



## ***Syngonanthus restingensis* (Eriocaulaceae): A remarkable new species endemic to Brazilian coastal shrublands**

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### **Abstract**

*Syngonanthus restingensis* (*S.* sect. *Syngonanthus*) is described from open shrubby restinga in the states of Rio de Janeiro and Bahia, Brazil. The species lacks close relatives, and some unusual traits are discussed, including floral bracts, hydathodes, and pseudovivipary. Its IUCN Conservation Status is assessed as Endangered.

**Key words:** taxonomy, Atlantic Forest, restinga, pseudovivipary

### **Resumo**

*Syngonanthus restingensis* (*S.* sect. *Syngonanthus*) é descrita para a restinga aberta arbustiva dos estados do Rio de Janeiro e da Bahia, Brasil. A relação da espécie com outras de *S.* sect. *Syngonanthus* é desconhecida e essa espécie possui algumas características não usuais no gênero, como a presença de brácteas florais, hidatódios e pseudoviviparidade, que são discutidas no presente trabalho. A sua categoria na IUCN é assinalada como ameaçada de extinção.

**Palavras chave:** taxonomia, Mata Atlântica restinga, pseudoviviparidade

### **Introduction**

The genus *Syngonanthus* Ruhland, as recently emended by Parra *et al.* (2010), contains about 135 mostly Neotropical species. The highest diversity of species is found on wet sandy soils of the Precambrian Shields of Guiana and Central Brazil, as well as in Amazonian sand *campinas*. A few, mostly widespread species, extend to Atlantic coastal restinga.

Recently, a distinctive new *Syngonanthus* has come to light, known from only three restinga sites in the states of Rio de Janeiro and southern Bahia, where it occurs in a relatively restricted habitat type, sometimes known as "Ericaceae scrub," characterized by poor drainage and scattered shrub islands among sand dunes (Montezuma & Araujo 2007). The coastline from the northern littoral of Rio de Janeiro state to Bahia has been visited by botanical collectors since the early 19th century (Araujo *et al.* 2001). However, the species here described was first collected only in 1953, by Segadas-Vianna in the restinga of Barra de São João (Rio das Ostras), followed by Araujo in the restinga of Carapebus, and by Hatschbach in southern Bahia (Fig. 1). The species came to the simultaneous attention of the authors independently, on the basis of specimens from different localities. Given the rapid ongoing loss of restinga habitat due to development, it may already be

extinct at some sites, but is currently known to occur in the Parque Nacional da Restinga de Jurubatiba (PNRJ) in Rio de Janeiro.

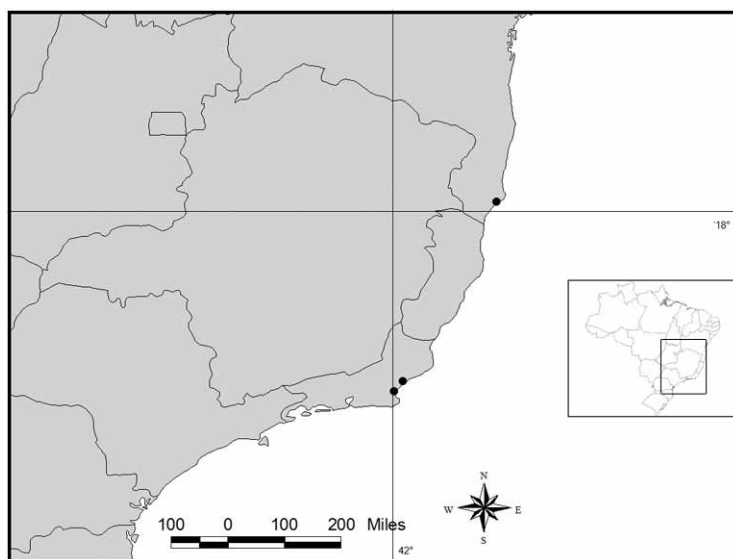


FIGURE 1. Map of southeastern Brazil showing collection localities of *S. restingensis* (black dots).

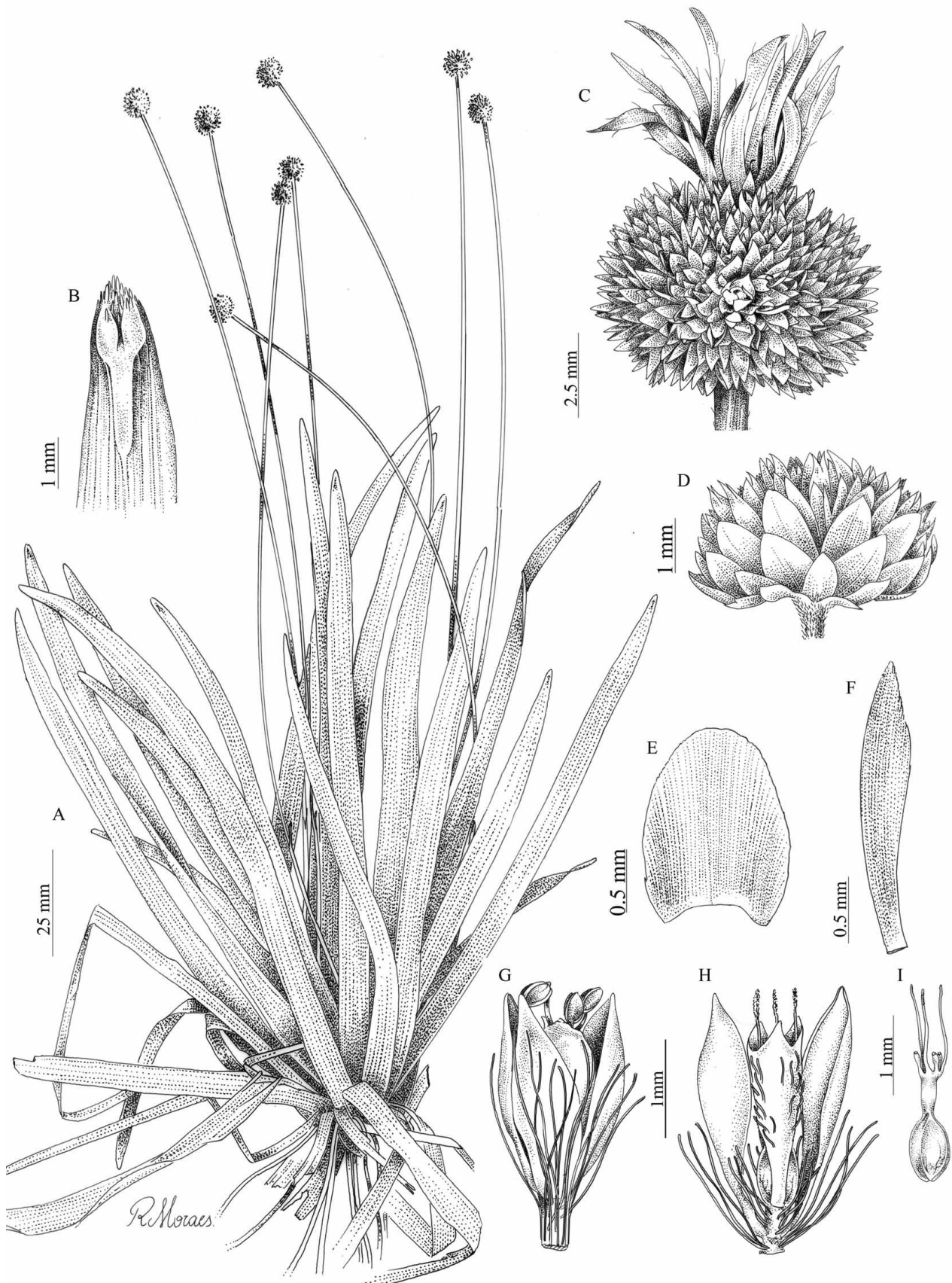
## Taxonomic treatment

*Syngonanthus restingensis* Hensold & A.Oliveira, *sp. nov.* (Figs. 2, 3)

*Herba rosulata. Folia ligulata, acuta, chartacea ascendente, ad 22 cm longa et 9 mm lata, cacuminis pallidis membranaceis in juventute minute barbatis. Inflorescentiae 7–10; scapi ad 40 cm longi, 5–8-costati, vestiti pilis dibrachiatis. Capitula albida, demum globosa glabrata, ad 7.5 mm diametro. Bractee involucrales capitulum haud excedentes. Bractee florales adsunt, floribus paulo breviores. Sepala crassa, naviculares, albida; corolla membranacea lobis involutis post anthesin. Flores pistillati: Sepala in axillis longipilosa; corolla abaxialiter pilosa; appendices styli clavatae, apice papillosae demum collabentes.*

**Type:**—BRAZIL. Rio de Janeiro: Casimiro de Abreu, Barra de São João, 5 km ao norte do Rio das Ostras, 3 September 1953 (fl), *F. Segadas-Vianna et al. Restinga I-927* (holotype R!, isotypes B!, K!, F!, HUEFS!, NY!, SPF!, RB!)

*Rosettes* robust, from short erect, apparently unbranched stem. *Roots* white to cream-colored, 1.0–1.3 mm in diameter, spongy, the cortex aerenchymatous, non-diaphragmatic, thin-walled, surrounding a persistent fibrous core ca. 0.15–0.25 mm in diameter. *Leaves* ca. 10–22 cm long by 5–9 mm wide, ligulate, ascending, flat, acutely narrowed to pale blunt tip; ca. 10–14-costate on lower surface, more or less smooth above; spongy mesophyll arranged in diaphragms between the vein buttresses, the leaves sometimes visibly fenestrate at least at base; in young leaves the leaf apex (hydathode) pale and achlorophyllous especially abaxially, bearded adaxially; in older leaves the marginal thickening, when present, interrupted at slightly recessed or retuse apex. *Leaf pubescence* mostly ephemeral and leaves glabrate, but both surfaces of developing leaves covered with short to long appressed malpighian (dibrachiate) trichomes, especially on upper surface, the persistent basal cells visible as pale punctations on mature leaves; the trichomes sometimes quite long and asymmetrical with the long arm ascending and the short tightly appressed, so that they may appear as scattered erect unicellular trichomes, especially on older leaves. *Inflorescences* 7–10 per rosette. *Peduncle sheaths* 3.5–5.5 cm long, much surpassed by leaves; the apex acute, stiffly erect, ca. 5 mm long, with minutely recurved-uncinate tip; matted-ciliate along margin, otherwise pubescent like leaves. *Peduncles*



**FIGURE 2.** *Syngonanthus restingensis* (drawn from *Segadas-Vianna 950* by Renato Moraes, except where noted). **A.** Habit; **B.** Detail of leaf apex with hydathode; **C.** Mature capitulum showing vivipary; **D.** Young capitulum (*Segadas-Vianna 941*); **E.** Involucral bract; **F.** Floral bract; **G.** Staminate flower; **H.** Pistillate flower, with one sepal removed (*Hatschbach 47076*); **I.** Gynoecium



**FIGURE 3.** *Syngonanthus restingensis* (A–C, E–F: Fontella 4194. D: A. Oliveira *et al.* 268). **A.** Population at flowering; **B.** Detail of habitat showing population on *Sphagnum* turf; **C.** Inflorescences showing early vegetative proliferation; **D.** Senescent scapes bearing pseudoviviparous rosettes. **E–F.** SEM images of seed; **F.** Detail of seed showing appressed pseudotricones. (Photos A–C by Marcelo Fraga Castilho. Photo D by Adriana Oliveira. Photos E–F by Amanda Veiga.)

19–40 cm long at flowering, often longer and decumbent after flowering, 5–8-costate, the costae pale, thin or thick, extending to peduncle apex; sparingly pubescent throughout with appressed to ascending malpighian hairs, with a dense collar of longer hairs subtending the involucre; gland-tipped hairs absent. *Capitula* 6.0–7.5 mm in diameter, firm, subcoriaceous to carnosae, uniformly cream-colored in all parts, virtually glabrous, at least sometimes pseudoviviparous, producing viable leafy rosettes from the apex after flowering; involucre shallow, surpassed by flowers, reflexed and hidden from view in mature globose capitula; involucre bracts in ca. 3 series, the lower ovate, grading upward to oblong or oblong-spathulate, obtuse to acute, apiculate,

chartaceous to coriaceous, often with a fine engraved darker (possibly greenish when fresh) midvein; glabrous or sparingly ciliate on lower margins, 1.9–2.5 mm long, 0.7–1.1 mm wide. Receptacle hemispheric, villous with pale rust-brown multicellular trichomes slightly darker than the flowers. *Floral bracts* present throughout capitulum, broadly linear to oblanceolate, with clasping base, the apex acute and sometimes inflexed, navicular, glabrous or sparingly ciliate below, ca. 2.0–2.2 × 0.60–0.75 mm, or 2/3–3/4 the length of the pedicellate flowers. Staminate and pistillate flowers about equal in number; staminate flowers smaller in size than pistillate but appearing equal due to the longer pedicels. *Staminate flowers*: Pedicels 0.35–0.55 mm. Sepals obovate to subspathulate, acute to short-acuminate, navicular, the laterals somewhat asymmetric incurved, 1.6–2.0 × 0.75–0.85 mm, free to base or nearly, chartaceous to coriaceous, glabrous. Corollas with anthophore ca. 0.6–0.75 mm, and tube ca. 1.1–1.2 mm including the triangular lobes, glabrous, membranous, the lobes involute after anthesis. Filaments adnate to basal half of corolla or somewhat less, exert slightly past lobe tip. Anthers white, ca. 0.3 mm. Pistillodes (nectaries) present. *Pistillate flowers*: Pedicels 0.15–0.30 mm. Sepals broadly elliptic, acute to short-acuminate, navicular, slightly zygomorphic, (1.7–)2.2–2.4 mm long, 1.0–1.2 mm wide, chartaceous to coriaceous or carnosose, especially thickened along the keel, glabrous, with midvein often evident. Floral axis between sepals and petals sometimes slightly elongated, up to 0.3 mm, and ringed with long trichomes. Petals broadly linear-oblanceolate, membranaceous, connate medially (sometimes ephemerally), free basally, the lobes triangular-acute to acuminate and strongly involute after anthesis, pilose externally below apex, and with a long-pilose staminodial scale at inner base. Ovary ca. 0.5 mm at anthesis, the style column 0.35–0.45 mm; the nectariferous branches ("appendages") 0.35–0.50 mm long, the glandular apex clavate-truncate and papillose at the upper margin, membranous and collapsing after anthesis; the stigmatic branches simple, ca. 0.85–0.95 mm, briefly exert from corolla at anthesis, not surpassing sepal tips. *Seeds* red-brown, ovoid to ellipsoid, ca. 0.6–0.7 × 0.30–0.35 mm, with longitudinal rows of prostrate rod-like thickenings (pseudo-trichomes), which may or may not become weakly erect upon wetting.

**Phenology**:—Collected in flower and fruit only between mid-August and late September in Rio de Janeiro (8 specimens in 6 years), and in late October in Bahia. For both localities, these dates coincide with the approximate end of the local dry season, which is more pronounced in the northern littoral of Rio de Janeiro than in southern Bahia (Araujo & Henriques 1984, Rivas-Martínez & Rivas-Sáenz 1996–2009).

**Habitat and distribution**:—Recorded from three restinga localities from the southeastern tip of Bahia to the northern littoral of Rio de Janeiro State. The Bahia locality, Rio Pau Velho (collected 1983), is probably ca. 2 km S of Nova Viçosa. The species occurs on sandy, seasonally inundated backdune sites in herbaceous or open shrubby restinga. It may occur on *Sphagnum* mats (*Fontella et al.* 4194, Fig. 3B), and partially submerged in rivulets (*Hatschbach* 47076).

**Additional specimens examined (paratypes)**:—BRAZIL. **Bahia**: Nova Viçosa, Rio Pau Velho. Campo de restinga, junto a pequeno córrego (parcialmente mergulhada), 20 October 1983 (fl, fr), *G. Hatschbach & O. Guimarães* 47076 (C!, F!, MBM, MO, NY!, Z-ZT!). **Rio de Janeiro**: Rio das Ostras, 5 km ao norte do Rio das Ostras, 4 September 1953 (fl), *F. Segadas-Vianna et al.*, *Restinga I-941* (GH!, R!); *ibid.*, 5 September 1953 (fl), *F. Segadas-Vianna et al.*, *Restinga I-950* (R!); Macaé, PNRJ, cerca de 2 km da lagoa Comprida, brejo de *Laplacea*, 22 September 1981 (fl), *D. Araújo & N. Crud* 4597 (GUA!), PNRJ, Fazenda São Lázaro, 14 August 1986 (fl), *Correa et al.* 772 (R!); Carapebus, PNRJ, 12 Sep 1995 (fr), *V.L.C. Martins* 205 (R!), PNRJ, estrada de acesso a Fazenda São Lázaro, caminho de praia, 15 August 1996 (fr), *I.M. da Silva* 357 (R!); lado esquerdo da lagoa de Carapebus, 22°13'54"S, 41°35'24"W, 10 September 2009 (fl), *J. Fontella et al.* 4194 (HB!, R!). PNRJ, lado esquerdo sentido Praia de Carapebus, ca. 1,5 km do Canal Macaé-Campos, sentido praia, 14 July 2011 (st), *A. Oliveira et al.* 268 (R!).

**Affinities and notes on critical characters**:—*Syngonanthus restingensis* is difficult to mistake for any other species of the genus. Its rosettes of broad ligulate ascending leaves which clearly surpass the peduncle sheaths (Fig. 2A) are the largest of any rosulate species of *Syngonanthus*. The presence of floral bracts (Fig. 2F), the conspicuous bearded hydathode at the leaf tip (Fig. 2B), and the rigid, globose, often proliferous capitula borne on decumbent peduncles (Fig. 2C and 3C–D), are also distinctive characters.

As currently circumscribed (Parra *et al.* 2010), *Syngonanthus* comprises two traditional sections, *S. sect. Syngonanthus* and *S. sect. Carphocephalus* (Körnigke) Ruhland. With its rosulate habit and membranous corollas with partially adnate staminal filaments, *S. restingensis* falls into the large and variable *S. sect. Syngonanthus* (ca. 115 species). Within this section, however, it is morphologically isolated. Of the ca. 65 rosulate species of *S. sect. Syngonanthus*, the vast majority have linear to setaceous, often recurving leaves less than 5 cm long and 4 mm wide, which equal or are exceeded by the peduncle sheaths. A complex of rare Brazilian Cerrado species (*Syngonanthus pulcher* Ruhland *et aff.*) approach *S. restingensis* in size, with broad, ascending leaves up to 10 cm long and 7.5 mm wide, but these also are surpassed by the sheaths. While the long-leaved rosette habit found in *S. restingensis* is not uncommon in species of other genera, such as *Leiothrix flavescens* (Bongard) Ruhland, *Eriocaulon magnificum* Ruhland, and *Paepalanthus* subg. *Platycaulon* Martius, it is anomalous in *Syngonanthus*.

*Syngonanthus restingensis* also differs from *S. pulcher* and allies in several additional characters, including the presence of floral bracts, the conspicuous bearded hydathode-like structure (Fig. 2B), the leaf pubescence more abundant adaxially than abaxially, the absence of glandular hairs, and the presence of hairs on the floral axis above the sepals. In addition, *S. pulcher* and allies are distinguished by spadiceous pellucid involucre bracts.

Similarities in floral and micro-characters suggest a closer affinity between *Syngonanthus restingensis* and *S. longipes* Gleason, a robust species of Amazonian *campinarana*. *Syngonanthus longipes* is stem-dimorphic, rather than strictly rosulate, with inflorescences of terminal umbels borne on very elongate stolon-like secondary branches, arising from a primary rosette. However, its ligulate rosette leaves resemble those of *S. restingensis* in size and texture, with a similar bearded hydathode-like structure at the apex. Both species lack glandular hairs, and the capitulum and flower structure are also similar, including the presence of floral bracts, the rigid globose capitula, the fleshy sepals, and the pistillate flower axis pilose between the sepals and petals.

*Floral Bracts.* The presence of floral bracts may be a particularly significant character, though it has never been comprehensively surveyed in *Syngonanthus*. The genus is unusual in possessing many species both with and without well-developed floral (receptacular) bracts subtending each flower. In most Eriocaulaceae, all flowers are bracteate. The only taxa besides *Syngonanthus* which lack floral bracts are the genus *Comanthera* L.B. Smith *emend.* Parra *et al.* (2010), two Madagascan endemics originally described in the genus *Moldenkeanthus* Morat (placed by Stützel, 1987, in *Paepalanthus* Martius), and two of the fifteen species of the African genus *Mesanthemum* Körnicke (*M. albidum* Lecomte 1909, and *M. reductum* Hess 1955). In the course of studying possible affinities of *S. restingensis*, we informally surveyed the occurrence of floral bracts in *Syngonanthus*, based on protologues, recent literature (Parra 1998, Phillips 1997), and our own dissections of herbarium material, with the following results.

Though floral bracts are not uncommon in *Syngonanthus*, they are rare among the ca. 65 rosulate species of *S. sect. Syngonanthus*. Besides their occurrence in *S. restingensis*, they are known with certainty in only three cushion-forming perennials endemic to Venezuelan *tepui*s: *S. duidae* Moldenke, *S. tiricensis* Moldenke, and *S. pakaraimensis* var. *rivularis* (Moldenke) Hensold. (Reports of floral bracts in the descriptions of *S. auripes* Silveira and *S. yacuambensis* Moldenke were shown by our examination of types to be erroneous.) However, among the remaining ca. 50 species of *S. sect. Syngonanthus*, which are characterized by stem-dimorphism, nearly half, like *S. longipes*, have floral bracts, as do at least five of the 16 species of *S. sect. Carphocephalus*. They also occur in the closely related genus *Philodice* Martius. In a recent molecular cladistic analysis (Andrade *et al.* 2010), only two species of *Syngonanthus s.s.* were analyzed, both lacking floral bracts. These formed a clade sister to *Philodice* (bracts present) and distinct from *Comanthera* (bracts lacking), suggesting parallelism or reversal in the loss of bracts.

*Hydathodes.* The presence and structure of hydathodes are also not well surveyed. Hydathode-like structures, characterized by a mass of tracheids at the leaf apex, and usually associated with a discontinuous epidermis, have been occasionally and casually reported for some species of *Eriocaulon* L. (Hare 1950) and *Paepalanthus* (Stützel & Briechle 1990, Tissot-Squalli 1997, Hensold 1988). They are probably widespread

but under-reported in the family. However the bearded, achlorophyllous, retuse leaf apex seen in *S. restingensis* (Fig. 2B), suggests a distinctive form of hydathode, most similar to that seen in *S. longipes*. The minutely indented apex in both species is associated with the lack of marginal thickening (reduction in epidermal cells) at the apex. In most *Syngonanthus*, leaf marginal thickening is continuous to the often canaliculate, acute, and not evidently barbate apex.

**Life history and reproductive biology:**—*Syngonanthus restingensis* has robust but simple rosettes. Branching of the stem from the base to form clumps, common in many perennial species of *Syngonanthus*, has not been observed. However, field observations in the PNRJ have shown abundant clonal propagation by production of vegetative rosettes from the capitulum apex after flowering, i.e. pseudovivipary *sensu* Elmqvist & Cox (1996). As the rosettes develop, the peduncles elongate and become decumbent, depositing the plantlets on the soil where they root. These populations form regular rounded colonies (Fig. 3A).

Remarkably, this clonal propagation is difficult to observe in herbarium specimens collected in flower, and even in flowering populations in the field. Normal fertile capitula and seeds are first produced, on relatively upright peduncles, and may show no signs of proliferation at the time of collection. Only two of the available flowering herbarium specimens showed early signs of vegetative proliferation from the inflorescence (*J. Fontella et al.* 4194, *Segadas-Vianna I-950*).

Pseudoviviparous proliferation occurs sporadically throughout the Eriocaulaceae (Monteiro-Scanavacca *et al.* 1976), being best developed and apparently genetically fixed in a few *Paepalanthus* species (*P.* [unranked] *Vivipari* Ruhland) and especially in *Leiothrix* subg. *Stephanophyllum* (Körnicke) Ruhland. In these groups, viable plantlets are regularly produced on decumbent peduncles, as carefully studied in *Leiothrix spiralis* (Bongard) Ruhland (Coelho *et al.* 2005, 2006), and *L. flagellaris* (Guillemin) Ruhland (Figueira & Del Sarto 2007). According to Giuliatti (1984), seed production is much reduced in these pseudoviviparous species.

*Syngonanthus restingensis* appears to be the first documented case of regular, perhaps genetically fixed, pseudoviviparous propagation in *Syngonanthus*. It is unusual because of the simultaneous production of abundant normal flowers and seeds, and merits further study. Pseudovivipary may also occur as an irregular response to environmental stress or fungal infection (Elmqvist & Cox 1996). These authors suggest that it is most common in plants of higher elevations and arid environments, while a recent review of pseudovivipary in Cyperaceae of South Africa suggests association with stressful fluctuations in water level, as an adaptive response in perennial species of seasonally inundated habitats (Gordon-Gray *et al.* 2009).

**Phytogeography and endemism in restinga:**—The isolated taxonomic position of *Syngonanthus restingensis* may be unusual among taxa endemic to restinga. The Brazilian restinga flora, occupying coastal plains of Quaternary age (Scarano 2002), is usually assumed to be a product of recent colonization, primarily from adjoining Atlantic coastal forest (Rizzini 1979), as well as *campo rupestre* and *cerrado* formations, with inadequate time for speciation to occur (Araujo 2000). Because it is therefore expected to have few endemic species, restinga vegetation has not been treated as an urgent conservation priority (Barbosa *et al.* 2004). Nonetheless, Araujo *et al.* (2001) estimated that 48, or about one tenth of the definitively determined taxa in the flora of the PNRJ were endemic to restinga habitat, while a substantial number of taxa (> 20% of the total flora) were still not definitively determined. About 25 of the 48 restinga endemics were reported as endemic to the stretch between Bahia and Rio de Janeiro, similar to the distribution of *S. restingensis*.

Of the nine other Eriocaulaceae species found in the PNRJ (Sano *et al.* 2001), most are also found in the interior of Brazil, especially in the *campos rupestres* of Minas Gerais and Bahia, or in wet *cerrado*. *Paepalanthus sessiliflorus* Körnicke is reported as endemic to restinga (Araujo *et al.* 2001), but this species is also known from Venezuela and the interior of Brazil (Hensold 1999; Giuliatti, personal communication). Among Eriocaulaceae of the PNRJ, *S. restingensis* is the only species endemic to restinga, without obvious close relatives in the interior of Brazil. It may have once occupied a broader range, persisting now only in restinga.

**Notes on habitat:**—Within restinga *Syngonanthus restingensis* is known to occur in an open shrubby formation on temporarily inundated depressions among sand dunes, traditionally described as Ericaceae Scrub

(Ule 1901, Araujo & Henriques 1984), and more recently designated *formação arbustiva inundável* (Montezuma & Araujo 2007). Henriques *et al.* (1986) report the “Ericaceae formation” in Rio de Janeiro, in the restingas of Carapebus, Cabo Frio, and probably at one time in Rio das Ostras as well. It has also been reported from the Massambaba Protected Area west of Cabo Frio (Araujo *et al.* 2009), as well as from certain restingas in the state of Espírito Santo (e.g., Pereira & Araujo 1995), but *S. restingensis* has not been found in inventories of these areas.

In a preliminary floristic survey of restingas in the state of Rio de Janeiro, Araujo & Henriques (1984) cited seven of ten Eriocaulaceae species occurring in Ericaceae Scrub. Of these, the species “*Syngonanthus sp.*” may represent *S. restingensis*, which was first collected by Araujo in 1981 (Araujo & Crud 4597), in association with the shrub *Laplacea fruticosa* (Schrader) Kobuski, also cited as typical of Ericaceae Scrub. In addition, the species cited as “*Syngonanthus sp.*” in the Flora of the PNRJ (Sano *et al.* 2001) almost certainly represents *S. restingensis* (A. Giuliatti, personal communication). The voucher Araujo 5214 (GUA), collected in 1982, was reported as growing in the shade in “*brejo de Bonnetia*,” referring to *B. stricta* (Nees) Nees & Martius, which forms dense stands in saturated areas within Ericaceae Scrub (Henriques *et al.* 1986, Montezuma & Araujo 2007).

The Eriocaulaceae in general are edaphic specialists on acidic, often sandy and poorly drained sites, and most species are heliophiles. Ericaceae Scrub may provide a favorable balance of sun exposure, soil moisture and soil acidity for the Eriocaulaceae typically found there. The more abundant “Clusia Scrub” formation, found on upland sites is drier, and the closed forest formations are probably too shady. *Brejo herbáceo*, or herbaceous marsh, may occur adjacent to Ericaceae Scrub, occupying wetter sites at lagoon margins and at the base of interdunal depressions. Three of the seven species of Eriocaulaceae described by Araujo & Henriques (1984) from Ericaceae Scrub also are reported from *brejo*, but this habitat suffers greater extremes of inundation, which may discourage longer-lived perennial species. Thus, it is noteworthy, from a conservation perspective, that Ericaceae Scrub has recently been suggested to be a product of historical disturbance, which, in the absence of management, may progress to forest over time (Montezuma & Araujo 2007).

Studies of restinga vegetation in Bahia have been few compared to Rio de Janeiro and Espírito Santo. The specific habitat of the outlying northern population of *S. restingensis* in southern Bahia is not known, though judging from its associates (*cf. Hatschbach 47073-47077* at MBM, *fide* Rede SpeciesLink 2011) it is probably found in a *brejo*-like habitat. Field study of this currently unprotected site is desirable.

**Conservation status:**—*Syngonanthus restingensis* is here assessed as Endangered (EN), according to IUCN Red List Criteria B1ab(ii) (IUCN 2001).

It is known only from a narrow coastal zone no more than a few kilometers wide and about 650 km long. Within this area, it occurs in a specialized edaphically limited habitat type (*Formação Arbustiva Inundável, sensu* Montezuma & Araujo 2007), of characteristically patchy distribution. This vegetation type was estimated by Henriques *et al.* (1986) as constituting only about 9 % of the terrestrial vegetation in the approximately 6,300 ha area of Carapebus restinga which he studied, an area now falling mostly within the boundaries of the PNRJ. If generalizable to the park as a whole, this would amount to less than 1,400 ha (14 km<sup>2</sup>) of habitat available at the largest and best protected restinga site within the species' range.

Not only is this habitat type locally fragmented, but at a regional level, the characteristics and species composition of coastal restinga vary widely, due to great differences in the width, topography and geological age of the coastal plain. The PNRJ is remarkable for its extensive coastal plain up to 10 km wide, with the oldest beach ridges dating to the Pleistocene (120,000 yrs BP), with other coastal plains in Rio de Janeiro dating only to 5,000-3,000 yrs BP (Scarano 2002).

The restinga flora is suffering rapid habitat destruction because of intense road, real estate development, and logging activity along the coast (Rocha *et al.* 2007, Zamith & Scarano 2006). Thus unprotected areas of natural restinga vegetation are all under imminent threat, especially the accessible open shrubby formations found nearest the coast.

From the restinga of Barra de São João (Mun. Rio das Ostras) at the western edge of its range, *S. restingensis* has not been collected since 1953. This region is today intensely urbanized and the species may



no longer occur there. In the restinga of Carapebus all recent collections have been made within the federally protected Parque Nacional da Restinga de Jurubatiba. The Bahia locality (collected 1983) is also in an unprotected area. However, the nearby Ilha de Barra Velha (100 km<sup>2</sup>) between Nova Viçosa and Caravelas still contains well-conserved restinga where the species might be sought. It also may be expected in the intervening state of Espírito Santo though it has not appeared in numerous recent inventories (Restinga net 2011).

### Name citations (Eriocaulaceae):

*Comanthera* Smith (1937: 38) *emend.* Parra *et al.* (2010: 1136); *Eriocaulon* Linnaeus (1753: 87); *Eriocaulon magnificum* Ruhland (1903: 48); *Leiothrix* subg. *Stephanophyllum* (Körnigke 1863: 416) Ruhland (1903: 235); *Leiothrix flagellaris* (Guillemin 1838: 60) Ruhland (1903: 237); *Leiothrix flavescens* (Bongard 1831: 628) Ruhland (1903: 231); *Leiothrix spiralis* (Bongard 1831: 634) Ruhland (1903: 226); *Mesanthemum* Körnicke (1856: 572); *Mesanthemum albidum* Lecomte (1909: 601); *Mesanthemum reductum* Hess (1955: 183); *Moldenkeanthus* Morat (1967: 466); *Paepalanthus* Martius (1834: 28); *Paepalanthus* subg. *Platycaulon* Martius (1834: 28); *Paepalanthus* [unranked] *Vivipari* Ruhland (1903: 164); *Paepalanthus sessiliflorus* Körnicke (1863: 361); *Philodice* Martius (1834: 26); *Syngonanthus* Ruhland (1903: 242); *Syngonanthus* sect. *Carphocephalus* (Körnigke 1863: 465) Ruhland (1903: 264); *Syngonanthus auripes* Silveira (1928: 343); *Syngonanthus duidae* Moldenke (1951: 127); *Syngonanthus longipes* Gleason (1929: 15); *Syngonanthus pakaraimensis* var. *rivularis* (Moldenke 1957: 411) Hensold (1991: 437); *Syngonanthus pulcher* Ruhland (1903: 255); *Syngonanthus tiricensis* Moldenke (1957: 412); *Syngonanthus yacuambensis* Moldenke (1953: 182).

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