



Universidade Federal de Minas Gerais
Instituto de Ciências Biológicas
Departamento de Botânica
Programa de Pós-Graduação em Biologia Vegetal



YURI FERNANDES GOUVÊA

**A REVISION OF *SOLANUM ASTEROPHORUM* GROUP (SUBG.
LEPTOSTEMONUM, SOLANACEAE)**

Orientador: Prof. Dr. João Renato Stehmann
Universidade Federal de Minas Gerais (UFMG)

BELO HORIZONTE – MG

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Dissertação apresentada ao Programa de Pós-Graduação em Biologia Vegetal do Departamento de Botânica do Instituto de Ciências Biológicas da Universidade Federal de Minas Gerais, como requisito parcial à obtenção do título de Mestre em Biologia Vegetal.

Área de Concentração: Morfologia, Sistemática e Diversidade Vegetal.

BELO HORIZONTE – MG

2016

043

Gouvêa, Yuri Fernandes.

A revision of *Solanum asterophorum* group (subg. *Leptostemonum*, Solanaceae) [manuscrito] / Yuri Fernandes Gouvêa. – 2016.

52 f. : il. ; 29,5 cm.

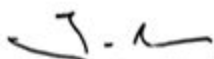
Orientador: João Renato Stehmann.

Dissertação (mestrado) – Universidade Federal de Minas Gerais, Departamento de Botânica.

1. Mata Atlântica - Brasil - Teses. 2. Endemismo - Teses. 3. Solanaceae - Teses. 4. Taxonomia vegetal - Teses. 5. Biologia vegetal – Teses. I. Stehmann, João Renato. II. Universidade Federal de Minas Gerais. Departamento de Botânica. III. Título.

CDU: 581

Dissertação defendida e aprovada, em 24 de fevereiro de 2016, pela banca examinadora constituída pelos professores:



Dr. João Renato Stehmann (UFMG)



Dr. Marcos Eduardo Guerra Sobral (UFSJ)



Dr. Alexandre Salino (UFMG)

AGRADECIMENTOS

Agradeço aos meus pais por terem me presenteado com a oportunidade de conhecer a vida; ao meu pai por ser meu amigo; por alimentar minha curiosidade com explicações raciniais desde pequeno; e por sempre reforçar princípios como a honestidade, a importância do esforço e do trabalho. À minha mãe, pelo amor, apoio e incentivo incondicionais. Ao meu irmão Iago, pelo amor, e companhia. Às minhas avós, pelas quais carrego enorme carinho e amor.

Ao Dr. João Renato Stehmann, por ter me recebido como aluno; pela confiança depositada em mim; e pela tranquilidade e compreensão que transparece até mesmo nos momentos de tensão. Ao Leandro Lacerda Giacomini por, como professor, ter me apresentado à Sistemática Vegetal e às Solanaceae; Aos membros da banca, por aceitarem o convite e contribuírem com o trabalho; e como amigo, pela ajuda, apoio e por compartilhar bons momentos. Ao Alexandre Salino, pela solicitude e amizade. Ao João Aguiar Nogueira Batista por me receber no Laboratório de Sistemática Molecular e pela paciência ao me instruir sempre que preciso. Ao Bruno Fernandes Falcão, Luiz Armando Góes-Neto, Flípe Soares de Souza “Fifão” e Jeferson Miranda Costa pela amizade recente que, no entanto, parece ser de “mili anos”. À Raquel Viveros, Suzana Moreira, Mariana Bünger, Juliana Francisco e Thaís Almeida, pela amizade e carinho, que é recíproco, e por sempre estarem dispostas a ajudar. À todos do Laboratório de Sistemática Vegetal, por tornar o ambiente de trabalho tão agradável e prazeroso, que torna tênue a diferença entre trabalho e diversão.

Aos meus amigos de sempre, Caio Tadeu, Simão Vinhas, Luca Vinhas, João Artur, João Vinhas e Maysa Prado, por serem quem são. À CAPES, pela concessão da bolsa de mestrado.

A todos, pois: “um sonho que se sonha só, é só um sonho que se sonha só, mas um sonho que se sonha junto é realidade”.

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Note:

“For the purposes of the International Code of Nomenclature for algae, fungi and plants, this work does not constitute an effective publication for the nomenclatural changes and new names proposed here. These changes will take effect only after the publication of the manuscript presented here.”

Nota:

“Para efeito do Código Internacional de Nomenclatura de Algas, Fungos e Plantas, esta dissertação não constitui publicação efetiva para as mudanças nomenclaturais e os novos nomes aqui propostos. Estas mudanças serão efetivadas somente a partir da publicação do manuscrito aqui apresentado.”

The present work was written according to the standards of the Systematic Botany Journal.

A Revision of *Solanum asterophorum* Group (subg. *Leptostemonum*, Solanaceae)

Yuri Gouvêa^{1,2} & João Stehmann¹

¹Departamento de Botânica, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Avenida Antônio Carlos, 6627, 31270-901, Belo Horizonte, MG, Brazil

²Author for correspondence (gouvea.yf@gmail.com)

Abstract—*Solanum asterophorum* species group includes four species, all endemic to the Brazilian Atlantic Forest. Species of this group are all prickly shrubs with zig-zagged branches, paired leaves, reduced leaf-opposed inflorescences and partially accrescent fruiting calyx. They inhabit edges of conserved, wet forests to disturbed sites close to them, usually preferring indirect light and damp soils. Two of these species are relatively widespread; *S. asterophorum* ranges from the southeastern region of Brazil to the northeastern, and *S. piluliferum* from the southeastern to southern; while the other two have a more restricted distribution. The morphology, taxonomic history, nomenclature, distribution, and some ecological aspects are reviewed. Descriptions, distribution maps, photos and assessment of conservation status of each species, as well as a dichotomous key for the group are provided.

Keywords—Brazilian Atlantic Forest, endemic, Neotropics, Solanaceae, taxonomy.

Resumo—O grupo *Solanum asterophorum* inclui quatro espécies, todas endêmicas da Floresta Atlântica brasileira. Todas as espécies deste grupo são arbustos aculeados com ramos flexuosos, folhas geminadas, inflorescências reduzidas opostas às folhas e cálices frutíferos parcialmente acrescentes. Elas abitam desde bordas de florestas úmidas preservadas a áreas impactadas próximas a esta, geralmente preferindo locais com luz indireta e sólo úmido. Duas dessas espécies possuem uma distribuição relativamente ampla; *S. asterophorum* ocorre ao longo da regiões Sudeste e Nordeste do Brasil, e *S. piluliferum* da região Sudeste à região Sul do Brasil; enquanto as outras duas espécies apresentam uma distribuição mais restrita. A morfologia, história taxonômica, nomenclatura, distribuição e alguns aspectos ecológicos são aqui revisados. São fornecidas descrições, mapas de distribuição, imagens e avaliação do estado de conservação de cada espécie, bem como uma chave dicotômica para o grupo.

Palavras-chave—Floresta Atlântica Brasileira, endemismo, Neotrópicos, Solanaceae, taxonomia.

INTRODUCTION

Solanum L. (Solanaceae) with approximately 1.400 species is among the most specious (Frodin, 2004) and economically important genera of flowering plants (Hawkes 1999). Although widely distributed in all tropical and temperate continents, its highest species diversity is found in New World and is especially associated to the Andes, Central America cordilleras and Brazilian Atlantic forest (Whalen 1983; Nee 1999; Knapp 2002). It can be distinguished from the other Solanaceae genera by the presence of poricidal anther dehiscence and the lack of specialized calyx structure found in the related genus *Lycianthes* (D'arcy 1986), with which it shares the characteristic poricidal anthers. Despite *Solanum* be easily recognized due to this floral uniformity, the enormous morphological diversity and plasticity

of its vegetative traits make the infrageneric taxonomy of the group less clear (Roe 1966, 1972).

The large size, wide distribution and morphological and nomenclatural complexity (ca. 5000 associated names) of *Solanum* have challenged generations of taxonomists, leading to the proposition of different systems based on morphological characters (Linnaeus 1753; Dunal 1813; G. Don 1838; Dunal 1852; Bitter 1919; Seithe 1962; Danert 1967, 1970; D'arcy 1972; Whalen 1984; Nee 1999; Child & Lester 2001; Hunziker 2001). More recently, through the employment of molecular systematic techniques, were identified the major monophyletic groups within the genus (Bohs 2005; Weese & Bohs 2007). These works provided a framework for further phylogenetic and revisionary studies on these clades (*e. g.*, Levin 2006; Stern et al. 2011; Tepe & Bohs 2011; Knapp 2013; Stern et al. 2013; Särkinen et al. 2015).

The largest clade within *Solanum* encompasses almost all species previously assigned to the *Solanum* subg. *Leptostemonum* (Dunal) Bitter, and therefore was named Leptostemonum clade (Bohs 2005; Weese & Bohs 2007). Its species are popularly known as “spiny” (more accurately prickly) solanums being characterized by the presence of prickles plus stellate trichomes. The Leptostemonum clade is widespread in both New and Old World, with species of each region composing a different clade within it: the New World and the Old World clades (Levin 2006). Recently, these two subclades were the subjects of more detailed phylogenetic studies aiming elucidate their internal relationships in different works; the New World clade in Stern et al. (2011), and the Old World clade in Vorontsova et al. (2013). One of the strongly supported clades recovered among the New World taxa in Stern et al. (2011) is the *Asterophorum* clade, which corresponds to the Whalen’s (1984) *Solanum asterophorum* Species group.

Solanum asterophorum species group comprises four species, all of them endemic to the Brazilian Atlantic Forest. They are morphologically distinctive among the other members of the Leptostemonum clade due to its flexuous (zig-zagged) stems, paired and unequally sized leaves, small, leaf-opposed inflorescences and partially accrescent fruiting calyx. Two of these species (*Solanum asterophorum* Mart. and *Solanum piluliferum* Dunal) have a wider distribution and have been known for longer than the other two; the recently described, more narrowly distributed and poorly collected *Solanum igniferum* Gouvêa & Stehmann and *Solanum sessilantherum* Gouvêa & Stehmann. The present contribution is a revision of that group.

MATERIALS AND METHODS

The present study is result of an extensive field and herbarium work and was conducted under the light of previous molecular phylogenetic results (Stern et al. 2011). We examined specimens from the group's representative collections deposited in the following herbaria (herbarium abbreviations follow *Index Herbariorum*, <http://sweetgum.nybg.org/science/ih/>; Thiers 2015): ALCB, ASE, CESJ, BR, CVRD, ESA, FUEL, FURB, G, HUEFS, IPA, JPB, K, M, MAC, MBM, MBML, P, RB, UEC, UFP. We used images of type specimens made available by Global Plants (<http://plants.jstor.org>) to aid in lectotypification choices. We also collected all these species throughout their range, including the two recently discovered species (Gouvêa and Stehmann in prep.). Type specimens with sheet numbers are cited with the herbarium acronym, a dash and the sheet number respectively (i.e. MO-1781232); barcodes are written between brackets, as a continuous string (i.e. [G00104280]).

For the species delimitation we have essentially followed the “morphological cluster” concept (Mallet 1995), or simply morphological species concept: i.e., “assemblages of individuals with morphological features in common and separate from other such assemblages by correlated morphological discontinuities in a number of features” (Davis and Haywood 1963).

Descriptions were based on dried herbarium material supplemented by measurement from living and rehydrated material. Colors of flowers, fruits and other structures which may have lost the original color are described from living material or from herbarium label data. The developmental and architectural observations were made in living plants held under cultivation in the Museu de História Natural e Jardim Botânico da Universidade Federal de Minas Gerais and *in situ* along field works. The terms used to describe the overall morphology and vestiture are based on Radford et al. (1974). The terminology used to describe the trichomes types are according to Roe (1971) and Mentz et al. (2000).

Species with few georeferenced collections have been georeferenced using available locality data aiming to represent its geographic distribution on the map. Species conservation status were assessed using the Geospatial Conservation Assessment Tool (GeoCAT, <http://geocat.kew.org>; Moat 2007) based on the IUCN red list and criteria (IUCN 2014). The extent of occurrence (EOO) represents the range of the species. The area of occupancy (AOO) indicates the number of occupied points within their range and was calculated using the default grid size of 2 km². Collections georeferenced using label locality data were not

included in the conservation assessment when the locality description was interpreted as inaccurate.

RESULTS

TAXONOMIC HISTORY OF *SOLANUM ASTEROPHORUM* SPECIES GROUP

The history of *Solanum asterophorum* group begins in 1838, with the description of *S. asterophorum* Mart. published by Karl Friedrich Phillip von Martius along with his treatment of Brazilian flora species in “*Flora oder Botanische Zeitung*”. Then, less than a decade later, Otto Sendtner (1846) described *S. asterophorum* Mart. var. *tomentosum* Sendtn. (here considered a synonym of *S. asterophorum*) in his treatment of the Solanaceae in Martius’ *Flora Brasiliensis*. In the same treatment Sendtner described *S. densiflorum* Sendtn., a later homonymous of the Mexican species *S. densiflorum* M. Martens & Galleotti described one year before, which makes the former an illegitimate name according to Article 53.1 of the Code (McNeill et al. 2012).

In Candolle’s *Prodromus*, Michel-Félix Dunal (1852) described *S. gomphoidellum* Moric. ex Dunal, *S. melancholicum* Salzm. ex Dunal and *S. tetricum* Dunal, the tree names treated in this revision as synonyms of *S. asterophorum*. In addition to these, he also described in the same work *S. piluliferum* Dunal and *S. piluliferum* Dunal var. *densiflorum* Dunal, the later based on Sendtner’s illegitimate name.

Whalen (1984) analyzed the internal relationship of *Solanum* subg. *Leptostemonum* based on morphological traits and was the first one to point out the affinity between *S. asterophorum* and *S. piluliferum*. He proposed the placement of these taxa in an informal group called *Solanum asterophorum* species group, based primarily on its flexuous (zig-zagged) stems, paired and unequal leaves, reduced leaf opposed inflorescences and accrescent calyces. In his concept the *S. asterophorum* species group would include only *S. asterophorum* (considering *S. melancholicum* and *S. tetricum* as synonyms of *S. asterophorum*) and *S. piluliferum* (considering *S. densiflorum* Sendtn. a synonym of *S. piluliferum*); the other aforementioned names were not treated by him.

Later, Nee (1999) in his Synopsis of New World *Solanum* species assigned *S. asterophorum* to *Solanum* section *Polytrichum* (Whalen) Child and *S. densiflorum* Sendtn. (here considered to be conspecific with *S. piluliferum*) to *Solanum* section *Erythrotrichum* (Whalen) Child. Some years later, the molecular phylogenetic work carried out by Stern et al.

(2011) recognized *S. asterophorum* and *S. piluliferum* as sister taxa in a well-supported and isolated clade containing only these two species. This clade was informally named “Asterophorum clade”, result that corroborates the grouping proposed by Whalen (1984) and refutes the placement of *S. asterophorum* in sect. *Polytrichum*, and *S. densiflorum* Sendtn. (*S. piluliferum*) in sect. *Erythrotrichum* as suggested by Nee (1999).

MORPHOLOGY

DEVELOPMENT, HABIT AND STEMS—All species of *S. asterophorum* species group have defoliate sympodial units, with geminate leaves (paired, as in the Geminata clade, Knapp 2008; e. g., Figs. 2C, E) at each node. Initially, the growth of this species is monopodial, with alternate leaves arranged in a 2/5 phyllotaxic spiral. The sympodial growth starts at beginning of flowering; the stem undergoes two subsequent dichotomous branching (the first branching is trichotomous in *S. piluliferum*; see Fig. 8A) with the second one turned 90° regarding the former. After the second branching, each node starts to develop geminate leaves and the stem assumes a flexuous (zig-zagged) growth, with a single axillary branch arising obliquely and alternately to the leaf pairs (e. g., Fig. 5A). This pattern is similar to that seen in some species of Torva clade of Stern et al. (2011), which have solitary rather than paired leaves, and corresponds to Leeuwenberg’s architectural model (Bell and Dines 1995).

Members of *Solanum asterophorum* species group are all lignescent many-branched shrubs, with the older stems remaining photosynthetic at maturity only in populations of *S. asterophorum* from Santa Teresa and nearby localities (Fig. 2E), Espírito Santo State. Mature individuals of its species usually reach up to 1.5-2 m, although some specimens of *S. piluliferum* have been recorded on herbarium labels with to 3 m. The stems commonly grow upward, except in *S. igniferum* that after the second branching assumes a plagiotropic growth (Fig. 5A). In general the prickles are flattened, broad-based, moderately distributed and recurved, but *S. piluliferum* has straight, triangular, sparsely distributed ones, sometimes absent from the uppermost portion of the stems.

TRICHOMES—The stems, petioles, leaves, inflorescence axes, pedicels and calyces of all species in *S. asterophorum* species group are covered by stellate trichomes. Despite the relatively low diversity of trichome types and great intraspecific variation (especially in *S. asterophorum*; see Figs. 2C, E) of its density, these can be useful as a supplementary characteristic in delimiting species within the group. Only two trichome types are found in *S. asterophorum* species group: branched, stellate and minute, glandular ones; this last is only

found in the ovaries, youngest parts of the stems (difficult to see in plants with dense vestiture) and at base of the prickles. The stellate trichomes range from apparently sessile to long-stalked; the stalks are always multiseriate with 2 to 4 cells wide, the rays commonly vary from (2-)4 to 8(-12), and the midpoints range from obsolete to longer than rays, variation that often can be found in a single specimen (except in *S. sessilantherum*). There is also a great variation both in trichome density and color among the species of *S. asterophorum* group. Trichomes can be very sparsely (as in populations of *S. asterophorum* from Santa Teresa, Espírito Santo State; Fig. 2E) to densely distributed (as in *S. igniferum*, *S. piluliferum* and some populations of *S. asterophorum*; Figs. 5, 8, 2C). The vestiture can be composed by hyaline to pale yellow or brownish trichomes in *S. asterophorum* (except in some populations from southern coastal Bahia; see *S. asterophorum* note); notably orange-ferruginous in *S. igniferum* (Fig. 5); hyaline, stramineous, ochraceous to ferruginous in *S. piluliferum* (Fig. 8); and hyaline to brownish in *S. sessilantherum* (Fig. 11).

LEAVES—The leaves of *S. asterophorum* species group are all petiolate, lobed (or entire in *S. piluliferum*), geminate anisophyllous and have trichomes in both surfaces. The leaf texture varies from membranaceous to chartaceous (coriaceous in *S. sessilantherum*). In general the major leaf shape ranges from ovate to obovate; all this range can be found in *S. asterophorum* and *S. igniferum*, sometimes within individual plants; in *S. sessilantherum* the leaves vary from elliptic to obovate; and in *S. piluliferum* they are strictly elliptic. The major leaf base is usually asymmetric, which is weaker in the minor leaves that often have symmetric bases. The minor leaves range from elliptic to nearly circular. In juvenile forms, as pointed out by Roe (1966), the leaves are usually larger, more densely armed and more deeply lobed (especially in *S. asterophorum* and *S. igniferum*). Although *S. piluliferum* has entire leaves at maturity, the leaves of its juvenile forms are often deeply lobed. The prickles are distributed along the midrib and primary veins of both surfaces in *S. asterophorum*, *S. sessilantherum* and can be present or not in older individuals of *S. igniferum*; very rarely present in *S. piluliferum* leaves.

According to Nurit-Silva and Agra (2011), the distribution pattern of stomata in leaves of *S. asterophorum* is hypostomatic with anisocytic stomata, and the anticlinal walls of both abaxial and adaxial epidermal cells are curved. These characteristics still were not evaluated in other species of the *S. asterophorum* species group. However, their preference for damp sites with indirect light can be related to the hypostomatic pattern, which limits the gas exchange, suggesting that the other species also may be hypostomatic (Parkhurst 1978).

INFLORESCENCES—All members of *S. asterophorum* species group have unbranched, apparently lateral, leaf-opposed to subopposite, reduced monochasial cymes. In *S. asterophorum* and *S. piluliferum* they are typically congested, with the pedicel insertion points evenly distributed and usually paired or nearly so (Figs. 2A, 8B). The shorter pedicels and the usually dense vestiture of reproductive structures of *S. piluliferum* gives to its inflorescences a very congest appearance. In contrast, *S. sessilantherum* has relatively lax inflorescences with non-paired pedicel insertion points, if paired, only those more distal or one or another in an unequally spaced inflorescence (Fig. 11B). The inflorescences of *S. igniferum* have an intermediary spacing, falling between those congested (in *S. asterophorum* and *S. piluliferum*) and more lax (in *S. sessilantherum*) with closer but usually non-paired pedicel insertion points (Fig. 5C). In general the inflorescence axes are unarmed (except in *S. sessilantherum* which has armed ones; see Figs. 11B, D). A pattern related to the length of inflorescence axes has been observed in *S. asterophorum* species group; in a branch, the more proximal inflorescences are longer, and gradually shorter inflorescences are produced toward apex, with the more distal ones often few-flowered and very short, sometimes almost sessile. Therefore, when possible, the inflorescence characters must be observed in the more developed, proximal inflorescences. The position of buds in the inflorescences varies among the species, being a diagnostic character; in *S. asterophorum* the buds are held facing down (Figs. 2B, F), differently, in *S. igniferum* and *S. sessilantherum* the buds are kept erect to horizontally disposed (Figs. 5B, 11A).

FLOWER—The flowers of *S. asterophorum* species group are all perfect, pentamerous, sympetalous and white (purplish-white in some specimens of *S. igniferum*) in color, with the buds ellipsoid. The bud pedicels are usually straight or nearly so (except in *S. asterophorum* which has the bud pedicels curved downward (Figs. 2B, F). Most species have conical calyx tube (somewhat angular in *S. igniferum*) with oblong to lanceolate lobes, armed or not, but in *S. piluliferum* the calyx is globose with deltate to shallowly triangular lobes and always unarmed (Fig. 8B). The corolla of all species is covered by stellate trichomes abaxially and on the apex adaxially, with glabrous, well developed interpetalar tissue. The anthers have poricidal dehiscence like all other species of *Solanum*, and are all tapered toward the apex as most species of subg. *Leptostemonum*. These are usually lanceolate, slender, connivent and supported by apparent filaments, except in *S. sessilantherum* which has widely lanceolate, apparently sessile anthers embedded into receptacle, with very poorly developed filaments (Fig. 11B). Ovaries of all species are short-cylindrical and convex at apex, moderately to sparsely covered by small glandular trichomes. The styles are white and covered with stellate

trichomes usually to the proximal 1/2 of its length; are included in the anther tube in short-styled flowers and exerted in long-styled ones.

FRUITS— The fruits in *S. asterophorum* species group (Figs. 2D, G, 5D, 8D, 11D) are tetralocular berries with a watery mesocarp. In general the fruit shape ranges from spherical to widely depressed ovate, with some specimens of *S. piluliferum* having slightly obloid fruits; the most different shape of fruit in this group is found in *S. sessilantherum*, which has obloid to transversely elliptic (3:2) and relatively large berries (11D). The fruits are partially covered by the accrescent calyx (3/4 to 1/4 of mature fruit). They are usually green to pale green in early stages of development with the exposed portion becoming whitish or yellowish, eventually remaining pale green (in *S. sessilantherum* the fruits are green with the apex pale green at maturity). The fruit characteristics in *S. asterophorum* species group are typical of fruits eaten by bats, but there are no further evidences of it to date.

SEEDS—The seeds in *S. asterophorum* group are reniform and flattened. The coloration ranges from stramineous to brownish. Generally are produced 30-50 seeds per fruit, but those of *S. sessilantherum* often contains 60-70 seeds.

HABITAT AND GEOGRAPHIC DISTRIBUTION

Species of *S. asterophorum* species group are all endemic to the Brazilian Atlantic Forest. They occur across a wide latitudinal range (6°S to 27°S), from the northeastern State of Paraíba to the southern State of Santa Catarina, and can be found from sea level to c. 1500 m of elevation. All species seems to share the preference for damp soils and somewhat open sites with indirect light, as wet forest edges, clearings, roadsides and other disturbed areas near these forests (*S. piluliferum* seems to prefer higher elevations than the other species). Despite they inhabit apparently similar habitats, different species were not observed nor recorded co-occurring.

Among the species of the group, two have a wider distribution: *S. asterophorum* ranges from the northeastern State of Paraíba to the southeastern State of Rio de Janeiro (Fig. 1), and *S. piluliferum* ranges from the southeastern State of Rio de Janeiro to the southern State of Santa Catarina (Fig. 7). The other two species have a much more restricted known distribution: *Solanum igniferum* has been collected in only two localities in southern region of Espirito Santo State (Fig. 4), and *S. sessilantherum* is only found in the Parque Estadual do Desengano and surroundings, in Rio de Janeiro State (Fig. 10).

TAXONOMIC TREATMENT

KEY TO THE SPECIES OF *SOLANUM ASTEROPHORUM* SPECIES GROUP

- 1 Major leaves entire (in mature plants), elliptic, the apex acuminate; stem prickles straight, deltate and sparsely distributed (young stems rarely unarmed); calyx globose, usually densely covered with long-stalked trichomes; calyx lobes deltate.....3. *Solanum piluliferum* (Fig. 8)
 –Major leaves lobed, ovate to obovate, the apex acute to obtuse; stem prickles curved, moderately to densely distributed; calyx conical, sparsely to densely covered with sessile to short-stalked trichomes; calyx lobes narrowly oblong, elliptic or lanceolate.....2
- 2 Pedicels notably curved downward keeping the flower buds facing down; pedicel insertion points usually paired or nearly so..... 1. *Solanum asterophorum* (Fig. 2)
 –Pedicels straight or nearly so, keeping the flower buds erect to horizontally disposed; pedicel insertion points unpaired.....3
- 3 Young stems and adaxial leaf surface completely covered by orange-coloured to ferruginous trichomes; branches horizontally oriented (plagiotropic); inflorescence axes unarmed.....2. *Solanum igniferum* (Fig. 5)
 –Young stems and adaxial leaf surface covered by hyaline to brownish trichomes; plants with erect branches; inflorescence axes usually armed.....4. *Solanum sessilantherum* (Fig. 11)

1. SOLANUM ASTEROPHORUM Mart., in Flora 21, Beibl. 2: 79. 1838.—TYPE: BRAZIL. “prope Sebastianopolin, ibi Decembri florens. Ad Lagoa fea Sept. Dryas”, 1834, *Luschnath s.n.* (lectotype, here designated: BR [BR836630]!). Figures 1, 2.

Solanum asterophorum Mart. var. *tomentosum* Sendtn., Fl. Bras. [Martius] 10: 98. 1846.—TYPE: BRAZIL. *Sellow s.n.* (lectotype, here designated: P [P00324598]!).

Solanum melancholicum Salzm. ex Dunal, Prodr. [A. P. de Candolle] 13 (1): 200. 1852.—TYPE: BRAZIL. Bahia. “In collibus circa Bahiam”, 1830, *Salzmann 390* (holotype: G-DC [G00145876]!; isotype: P [P00337131]!).

Solanum tetricum Dunal, Prodr. [A. P. de Candolle] 13 (1): 205. 1852. —TYPE: BRAZIL. *Gaudichaud 515* (lectotype, here designated: P [P00384256]!; Isolectotypes: P [P00445098]!, P [P00384254]!, P [P00384255]!, G-DC [G00145836]!, F [F0073432F]!, F [F0073434F], F [F0073435F], W-0022476!, BR [BR0000008290564]!).

Solanum gomphoidellum Moric. ex Dunal, Prodr. [A. P. de Candolle] 13 (1): 215. 1852. —TYPE: BRAZIL. Bahia. Circa Moritiba. *Blanchet 3473* (lectotype, here designated: G 2

sheets [G00405700, G00405700_a]; isolectotypes: C [C10019216]!, G [G00405785], P [P00324600]!, W- 0001939!).

Shrubs up to 2 m, spreadingly branched, erect. The initial vegetative growth is monopodial, with solitary leaves arranged in a 2/5 phyllotaxic spiral to the onset of the flowering, when it becomes sympodial; the first two subsequent branching are dichotomous, usually with the distal one turned 90° regarding to the proximal, after the second branching the dichotomous pattern gives place to a flexuous (zig-zag) growth, with geminate leaves at each node. Young stems terete, sparsely stellate-puberulent to densely stellate-tomentose; the trichomes hyaline to yellow or brownish, rarely ochraceous almost ferruginous close the meristems, porrect, apparently sessile to long-stalked, the stalks to 0.8 mm long, multiseriate, 2-4 cells wide, the rays 4-8(-11), 1-celled, the midpoints apparently absent to the same length the rays, 1-celled, straight to oblique; moderately armed, the prickles recurved, 2.4-5.5 mm long, 1.2-7.2 mm wide at base, flattened, stramineous to brown, sometimes becoming ferruginous toward the apex, with stellate trichomes like those of the stems and some small, subsessile, glandular ones at base, these often darkened when dry; bark of older stems glabrescent to moderately stellate-tomentose before secondary growth, green to dark brown. Sympodial units difoliate, geminate, anisophyllous. Leaves lobed, repand in large-leaved plants, membranaceous to cartaceous, weakly to markedly discolorous, drying green, brown or black, with the vestiture giving an pale green, pale yellow or brownish, rarely ochraceous appearance on the adaxial surface; the adaxial surface sparsely stellate-puberulent to densely stellate-tomentose, the trichomes hyaline, yellowish or brownish, rarely ochraceous, porrect, sessile to short-stalked, the stalks to 0.6 mm long, multiseriate, 3-4 cells wide, the rays (3-)4-8(-11), 1-celled, the midpoints 1-celled, erect to oblique, apparently absent to longer than the rays, the abaxial surface sparsely stellate-puberulent to densely stellate-tomentose, the trichomes hyaline to yellow or brownish, porrect, sessile to short-stalked, long-stalked ones less common, the stalks to 0.6 mm long, multiseriate, 3-4 cells wide, the rays 4-8(-10), 1-celled, the midpoints 1-celled, erect to obliquous, apparently absent to slightly longer than the rays, both major and minor leaves with the same vestiture pattern; unarmed to moderately armed along the midrib and the primary veins on both surfaces, the prickles straight to slightly obliquous, flattened, 2.5-10 mm long, 0.7-3.9 mm wide at base, 0-10 above and 0-10 beneath; major leaves with 6-10 pairs of primary veins, blades 10.5-29.5 cm long, 5-20.5 cm wide, elliptic to obovate, rarely ovate, the apex acute to obtuse, the base narrowly cuneate to cuneate, less often rounded, generally asymmetric, shallowly to deeply lobed, rarely entire,

the lobes deltate, (0-)1-6 on each side, to 2.7(4.9) cm long, 1-5.4 cm at base, acuminate to roundish apically; petiole 1.5-5.8 cm, sparsely stellate-puberulent to densely stellate-tomentose with stellate trichomes like those of the stems, the prickles 0-7, straight; minor leaves with 5-7 pairs of primary veins, blades (4.5-)6.3-17.5 cm long, 3.3-10 cm wide, elliptic to nearly rounded, the apex acuminate to rounded-mucronulate, the base acuminate to rounded, generally symmetric, entire to lobed, the lobes 0-4 on each side, to 2.3 cm long, to 5 cm wide at base; petiole (0.5-)0.7-2.7 cm, sparsely stellate-puberulent to densely stellate-tomentose, with stellate trichomes like those of the stems, the prickles 0-6; the leaves of juvenile forms are usually bigger, more armed and lobed (n° and length of lobes and prickles), becoming smaller, less armed and lobed in older plants. Inflorescences a reduced monochasial cyme, unbranched, apparently lateral, leaf-opposed to subopposite, the inflorescence axis (peduncle plus rachis) sparsely stellate-puberulent to densely stellate-tomentose with stellate trichomes like those of the stems, unarmed, the peduncle nearly absent to 4.5 mm long, usually gently curved at the tip, the rachis (1.2-)4-20.5 mm, unarmed, with (2-)5-12(-21) flowers, the pedicel insertion points closely spaced, usually paired, to 1.4 mm apart, 1-2 flowers open at the same time; pedicels curved downward keeping the flower buds facing down, 8.2-17 mm long, usually geniculate distally at anthesis, articulated at base, armed or not, sparsely stellate-puberulent to densely stellate-tomentose, the trichomes hyaline to yellow or brownish, rarely somewhat ochraceous, porrect, apparently sessile to long-stalked trichomes, the stalks to 0.8(-1.2) mm long, multiseriate, 2-3 cells wide, the rays (4-)6-8(-10), 1-celled, the midpoints apparently absent to 2/3 the length of the rays, 1-celled. Flowers 5-merous, rarely 4-merous (anomalous flowers of plants from southern coast of Bahia) perfect, heterostylous; initially all flowers are long-styled and hermaphroditic, the short-styled and functionally male flowers begin to be produced late in the flowering, usually distally in the inflorescence. Calyx tube conical, 4-7.6 mm long, the prickles 0-30, sparsely stellate-puberulent to densely stellate-tomentose, with trichomes like those of the pedicels, the lobes narrowly oblong, elliptic or lanceolate, often reflexed at anthesis, 1.6-5.9(-9.8) mm long, often unequal in length, 1.5-2.8(-4) mm wide, the apices acuminate to rounded. Corolla 2.8-4 cm in diameter, white, stellate, the interpetalar tissue well-developed and wavy, lobed for 2/5 to 3/5 of its length, the lobes 8-10.9 mm length, 8.9-14.3 mm wide, rounded to deltoid, often apiculate at apex, the lobe tips usually cucullate and reflexed at anthesis, moderately to densely stellate-tomentose along its whole length abaxially, the trichomes hyaline to brownish, porrect to multiangulate, misshapen, sessile to short-stalked, the stalks to 0.4 mm long, multiseriate, 2-4 cells wide, the rays 4-8(-11), tortuous, the midpoints variable in

length, the adaxial surface moderately to densely stellate-tomentose at apex becoming gradually less dense towards the base, the trichomes are like those of the abaxial surface, strongly misshapen. Stamens equal, with the filament tube 1.3-3.2 mm long, the free portion of the filaments 0.9-1.6 mm long; anthers lanceolate, slender, narrowed towards the apex, sagittate at base, connivent or not, with apical poricidal dehiscence, 6.2-12.1 mm length, 1.2-2.7 mm wide. Ovary short-cylindrical, convex at apex, with some glandular trichomes; style 10.7-14.6 mm, white, cylindrical, straight to gently curved in long-styled flowers; 6-8.2 mm, straight in short-styled flowers; glabrous to moderately stellate-tomentose at base; stigma 0.8-1.4 mm long, sometimes bilobed at apex, green, with a papillose surface. Fruit a spherical to widely depressed ovate berry, 9.5-14.1 mm length, 11.6-15.8 mm wide; fruiting pedicels 1.3-2 cm long, armed or unarmed; fruiting calyx accrescent, covering 1/3-3/4 of the mature fruit, the lobes 3.9-8.4 mm length, 5.4-8.3 mm at base; the pericarp smooth, glabrous, the exposed portion pale green, pale yellow or white, the portion covered by the calyx pale green to green at maturity. Seeds ca. 30-55 per berry, 3.5-4.2 mm long, 2.8-3.4 mm wide, flattened, reniform, stramineous to brown.

Habitat and Distribution (Fig. 3)—*Solanum asterophorum* is widely distributed along the northeastern and southeastern regions of Brazil in the Atlantic Forest domain, except in Ceará, Rio Grande do Norte (northeastern) and São Paulo (southeastern) states, where there are no records of this species. *Solanum asterophorum* seems to prefer damp sites with indirect light, as wet forest edges and disturbed areas near these forests, like roadsides and partially deforested places, but sometimes it can be found in wet forest understory; sea level to ca. 800 m.

Phenology—Flowering and fruiting specimens have been collected in all months, with a flowering peak from November through April and the fruiting peak from May through October.

Preliminary Conservation Status (IUCN 2014)—Despite the relatively small area of occupancy (AOO: 476 km²), the large extent of occurrence (EOO: 540,573 km²) and the numerous collection localities and known populations of *S. asterophorum* give it an IUCN Red List Status of Least Concern (LC).

Etymology—The protologue lacks etymology, but the epithet comes from the Greek “aster(-o)”, star, and “phoro”, bear, carry, a possible reference to the stellate trichomes covering the plant.

Additional Specimens Examined—Brazil. **Alagoas:** Mun. Maceió, Parque Municipal de Maceió, 22 Nov 2011 (fl), *Sampaio et al.* 37 (UFP); Mun. Murici, Bananeiras, 9°14'5”S, 35°52'61”W,

513 m, 16 Mar 2000 (fl), *Carvalho et al. 7141* (CEPEC, MAC, NY); Mun. Pilar, Fazenda Lamarão, 09°36'12"S, 35°55'09"W, 79 m, 19 Nov 2011 (fr), *Sampaio & Araujo 29* (UFP); Mun. Quebrangulo, REBIO Pedra Talhada, mata próxima a sede da REBIO, 9°15'16"S, 36°25'50"W, 664 m, 25 Jan 2012 (fl), *Sampaio et al. 55* (UFP). **Bahia:** Mun. Almadina, 5.3 km from Almadina on road to Ibatupã, then left 7.9 km on road to Serra dos Sete Paus, 14°44'11"S, 39°41'57"W, 500-650 m, 04 Apr 1997 (fr), *Thomas et al. s.n.* (HUEFS, MBM, NY); Mun. Amargosa, próximo à "Jacubinha", na casa do Sr. Arlindo, 13°7'0"S, 39°39'5"W, 630-900 m, 16 Nov 2007 (fl), *Perdiz et al. 237* (BHCB, CEPEC, HUEFS); Serra do Timbó, trilha para o jequitibá, área de estudos do Projeto Timbó/Centro Sapucaia, 13°7'3"S, 39°39'50"W, 809 m, 28 Jan 2007 (fl), *Cardoso et al. 1688* (CEPEC, HUEFS); Mun. Amélia Rodrigues, 4 km SE de Amélia Rodrigues, 12°26'29"S, 38°44'02"W, 20 Mar 1987 (fl), *Queiroz & Crepaldi 1464* (HUEFS, PEUFR); Mun. Aureliano Leal, fragmento de mata próxima à torre da Embratel, 14°25'13"S, 39°16'16"W, 561 m, 23 Sep 2008 (fl), *Giacomin et al. 205* (BHCB); Mun. Belmonte, distrito de Barrolândia, Estação Expe. Gregório Bondar (EGREB), Rodovia Itapebi/Belmonte km 51, a 5 km a oeste de Barrolândia, 30 Mar 1988 (fl, fr), *Santos 853* (CEPEC);



FIG. 1. Scan of lectotype of *Solanum asterophorum*.

Mun. Cachoeira, depois de Balém, na estrada para Sto. Antônio, Fazenda JOMEI, a 4 km da rodovia, 12°32'S, 39°5'W, 27 May 2003 (fl), Oliveira 889 (HUEFS, JPB); Mun. Camaçari, margem da BA-093, próximo ao Pólo Petroquímico, 28 May 2011 (fl), Barletta-Mattos & Abreu 4 (ALCB); Mun. Dias D'avila, acesso da BR-093, 5 Aug 1994 (fl, fr), *Guedes et al. s.n.* (ALCB); Mun. Eunápolis, plantio de *Eucalyptus*, 22 Apr 1994 (fl,fr), *Guedes et al. s.n.* (ALCB); Projeto Sapucaieira, 16°22'00"S, 39°34'00"W, 200 m, 19 Jan 1997 (fl), *Guedes et al. 4254* (ALCB, UFP); Mun. Itacaré, estrada que liga a torre da Embratel com a BR-101/Itacaré, a 5.8 km da entrada, cerca de 25 km a SE de Ubaitaba, 15 Jun 1979 (fl), *Mori & Carvalho 12023* (CEPEC, NY); Mun. Ituberá, Assentamento Limoeiro, proximidade da sede, área de reserva, 13°59'33"S, 39°17'11"W, 16 Dec 2001 (fl), *Alves et al. 341* (ALCB, CEPEC); Mata do Ponto Alto, 13°43'S, 39°08'W, 28 Nov 2005 (fl), *Guedes et al. 11907* (ALCB, CEPEC); Mun. Jaguaquara, estrada para Apuarema 5.7 km de Jaguaquara, 13°34'48"S, 39°55'51"W, 808 m, 24 Apr 2002 (fl), *Oliveira et al. 790* (HUEFS); Mun. Porto Seguro, rodovia para Eunápolis, km 13, 4 Feb 1972 (fl), *Eupunino 194* (CEPEC); Mun. Prado, Parque Nacional do Descobrimento, entrada a esquerda no km 12 da estrada principal que atravessa o Parque, 17°11'S, 39°20'W, 70 m, 2 Nov 2009 (fl), *Matos et al. 1901* (CEPEC); Cumuruxatiba, beira de estrada de terra que liga Cumuruxatiba a Prado, 17°07'14"S, 39°11'41"W, 25 m, 19 Jun 2014 (fl), *Gouvêa et al. 134* (BHCB); Beira de estrada de terra que liga Vila Guarani à Barra do Cahy, 16°58'57"S, 39°22'13"W, 40 m, 19 Jun 2014 (fl), *Gouvêa et al. 128* (BHCB); Beira de estrada de terra que liga Vila Guarani à Barra do Cahy, 16°59'40"S, 39°23'27"W, 108 m, 19 Jun 2014 (fr), *Gouvêa et al. 125* (BHCB); Beira de estrada (BA-489), próximo ao Parque Nacional do Descobrimento, 17°17'10"S, 39°19'05"W, 55 m, 19 Jun 2014 (fl), *Gouvêa et al. 123* (BHCB); Mun. Ribeirão Largo, ca. 23 km na estrada Itambé/Encruzilhada, 15°19'39"S, 40°45'5"W, 870 m, 14 Aug 2001(fr), *Carvalho et al. 6909* (CEPEC, HUEFS, JPB, NY); Mun. Salvador, Estação Ecológica de Cotegipe, 22 Sep 1994 (fl), *Guedes et al. s.n.* (ALCB); Unidade Ecológica do Cia, 17 Dec 1986 (fl), *Silva 05* (ALCB); Mun. Santa Cruz Cabrália, Estação Ecológica do Pau-Brasil e arredores, cerca de 16 km a W de Porto Seguro, 2 Jul 1978 (fl,fr), *Mori 10207* (CEPEC, NY); Estação Ecológica do Pau-Brasil, cerca de 16 km a W de Porto Seguro, 10 Mar 1983 (fl), *Brito & da Vinha 212* (CEPEC); Mun. São Sebastião do Passé, Lamarão do Passé, 12°30'S, 38°20'W, 8 Oct 1999 (fl, fr), *Guedes et al. 6500* (ALCB, CEPEC, JPB); Mun. Uruçuca, 17-20 km de Uruçuca, na estrada Uruçuca para Itacaré, 14°26'33"S, 39°14'29"W, 75 m, 7 Mar 2000 (fr), *França et al. 3359* (FUEL, HUEFS, JPB, UFG); Mun. Wenceslau Guimarães, Estação Ecológica Estadual Nova Esperança, sede a 7 km a W do povoado de Nova Esperança, 13°35'43"S, 39°43'18"W, 700 m, 26 Jul 2001 (fr), *Mattos-Silva et al. 4447* (ALCB, HUEFS, UESC); 13°41'S, 39°28'W, 2 Dec 2001 (fl), *Alves et al. 399* (ALCB, CEPEC).

Espírito Santo: Mun. Ibiraguá, Estação Ecológica do Morro da Vargem, Trilha do Bananal, 19°53'S, 40°23'W, 300-470 m, 27 May 1990 (fl), *Gomes et al. 1154* (BHCB, MBML, VIES); Mun. Linhares, Povoação, 17 Oct 1983 (fl), *Hatschbach 46923* (MBM); Reserva da Companhia Vale do Rio Doce, Estrada Roxinho, próximo ao aceiro catelã, 19°09'31"S, 40°03'39"W, 47 m, 8 Apr 2006 (fl), *Pinho-*

Ferreira et al. 616 (BHCB, CVRD, ESA); Estrada Jequitibá Rosa, ca. 500 m do início, 19°08'20"S, 39°55'41"W, 25 m, 11 Apr 2006 (fl), *Romão et al. 1337* (BHCB, ESA, CVRD); Degredo, floresta sobre cordão arenoso, 19°20'51"S, 39°43'46"W, 14 May 2010 (fl), *Ribeiro et al. 166* (BHCB, VIES); Reserva Floresta de Linhares, 200 m após o Córrego Rancho Alto, 11 Dec 1991 (fl, fr), *Zortea 6* (BHCB, CVRD, MBML); Aceiro com Nivaldo, canto G, ao lado do aceiro, 23 Jan 1995 (fl), *Folli 2494* (BHCB, CVRD); Estrada Guapuruvú, lado esquerdo indo para o norte, 21 Apr 1993 (fl), *Folli 1865* (BHCB, CVRD); A 500 m do Córrego Rancho Alto, ao lado da estrada, 10 Apr 1993 (fl, fr), *Folli 1862* (BHCB, CVRD); Estrada Gávea, entrada do Bloco C do Ensaio de Prod. Sustentada, 12 Oct 1990 (fl), *Menandro 272* (BHCB, CVRD, UEC); Aceiro com Adair Campo, próximo a divisa com José Catelã, 10 Nov 1998 (fl, fr), *Folli 3277* (BHCB, CVRD); Mun. Santa Teresa, trilha subindo o morro ao lado do Country Club, 25 Feb 1996 (fl), *Lombardi & Temponi 1129* (BHCB); Vale do Canaã, 16 Apr 1984 (fr), *Boone 48* (BHCB, MBML); 4 Dec 1985 (fl), *Vimercat 321* (BHCB, MBML); 8 Nov 1985 (fl), *Boone 864* (BHCB, MBML); Rio Saltinho, 26 Apr 1984 (fl, fr), *Pizziolo 2* (BHCB, MBML); Em plantação de banana próximo a rodovia ES-261, 19°56'22"S, 40°30'21"W, 527 m, 15 May 2015 (fl), *Gouvêa & Falcão 189* (BHCB); 16 Sep 2014 (fl), *Gouvêa & Falcão 140* (BHCB); Estação Biológica de Santa Lúcia, 7 Nov 1985 (fl), *Fernandes 1601* (BHCB, MBML); Trilha do Indaiá-açu, 19°58'04"S, 40°32'15"W, 622 m, 6 Feb 2011 (fl), *Giacomin et al. 1214* (BHCB); Nova Lombardia, Estrada de terra que leva de Santa Teresa para Nova Lombardia, 19°50'59"S, 40°30'56"W, 606 m, 16 Sep 2014 (fl), *Gouvêa & Falcão 141* (BHCB); Reserva Biológica Augusto Ruschi, 800 m, 16 Oct 2001 (fl), *Kollmann & Bausen 4867* (BHCB, MBML); Estrada para Goipaboaçu, parte final, 800 m, 24 Oct 2002 (fl), *Vervloet et al. 1293* (BHCB, MBML); Divisa com propriedade Vanildo Bragacha, 23 Jan 2003 (fr), *Vervloet & Bausen 1734* (BHCB, MBML); Dra. Marlene, antiga estrada, 23 Jul 2002 (fr), *Vervloet et al. 502* (BHCB, MBML); Estrada partindo da Casa da Pedra, 11 Dec 2002 (fl), *Vervloet et al. 1491* (BHCB, MBML); Propriedade do Sr. Furlani, próximo a plantação de banana, 19°48'22"S, 40°32'19"W, 720 m, 9 Jun 2012 (fl, fr), *Giacomin et al. 1868* (BHCB, NY); Fragmento de Floresta Ombrófila preservada anexo à plantação de bananeira, 19°48'16"S, 40°32'18"W, 803 m, 7 Feb 2011 (fl), *Giacomin et al. 1223* (BHCB); Mun. São Mateus, Reserva Biológica do Sooretama, Lago do Macuco, ca. 30 m, 15 May 1977 (fl), *Martinelli 2157* (BHCB, RB). **Minas Gerais:** Mun. Ataleia, estrada que leva da Comunidade Canaã a Ataleia, pasto, 18°00'51"S, 41°09'21"W, 286 m, 15 Jun 2014 (fl), *Gouvêa et al. 100* (BHCB); Mun. Caratinga, Estação Biológica de Caratinga, 11 Oct 1987 (fl, fr), *Costa et al. 296* (BHCB); 06 Apr 1990 (fl), *Costa et al. s.n.* (BHCB); Fazenda Montes Claros, beira de estrada, 11 Jan 1991 (fl), *Stehmann s.n.* (BHCB); APA Lagoa Silvana, 28 Jun 2002 (fl), *Pivari & Côrtes 116* (BHCB, CESJ, MBM, SPF); F.M.C Mata do Rafael, 26 Apr 1984 (fl, fr), *Andrade & Lopes 371* (BHCB, UEC); Mun. Descoberto, Reserva Biológica da Represa do Grama, 09 Jun 2001 (fl, fr), *Castro et al. 466* (BHCB, CESJ, MBM); 21°25'53"S, 42°56'48"W, 563 m, 15 May 2015 (fl, fr), *Gouvêa & Falcão 192* (BHCB); Mun. Dionísio, Lagoa do Jacaré, 19°49'15"S, 42°39'48"W, 276 m, 06 Jun 2003 (fr), *França 362* (BHCB,

FUEL); CEMAS, Cia. Agrícola e Florestal Santa Bárbara, 7 Feb 1986 (fl), *Campos 38* (BHCB); Mun. Gonzaga, Fazenda do Sr. Gezier Nunes, 18°47'47", 42°27'40", 790 m, 5 Sep 2008 (fr), *Kamino & Silva 1152* (BHCB); Mun. Marilíeria, Parque Estadual do Rio Doce, entrada do alojamento, trilha para Porto Capim, 30 Mar 1996 (fl), *Lombardi et al. 1195* (BHCB); 02 May 1997 (fl, fr), *Tavares s.n.* (BHCB, FUEL, MBM); Estrada Restaurante-Laboratório, perto do laboratório, 19°46'S, 42°37'W, 3 Mar 1999 (fl), *Lombardi 2548* (BHCB, FUEL); Trilha da Campolina, 31 Oct 1992 (fl), *Stehmann & Arantes s.n.* (BHCB); Mun. Novo Cruzeiro, Fazenda Araras, 17°36'47"S, 41°57'49"W, 754 m, 2 Oct 2004 (fl, fr), *Stehmann et al. 3548* (BHCB, MBM); Mun. Santa Bárbara, Estação de Pesquisa e Desenvolvimento Ambiental de Peti, 19°53'33"S, 43°21'55"W, 21 May 2005 (fl), *Ferreira & França 106* (BHCB); 8 Mar 1988 (fl), *Stehmann & Pedralli s.n.* (BHCB); Mun. Teófilo Otoni, Afloramento rochoso lado esquerdo da MG-418, cerca de 30 km ao norte de Teófilo Otoni, 17°51'22"S, 41°15'39"W, 546 m, 8 Jan 2011(fl), *De Paula et al. 106* (BHCB); Mun. Timóteo, Parque Estadual do Rio Doce, 19°35'28"S, 42°34'07"W, 248 m, 4 May 2004 (fl), *França & Raggi 547* (BHCB, CESJ); Mun. Viçosa, Mata do Paraíso near town of Viçosa, at roadside, 20°47'59"S, 42°51'60"W, 705 m, 21 Apr 2010 (fl), *Agra et al. 7250* (BHCB, JPB, UT). **Paraíba:** Mun. Areia, Escola de Agronomia do Nordeste, em terrenos de mata, lugares altos e úmidos, 08 Jun 1953 (fl), *Moraes 796* (MBM). **Pernambuco:** Mun. Jaqueira, Serra do Urubu, nas proximidades da Pedra do Cruzeiro, no interior da mata, 8°43'56"S, 35°50'44"W, 730 m, 1 Apr 2012 (fl, fr), *Sampaio et al. 83* (BHCB, UFP); *Sampaio et al. 75* (BHCB, UFP); Mun. Recife, Reserva Florestal do Curado, 25 Oct 1967 (fl, fr), *Lira 128* (UFP). **Rio de Janeiro:** Mun. Casimiro de Abreu, Estrada de terra que liga uma das entradas da Reserva Biológica Poço das Antas à BR-101, beira de estrada, 22°31'35"S, 42°19'29"W, 35 m, 29 Apr 2015 (fl), *Gouvêa & Stehmann 179* (BHCB); 22°31'44"S, 42°18'49"W, 44 m, 29 Apr 2015 (fl), *Gouvêa & Stehmann 175* (BHCB); Mun. Rio de Janeiro, estrada da Vista Chinesa, Alto da Boa Vista, km 3, 10 Apr 1981 (fl), *Carauta 91* (RB); Vista Chinesa, 20 May 1958 (fl, fr), *Liene et al. 3767* (RB); Estrada das Paineiras, ca. 500 m, 9 May 1973 (fl), *Sucre 9978* (JPB, RB); Serra da Carioca, estrada do Cristo Redentor, 25 May 1945 (fl, fr), *Occhioni 354* (RB); Botafogo, Morro Mundo Novo, vertende leste, 12 Jun 1998 (fl, fr), *Amancio et al. 7* (JPB, RB).

Notes—*Solanum asterophorum* differs from other species of *S. asterophorum* species group by a combination of its pedicels curved downward keeping the buds facing down, and conical calyx (see Figs. 2B, F). The former character can sometimes be difficult to observe in herbarium sheets, once the pressing process influences the position of the buds. Thus, in order to facilitate the identification, it should be noted at the time of collection and included in the label observations when possible. *Solanum asterophorum* is closely related to *S. igniferum* and *S. sessilantherum*, with which it shares lobed leaves and conical calyx, among other characters. However, differently of *S. asterophorum*, *S. igniferum* has a notable orange vestiture, plagiotropic branches, buds erect to horizontally disposed and more lax

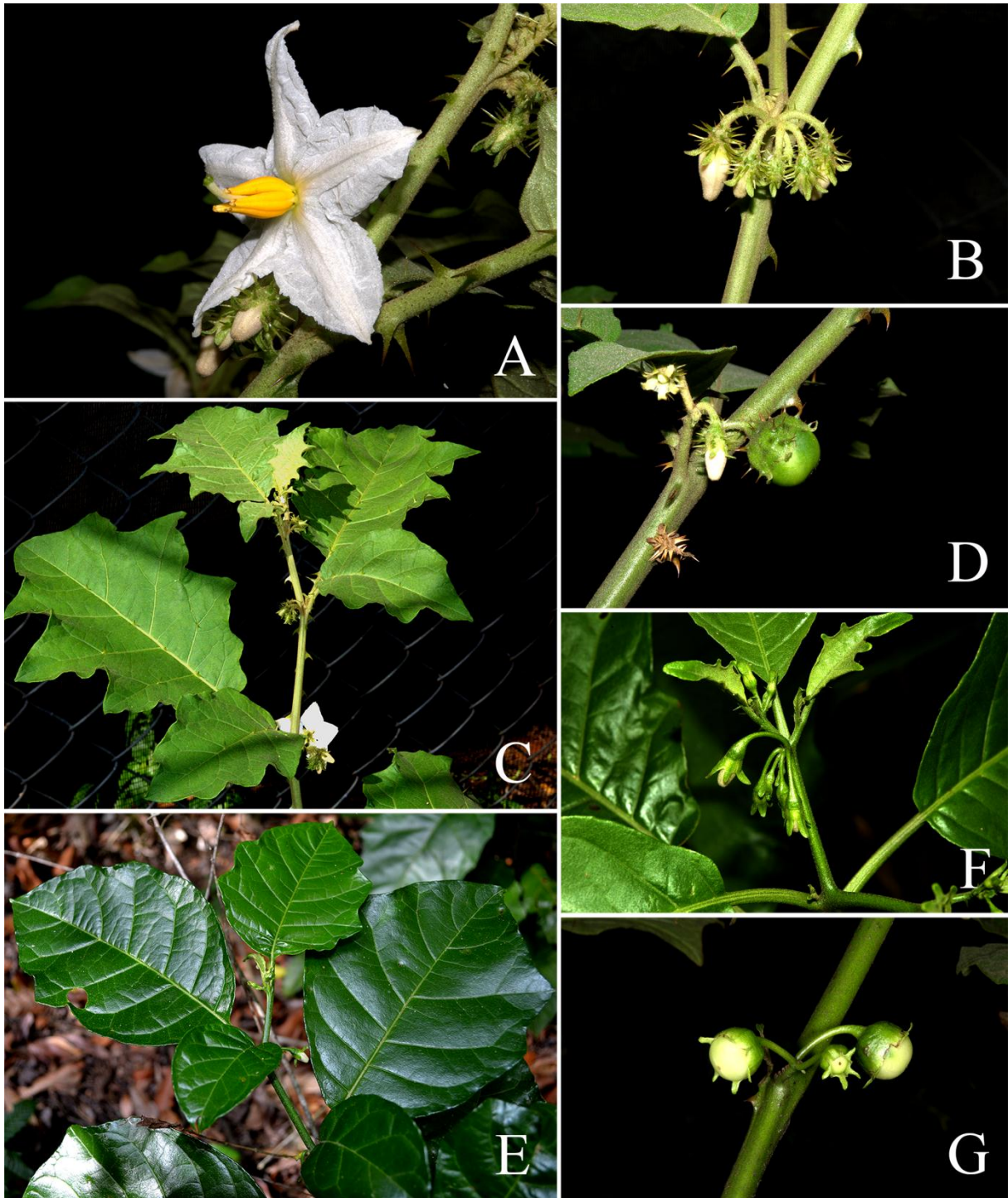


FIG. 2. *Solanum asterophorum* from Minas Gerais (Gouvêa & Falcão 192, BHCB). A. Flower. B. Young inflorescence; note the pedicels curved downward keeping the buds facing down and the pedicel insertion points closely spaced. C. Habit. D. Fruit. E. Habit of *S. asterophorum* from Santa Teresa, Espírito Santo (Giacomin *et al.* 1214, BHCB); note the shiny aspect of its stem and leaves given by the very sparse vestiture. F. Young inflorescence. G. Fruits. Credits: E: L. L. Giacomin.

inflorescences; and *S. sessilanthorum* has buds erect to horizontally disposed, more lax inflorescences, inflorescence axis armed, apparently sessile anthers and coriaceous leaves.

Solanum asterophorum has the most variable morphology among the species belonging to the *S. asterophorum* species group, having also the widest latitudinal range. Occurring from Rio de Janeiro State to Paraíba State, its populations varies mainly regarding to the vestiture of its stems, leaves, reproductive structures and the coloration of the epidermis when dry. There is a great variation in its density, color, length of trichome stalks and midpoints. Its vestiture density ranges from nearly glabrous, with trichomes sparsely distributed to dense, with interwoven trichome rays, stalks or both. The trichomes can be apparently sessile to long-stalked, with midribs longer than rays to nearly absent, also ranging in coloration, from hyaline to yellow or brownish, rarely somewhat ochraceous. When dry, the color of its epidermis can ranges from green to black, and specimens of intermediate coloration are common.

Populations with certain sets of characteristics are restricted to some localities along its range, and two extremes can be noted. Plants exhibiting a sparse vestiture composed by apparently sessile, hyaline trichomes with reduced midpoints, epidermis shiny green when fresh and black when dry (*e.g.*, Gouvêa & Falcão 189; Giacomini *et al.* 1214; Figs. E-G) are particularly found in some parts of southeastern Brazil. Collections of these materials have been done in the State of Espírito Santo (Mun. Santa Teresa and near localities), Minas Gerais (Mun. Caratinga, Estação Biológica de Caratinga), and throughout the State of Rio de Janeiro. Specimens with these morphological features correspond to the type material of *Solanum tetricum* Dunal, name treated as synonym of *S. asterophorum* by Whalen (1984) and subsequently recognized as an accepted name by Stehmann *et al.* (2015). However, many morphologically intermediate specimens have been collected and examined, which lead us to agree with Whalen's opinion, and treat *S. tetricum* as synonym of *S. asterophorum*.

In another way, plants from the southern coast of Bahia State have its young stems, leaves, inflorescence axis and calyx covered by a denser vestiture, consisting of short- to long-stalked, interwoven, pale yellow to yellow, rarely ochraceous trichomes. Furthermore, the trichomes of the upper leaf surface have midpoints longer than rays (*e.g.*, Gouvêa *et al.* 130; Matos *et al.* 1901) and its epidermis does not become black after dry.

However, most of the *S. asterophorum* collections consist of specimens with an intermediate morphology (Fig. 2A-D). These plants usually exhibit a vestiture of moderate density on those structures, usually with trichomes hyaline to brownish, apparently sessile to

short-stalked, midpoints of variable length, usually shorter than rays in specimens from southeastern Brazil (e.g., Gouvêa & Falcão 192), and longer than rays in northeastern specimens (e.g., França et al. 3359). Its epidermis ranges from green to brownish when dry.

Solanum asterophorum var. *tomentosum* Sendtn., a variety recognized by Sendtner (1846) in Flora Brasiliensis, was described based on two syntypes, one collected by prince Maximilian of Wied ("inter arbusta prope Campos", M. A. P. Prinz zu Wied s.n.), nowadays Campos dos Goytacazes, Rio de Janeiro, and the other by Sellow, without indicated locality. An analysis of both materials indicated that they belong to different species: *S. asterophorum* (Sellow s.n., P [P00324598]) and *S. igniferum* (Prinz zu Wied s.n., BR [BR836628]). The short description in the protologue includes morphological characters that could be associated to both taxa, but the yellowish brown or canescent leaves are traits that better correspond to *S. asterophorum*. We elected the material Sellow s.n. (P [P00324598]) with original label "Her. Reg. Berolinense" as lectotype of *S. asterophorum* var. *tomentosum*, here considered a synonym and interpreted as being within the range of variation of the species. There is another sample collected by Sellow s.n. (BR [BR836629]), identified only at specific level, and indicated as syntype of the variety by M. Nee. In spite of having the same number in the label (118), this material corresponds to a sample of *S. igniferum* and not of *S. asterophorum*, as the material of Sellow kept in P. For this reason, we decide not to accept it as duplicate neither as a syntype of the variety.

Some collections of *Salzmann* s.n. from Bahia ("in umbrosis" HAL [HAL0070575], K [K000590082], K [K000590083], MO [MO503643], and "in colibus" P [P00337131]) have been indicated as type material of *S. melancholicum*, a synonym of *S. asterophorum*. However, in the protologue the type was clearly indicated with the number 390, placed in de Candolle herbarium (G-DC), and this material is here reconized as the holotype. All other *Salzmann*'s materials were cited in the examined material, but are not accept as type material.

Dunal (1852) described *S. tetricum*, a synonym of *S. asterophorum*, based on the following syntypes: "In Brasiliae Rio de Janeiro sylvis", *Lhotsky* s.n. (G-DC), *Lund* 192 (G-DC), *Gaudichaud* 515 (G-DC, P); and "circa Bahia", *Guillot* s.n. (P). Among the syntypes, *Gaudichaud* 515 (P [P00384256]) was chosen as lectotype because it has buds and flowers, and the sample matches with the given description in the protologue. Furthermore, duplicates of this material are distributed in many herbaria.

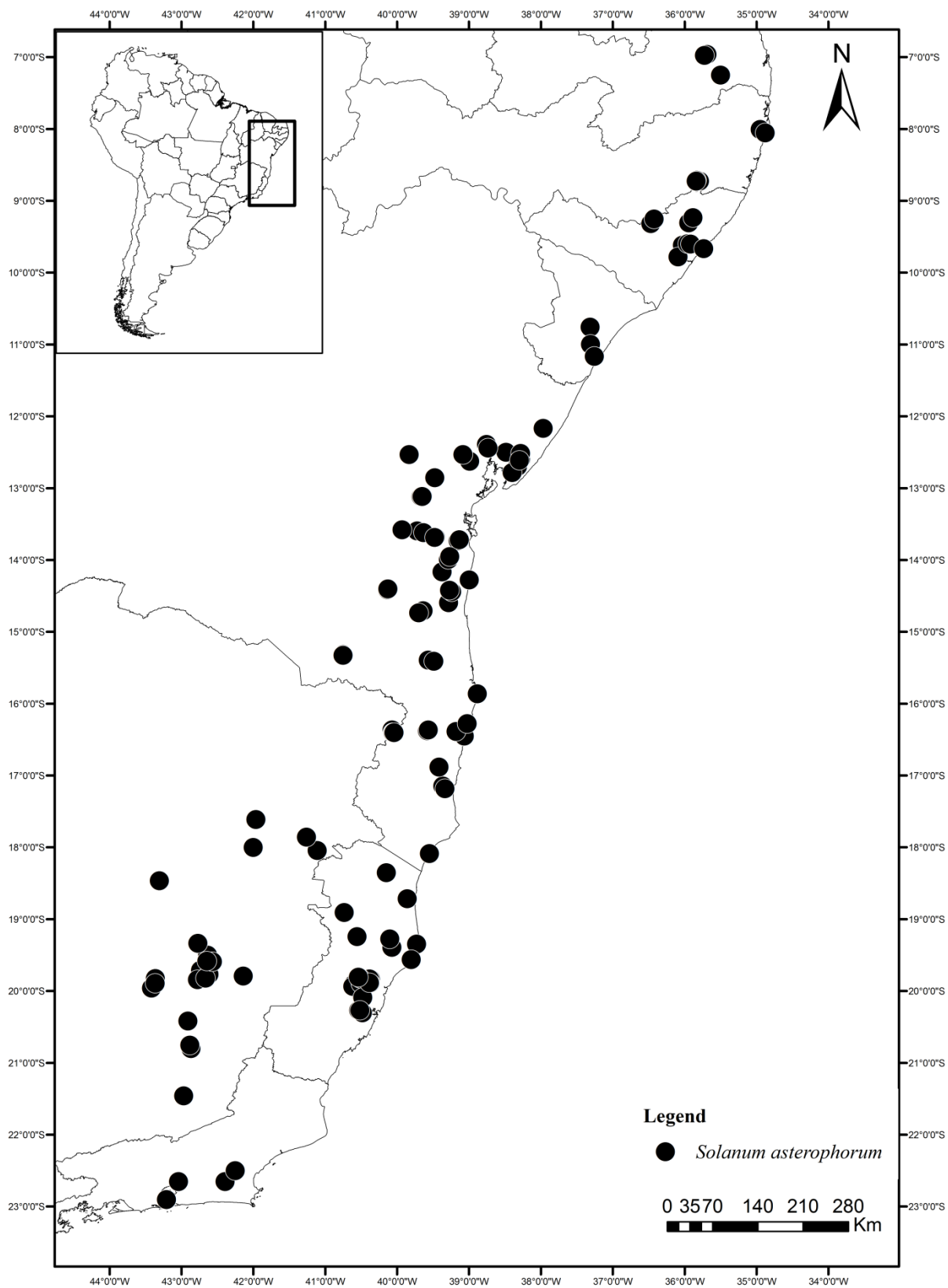


FIG. 3. Distribution of *Solanum asterophorum*.

2. SOLANUM IGNIFERUM Gouvêa & Stehmann, sp. nov., ined.— TYPE. BRAZIL. Espírito Santo: Mun. São Bento de Urânia, Estrada que liga a rodovia BR-262 a São Bento de Urânia, borda de Floresta Ombrófila Densa secundária, beira de estrada, 20°27'10"S, 40°54'16"W, 979 m, 27 April 2015 (fl, fr), *Y.F. Gouvêa & J.R. Stehmann 164* (holotype: BHCB 2 sheets [BHCB026909, BHCB026910]!; isotypes: [BM, K, NY, P, RB]). Figures 4, 5.

Shrubs up to 2 m, spreadingly branched, with horizontally oriented (plagiotropic) branches diverging from the top of a vertically oriented (orthotropic) stem; the initial vegetative growth is monopodial, with solitary leaves arranged in a 2/5 phyllotaxic spiral to the onset of the flowering, when it becomes sympodial; the first two subsequent branching are dichotomous, usually with the distal one turned 90° regarding to the proximal, after the second branching the dichotomous pattern gives place to a flexuous (zig-zag) growth, with geminate leaves at each node. Young stems terete, densely stellate-tomentose; the trichomes orange-colored to ferruginous, porrect, short- to long-stalked, the long ones less often, the stalks 0.03-0.4 mm long, multiseriate, 2-4 cells wide, the rays (4-)6-8(-10), 1-celled, unequal in length, the midpoints poorly developed, 1-celled, up to ¼ of size of the rays, oblique; moderately to sparsely armed, the prickles recurved, 1.8-4.5 mm long, 2-5 mm wide at base, flattened, stramineous at base becoming ferruginous towards the apex, with stellate trichomes like those of the stems and some small, sessile, glandular ones at base, these often darkened when dry; bark of older stems glabrescent to moderately stellate-tomentose before secondary growth, dark green to dark brown. Sympodial units difoliate, geminate, anisophyllous. Leaves lobed, repand in large-leaved plants, membranaceous to chartaceous, discolorous, drying green to dark brown with the vestiture giving a superficial yellowish orange-coloured appearance on the adaxial surface, and grayish green to yellowish green on the abaxial surface; the adaxial surface densely stellate-tomentose, the epidermis always visible, the trichomes porrect to antrorse, sessile to long-stalked, the stalks to 2.5 mm long, multiseriate, 3-4 cells wide, the rays (3-)4-8, 1-celled, unequal in length, the midpoints 1-celled, often straight, from ¾ to the same length the rays, with trichomes forked, sessile to short-stalked rarely present, the longer trichomes more densely distributed along the midrib and primary veins, these orange-colored to ferruginous, contrasting with the shorter, hyaline to stramineous ones, the abaxial surface densely stellate-tomentose, the lamina always visible, the trichomes porrect to antrorse, sessile to long-stalked, the stalks to 0.24 mm long, multiseriate, 3-4 cells wide, the rays 4-8, 1-celled, unequal in length, the midpoints 1-celled, up to ¾ of size of the rays, with

the longer trichomes more densely distributed along the midrib and primary veins, these less frequent than on the adaxial surface, usually ferruginous to orange-colored contrasting with the most frequent hyaline to stramineous shorter ones, both major and minor leaves with the same vestiture pattern; unarmed to moderately armed along the midrib and the primary veins on both surfaces, the prickles straight, flattened, 1-7.5 mm long, 0.5-2.5 mm wide at base, 0-25 above and 0-10 beneath; major leaves with 6-9 pairs of primary veins, blades ovate to obovate, 14-22(-30) cm long, 8-17(-23) cm wide, the apex acute to obtuse, the base cuneate to subcordate, generally asymmetric, shallowly to deeply lobed, the lobes deltate, (1-)2-8 on each side, to 2.5 cm long, to 6.5 cm at base; petiole 2-4.5 cm, densely stellate-tomentose with stellate trichomes like those of the stems, the prickles 0-5; minor leaves with 5-6 pairs of primary veins, blades elliptic to nearly rounded, 7-12 cm long, 4-7.5 cm wide, the apex acute to obtuse-rounded, the base acute to rounded, generally symmetric, entire to shallowly lobed, the lobes deltate, 0-3 on each side, to 1 cm long, to 2.5 cm wide at base; petiole 1-2.8 cm, densely stellate-tomentose with stellate trichomes like those of the stems, the prickles 0-4; the leaves of juvenile forms are bigger, more armed and lobed (n^o and length of lobes and prickles), becoming smaller, less armed and lobed in older plants. Inflorescences a reduced monochasial cyme, unbranched, apparently lateral, leaf-opposed to subopposite, the inflorescence axis (peduncle plus rachis) densely stellate-tomentose with stellate trichomes like those of the stems, unarmed, the peduncle nearly absent to 7 mm, the rachis 1.5-20 mm, unarmed, with (4-)7-15(-19) flowers, pedicel insertion points spaced 0-3.8 mm apart, with the more spaced ones at proximal portion of the rachis, 1(-2) flowers open at same time; pedicels straight or nearly so, keeping the flower buds erect to horizontally disposed, 9-16 mm long in open flowers, sometimes geniculate distally, articulated at base, unarmed, densely stellate-tomentose, the trichomes only ferruginous to orange-colored or mixed with hyaline to stramineous ones, porrect, short- to long-stalked, the stalks 0.04-0.4 mm long, multiseriate, 2-3 cells wide, the rays (6-)8(-11), 1-celled, unequal in length, the midpoints poorly developed, 1-celled, up to ½ of size of the rays. Flowers 5-merous, perfect, heterostylous; initially all flowers are long-styled and hermaphroditic, the short-styled and functionally male flowers begin to be produced late in the flowering, usually distally in the inflorescence. Calyx tube conical, somewhat angular, 5-7 mm long, with 0-10 prickles, densely stellate-tomentose with trichomes like those of the pedicels, the lobes narrowly oblong, elliptic or lanceolate, 2.5-7(-9) mm long, often unequal in length, 1.2-2.5(-2.8) mm wide, the apices acute to rounded. Corolla 3-3.8 cm in diameter, white to purplish-white, stellate, the interpetalar tissue well-developed and wavy, lobed for 1/3 to 3/5 of its length, the lobes 6.5-10.5 mm length, 7.6-14

mm wide, rounded to deltoid, apiculate at apex, the lobe tips usually cucullate and reflexed at anthesis, densely stellate-tomentose along its whole length abaxially, the trichomes usually ferruginous, porrect to multiangulate, usually misshapen, sessile to short-stalked, the rays up to 12, tortuous, the midpoint $\frac{1}{2}$ to the same length of the rays, the adaxial surface densely stellate-tomentose at apex, becoming gradually less dense towards the base, the basal half glabrous or nearly so, the trichomes like those of the abaxial surface, strongly misshapen. Stamens equal, with the filament tube 1.5-2.3 mm long, the free portion of the filaments 1-1.3 mm long; anthers lanceolate, narrowed towards the apex, sagittate at base, connivent, with apical poricidal dehiscence, 6.6-10.7 mm length, 1.5-2.4 mm wide. Ovary short-cylindrical, convex at apex, with some glandular trichomes; style white, cylindrical, 13.6-14.3 mm, often gently curved in long-styled flowers; 7.4-9 mm, straight in short-styled flowers; stellate-tomentose at base; stigma 1-1.3 mm long, often bilobed at apex, green, with a papillose surface. Fruit a widely depressed ovate to spherical, 9.7-13 mm length, 12.3-14.5 mm wide; fruiting pedicels 2-2.4 cm long, unarmed; fruiting calyx accrescent, completely covering the earlier stages of development of the fruit and $\frac{1}{2}$ - $\frac{3}{4}$ of the mature fruit, the lobes 3.5-10 mm long, 5.6-8 mm at base; the pericarp smooth, glabrous, the exposed portion white and the portion covered by the calyx green to pale green to maturity. Seeds ca. 40-50 per berry, 3.5-4.5 mm long, 3.1-3.4 wide, flattened, reniform, stramineous to pale brown.

Habitat and Distribution (Fig. 6)—*Solanum igniferum* seems to be endemic to southern Espírito Santo State, Brazil. Its populations grow in damp soil with indirect light, at the edge and in openings of wet forest fragments, these sometimes associated with granitic outcrops; from 400 to 980 m elevation.

Phenology— Flowering collects have been made between November and June, with the flowering peak from December to April; fruiting material have been collected from February to June.

Preliminary Conservation Status (IUCN 2014)—The conservation status of *S. igniferum* is here considered endangered (EN) based on the small extent of occurrence (EOO, 145,400 km²), the very small area of occurrence (AOO, 20 km²) and the fact that there is no record of this species within protected areas.

Etymology— The specific epithet “*igniferum*” refers to its peculiar fire-colored vestiture.

Additional Specimens Examined—Brazil. **Espírito Santo:** Mun. Alfredo Chaves, São Bento de Urânia, 900 m, 14 Jan 1995, *Hatschbach & Silva 61483* (CEPEC, MBM, NY); Mun. Atílio Vivacqua, estrada de terra para a comunidade de Moitão do Sul, 21°00'11"S, 41°12'15"W, 461 m, May 2015, *Gouvêa & Falcão 190* (BHCB); 21°00'08"S, 41°12'15"W, 435 m, 05 June



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UNIVERSIDADE FEDERAL DE MINAS GERAIS



BHCB026909



Herbário BHCB

No. 176412

Família: Solanaceae

Espécie: *Solanum*

Det.:

Data:

Localidade: Brasil, Espírito Santo, São Bento de Urânia, Estrada que liga a rodovia (BR-262) a São Bento de Urânia, Borda de Floresta Ombrófila Densa secundária. Beira de estrada.

20°27'10" S, 40°54'16" W

Altitude: 979m

Coletor: Gouvêa, Y.F. 164

Data: 27 April 2015

Stehmann, J.R.

Notas: Arbusto ca. 1,3 m. Corola branca. Anteras amarelas. Frutos alvos.



FIG. 4. Scan of holotype of *Solanum igniferum*.

2012, *L.L. Giacomini et al. 1845* (BHCB, NY, RB); Mun. Marechal Floriano, Pedra Azul, 16 May 1999, *Hatschbach et al. 69092* (BHCB, C, MBM). **Origin not indicated:** *Sellow s.n.* (BR, [BR0000008366290]).

Notes— *Solanum igniferum* is unique in *S. asterophorum* species group due to the combination of its adaxial leaf surfaces, midrib of both leaf sides, calyx, pedicels, inflorescence axis and young stems completely covered by a notable orange to ferruginous vestiture; plagiotropic branches sprawling horizontally; and pedicels straight or nearly so, keeping the buds erect to horizontally oriented (see Fig. 5). *Solanum igniferum* resembles *S. asterophorum*, but the vestiture of *S. asterophorum* is hyaline, yellowish or brownish, the branches erect and the pedicels are curved downward keeping the buds facing down. *Solanum igniferum* also resembles *S. piluliferum* in its somewhat similar vestiture, but the globose calyx and entire leaves of *S. piluliferum* readily distinguish the two species.

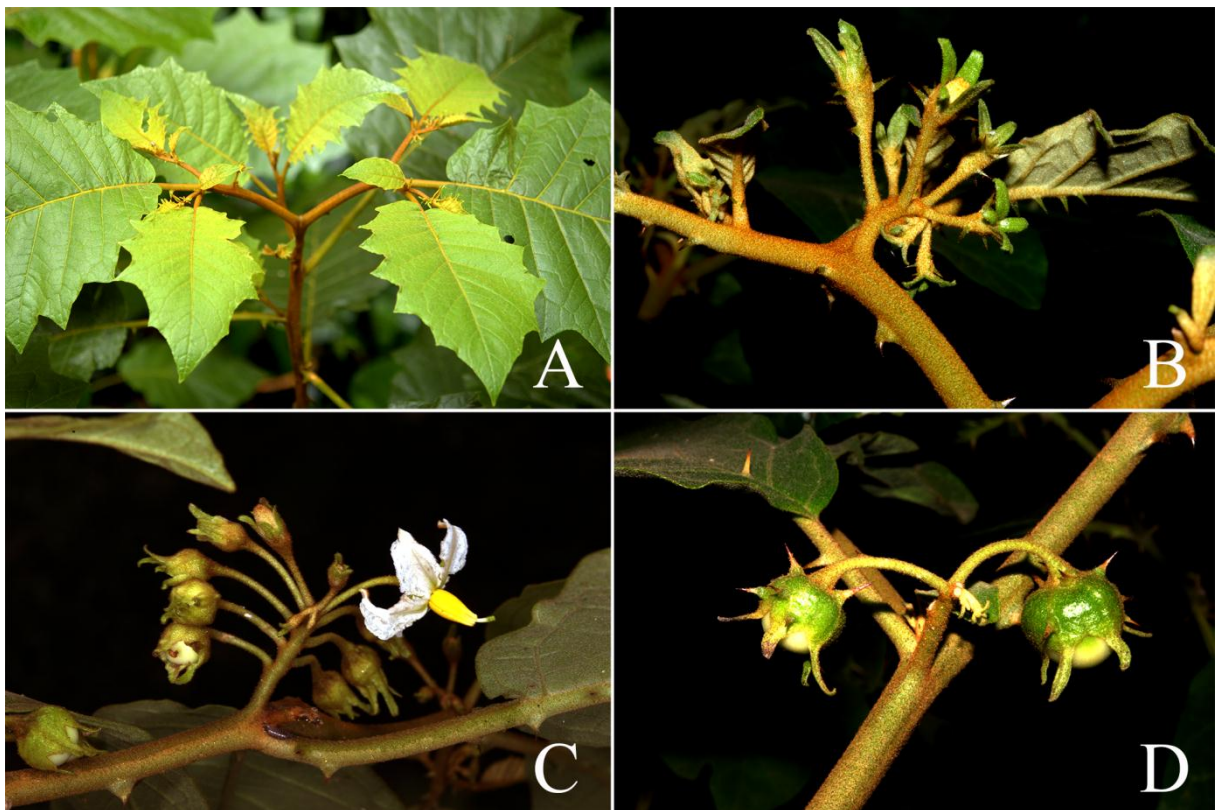


FIG. 5. Photo of type collection of *Solanum igniferum* (*Y.F. Gouvêa & J.R. Stehmann 164*, BHCB). A. Habit; note the orange vestiture completely covering the stems; the two subsequent branching, typical of the group; and plagiotropic branches exclusive of *S. igniferum*. B. Young inflorescence; note the pedicels straight or nearly so, keeping the buds erect to horizontally oriented. C. Mature inflorescence. D. Fruits.

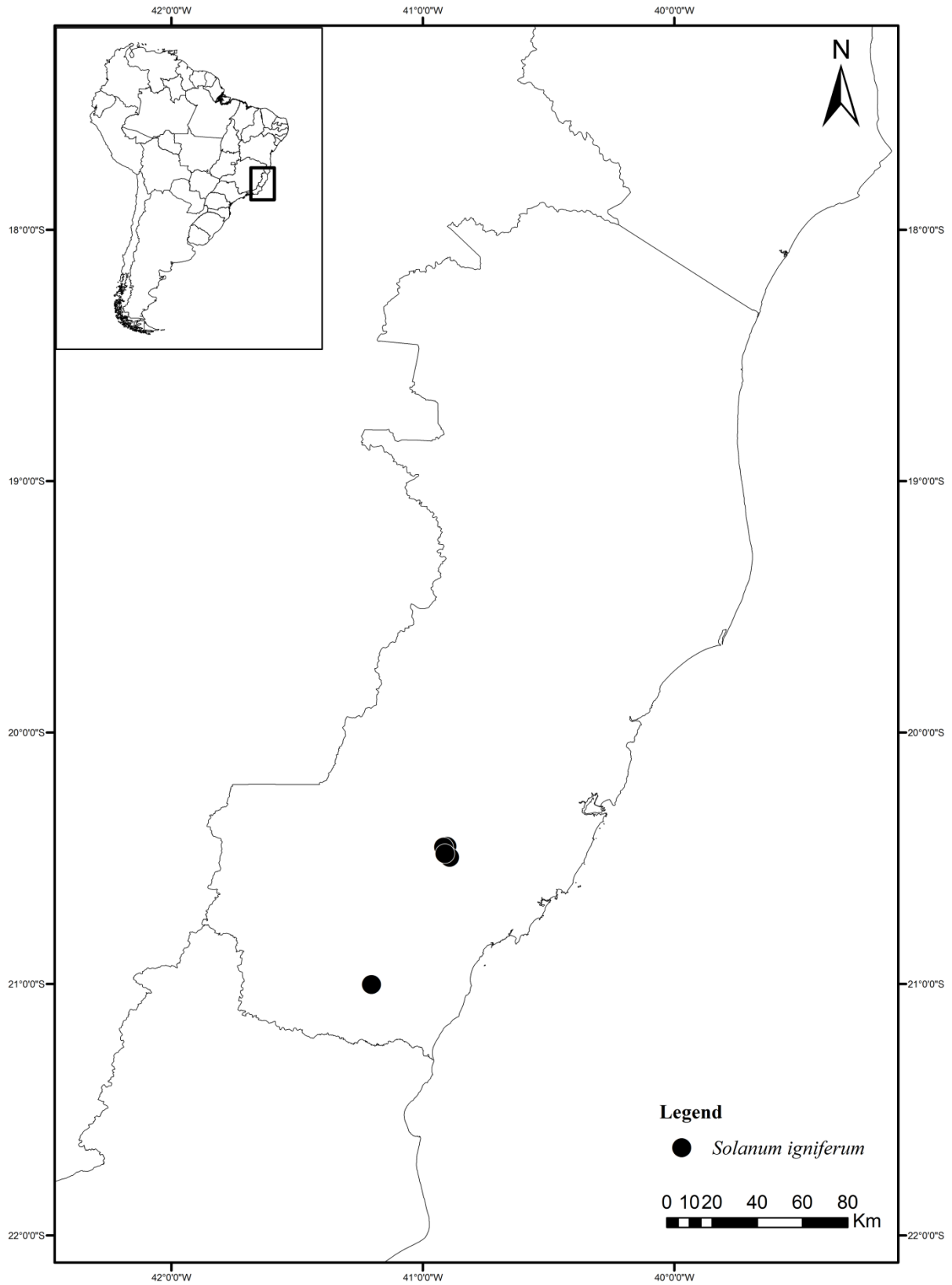


FIG. 6. Distribution of *Solanum igniferum*.

The first specimen corresponding to *S. igniferum* was collected by *Sellow s.n.* (BR [BR0000008366290]) with no locality indicated and determined as *S. asterophorum*. This material was also pointed out as syntype de *S. asterophorum* var. *tomentosum* Sendtn. by M. Nee (2006), but no evidence exist to recognize it as a syntype of the variety (see comments in *S. asterophorum*).

3. SOLANUM PILULIFERUM Dunal, Prodr. [A. P. de Candolle] 13(1): 265. 1852.—TYPE: BRAZIL. “In Brasiliâ circa Novo Friburgo provinciæ Rio de Janeiro”, *Claussen 58* (holotype: P [P00368472]!; isotype G [343348]!). Figures 7, 8.

Solanum densiflorum Sendtn., Fl. Bras. [Martius] 10: 93, Table 6, Figs. 63-66. 1846. Nom. Illegit., non M. Martens & Gal. (1845). —TYPE: Brazil. “In aquaticis ad Sta. Cruz et Rozário, prov. Sebastianopolitanae, frequens, Decembri florens”, *Martius s.n.* (lectotype, here designated: M [M0165943]!)

Solanum piluliferum Dunal var. *densiflorum* Dunal, Prodr. [A. P. de Candolle] 13(1): 265. 1852. —TYPE: Based on *S. densiflorum* Sendtn.

Shrubs up to 3 m, spreadingly branched, erect. The initial vegetative growth is monopodial, with solitary leaves arranged in a 2/5 phyllotaxic spiral to the onset of the flowering, when it becomes sympodial; the first two branching are trichotomous and dichotomous respectively, with the branches initially patently disposed, the distal branchings are usually turned 90° regarding to the proximal, after the second branching the dichotomous pattern gives place to a flexuous (zig-zag) growth, with geminate leaves at each node. Young stems terete, densely stellate-tomentose, the trichomes porrect, stramineous to ochraceo-ferruginous, sometimes reddish in young plants, apparently sessile to long-stalked trichomes, the stalks to 1.6(-1.9) mm long, multiseriate, 2 cells wide, the rays (4-)6-8(-10), 1-celled, the midpoints apparently absent to 2/3 the length of the rays, 1-celled, sparsely armed, the prickles short, straight, flattened, deltoid, 1-3 mm long (young stems sometimes unarmed), 1.1-3 mm wide at base, with stellate trichomes like those of the stem on the base; bark of older stems, dark-brown, glabrescent to moderately stellate-tomentose. Sympodial units difoliate, geminate, anisophyllous. Leaves cartaceous, discolorous, drying green to dark brown, with the vestiture giving an ochraceous to ferruginous appearance above, green, greenish grey or dark brown beneath, with the vestiture giving a stramineous to ochraceous appearance; the adaxial surface moderately stellate-puberulent to densely stellate-tomentose, the lamina always visible, the trichomes denser distributed along the veins, stramineous to ferruginous, porrect, multiradiate, sessile to long-stalked, the stalks to 0.7 mm long,

multiseriate, 2-3 cells wide, the rays (3-)4-8(-10), 1-celled, the midpoints usually obliquous, 1/6 the length to longer than rays, 1-celled, the multiradiate trichomes more rayed, usually ferruginous, the abaxial surface always denser than the adaxial one, stellate-tomentose, the trichomes denser distributed along the veins, porrect, sessile to long-stalked, the stalks to 0.8 mm long, multiseriate, 2-3 cells wide, the rays 4-8(-11), 1-celled, the midpoint 1-celled, 1/6 the length to almost same length the rays, both major and minor leaves with the same vestiture pattern; major leaves unarmed above (except in juvenile forms), rarely armed at midrib beneath, the prickles 0-4, deltoid, straight and flattened, the blades entire, less often sinuate, elliptic, 7.5-19.5 cm long, 5-8.5 cm wide, the apex acuminate, rarely acuminate, the base cuneate, asymmetric; petiole 0.5-2.5(-3) cm, densely stellate-tomentose, with trichomes like those of the stem, usually unarmed, less often armed with to 5 prickles; minor leaves unarmed, blades elliptic to nearly circular, 2.3-7.5 cm long, 2.4-6.4 cm wide, the apex obtuse to rounded, less often acute to acuminate, the base attenuate to rounded, often symmetric, entire; petiole 0.36-1.3 cm, densely stellate-tomentose, with trichomes like those of the stem, unarmed or with up to 3 prickles. Inflorescences a reduced monochasial cyme, unbranched, apparently lateral, leaf-opposed to subopposite, inflorescence axis (peduncle plus rachis) densely stellate-tomentose, the trichomes porrect, sometimes multiangular, sessile to long-stalked, the stalks to 2.5(-3) mm long, multiseriate, 2-5 cells wide, the rays 4-10, the midpoints 1/2 the length to longer than rays, unarmed, the peduncle straight, (0-)1.5-7 mm long, the rachis curved, to 0.2-3.3 cm, pedicel insertion points closely spaced, to 1 mm apart, often paired or nearly so, with (3-)5-20 flowers, 1-2 flowers open at same time; pedicels usually straight, unarmed, articulated at base, 4-8 mm long in open flowers, densely stellate-tomentose, with trichomes like those of the inflorescence axis. Flowers 5-merous, perfect, heterostylous, usually distally in the inflorescence. Calyx tube globose, (2.2-)2.5-4.3 mm long, densely stellate-tomentose, often denser than the pedicels and inflorescence axis, with trichomes like those of the inflorescence axis, unarmed, the lobes deltate to shallowly triangular, 1-1.8 mm long, 1.8-3 mm wide at base. Corolla 1.8-2.9 cm in diameter, white, stellate, with interpetalar tissue, lobed for 1/5-1/2 of its length, the lobes 7-8.2(-9.8) mm long, 5-9.8 mm wide, deltate, densely stellate-tomentose abaxially, the trichomes porrect, sessile short-stalked, hyaline to ferruginous, the rays 8-10, tortuous, the midpoint 3/5 the length to longer than rays, the adaxial surface sparsely to moderate stellate-tomentose at apex, usually becoming gradually less dense towards the base, the basal half glabrous or nearly so, the trichomes usually misshapen. Stamens equal, with the filament tube 1.4-2 mm long, the free portion of the filaments 0.6-1.8 mm long; anthers elliptic to lanceolate, 5.7-10 mm length,

1.5-2.1 mm wide, narrowed towards the apex, sagittate at base, sometimes lacking conspicuous lobes, connivent or not, poricidal dehiscence at the tips. Ovary short-cylindrical, convex at apex, with small glandular trichomes at apex, sometimes with sessile stellate trichomes; style 10.3-12.8 mm long, often gently curved in long-styled flowers, 2.5-6 mm long, straight in short-styled flowers, white, cylindrical, with some sessile, stellate trichomes at base; stigma 0.8-0.9 mm long, rounded to bilobed at apex, green, with a papillose surface. Fruit spherical to obloid berry, 9.8-14 mm length, 12.5-15 mm wide, rigid when mature; fruiting pedicels 8.5-13.5 mm long, 1.2-2.1 mm in diameter at base, unarmed, rigid; fruiting calyx accrescent, truncate to rounded at base, covering $\frac{1}{2}$ - $\frac{1}{4}$ of the mature fruit, the lobes (3.9-4.2-7.5 mm length, 5.7-8.8 mm wide at base; the pericarp smooth, glabrous, usually whitish to pale green at maturity. Seeds ca. 20-50 per berry, 3-4 mm long, 2.7-3.3 mm wide, flattened, reniform, stramineous to brown.

Habitat and Distribution (Fig. 9)—In Southern Brazil, *S. piluliferum* is known from several localities in the eastern of Paraná and Santa Catarina States, and in Southeastern Brazil is known from eastern of Minas Gerais and São Paulo States, and throughout the state of Rio de Janeiro. *Solanum piluliferum* grows at the edge of wet forests, roadsides and disturbed areas near these forests; from 200 to 1500 m elevation.

Phenology—Flowering collections have been made between September and April, with a flowering peak from September through November; fruiting specimens have been collected from December to May.

Preliminary Conservation Status (IUCN 2014)—The preliminary IUCN Red List conservation status of *S. piluliferum* is here considered of least concern (LC) due to its relatively wide distribution (EEO: 202,475 km²), abundant populations and numerous collections across the distribution range, although the small area of occupancy (AOO: 188 km²) suggests that it should be listed as endangered (EN).

Etymology—The specific epithet “piluliferum” probably derives from the Latin noun “pila” meaning “ball” or “bullet”, due to the Dunal’s mention in the original description “[...] Calyx post anthesin globosus, ovarium tegens, piluliformis.”: Calyx globose after anthesis, covering the ovary, ball- or bullet-shaped.

Additional Specimens Examined—Brazil. **Goiás:** “in prov. Goyazana ante Sobradinho”, *Pohl s.n.* (syntype, BR [BR000005538669]); *Pohl s.n.* (syntype, BR [BR000005538027]). **Minas Gerais:** Mun. Juiz de Fora, Monte Verde/Rio Santa Bárbara, Jan 2007 (fl, fr), *Viana & Maciel s.n.* (BHCB); Reserva Biológica Municipal Santa Cândida, 8 Aug 1997, *Lafetá 252*

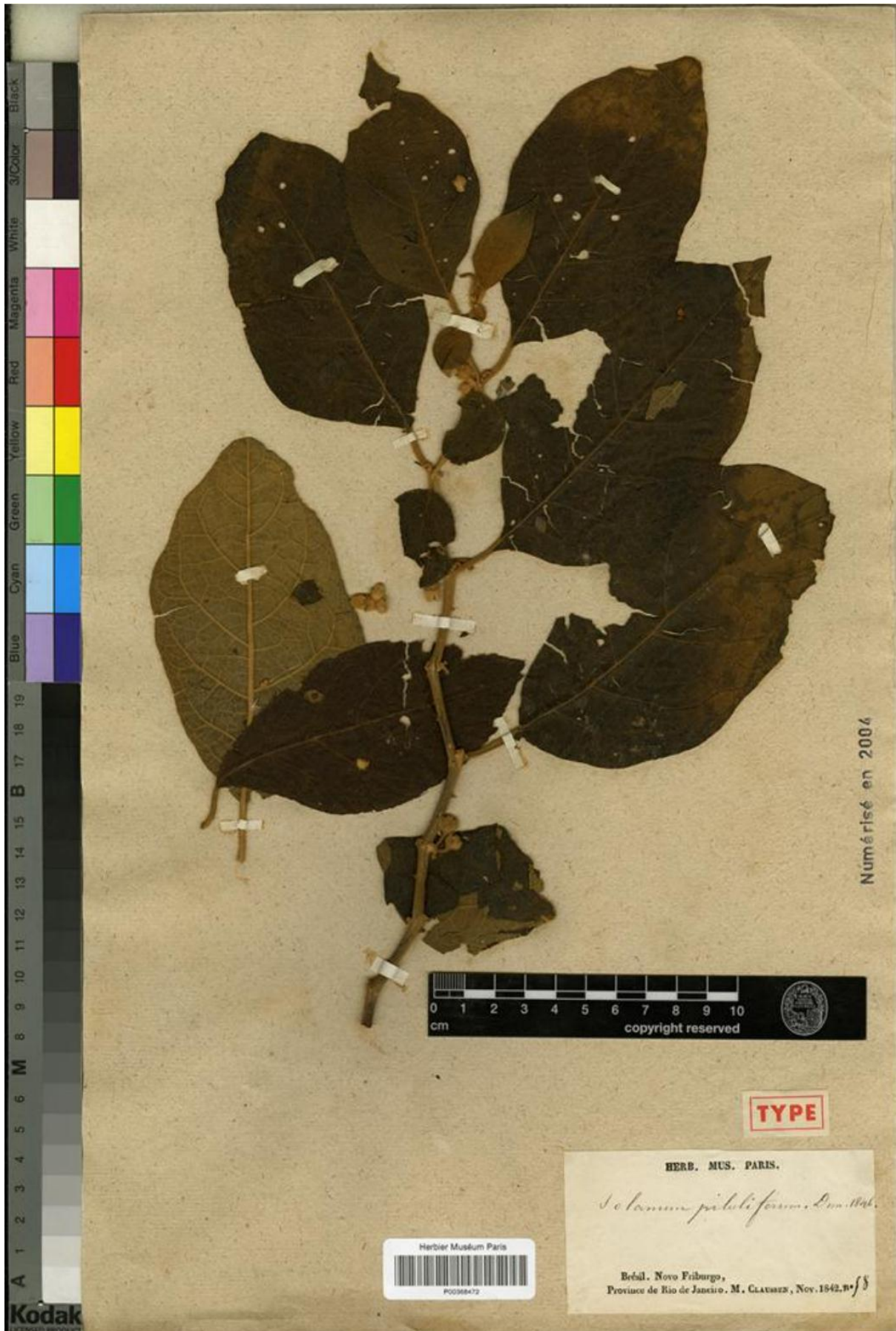


FIG. 07. Scan of holotype of *Solanum piluliferum*.

(CESJ); Mun. Lima Duarte, Serra Negra, RPPN Fazenda Serra Negra, 5 Apr 2009 (fr), Oliveira et al. 53 (CESJ); Mun. Miradouro, Córrego Alegre, 12 Jan 2001 (fl), Salino & Morais 5994 (BHCB); Mun. Rio Preto, Serra Negra, mata atrás do Cambuí, 26 Jan 2007 (fl, fr), Feliciano et al. 18 (CESJ); Mun. Santa Rita de Jacutinga, 30 Sep 1989 (fl), Grandi 2630 (BHCB). **Paraná:** Mun. Adrianópolis, Parque das Lauráceas, 17 Nov 1999 (fl), Barbosa & Abe 403 (CESJ, FUEL, ICN, NY); Mun. Guaratuba, Castelhanos, 20 Jan 1994 (fl), Kummrow et al. 3334 (BHCB, MBM, NY); Pirizal, 14 Dec 1971 (fl, fr), Dombrowski & Kuniyoshi 3886 (BHCB, MBM). **Rio de Janeiro:** Mun. Nova Friburgo, Parada Augusto Alves, 1 Jan 1997 (fl, fr), Kinupp 121 (BHCB, FUEL, HCF); Mun. Nova Iguaçu, Distrito de Tinguá, Rebio, Estrada do Ouro, 400-700 m, 24 Oct 2002 (fl), Bovini et al. 2213 (BHCB, RB); Mun. Petrópolis, Estrada do Ribeirão n° 68, 12 Nov 2000 (fl), Alves 1 (CESJ); Fazenda Itaipava, beira da estrada de acesso, 17 Nov 2005 (fl), Siqueira & Gracff 38 (BHCB, RB); Mun. Resende, Margens da rodovia BR-354 indo de Engenheiro Passos para Itamonte, ca. 2 km antes da entrada para a parte alta do Parque nacional do Itatiaia, 22°23'12"S, 44°45'12"W, 1439 m, 20 Nov 2013 (fl), Giacomini et al. 2023 (BHCB); Mun. Rio Claro, Rio do Braço, 1 Dec 2004 (fl), Oliveira 1100 (MBM, RB); Mun. Santa Maria Madalena, Alto Imbé, próximo à plantação de Eucalyptus à margem da rodovia RJ-180, 21°59'59"S, 41°56'45"W, 282 m, 12 Sep 2014 (fl), Gouvêa & Falcão 138 (BHCB); Sellow 135 (W [W1889-0291695]). **Santa Catarina:** Mun. Angelina, Linha do Chaves, 27°32'24"S, 48°57'36"W, 718 m, 6 Apr 2010 (fr), Stival-Santos et al. 2346 (BHCB FURB); Mun. Apiúna, Faxinalzinho, 27°10'49"S, 49°23'37"W, 793 m, 17 Mar 2010 (fr), Korte & Kniess 2187 (FURB); Mun. Jaraguá do Sul, Garibaldi, 26°33'08"S, 49°10'33"W, 180 m, 26 Jan 2010 (fr), Dreveck & Carneiro 1592 (FURB); Mun. Rodeio, São Pedro, 26°54'37"S, 49°24'41"W, 611 m, 30 Mar 2010 (fl, fr), Korte & Kniess 2340 (FURB); Próximo a divisa com Benedito Novo, Morro do Ipiranga, 26°52'19"S, 49°24'13"W, 775 m, 15 Oct 2012 (fl), Funez 1108 (FURB); Mun. São Bento do Sul, arredores do Cepa Rugendas-Univille, Rio Natal, 26°09'01"S, 49°13'27"W, 7 Feb 2009 (fl, fr), Meyer 899 (BHCB, JOD); Próximo à comunidade de Rio Natal, CEPA Rugendas, area pertencente à Univille, em margem de fragmento de Floresta Ombrófila Densa, na estrada que leva ao alojamento, 26°19'24"S, 49°18'29"W, 670 m, 10 Feb 2012 (fl,fr), Giacomini et al. 1706 (BHCB, NY). **São Paulo:** Mun. Bom Sucesso de Itararé, estrada de Bom Sucesso a 2 km da Mineração de cal São Judas Tadeu, 24°19'13"S, 49°13'04"W, 15 Dec 1997 (fr), Chung et al. 154 (BHCB, ESA, IAC); Mun. Iporanga, Fazenda Intervalos, Estrada para Bocaina, Trilha Gruta da Mãozinha, 22 May 1996 (fr), Hoch et al. 29 (BHCB, SP, UEC); Trilha do Carmo, 21 May 1996 (fr), Hoch et al. 13 (BHCB, SP); Mun. Mamparra, Reserva Florestal Carlos Botelho, a 2

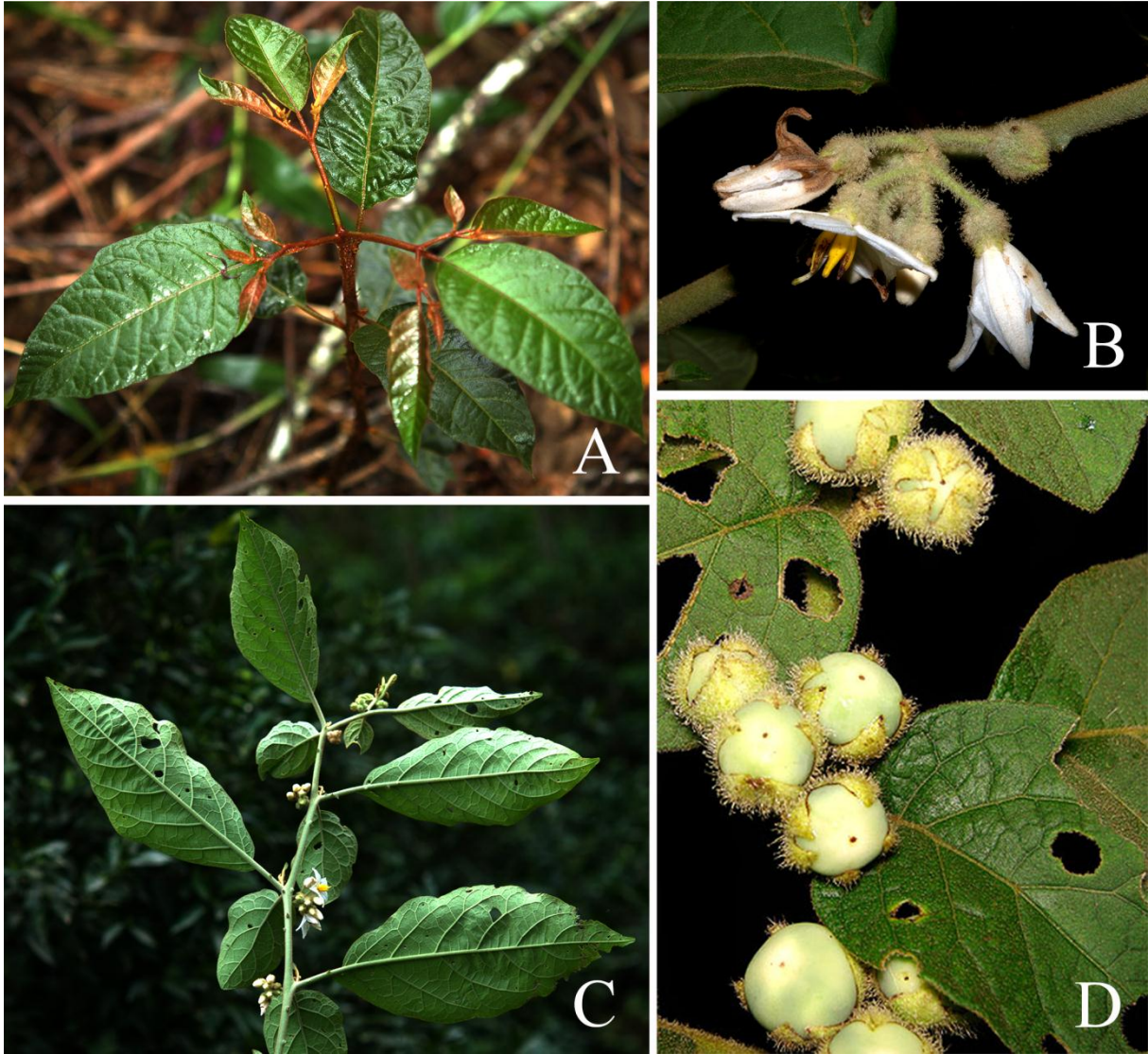


FIG. 8. *Solanum piluliferum*. A. Young plant; note the first trichotomous branchin followed by dichotomous branching. B. Inflorescence; note the long-stalked trichomes and the globose calyx. C. Habit. D. Fruit. Credit: D: L. M. Neto.

km da “sedinha”, beira de estrada, 15 Feb 1995 (fl), *Miyagi et al.* 484 (BHCB); Mun. Ribeirão Grande, Parque Estadual Intervales, trilha para o mirante antigo, 9 Feb 2000 (fr), *Amorim et al.* 3303 (CEPEC); Borda de estrada de São Pedro, próximo à entrada da Trilha da Cachoeira da Pedrinhas, 24°18’S, 48°21’W, 790 m, 18 Apr 2003 (fl, fr), *Medeiros et al.* 37 (BHCB, HUEFS, UEC); Mun. São Jose do Barreiro, Outskirts of Parque Nacional Serra da Bocaina, road from park administrative headquarters at São Jose do Barreiro to alojamento at entrance to park, 22°39’50’’S, 44°35’33’’W, 746 m, 2 May 2011 (fr), *Agra et al.* 7354 (BHCB); Mun. São Miguel Arcanjo, Parque Estadual de Carlos Botelho, Trilha do Rio Taquaral, 24°03’41’’S, 47°59’44’’W, 853 m, 8 Dec 2011 (fl, fr), *Bünger et al.* 575 (BHCB); **State not indicated:** according to protologue “In Brasilia australiore”, only “Brasilia” in the herbarium labels, *Sellow s.n.* (syntype, K [K000590086]); *Sellow s.n.* (syntype, P [P00368471]); *Sellow s.n.* (syntype, BR [BR0000005538355]).

Notes—*Solanum piluliferum* is easily differentiated from other species in *S. asterophorum* species group by its calyx globose with deltate lobes, usually densely covered by long-stalked trichomes (Fig. 8B); leaves entire with the apices acuminate (Fig. 8C); and stems sparsely armed with short, straight, deltate, flattened prickles. Different from other species of the group, the herbarium material may lack prickles. Furthermore, the stramineous to ochraceo-ferruginous coloration of its vestiture also can help in its identification. Although the adult individuals have entire leaves, its juvenile forms may have the first leaves lobed, and often exhibits a distinct reddish coloration on its stem and leaves.

This species seems to prefer to grow in higher and colder regions than other members of the group. Most of the specimens were collected above 600 m elevation, and it usually only occurs below this range in regions of mild temperature as *Gouvêa & Falcão 138*, collected at 282 m elevation, near the municipality of Santa Maria Madalena. These morphological and ecological characteristics suggest that *S. piluliferum* is the most distantly related species of the *S. asterophorum* species group.

Solanum densiflorum Sendtn. (1846) is a later homonymous of *S. densiflorum* M. Martens & Galeotti (1845), synonym of *S. lanceolatum* Cav., a species belonging to Torva clade *sensu* Stern et al. (2011). For thus, it is an illegitimate name, and must not be used as a basionym of the variety described by Dunal (1852), here considered a replacement name (Art. 6.11, MacNeil et al, 2012). *Solanum densiflorum* Sendtn. (non M. Martens & Galeotti, 1845) was described based on syntypes collected by Martius, Pohl and Sellow, all of them cited without collector number in the protologue. We elect as lectotype one of the two Martius’ exsiccates kept in herbarium M [M0165943] because it best represents the described species.

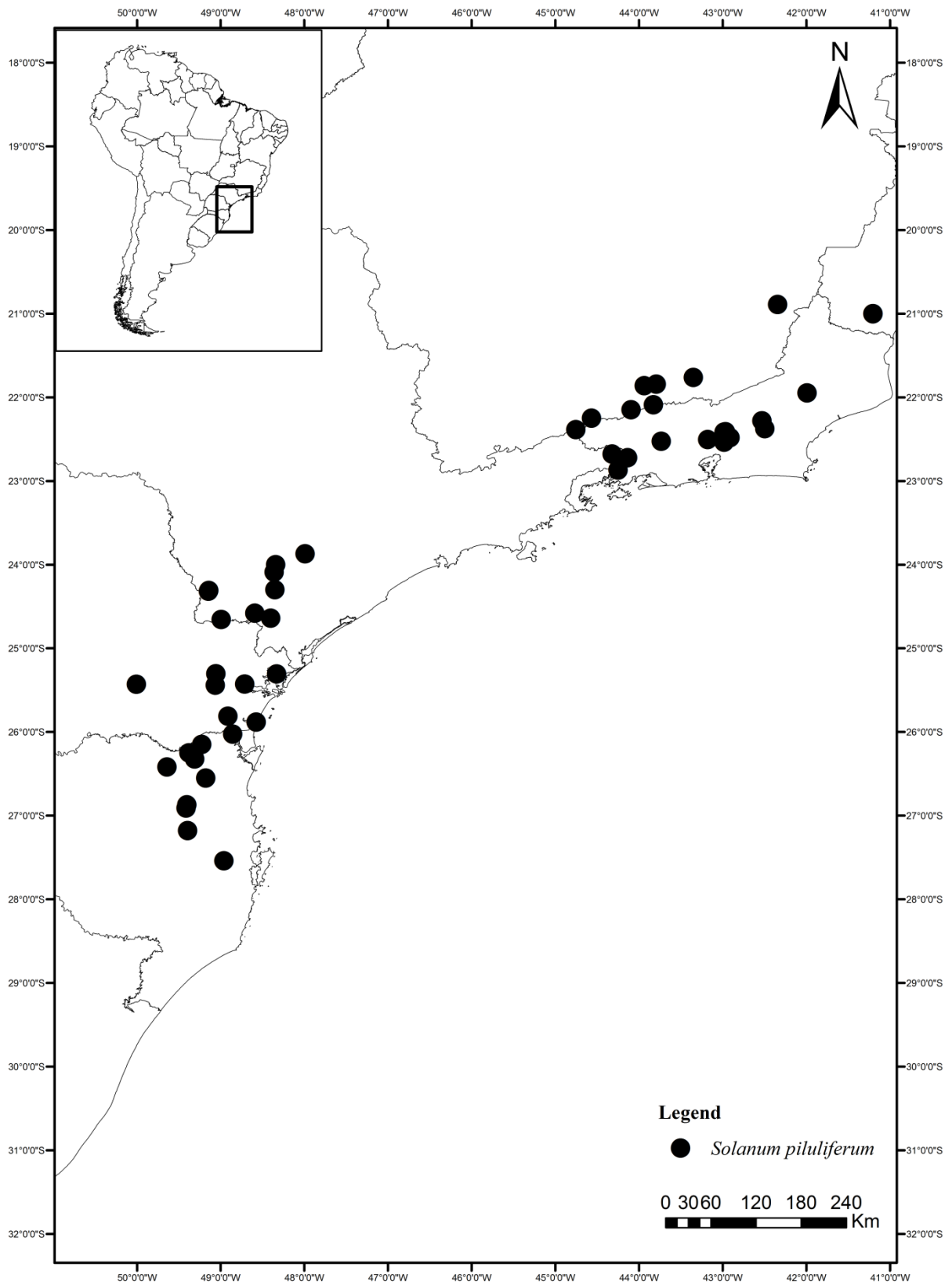


FIG. 9. Distribution of *Solanum piluliferum*.

4. SOLANUM SESSILANTHERUM Gouvêa & Stehmann, sp. nov., ined.—TYPE. BRAZIL. Rio de Janeiro: Campos dos Goytacazes, Espera Feliz, 21°50'47"S, 41°36'29"W, 22 m, 15 May 2015 (fl, fr), *Gouvêa & Falcão 188* (BHCB) (holotype: BHCB! BHCB-176436; isotypes: [BM, K, NY, P, RB]). Figures 10, 11.

Shrubs up to 2 m, spreadingly branched, erect. The initial vegetative growth is monopodial, with solitary leaves arranged in a 2/5 phyllotaxic spiral to the onset of the flowering, when it becomes sympodial; the first two subsequent branching are dichotomous, usually with the distal one turned 90° regarding to the proximal, after the second branching the dichotomous pattern gives place to a flexuous (zig-zag) growth, with geminate leaves at each node. Young stems terete, densely to moderate stellate-tomentose near the apical meristem, becoming sparsely stellate-puberulent downward on the stem; the trichomes hyaline to brownish, porrect, apparently sessile to subsessile, rarely short-stalked, the stalks less than 0.1 mm long, the rays 4-8(-10), 1-celled, the midpoints poorly developed, often apparently absent, 1-celled, and some small, subsessile, glandular trichomes usually present on youngest portion of the stem (hardly observable in poorly preserved material); moderately armed, the prickles recurved, 1.3-5.8 mm long, 1-4.5 mm wide at base, flattened, stramineous at base usually becoming ferruginous towards the apex, with stellate trichomes like those of the stems, and some small, subsessile, glandular ones at base; bark of older stems glabrescent, dark green to dark brown to blackened. Sympodial units difoliate, geminate, anisophyllous. Leaves lobed, coriaceous, shiny, slightly discoloured, drying dark green to dark brown above, and dark brown to grayish brown beneath (with a metallic appearance); the adaxial surface sparsely to moderately stellate-tomentose, the lamina always visible, the trichomes porrect, sessile to subsessile, the stalks less than 0.1 mm long, the rays (3-)4-8(-11), 1-celled, the midpoints 1-celled, poorly developed, often apparently absent, the more rayed trichomes (7-8(-11) rays) usually somewhat brownish, sometimes multiradiate, usually denser along the veins, less often than the hyaline, less rayed ones (4-6 rays) on the remainder of surface, the abaxial surface moderately stellate-tomentose, the lamina always visible, the trichomes porrect, sessile to short-stalked, the stalks to 0.1 mm long, the rays 4-8, 1-celled, the midpoint 1-celled, very poorly developed, often apparently absent, with some trichomes somewhat brownish, the distribution pattern related to the number of rays and coloration described for the adaxial surface is weaker or absent, both major and minor leaves with the same vestiture pattern; armed along the midrib and the primary veins above, and usually only on the midrib beneath, the prickles straight and flattened; major leaves with 6-10 pairs of primary veins, blades elliptic to obovate, 12.5-22.5 cm long, 5.9-12.5 cm wide, the apex acute to acuminate,

the base cuneate, slightly decurrent, generally asymmetric, shallowly to deeply lobed, the lobes deltate, (1-)2-6 on each side, to 2 cm long and 3.2 cm at base, the prickles (0-)13-23 above, (1-)6-11 beneath, 2.5-9.0 mm long, 0.6-3.1 mm wide at base; petiole 1.2-2.5 cm, moderately stellate-tomentose with trichomes like those of the stems, the prickles 0-5; minor leaves with 5-6 pairs of primary veins, blades elliptic, 5.1-8.1 cm long, 2.4-5.1 cm wide, the apex acuminate to rounded, the base cuneate, symmetric or asymmetric, entire to shallowly lobed, the lobes deltate, 0-3 on each side, the prickles (0-)1-3 above and (0-)3-7 beneath, 2.3-6.6 mm long, 1-1.8 mm wide at base; petiole 0.7-2 cm, sparsely stellate-puberulent to moderately stellate-tomentose with stellate trichomes like those of the stems, the prickles 0-3. Inflorescences an reduced monochasial cyme, unbranched, apparently lateral, leaf-opposed to subopposite, the inflorescence axis (peduncle plus rachis) sparsely to moderately stellate-puberulent, with trichomes like those of the stem, usually armed, 0-7 prickles, the peduncle nearly absent to 1.7 cm, the rachis to 1.9 cm, straight, the pedicel insertion points generally unequally spaced, 1.5 to 6.2 mm apart, unpaired, if paired only at the tip of the rachis, with (1-)2-7 flowers, 1-2 flowers open at same time; pedicels straight or nearly so, keeping the flower buds erect to horizontally disposed, 10.4-22 mm long in open flowers, distally geniculate at atthesis, articulated at base, armed, moderately to sparsely stellate-tomentose, with trichomes like those of the stems. Flowers 5-merous, perfect, heterostylous; initially all flowers are long-styled and hermaphroditic, the short-styled and functionally male flowers begin to be produced late in the flowering, usually distally in the inflorescence. Calyx tube conical, 3.4-5.8 mm long, sparsely to densely armed, the prickles 0-35, usually dorsiventrally flattened and adpressed when dry, swollen at base when fresh, moderately to densely stellate-tomentose, with trichomes like those of the adaxial surface of leaves, the lobes foliaceous, narrowly oblong, elliptic or lanceolate (often varying in the same flower), the apex acuminate to rounded, 2-9(-12.5) mm long, often unequal in length, 1.8-3.5 mm wide. Corolla 2.4-2.9 cm in diameter, white, stellate, the interpetalar tissue well-developed and wavy, lobed for 1/2 to 2/3 of its length, the lobes 7.8-9 mm length, 7.6-9.8 mm wide, rounded to deltoid, apiculate at apex, the tips of the lobes reflexed at anthesis, moderately to densely stellate-tomentose abaxially, the trichomes hyaline to brownish, porrect to multiangulate, sessile to subsessile, the rays 4-12, tortuous, the midpoint poorly developed, sometimes with multiradiate, many rayed (more than 12 rays) ones at the tip of the lobes, the adaxial surface moderate to densely stellate-tomentose at apex, becoming gradually less dense towards the base, the basal half glabrous or nearly so, the trichomes are like those of the abaxial surface, strongly misshapen. Stamens equal, with the filament tube 1.1-1.7 mm long, the free portion of the filaments very

reduced, to 0.5 mm long; anthers apparently sessile with basal lobes embedded into the basal portion of the corolla tube, widely lanceolate, narrowed towards the apex, sagittate at base, connivent, poricidal dehiscence at the tips, 7.1-9 mm length, 1.8-2.8 mm wide. Ovary short-cylindrical, convex at apex, with some small glandular trichomes; style 10.1-11.4 mm, white, cylindrical and gently curved in long-styled flowers; 5-6.4 mm, straight in short-styled flowers; with some stellate trichomes at base; stigma 0.8-1.17 mm long, sometimes bilobed at apex, green, with a papillose surface. Fruit a obovoid to transversely ellipsoid berry, 9.7-12.8 mm length, 14-17.6 mm wide; fruiting pedicels 14-25 mm long, 0-3 prickles; fruiting calyx accrescent, truncate at base (slightly concave at center in fresh material), covering $\frac{1}{3}$ - $\frac{1}{4}$ of the mature fruit, the lobes 4-7.5 mm length, (4.7-)7.8-11.5 mm wide at base; the pericarp smooth, glabrous, green to dark green with the apex pale green to whitish at maturity. Seeds ca. 40-70 per berry, 4.1-5 mm long, 3.2-3.7 mm wide, flattened, reniform, stramineous at the edge, brown at the center.

Habitat and Distribution (Fig. 12)—Known only from the Parque Estadual do Desengano and surroundings, in Rio de Janeiro State, Brazil. *Solanum sessilantherum* inhabits wet forest edges and seems to prefer damp soil and indirect light; the only available data indicates ca. 20 m elevation.

Phenology—Flowering specimens have been collected from September to May; fruiting specimens have been collected between November and June.

Preliminary Conservation Status (IUCN 2014)—Data Deficient (DD); the number of georeferenced collections (1) and inaccurate locality assignments preclude the assessment. Only 6 collections were made in about 38 years, four of these within the P. E. Serra do Desengano and other two in a near forest fragment. This indicates that *S. sessilantherum* is a somewhat rare species, and efforts for increase its collections are priority for an accurate conservation assessment.

Etymology—This compound specific epithet is an union of the Latin terms “sessile” and “anther”, referring to the very reduced filaments, which keep its anthers embedded into receptacle, giving it a sessile appearance.

Additional Specimens Examined—Brazil. **Rio de Janeiro:** Mun. Campos dos Goytacazes, Espera Feliz, espécime mantido sob cultivo no Museu de História Natural e Jardim Botânico da UFMG, indivíduo n° 616, 21°50'47”S, 41°36'29”W, 22 m, 15 May 2015 (fl, fr), *Gouvêa & Falcão 187* (BHCB); Mun. Santa Maria Madalena, Parque Estadual do Desengano, Fazenda Morumbeca do Imbé, na mata, 11 Sep 1999 (fl), *dos Santos 420* (RB);



FIG. 10. Scan of holotype of *Solanum sessilantherum*.

Trilha para Morumbeca do Imbé, parte média da trilha, antes do Riacho da Morumbeca à direita, 15 Jun 2000 (fr), *dos Santos 565* (BHCB, RFFP); Alto Imbé, picada para o Cruzeiro, 350-450 m, 24 Oct 2012 (fl), *Bandeira et al. 142* (BHCB, RB); Derrubadinha, 24 Nov 1977 (fl, fr), *Mautone 460* (JPB, RB);

Notes—*Solanum sessilantherum* can be distinguished from other members of the *S. asterophorum* species group by a suite of characters: its armed inflorescence axis (Fig. 11D, B); pedicels straight or nearly so, keeping the buds erect to horizontally oriented; unpaired pedicel insertion points; apparently sessile anthers with inconspicuous filaments; transversely elliptic (2:3) berries; and coriaceous leaves. *Solanum sessilantherum* is particularly similar to *S. asterophorum* (especially those with the vestiture less dense) with which shares the overall appearance.

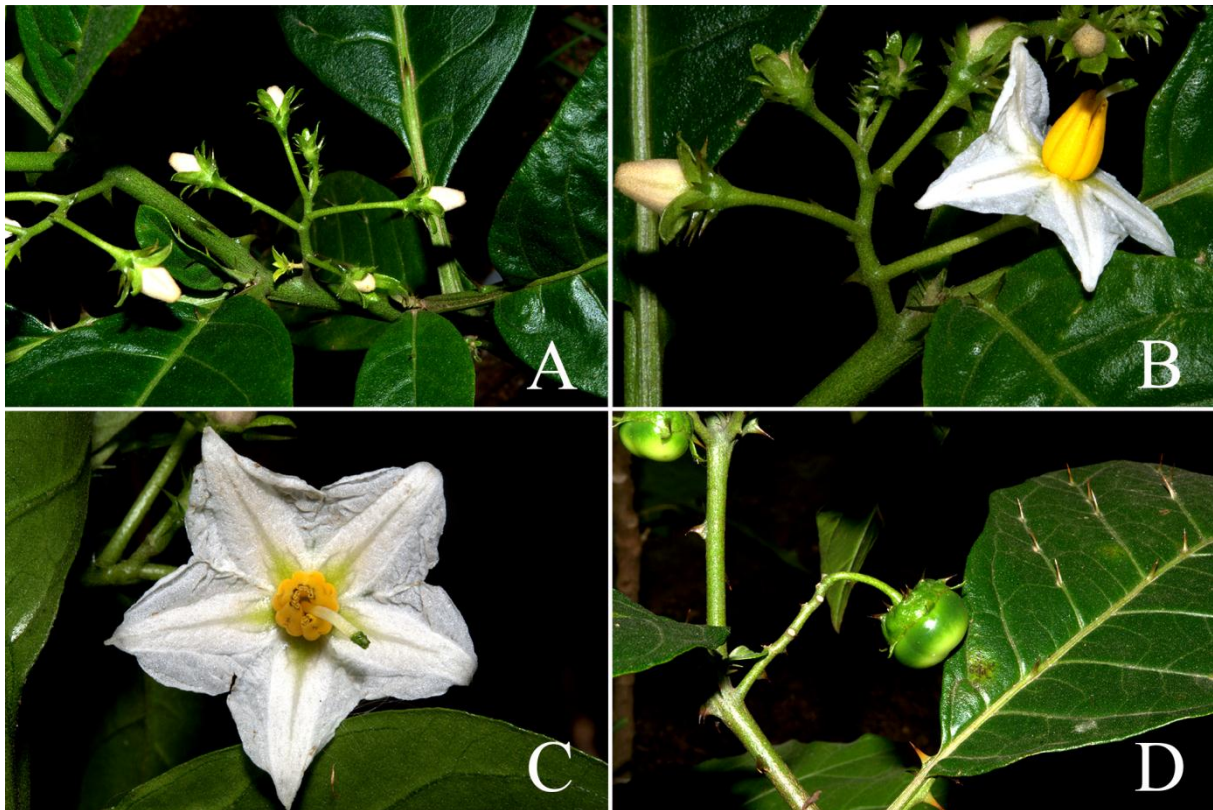


FIG. 11. Photos of type collection of *S. sessilantherum* (*Gouvêa & Falcão 188*). A. Young inflorescence; note the pedicels straight keeping the buds erect to horizontally oriented. B. Mature inflorescence; note the anthers embedded into receptacle giving a sessile appearance and the armed inflorescence axis. C. Flower. D. Fruit; note its obloid shape.

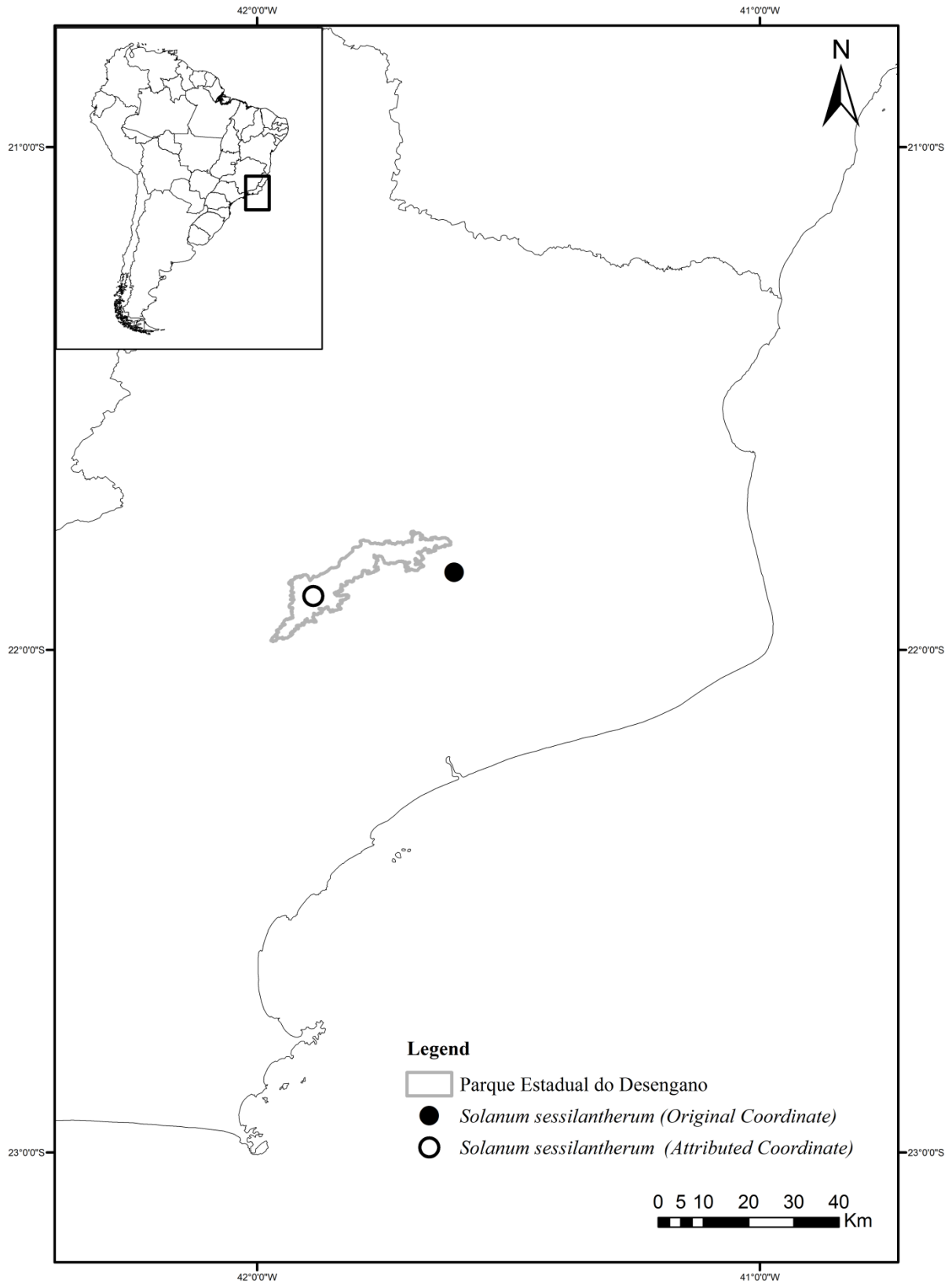


FIG. 12. Distribution of *S. sessilantherum*.

Despite this, *S. asterophorum* has unarmed inflorescence axis, pedicel curved downward keeping the buds facing down, pedicel insertion points very close, usually paired (Figs. 2B, F) making the inflorescence more congested than the *S. sessilantherum*, which allows the distinction among the species.

With few collections, *S. sessilantherum* is known only from two localities, the Parque Estadual do Desengano, Rio de Janeiro State, and a very close forest fragment. The nearest collection of *S. asterophorum* is from the municipality Casimiro de Abreu, Rio de Janeiro State, about 100 km straight from the collection points of *S. sessilantherum*. *Solanum piluliferum* is the species belonging to the *S. asterophorum* species group with the nearest record from *S. sessilantherum*. These species can be easily differentiated from each other; *S. piluliferum* has globose calyx, congested inflorescences with paired pedicel insertion points (Fig. 8B) and stramineous to ferruginous vestiture, whereas *S. sessilantherum* has conical calyx, more lax inflorescences with unpaired pedicel insertion points and hyaline to brownish vestiture (see Fig. 11).

NAMES NOT VALIDLY PUBLISHED

Solanum scaberrimum Dunal, Prodr. [A. P. de Candolle] 13(1): 349. 1852. Nom. nud. pro syn. *S. asterophorum* Dunal.

Solanum asterophorum Mart. var. *melancholicum* (Dunal) Bitter, nom. nud. in sched. (*Blanchet 3473*, G). This name represents a not published combination of the name *S. melancholicum* Salzm. ex Dunal as a variety of *S. asterophorum* made by Bitter in a sheet label of the lectotype of *S. gomphoidellum* Moric. ex Dunal.

ACKNOWLEDGEMENTS

We would like to thank the curators of the herbaria cited in the text for the loan of specimens; Bruno Fernandes Falcão for the aid and companionship in the field; Natural History Museum and Botanic Garden of the Universidade Federal de Minas Gerais for giving space for growing the plants; Felipe Soares de Souza “Fifão” for the aid with maps. Financial support was given by FAPEMIG (APQ-01706-13), CNPq (309304/2013-0), and CAPES (grant to first author).

LITERATURE CITED

- Bell, A. D., and T. D. Dines. 1995. Branching patterns in the Solanaceae. Pp. 157-171 in *Experimental and molecular approaches to plant biosystematics*, eds. P. C. Hoch, and A. G. Stephenson. Monographs in Systematic Botany from the Missouri Botanical Garden, Vol. 53. St. Louis: Missouri Botanical Garden Press.
- Bitter, G. 1919. Solana nova vel minus cognita XVIII. *Repertorium Specierum Novarum Regni Vegetabilis* 16: 79–103.
- Bohs, L. 2005. Major clades in *Solanum* based on *ndhF* sequence data. Pp. 27–49 in *A festschrift for William G. D'Arcy: The legacy of a taxonomist*, eds. R. C. Keating, V. C. Hollowell, and T. B. Croat. Monographs in Systematic Botany from the Missouri Botanical Garden, Vol. 104. St. Louis: Missouri Botanical Garden Press.
- Child, A. and R. N. Lester. 2001. Synopsis of the genus *Solanum* L. and its infrageneric taxa. Pp. 39–52 in *Solanaceae V: Advances in taxonomy and utilization*, eds. R. G. van den Berg, G. W. M. Barendse, G. M. van de Weerden, and C. Mariani. Nijmegen: Nijmegen University Press.
- Danert, S. 1967. Die Verzweigung als infragenerisches Gruppenmerkmal in der Gattung *Solanum* L. *Kulturpflanze* 15: 275–292.
- Danert, S. 1970. Infragenerische Taxa der Gattung *Solanum* L. *Kulturpflanze* 18: 253–297.
- D'arcy, W. G. 1972. Solanaceae studies II: typification of subdivisions of *Solanum*. *Annals of the Missouri Botanical Garden* 59: 262–278.
- D'arcy, W. G. 1986. The calyx in *Lycianthes* and some other genera. *Annals of the Missouri Botanical Garden* 73: 117-127.
- Davis P. H., V. H. Heywood. 1963. Principles of angiosperm taxonomy. Edinburgh: Oliver and Boyd Ltd.
- Don, G. 1837. A general system of gardening and botany. London.
- Dunal, M.-F. 1813. Histoire naturelle, médicale et économique des *Solanum* et des genres qui ont été confondus avec eux. Montpellier: Renaud.
- Dunal, M.-F. 1852. Solanaceae. Pp. 1–290 in *Prodromus systematis naturalis regni vegetabilis* Vol. 13(1), ed. A. P. de Candolle. Paris: V. Masson.
- Frodin, D. G. 2004. History and concepts of big plant genera. *Taxon* 53:753–776.
- Hawkes, J. G. 1999. The economic importance of the family Solanaceae. Pp. 1–8 in *Solanaceae IV*, eds. M. Nee, D. Symon, R. Lester, and J. Jessop. Richmond, U.K.: Royal Botanic Gardens, Kew.

- Hunziker, A. T. 2001. *Genera Solanacearum*, the genera of Solanaceae illustrated, arranged according to a new system. Ruggell, Liechtenstein: A. R. G. Gantner Verlag.
- IUCN Standards and Petitions Subcommittee. 2014. Guidelines for using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee. Downloaded from <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> on 18 Dec 2015.
- Knapp, S. 2002. Assessing patterns of plant endemism in Neotropical uplands. *Botanical Review* 68: 22–37.
- Knapp, S. 2008. A revision of the *Solanum havanense* species group (section *Geminata* (G. Don) Walp. pro parte) and new taxonomic additions to the *Geminata* clade (*Solanum*: Solanaceae). *Annals of the Missouri Botanical Garden* 95: 405–458.
- Knapp, S. 2013. A revision of the Dulcamaroid Clade of *Solanum* L. (Solanaceae). *PhytoKeys* 22: 1–432.
- Levin, R. A., N. R. Myers, and L. Bohs. 2006. Phylogenetic relationships among the “spiny solanums” (*Solanum* subgenus *Leptostemonum*, Solanaceae). *American Journal of Botany* 93: 157–169.
- Linnaeus, C. 1753. *Species Plantarum*. L. Stockholm: Salvius.
- Mallet, J. 1995. A species definition for the modern synthesis. *Trends in Ecology & Evolution* 10: 294–299.
- Martius, C. F. P. von. 1838. *Herbarium Florae Brasiliensis. Plantae brasilienses exsiccatae, quas denominatas, partim diagnosi aut observationibus instructas Botanophilis offert Dr. C. Fr. Ph. de Martius. Flora* 21(2, Beibl.): 49–96.
- McNeill, J., F. R. Barrie, W. R. Buck, V. Demoulin, W. Greuter, D. L. Hawksworth, P. S. Herendeen, S. Knapp, K. Marhold, J. Prado, W. F. Prud’homme van Reine, G. F. Smith, J. H. Wiersema, and N. J. Turland. 2012. *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code)*. *Regnum Vegetabile* 154. Königstein: Koelz Scientific Books.
- Mentz, L. A., P. L. Oliveira, and M. V. da Silva. 2000. Tipologia dos tricomas das espécies do gênero *Solanum* (Solanaceae) na Região Sul do Brasil. *Iheringia Série Botânica* 54:75–106.
- Moat, J. 2007. *Conservation assessment tools extension for ArcView 3.x, version 1.2*. GIS Unit, Royal Botanic Gardens, Kew. Available at <http://www.rbgekew.org.uk/cats>.

- Nee, M. 1999. A synopsis of *Solanum* in the New World. Pp. 285–333 in *Solanaceae IV: Advances in biology and utilization*, eds. M. Nee, D. E. Symon, R. N. Lester, and J. P. Jessop. Richmond, U. K.: Royal Botanic Gardens, Kew.
- Nurit-Silva K., M. F. Agra. 2011. Leaf epidermal characters of *Solanum* sect. *Polytrichum* (Solanaceae) as taxonomic evidence. *Microscopy Research and Technique* 74(12): 1186–1191.
- Parkhurst, D. F. 1978. The adaptative significance of stomatal occurrence on one or both surfaces of leaves. *Journal of Ecology* 66: 367–383.
- Radford A. E., W. C. Dickison, J. R. Massey, and C. R. Bell. 1974. Vascular plant systematics. New York: Harper & Row Publishers.
- Roe, K. E. 1966. Juvenile forms in *Solanum mitlense* and *S. blodgettii* (Solanaceae) and their importance in taxonomy. *Sida* 2(5): 381–385.
- Roe, K. E. 1971. Terminology of hairs in the genus *Solanum*. *Taxon* 20:501–508.
- Roe, K. E. 1972. A revision of *Solanum* section *Brevantherum* (Solanaceae). *Brittonia* 24: 239–278.
- Särkinen T. S., G. E. Barboza, S. Knapp. 2015. True Black nightshades: Phylogeny and delimitation of the Morelloid clade of *Solanum*. *Taxon* 64(5): 945–958.
- Seithe, A. 1962. Die Haararten der Gattung *Solanum* L. und ihre taxonomische Verwertung. *Botanische Jahrbucher für Systematik, Pflanzengeschichte und Pflanzengeographie* 81: 261–336.
- Sendtner, O. 1846. Solanaceae. Pp. 1–227 in *Flora Brasiliensis* vol. 10, ed. K. F. P. von Martius. Munich and Leipzig: P. Fleischer.
- Stehmann, J. R., L. A. Mentz, M. F. Agra, M. Vignoli-Silva, L. L. Giacomini, I. M. C. Rodrigues. 2015. Solanaceae in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB225> accessed on 25 Nov 2015.
- Stern, S. R., M. F. Agra, and L. Bohs. 2011. Molecular delimitation of clades within New World species of the “spiny solanums” (*Solanum* subgenus *Leptostemonum*). *Taxon* 60: 1429–1441.
- Stern, S., L. Bohs, L. L. Giacomini, J. R. Stehmann, and S. Knapp. 2013. A revision of *Solanum* section *Gonatotrimum* Bitter (Solanaceae). *Systematic Botany* 38: 471–496.
- Tepe, E. J. and L. Bohs. 2011. A revision of *Solanum* section *Herpystichum*. *Systematic Botany* 36: 1068–1087.

- Thiers, B. 2015. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/science/ih/>. continuously updated
- Vorontsova, M. S., S. Stern, and S. Knapp. 2013. African spiny *Solanum* (subgenus *Leptostemonum*, Solanaceae): a thorny phylogenetic tangle. *Botanical Journal of the Linnean Society* 173: 176–193.
- Weese, T. and L. Bohs. 2007. A three gene phylogeny of the genus *Solanum* (Solanaceae). *Systematic Botany* 33: 445–463.
- Whalen, M. D. 1984. Conspectus of species groups in *Solanum* subgenus *Leptostemonum*. *Gentes Herbarum* 12: 179–282.