Pacific and Indian Oceans	Endemic to Cuba

Geographic distribution and ecology:—After a recognition survey to islands and coastal dunes of the Ria Lagartos Biosphere Reserve in the state of Yucatan, Mexico, collecting the most common species, some individuals of *Scaevola rialagartensis*, probably endemic to this region of Mexico, were found growing at the edge of the mangrove forest at an altitude of 0 to 1 m.

Scaevola rialagartensis is a species of shrub vegetation growing along coastal dunes, along the edges of mangrove forests on white sandy soils, at an altitude of 2 m a.s.l., mainly on coastal dunes of the Rio Lagartos beach. Based on the Köppen climate classification, the coastal zone of Yucatan presents a strip of BS (dry or arid) climate, with some variations characterized by scarce rains and high temperatures (Orellana *et al*. 1999). According to 1971–2000 records of the National Meteorological System, the El Cuyo weather station records a rainfall of 779 mm per year and an mean annual temperature of 26.8 °C (Torres *et al*. 2010).

Adult individuals of the new taxon reach up to 2.30 m high. They occur together with *Atriplex canescens* (Amaranthaceae), *Avicennia germinans* (Acanthaceae), *Bidens pilosa* (Asteraceae), *Canavalia rosea* (Fabaceae), *Cassytha filiformis* (Lauraceae), *Coccoloba uvifera* (Polygonaceae), *Conocarpus erectus* (Combretaceae), *Distichlis spicata* (Poaceae), *Ernodea littoralis* (Rubiaceae), *Ipomoea pes-caprae* (Convolvulaceae), *Lantana involucrata* (Verbenaceae), *Scaevola plumieri* (Goodeniaceae), *Sesuvium portulacastrum* (Aizoaceae), *Sporobolus virginicus* (Poaceae), *Suriana maritima* (Surianaceae), *Tournefortia gnaphalodes* (Boraginaceae), *Tribulus cistoides* (Zygophyllaceae), *Rhizophora mangle* (Rhizophoraceae), *Waltheria indica* (Malvaceae).

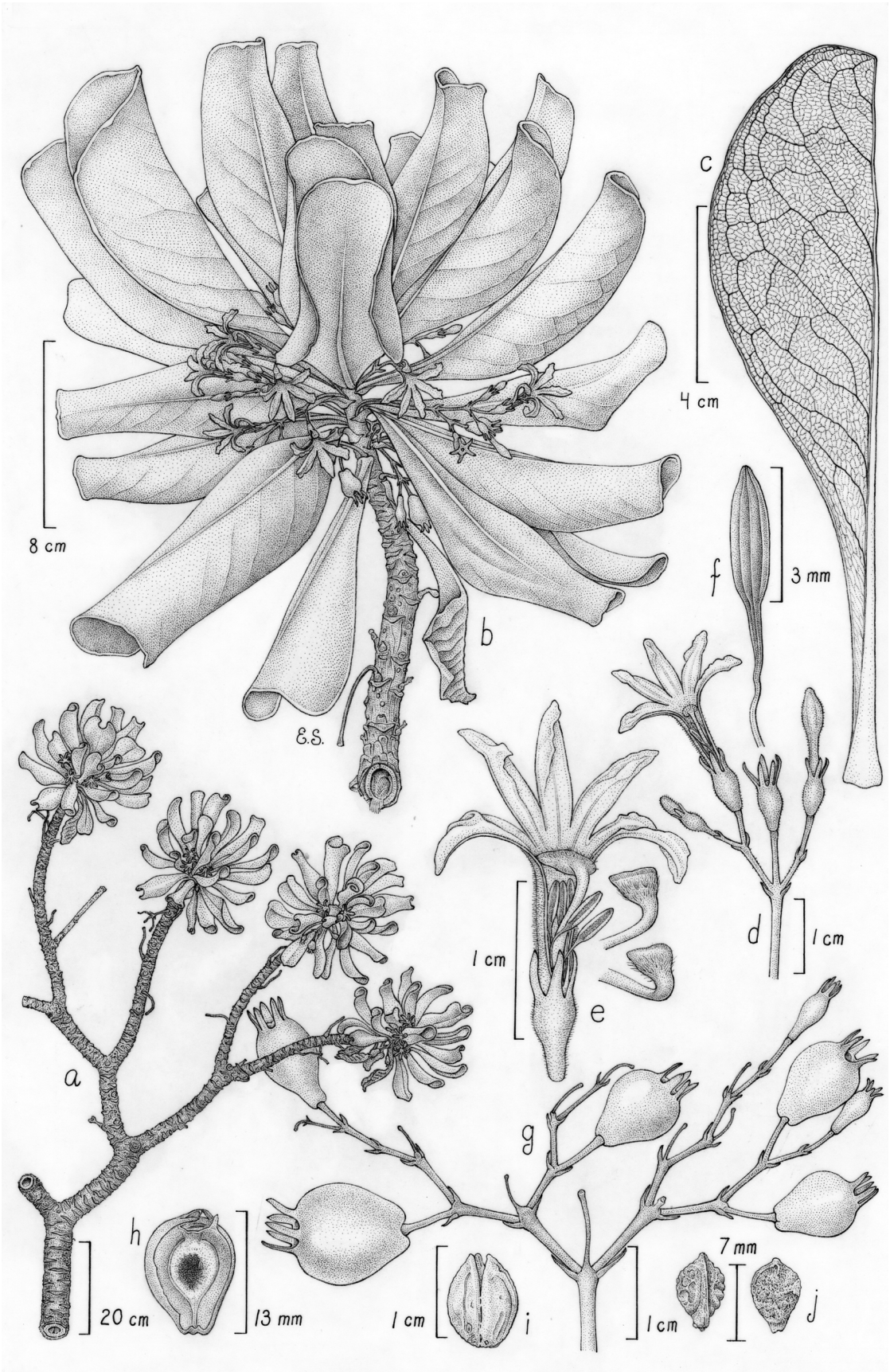

FIGURE 2. Illustration of *Scaevola rialagartensis*. a, portion of the habit; b, branch with flowers and fruits; c, detail of the leaf; d, portion of the inflorescence; e, flower with stigma details; f, stamen, g, portion of the infrutescence; h, fruit, longitudinal section; i, seed covered with the aril; j, seeds. Illustration by Edmundo Saavedra based on the holotype specimen *G. Castillo-Campos & J.J. Pale P. 29321*.

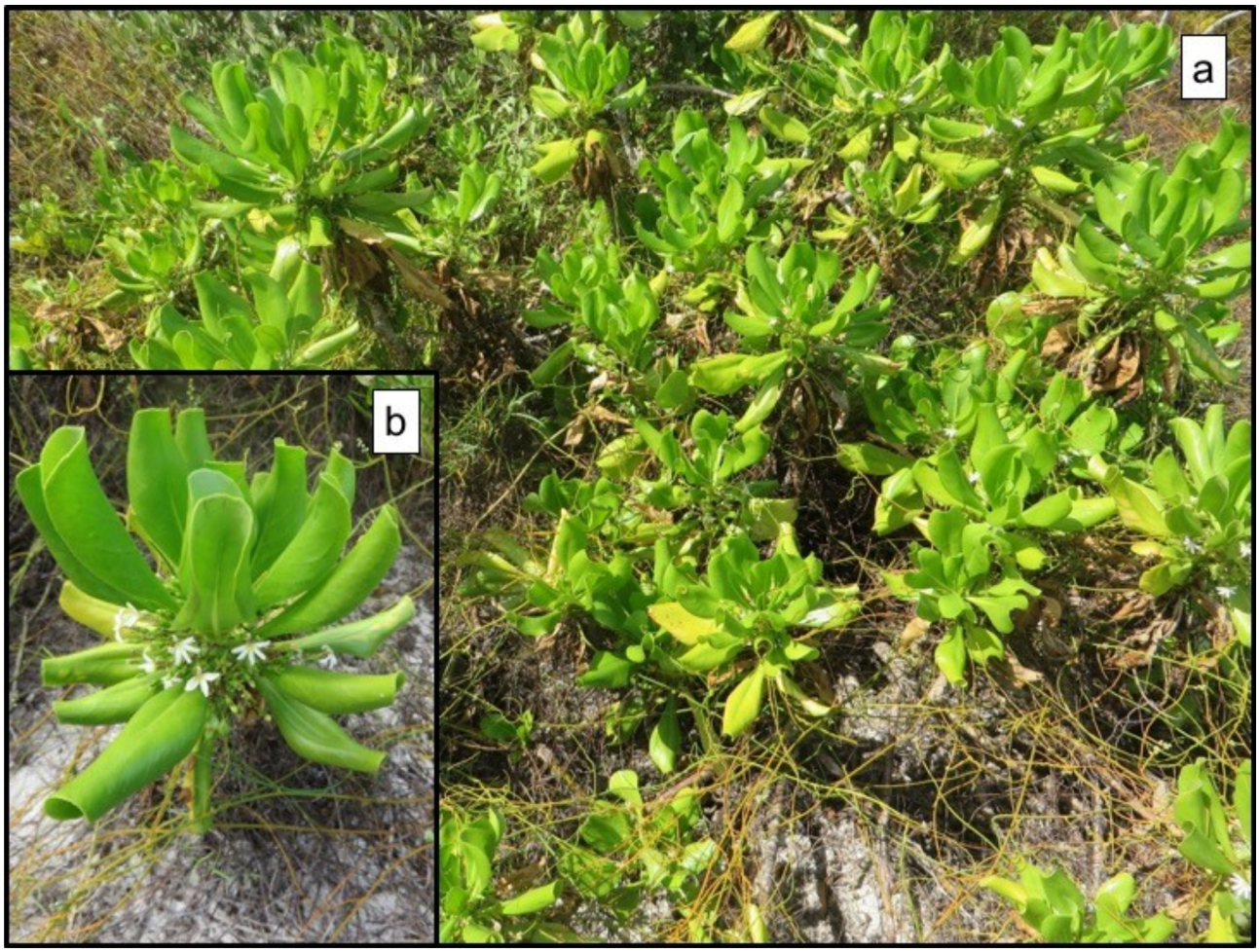

FIGURE 3. *Scaevola rialagartensis* Cast.-Campos sp. nov. in its habitat. a) shrub lying on the sand dune and parasitized by *Cassytha filiformis* L.; b) branch with inflorescences, flowers in anthesis, and revolute leaves. (Photos G. Castillo-Campos).

Etymology:—The name of the new species refers to the locality Rio Lagartos, Yucatan, an area where it grows and where the type specimen was collected.

Phenology:—*Scaevola rialagartensis* flowers from May to November and produces fruits from July to December.

Additional species examined:—MEXICO. Yucatán: Rio Lagartos, Rio Lagartos beaches, W of the town of Rio Lagartos, *G. Castillo-Campos & J.G. García-Franco 29313*.

Scaveola rialagartensis is sympatric with *S. plumieri* and resembles *S. taccada*. Both species can be differentiated by shrub size, leaf apex shape, and type of leaf nervation (Table 1).

The restricted distribution of *S. rialagartensis* in the Yucatan Peninsula includes areas that are currently under heavy disturbance and threatened by tourism and urbanization. Therefore, preserving and protecting the habitat where the species thrives is of the utmost importance. This species is parasitized by *Cassytha filiformis* L. (Lauraceae), an invasive species in coastal dunes in the type-locality areas. Due to its highly restricted distribution, low abundance, and potential threats, this species should be considered for inclusion in some protection category (i.e., subject to legal protection) in the Mexican Official Standard (NOM-59-SEMARNAT-2010) and on the list of endangered species issued by the International Union for the Conservation of Nature (IUCN).

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