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MARTIN GRINGS

TAXONOMIA DE MALVACEAE JUSS. (SUBFAMÍLIA MALVOIDEAE) NO RIO GRANDE DO SUL E FILOGENIA DA ALIANÇA MODIOLA (TRIBO MALVEAE) E GÊNEROS AFINS

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Tese apresentada como requisito parcial para obtenção do título de Doutor em Botânica com ênfase em Sistemática Vegetal na Universidade Federal do Rio Grande do Sul.

Orientadora: Prof.ª Drª. Ilsi Iob Boldrini

Co-Orientadora: Prof.ª Drª. Eudes Maria Stiehl Alves

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SUMÁRIO

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RESUMO

Malvaceae Juss. é uma família constituída de ervas, subarbustos, arbustos, lianas e árvores de pequeno e grande porte, com cerca de 250 gêneros e 4.200 espécies, sendo que, no Brasil ocorrem 73 gêneros e 783 espécies. Está subdividida em nove subfamílias: Grewioideae, Byttnerioideae, Tilioideae, Dombeyoideae, Browlowioideae, Helicteroideae, Sterculioideae, Malvoideae e Bombacoideae. Já Malvoideae está subdividida em três tribos: Hibisceae, Gossypieae e Malveae e está representada no Rio Grande do Sul por 20 gêneros e 88 espécies. Muitas espécies do Estado já são consideradas ameaçadas e para outras ainda não se conhece seu estado de conservação. A tribo Malveae é a mais diversa morfologicamente e alguns autores propuseram a sua classificação infratribal em alianças não formais. A aliança *Modiola* foi considerada filogeneticamente relacionada aos gêneros *Calyculogygas* e *Monteiroa* em estudo com marcador nuclear ITS. Os objetivos do presente estudo são: 1) realizar um tratamento taxonômico para a família Malvaceae-Malvoideae no Rio Grande do Sul, exceto o gênero *Pavonia*, já estudado para o Estado; 2) realizar uma inferência filogenética para a aliança *Modiola* e gêneros afins (*Calyculogygas, Monteiroa*), visando testar a monofilia dos gêneros e inferir as suas relações filogenéticas; 3) fornecer dados sobre a conservação das espécies de Malvaceae-Malvoideae no Rio Grande do Sul. Foram realizadas cerca de 25 expedições de campo e viagens para revisões de herbários, tendo sido coletadas e incorporadas aos herbários ICN e HUCS 230 exsicatas. Nas revisões de herbários foram revisadas 5000 exsicatas de 33 herbários. Foram coletadas também amostras de 18 espécies para o estudo filogenético da aliança *Modiola* e gêneros afins, o qual foi realizado com os marcadores moleculares ITS, rpl16, matK-trnK e ndhF. Como resultados do estudo temos: 1) a elaboração de sinopses dos gêneros *Calyculogygas*, *Modiola*, *Modiolastrum*, *Monteiroa*, *Sida* e *Tropidococcus*, com comentários taxonômicos e nomenclaturais, chaves, imagens e mapas de distribuição geográficas das 43 espécies; 2) a publicação da família Malvaceae para o município de Santa Maria, Rio Grande do Sul, com imagens das espécies descrições e chaves dicotômicas. Quatro espécies novas para a ciência foram descritas: *Monteiroa rubra* Grings, *Callianthe flava* Grings, *Callianthe maritima* Grings e *Callianthe sulcatarinensis* Grings. Foram realizadas três novas combinações: *Callianthe costicalyx* (K. Schumann ex Takeuchi & G.L. Esteves) Grings, *Modiola australe* (Krapovickas) Grings, *Modiola gilliesii*

(Steudel) Grings. Dois nomes foram revalidados, *Modiola lateritia* (Hooker) K. Schumann e *Modiola malvifolia* Grisebach. Dez nomes foram lectotipificados: *Malvastrum bullatum* e *Malvastrum dusenii*, basiônimos de *Monteiroa bullata* e *Monteiroa dusenii*, respectivamente; *Sida anarthra* (sinônimo de *S. potentilloides*), *S. cerradoensis*, *S. paradoxa*, *S. planicaulis*, *S. riedelii*, *S. rubifolia*, *S. viarum*; *Malva prostrata*, sinônimo de *Modiola caroliniana*. Foi confirmado o monofiletismo dos gêneros *Monteiroa*, *Calyculogygas* e *Tropidococcu*s. O gênero *Modiola*, até o momento tido como monoespecífico, foi expandido, passando a englobar a maior parte das espécies descritas em *Modiolastrum* (quatro das cinco espécies), com exceção de *Modiolastrum palustre* (Ekman) Krapovickas que permanece como incertae sedis. A partir dos registros de herbário e coletas próprias, foi possível categorizar o status de conservação de 46 espécies analisadas no presente estudo das quais 19 são consideradas ameaçadas: duas na categoria Vulnerável (VU), quatorze Em perigo (EN) e três como Criticamente em Perigo (CR). Duas espécies foram sinonimizadas (*Sida krapovickasii* e *S. pseudorubifolia*); nove espécies são novos registros para o Rio Grande do Sul (*Sida cerradoensis*, *S. confusa*, *S. cordifolia*, *S. glaziovii*, *S. lonchitis*, *S. nemorensis*, *S. ramoniana*, *S. reitzii*, *S. riedelii*). Foram reconhecidas 23 espécies da família Malvaceae para o município de Santa Maria-RS, pertencentes a 10 gêneros. Quanto a continuidade de estudos com os gêneros aqui tratados, sugere-se: 1) Estudo filogeográfico do gênero *Monteiroa*, para entender melhor a delimitação das espécies *Monteiroa reitzii*, *M. dusenii* e *Monteiroa bullata*. 2) Estudos citogenéticos e filogenômicos para compreender melhor o clado *Calyculogygas-Modiola-Modiolastrum-Tropicococcus*.

Palavras-chave: taxonomia, filogenia, conservação, Malvaceae-Malvoideae

ABSTRACT

Malvaceae Juss. is a family of herbs, subshrubs, shrubs, lianas and small and large trees, with around 250 genera and 4,200 species, with 73 genera and 783 species occurring in Brazil. It is subdivided into nine subfamilies: Grewioideae, Byttnerioideae, Tilioideae, Dombeyoideae, Browlowioideae, Helicteroideae, Sterculioideae, Malvoideae and Bombacoideae. The Malvoideae subfamily is subdivided into three tribes: Hibisceae, Gossypieae and Malveae and is represented in Rio Grande do Sul by 20 genera and 88 species. Many species in the State are already considered threatened and for others their conservation status is not yet known. Tribe Malveae is the most morphologically diverse and some authors have proposed its infratribal classification into non-formal alliances. The *Modiola* alliance was considered phylogenetically related to the genera *Calyculogygas* and *Monteiroa* in a study using ITS nuclear marker. The objectives of the present study are: 1) to carry out a taxonomic treatment for the Malvaceae-Malvoideae family in Rio Grande do Sul, except for the genus *Pavonia*, already studied for the State; 2) perform a phylogenetic inference for the *Modiola* alliance and related genera (*Calyculogygas*, *Monteiroa*), aiming to test the monophyly of the genera and infer their phylogenetic relationships; 3) provide data on the conservation of Malvaceae-Malvoideae species in Rio Grande do Sul. Around 25 field expeditions and trips to review herbaria were carried out, with 230 exsiccates being collected and incorporated into the ICN and HUCS herbaria. In the herbarium reviews, 5000 exsiccates from 33 herbaria were reviewed. Samples of 18 species were also collected for the phylogenetic study of the *Modiola* alliance and related genera, which was carried out with the molecular markers ITS, rpl16, matK-trnK and ndhF. As results of the study we have: 1) the elaboration of synopsis of the genera *Calyculogygas*, *Modiola*, *Modiolastrum*, *Monteiroa*, *Sida* and *Tropidococcus*, with taxonomic and nomenclatural comments, keys, images and geographic distribution maps of the 43 species; 2) the publication of the Malvaceae family for the municipality of Santa Maria, Rio Grande do Sul, with images of the species, descriptions and dichotomous keys. Four species new to science were described: *Monteiroa rubra* Grings, *Callianthe flava* Grings, *Callianthe maritima* Grings and *Callianthe sulcatarinensis* Grings. Three new combinations were made: *Callianthe costicalyx* (K. Schumann ex Takeuchi & G.L. Esteves) Grings, *Modiola australe* (Krapovickas) Grings, *Modiola gilliesii* (Steudel) Grings. Two names were revalidated, *Modiola lateritia* (Hooker) K. Schumann and *Modiola malvifolia* Grisebach. Ten

names were lectotypified: *Malvastrum bullatum* and *Malvastrum dusenii*, basionyms of *Monteiroa bullata* and *Monteiroa dusenii*, respectively; *Sida anarthra* (synonymous of *S. potentilloides*), *S. cerradoensis*, *S. paradoxa*, *S. planicaulis*, *S. riedelii*, *S. rubifolia*, *S. viarum*; *Malva prostrata*, synonymous of *Modiola caroliniana*. The monophyly of the genera *Monteiroa*, *Calyculogygas* and *Tropidococcus* was confirmed. The genus *Modiola*, until now considered monospecific, was expanded, now encompassing most of the species described in *Modiolastrum* (four of the five species), with the exception of *Modiolastrum palustre* (Ekman) Krapovickas, which remains as incertae sedis. From herbarium records and own collections, it was possible to categorize the conservation status of 46 species analyzed in the present study, 19 of which are considered threatened: two in the Vulnerable (VU) category, fourteen Endangered (EN) and three as Critically Endangered (CR). Two species were synonymized (*Sida krapovickasii* and *S. pseudorubifolia*); nine species are new records for Rio Grande do Sul (*Sida cerradoensis*, *S. confusa*, *S. cordifolia*, *S. glaziovii*, *S. lonchitis*, *S. nemorensis*, *S. ramoniana*, *S. reitzii*, *S. riedelii*). Twenty-three species of the Malvaceae family were recognized for the municipality of Santa Maria-RS, belonging to 10 genera. Regarding future studies with the genera treated here, it is suggested: 1) Phylogeographic study of the genus *Monteiroa*, to better understand the delimitation of the species *Monteiroa reitzii*, *M. dusenii* and *Monteiroa bullata*. 2) Cytogenetic and phylogenomic studies to better understand the *Calyculogygas-Modiola-Modiolastrum-Tropicococcus* clade.

Keywords: taxonomy, phylogeny, conservation, Malvaceae-Malvoideae.

1. INTRODUÇÃO

Malvaceae Juss. é uma família constituída de ervas, subarbustos, arbustos, lianas e árvores de pequeno e grande porte, com cerca de 250 gêneros e 4.200 espécies, sendo que, no Brasil, ocorrem cerca de 70 gêneros e 750 espécies (Souza & Lorenzi 2019). Segundo a Flora e Funga do Brasil (2024), ocorrem no Brasil 81 gêneros e 874 espécies, das quais 465 são endêmicas. A família está distribuída nas regiões tropical e temperada do globo, sendo predominantemente pantropical, com uma estimativa de que 65% dos gêneros de Malvaceae stricto sensu estejam concentrados nas Américas (Fryxell 1997) e tendo a América do Sul como o centro de riqueza específica (Barroso *et al.* 2004).

Nos sistemas de classificação tradicionais (Dahlgreen 1983, Cronquist 1988, Takhtajan 1997) Malvaceae foi considerada uma família distinta de Bombacaceae, Sterculiaceae e Tiliaceae, todas estas inseridas na Ordem Malvales. Porém, a separação destas famílias sempre foi considerada problemática (Edlin 1935, Bayer *et al.* 1999). Trabalhos de filogenia com base em dados moleculares, anatômicos, palinológicos, químicos e morfológicos, demonstraram que estas três últimas famílias são polifiléticas (Alverson *et al.* 1999, Bayer *et al.* 1999, Judd & Manchester 1997), e que a família Malvaceae sensu strictu é a única monofilética dessas quatro famílias tradicionais da ordem Malvales (Alverson *et al.* 1999). A partir destes trabalhos, Malvaceae foi expandida, sendo a ela incorporadas as três famílias de delimitação problemática, tendo como sinapomorfia morfológica, um nectário constituído de tricomas glandulares localizado internamente na base do cálice ou com menos frequência, nas pétalas, ou no tubo estaminal (Bayer *et al.* 1999). A partir de então a família foi subdividida em nove subfamílias: Grewioideae, Byttnerioideae, Tilioideae, Dombeyoideae, Browlowioideae, Helicteroideae, Sterculioideae, Malvoideae e Bombacoideae (Alverson et al. 1999, Bayer *et al.* 1999, Judd & Manchester 1997, Stevens 2001 onwards, Nyffeler *et al.* 2005).

A subfamília Malvoideae, que corresponde à família Malvaceae sensu strictu mais alguns representantes das antigas famílias Bombacaceae e Sterculiaceae (Alverson *et al.* 1999). No Rio Grande do Sul a subfamília Malvoideae está representada por 21 gêneros e 93 espécies (Malvaceae in FLORA E FUNGA DO BRASIL 2024).

Grings & Boldrini (2013) estudaram o gênero *Pavonia* para o Estado do Rio Grande do Sul, com 34 espécies no tratamento taxonômico, sendo três delas novas para a ciência (Grings *et al.* 2011, Grings & Boldrini 2012). Esta subfamília está subdividida em três tribos: Hibisceae, Gossypieae e Malveae, segundo Stevens 2001 onwards. Já, Malvaceae s.s., que compõe em parte Malvoideae, está subdividida em cinco tribos, segundo Fryxell (1988) e La Ducke & Doebley (1995): Decaschistieae, Gossypieae, Hibisceae, Malvavisceae e Malveae.

As espécies da tribo Malveae apresentam as partes livres dos estames agrupadas no ápice do tubo estaminal, o qual não é pentalobado (sinapomorfia da tribo). Além disso, o número de carpelos é igual ao número de estiletes, o fruto geralmente é um esquizocarpo e alguns representantes não apresentam epicálice (Fryxell 1988, Bayer & Kubitzki 2003, Takeuchi 2015). É considerada a tribo mais diversa morfologicamente e compreende 70 gêneros e cerca de 1000 espécies, com ampla distribuição geográfica (Fryxell 1997). A tribo Malveae é monofilética e relacionada com a tribo Gossypieae (Bayer *et al.* 1999, Alverson *et al.* 1999, Pfeil *et al.* 2002, Baum *et al.* 2004 e Nyffeler *et al.* 2005).

Quanto às subdivisões da tribo Malveae, foram propostas várias classificações por diversos autores. A primeira, elaborada por Bentham & Hooker (1862), com base na morfologia do gineceu, número de verticilos, número de óvulos por carpelo e posição do óvulo no ovário, dividiu a tribo em quatro subtribos: Abutilinae, Malopinae, Malvinae e Sidinae. Diversos autores seguiram essa classificação, propondo, algumas vezes, alterações (Schumann 1890, Edlin 1935, Kearney 1951). Bates (1968) propôs a subdivisão da tribo em alianças, classificação que foi seguida por Bates & Blanchard (1970), Fryxell (1988) e Bayer & Kubitzky (2003), com alterações. Essas novas propostas de subdivisão em alianças foram baseadas na presença ou ausência de epicálice, morfologia do pólen, número de cromossomos e nos dados de distribuição geográfica. Atualmente são reconhecidas 14 alianças para a tribo Malveae (Bayer & Kubitzki 2003).

Tate *et al.* (2005), em análise filogenética molecular da tribo Malveae, com base em sequências de ITS, chegou à conclusão de que a maioria das alianças e alguns gêneros não são monofiléticos. Outras análises filogenéticas moleculares testaram o monofiletismo de gêneros da tribo: Fuertes *et al.* (2003) para *Sida*, Tate & Simpson (2003) para *Tarasa*, Escobar Garcia *et al.* (2009) para as relações dos gêneros da aliança *Malva*, Huertas *et al.*

(2007) para *Palaua*, Tate (2011) para *Urocarpidium*, Wagstaff & Tate (2011) para *Plagianthus*, Escobar Garcia *et al.* (2012) para *Alcea*, Donnell *et al.* (2012) para *Callianthe*, *Bakeridesia* e *Abutilon* e Takeuchi (2015) para *Gaya* e gêneros afins.

Fryxell (1988) segregou *Modiola* e *Modiolastrum* da aliança *Sphaeralcea*, citando pela primeira vez a aliança *Modiola*. Bayer & Kubitzky (2003) acrescentaram o gênero *Tropidococcus*, recém-descrito na época, à aliança *Modiola*. Na análise filogenética molecular, realizada por Tate *et al.* (2005), esta aliança foi uma das poucas da tribo que foi suportada como monofilética. No entanto, foram utilizadas apenas duas espécies e dois gêneros na análise, entre as sete espécies e três gêneros que compõem a aliança. O gênero *Modiola* compreende apenas a espécie *Modiola caroliniana* (L.) G.Don, que ocorre nas Américas (Grings 2018 *Modiola* in Flora do Brasil 2020 em construção). O gênero *Modiolastrum* é composto por cinco espécies aceitas e ocorrem no Brasil, Argentina, Uruguai, Paraguai e Bolívia: *M. australe* Krapov., *M. gilliesii* (Steud.) Krapov., *M. lateritium* (Hook.) Krapov., *M. malvifolium* (Griseb.) K. Schum e *M. palustre* (Ekman) Krapov. (Krapovickas 1945, 1949, 1957, Grings 2018 *Modiolastrum* in Flora do Brasil 2020 em construção). Já o gênero *Tropidococcus* compreende apenas uma espécie, *T. pinnatipartitus* (A.St.-Hil. & Naudin) Krapov., endêmico de pequena região na Serra do Sudeste do Rio Grande do Sul, nos municípios de Bagé, Caçapava do Sul e Lavras do Sul (Krapovickas 2003).

Os gêneros *Calyculogygas* e *Monteiroa*, tradicionalmente integrantes da aliança *Sphaeralcea* (Fryxell 1997, Bayer & Kubitzki 2003, Tate *et al.* 2005) formaram um clado com *Modiola* e *Modiolastrum* na análise filogenética de Tate *et al.* (2005), separados de outros gêneros da aliança *Sphaeralcea*. *Calyculogygas* foi descrito por Krapovickas (1960) com apenas uma espécie, *Calyculogygas uruguayensis* Krapov., e, posteriormente, teve adição de uma nova espécie, *C. serrana* Grings (Grings *et al.* 2014, Grings 2018 *Calyculogygas* in Flora do Brasil 2020). *Monteiroa* é um gênero com 10 espécies, das quais nove ocorrem no Sul do Brasil, uma restrita a São Paulo e uma espécie ocorrendo também no Uruguai e Argentina (Krapovickas 2003, Bovini 2018).

A análise filogenética da aliança *Modiola* e gêneros afins (*Calyculogygas*, *Monteiroa*) apresentará dados mais aprofundados sobre a relação entre os gêneros dessa aliança e dos gêneros proximamente relacionados. Tate *et al.* (2005) não incluíram o gênero *Tropidococcus* na análise filogenética de seu estudo e utilizaram apenas uma

espécie de cada gênero desse clado (*Modiola*, *Modiolastrum*, *Calyculogygas* e *Monteiroa*), totalizando quatro espécies. O presente estudo pretende analisar todas as espécies destes gêneros, ou seja, 19 espécies, o que enriquecerá o conhecimento sobre esse grupo, testando o monofiletismo dos gêneros e apresentando uma inferência filogenética mais robusta da relação entre eles.

O gênero *Tropidococcus* é endêmico de pequena região na Serra do Sudeste do Rio Grande do Sul e o gênero *Calyculogygas* ocorre apenas no Uruguai e em pequenos trechos do Rio Grande do Sul e numa única localidade de Santa Catarina. Os gêneros *Modiola*, *Modiolastrum* e *Monteiroa* ocorrem no Brasil, apenas no sul (com exceção de uma espécie de *Monteiroa* que ocorre em São Paulo) e em regiões limítrofes.

A exata identificação das espécies é o primeiro passo para qualquer outra pesquisa ou uso diverso das plantas. A família Malvaceae-Malvoideae ainda carece de tratamentos taxonômicos no Rio Grande do Sul, o que dificulta a identificação de espécies para os mais variados fins, como: conservação, licenciamento ambiental, multiplicação visando produção de plantas ornamentais, recuperação de áreas degradadas e identificação de princípios ativos para farmácia, etc. A família Malvaceae apresenta grande potencial medicinal, com muitos estudos já tendo evidenciado esse potencial ou comprovado os efeitos benéficos de várias espécies para a saúde humana (Garcia 2007, Mostardeiro *et al.* 2014, Ewald *et al.* 2015, Girisch *et al.* 2016).

Quanto à conservação das espécies de Malvaceae-Malvoideae, a grande maioria ocorre em formações campestres (Grings & Boldrini 2013), as quais encontram-se atualmente ameaçadas com perdas de 50% da área de ocorrência original em 35 anos, e consequente perda de biodiversidade (Hasenack & Cordeiro 2009, Overbeck et al. 2007, Staude *et al.* 2018). Na Lista Oficial da Flora Ameaçada do Rio Grande do Sul (Rio Grande do Sul 2014), constam 36 espécies da família Malvaceae, das quais 34 pertencem a subfamília Malvoideae, algumas delas endêmicas de algumas regiões do Rio Grande do Sul: *Tropidococcus pinnatipartitus* (A.St.-Hil. & Naudin) Krapov., *Sida pseudorubifolia* Krapov. & Bueno, *Calyculogygas serrana* Grings, *Pavonia secreta* Grings & Krapovickas. Entretanto, ainda há dados deficientes sobre a conservação de representantes da família no Estado, conhecimento que foi incrementado a partir da presente tese, com a coleta exaustiva de espécies em todas as

regiões fisiográficas e com a análise do status de conservação das mesmas, de acordo com critérios da IUCN (2012).

Os objetivos da presente tese são:

- Realizar um tratamento taxonômico para a família Malvaceae-Malvoideae no Rio Grande do Sul, exceto o gênero *Pavonia*, já estudado por Grings & Boldrini (2013);
- Realizar uma inferência filogenética para a aliança *Modiola* e gêneros afins (*Calyculogygas*, *Monteiroa*, etc), visando testar a monofilia dos gêneros desta aliança e inferir as suas relações filogenéticas;
- Fornecer dados sobre a conservação das espécies de Malvaceae-Malvoideae no Rio Grande do Sul.

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2. ARTIGOS

2.1. FILOGENIA DA ALIANÇA *Modiola*, TRIBO MALVEAE, E GÊNEROS AFINS

Artigo a ser submetido para o periódico Botanical Journal of the Linnean Society

2.2. SINOPSE DOS GÊNEROS *Calyculogygas, Modiola, Modiolastrum* E *Tropidococcus*

Artigo a ser submetido para o periódico Darwiniana

2.3. SINOPSE DO GÊNERO *Monteiroa*

Artigo a ser submetido para o periódico Darwiniana

2.4. *MONTEIROA RUBRA* (MALVACEAE: MALVOIDEAE), A NEW SPECIES ENDEMIC TO THE SOUTHERN BRAZILIAN GRASSLANDS

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Monteiroa rubra (Malvaceae: Malvoideae), a New Species Endemic to the SouthernBrazilian Grasslands

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Abstract—Monteiroa rubra is described as a remarkable new species from Rio Grande do Sul, Brazil. It is notably distinct from the other ten species of *Monteiroa*. The new species is morphologically most similar to the four species of the genus with unlobed leaves that also lack cordate leaf bases. *Monteiroa rubra* apparently is an endemic species known from three localities in wetlands associated with grasslands in Augusto Pestana and Fontoura Xavier municipalities in southern Brazil. A morphological description, distribution map, photographs, ecological notes, and a key to morphologically most similar species are presented. According to IUCN criteria, if a formal assessment were performed, the new species wouldprobably be considered Endangered.

Keywords—IUCN red list, Rio Grande do Sul, taxonomy.

Monteiroa Krapov. (Malvaceae: Malvoideae) was described by Krapovickas (1951), who recognized five species. Sub- sequently, five more species were described (Monteiro 1955; Krapovickas 1962, 2003a) and currently ten species are recognized. The genus is distributed in south and southeast Brazil(São Paulo, Paraná, Santa Catarina and Rio Grande do Sul states), Uruguay, and Argentina (Rio da Prata and Rio Uru- guai, in the mouth of the Rio Negro). The species of *Monteiroa* occur in wetlands from highland grasslands and riversides ranging from 700 to 1700 m in the Atlantic Rainforest Biome, and there are also rare occurrences in wetlands from the Pampa biome grasslands at sea level (Krapovickas 2003a).

Morphological characters that distinguish the genus *Mon- teiroa* from other genera of Malveae (Malvaceae: Malvoideae) are the presence of determinate inflorescences (simple or double cincinnal cymes), mericarps without ornamentation that are dehiscent apically and on the ventral side, and falcate-lanceolate stipules (Krapovickas 1951, 2003a). Bates (1968) included *Monteiroa* in the *Sphaeralcea* alliance of Malveae. Tate et al. (2005) published evidence that *Monteiroa* is not closely relatedto *Sphaeralcea* A.St-Hil., but rather it is found in a clade with *Calyculogygas* Krapov., *Modiola* Moench, and *Modiolastrum* K.Schum. In recent years, several new species of Malvaceae have been described from southern Brazil (Krapovickas 2003a, 2003b, 2003c, 2007, 2014; Grings and Boldrini 2012; Grings et al. 2011, 2014), which highlights the gaps in knowledge that still exist for this family in this region. This article describes and illustrates a new species, *Monteiroa rubra*, apparently endemic to three localities in grasslands in Rio Grande do Sul, Brazil (Fig. 1).This species differs remarkably morphologically from other species of *Monteiroa*, from which it can be clearly distinguished by characteristics of its leaves, flowers, mericarps, and habit.

Materials and Methods

As part of a taxonomic study of the genus *Monteiroa*, collections were made throughout the Brazilian states of Rio Grande do Sul and Santa Catarina, material in herbaria was revised, known species were compared, and misidentifications of specimens were corrected according to the existing literature. This is what led to the recognition of the new species. The description of the new species and comparisons were performed by studying specimens in the following herbaria: ICN, PACA, HRCB, HUCS, MBM, HAS, (Thiers 2019) and UNILASALLE (unindexed, same address as the second author), and from new field collections. The informal, preliminary conservation status of *Monteiroa rubra* was evaluated following IUCN (2017) criteria and the GeoCAT tool (Bachman et al. 2011) was used to calculate the area of occupancy (AOO) and extent of occurrence (EOO).

Taxonomic Treatment

Monteiroa rubra Grings, sp. nov. Type: Brazil. Rio Grande do Sul: Fontoura Xavier, 696m alt., WGS–84–28.920S -52.357W, 19 Sep 2018 (fl), *M. Grings 1922 & S. A. L. Bordignon* (holotype: ICN!, isotypes: CTES!, K!,NY!, HUCS!, RB!).

Subshrubs, up to 1 m tall; stems strigose, densely covered with appressed to erect stellate trichomes. Stipules 3–10 30.3–13 mm, linear-subfalcate or lanceolate-subfalcate, margin sometimes toothed, with simple, bifid, or trifid trichomes, trichomes generally only on the margin of teeth, but sometimes also on the veins. Petioles 0.2–0.7 mm long. Leaf blades lanceolate, lanceolate-ovate, or narrowly elliptic, 0.9–5.6 3 0.3–1.8 cm, both surfaces strigose and with stellate trichomes, the abaxial surface more densely pubescent, base cuneate, 3-nerved, apex acute and sometimes mucronate, margin serrate-crenate with teeth sometimes slightly overlapping. Inflorescences simple cincinnal cymes 1–6.1 cm long, apical or axillary, with 4–11 flowers; peduncles 0.4–2.9 cm long, strigose, with stellate trichomes; bracts lanceolate, 4.5–9 3 0.6–1.2 mm, margin toothed, with simple or bifid trichomes,1.5–2 mm long, trichomes generally found only in the teeth,but sometimes also on the veins; pedicels 1–3 mm long; epi-calyx bracts 3, linear, 4–8 3 0.3–1 mm, inserted 0.5–1 mm below the calyx, margin toothed, with simple or bifid tri- chomes, 1.5–2 mm long in the teeth, but sometimes also on theveins; calyx 0.6–0.8 cm long, gamosepalous, 5-lobed, lobes ovate, 0.4–0.7 3 0.2–0.55 cm, hirsute, with simple or bifid trichomes 1–2 mm long on the margin and veins, apex acute to acuminate; corolla with 5 petals, apically notched, sometimes auriculate, 5–10 3 4.5–7 mm, red; staminal tube 2–3 mm long, filaments of the stamens about 30, anthers reniform; styles 7–10, emergent from the staminal tube, stigmas capitate; ovary with 7–10 carpels, uniloculate and uniovulate. Fruit schizocarpic, 3–5 3 2.3–3 mm; mericarps 7–10, dehiscent apically and on the upper half or upper two-thirds of the ventral and dorsal

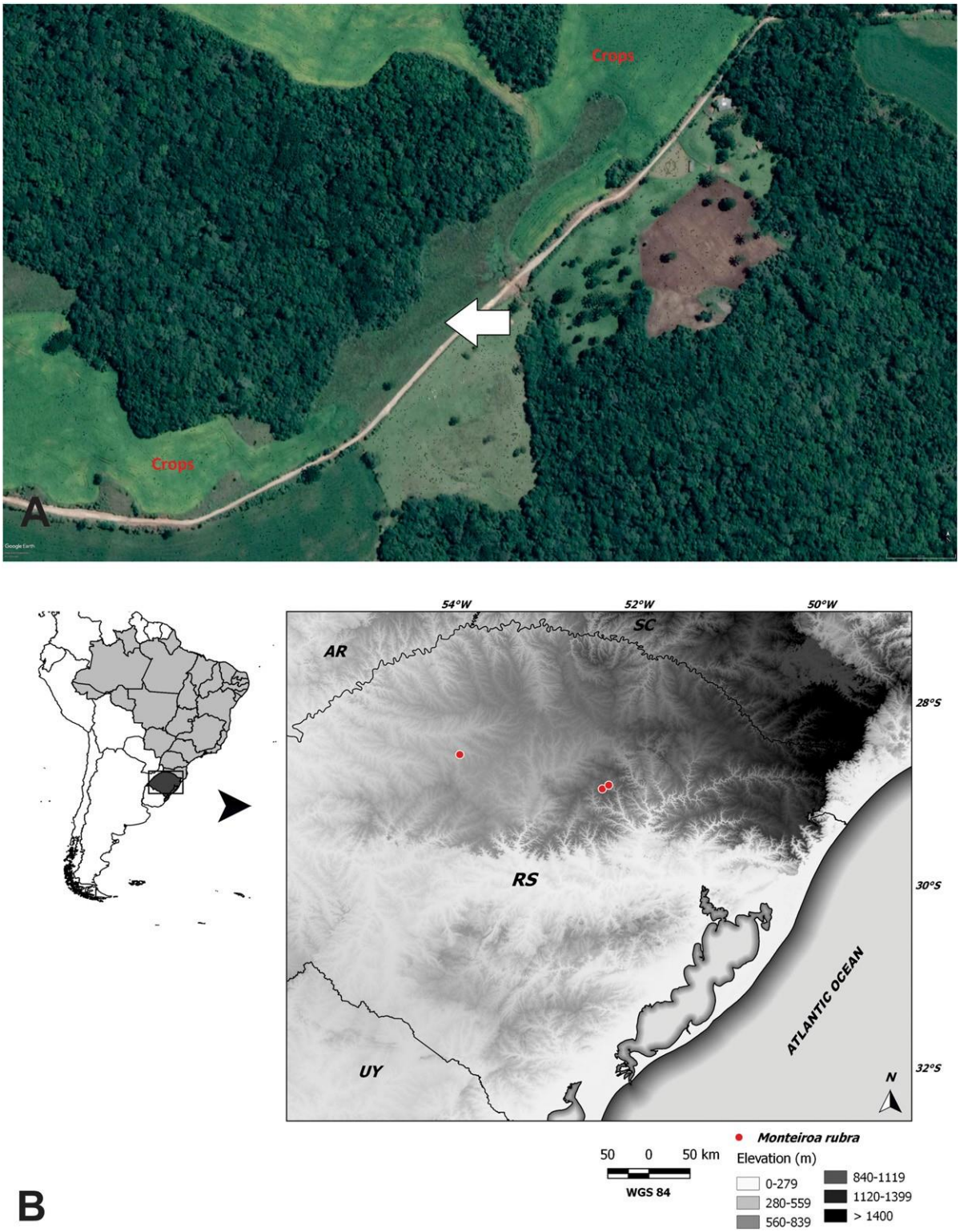

Fig. 1. *Monteiroa rubra* type locality and distribution map. A. Type locality (white arrow), in the border of a wetland in ecotone of *Araucaria* forest and grassland surrounded by crops. B. Distribution map of *M. rubra* (red points). AR 5 Argentina; UY 5 Uruguay; RS 5 Rio Grande do Sul, Brazil; SC 5 Santa Catarina, Brazil. (A. Google Earth image. B. Developed by Iuri Buffon).

faces, 2–3 3 1.2–2 mm, with sparse stellate trichomes, tri- chomes with two to six branches up to 0.3 mm long apically and on the upper portion of the dorsal face. Seeds reniform, free in the interior of the mericarp, 1.3–1.7 mm high, 1.2–1.5 wide from dorsal to ventral sides and 0.6–1.2 mm wide from lateral sides. Figures 2, 3.

Phenology—The species flowers from September until March, and fruits from November to March.

Distribution and Habitat—*Monteiroa rubra* is known only from three localities in Rio Grande do Sul State, Brazil (Fig. 1). The first locality where the species was collected in 1956, by José Pivetta, is known as Rosário, in the municipality of

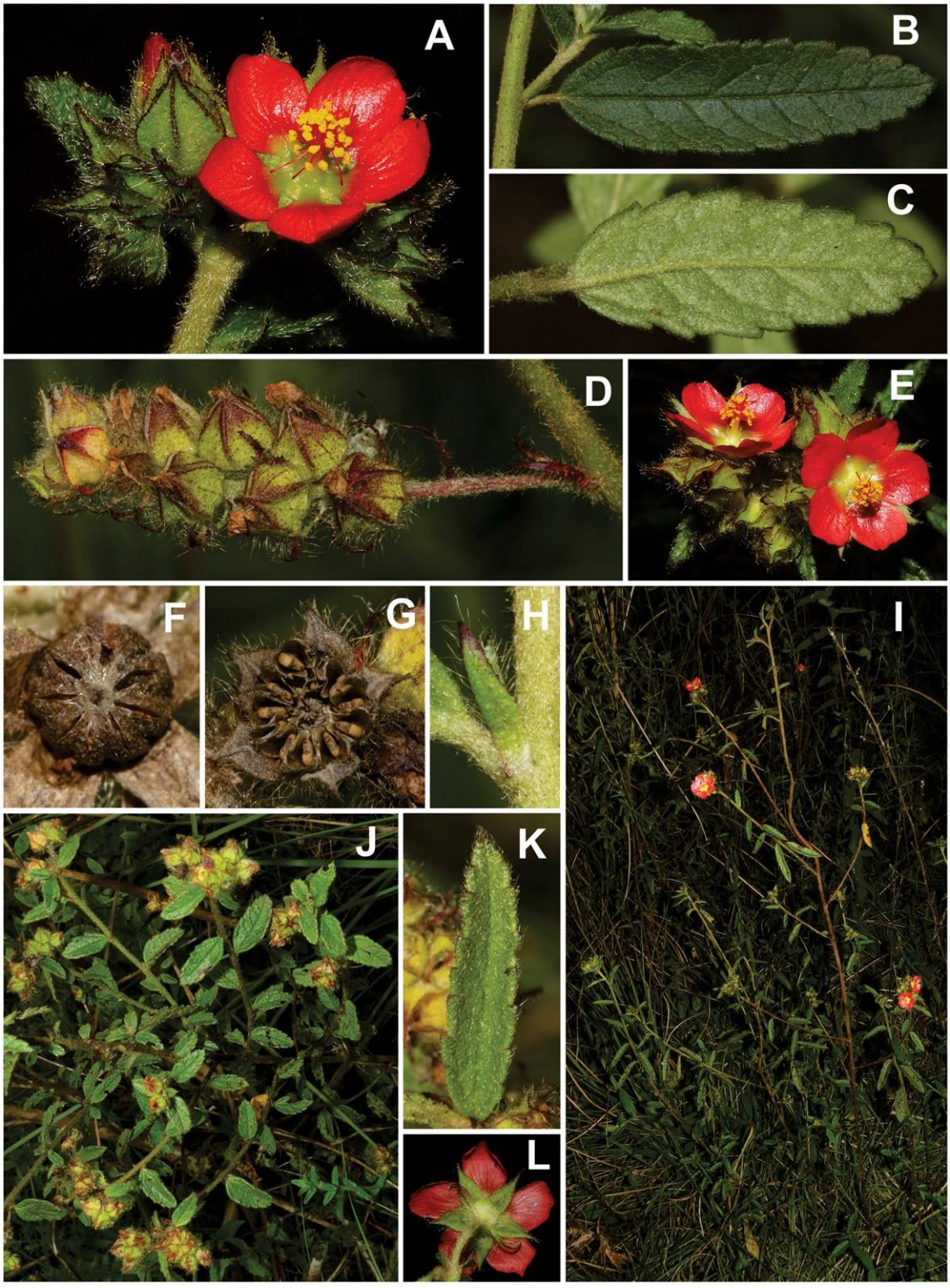

Fig. 2. *Monteiroa rubra*. A, E. Inflorescences of simple cincinnal cymes with buds and flowers. B, K. Adaxial surface of leaves. C. Abaxial surface ofleaf. D. Infructescence with immature schizocarps covered by calyces. F, G. Mature schizocarps, beginning to dehisce (F) and fully dehisced with the visible seeds (G). H. Stipule. I. Habit. J. Branches with infructescences. L. Epicalyx, calyx, and corolla.

Augusto Pestana, in the Pampa biome (IBGE 2004). Nowa- days, the original vegetation of this place is almost to-tally converted into soybean crops. The second locality is in the municipality of Fontoura Xavier, where the species was collected in 2002 by Alberto Knob and Sérgio A. L. Bordignon, in highland grasslands of the Brazilian Atlantic Rainforest biome (IBGE 2004). After many years visiting this same place, it was not possible to rediscover the species. The third locality is also in the municipality of Fontoura Xavier, 2.2 km from the second locality, and is the holotype specimen that was collected in September 2018 (Figs. 1, 3D, F). This is the only place where a population of

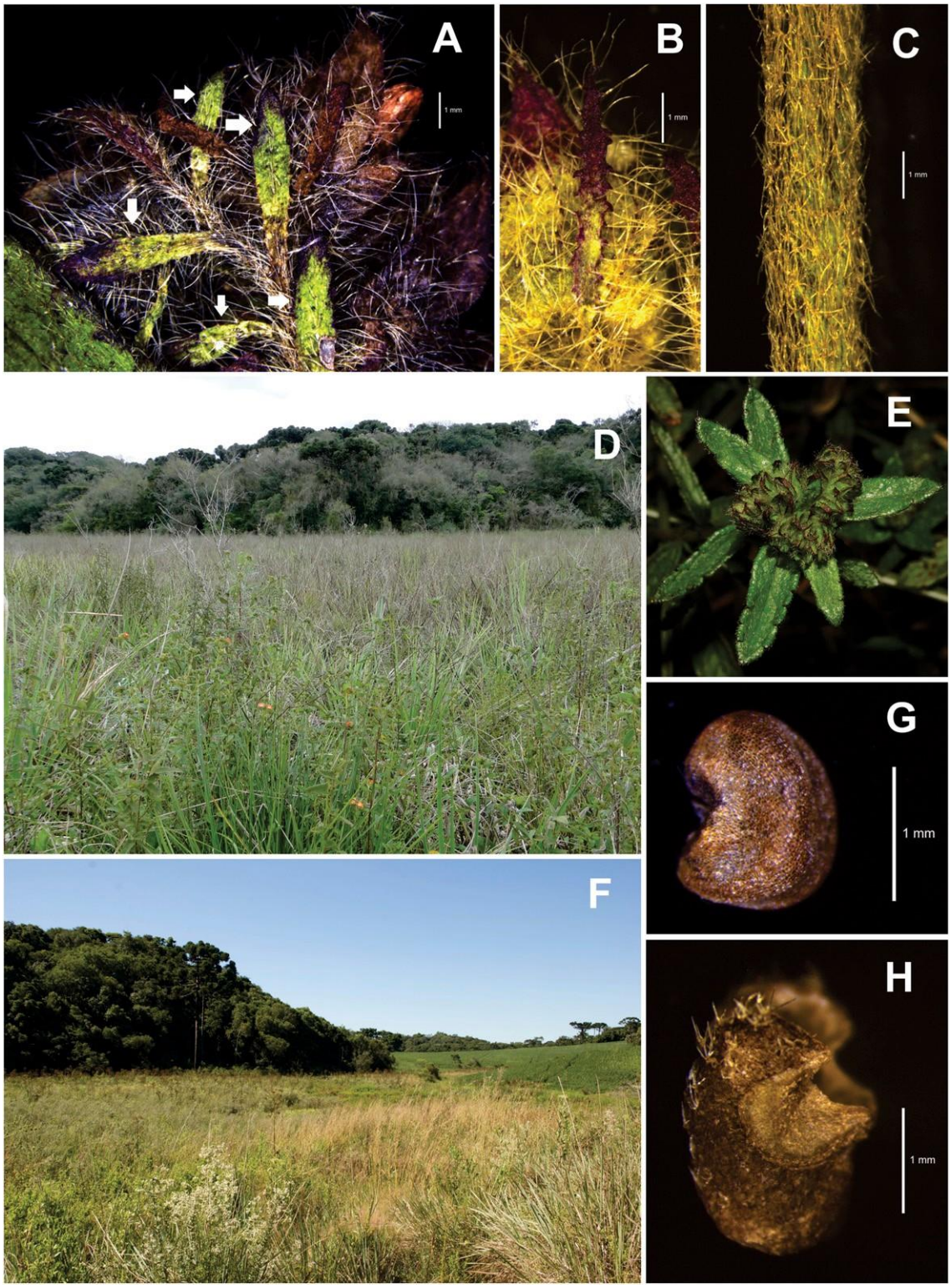

Fig. 3. *Monteiroa rubra* habitat and morphological details. A. Bracts of the inflorescence (white arrows). B. Epicalyx bract. C. Stems covered with stellate trichomes. D, F. Habitat, in the border of a wetland in ecotone of *Araucaria* forest and grassland surrounded by soybean crops, in Fontoura Xaviermunicipality. E. Branch with leaves and inflorescences with buds. G. Seed (lateral view). H. Mericarp (lateral view). (Scale bars 5 1 mm).

the species appears to persist. Fifteen other sites with wetlands in this region were visited, but the species was not found in any of these places. The holotype locality is an ecotone of *Araucaria* forests (where *Araucaria angustifolia* (Bertol.) Kuntze predominates) with highland grasslands at 696 m (Figs. 1, 3D, F). Here *Monteiroa rubra* occurs in the border of a little wetland, with the soil slightly moist, as compared to the adjacent wetland. Many species co-occur with *M. rubra*, mainly from the following families: Apiaceae (e.g. *Eryngium chamissonis* Urb., *Eryngium horridum* Malme,

Eryngium serra Cham. & Schltdl.); Asteraceae (e.g. *Chro- molaena laevigata* (Lam.) R.M.King & H.Rob., *Vernonanthura tweediana* (Baker) H.Rob.); Commelinaceae (e.g. *Floscopa glabrata* Hassk.); Gesneriaceae (e.g. *Sinningia elatior* (Kunth) Chautems); Lamiaceae (e.g. *Hoehnea scutellarioid*es (Benth.) Epling, *Hyptis balansae* Briq.); Lythraceae (e.g. *Cuphea tuberosa* Cham. & Schltdl.); Malvaceae (e.g. *Pavonia distinguenda* A.St.-Hil. & Naudin); Onagraceae (e.g. *Ludwigia sericea* (Cam- bess.) H.Hara); Poaceae (e.g. *Andropogon lateralis* Nees, *Sac- charum villosum* Steud., *Schizachyrium microstachyum* (Ham.) Roseng., B.R.Arrill. & Izag.); Rubiaceae (e.g. *Galianthe verbe- noides* Griseb.); Scrophulariaceae (e.g. *Buddleja elegans* Cham. &Schltdl.); Verbenaceae (e.g. *Aloysia polygalifolia* Cham.).

Etymology—The species name refers to the red color of the corolla, unique within the genus. The other ten species have pink, lilac, or purple corollas.

Informal Conservation Status—According to IUCN (2017) criteria A4c and B2ab (i, ii, iii, iv, v), if a formal assessment were performed and submitted, *Monteiroa rubra* would probably be considered an Endangered species. In this region 74% of grasslands were converted or degraded, mostly by soybean cropland (Andrade et al. 2015). This species has an area of occupancy (AOO) of 117.4 km^2, an extent of occurrence of 12,000 km^2, inhabits a severely fragmented habitat, and occursin just three locations. Finally, we projected a decline of extent of occurrence, area of occupancy, quality of habitat, number of populations or subpopulations, and number of mature individuals of the new species since in Rio Grande do Sul land-use change has increased considerably within the past decade and continues today (Andrade et al. 2015). Although the AOO of *M. rubra* indicates the species as Vulnerable, all other criteria indicate it as Endangered.

Taxonomic Relationships—*Monteiroa rubra* is notably dis- tinct from the other species of the genus. However, it is morphologically similar to the following species of *Monteiroa*, which are characterized by unlobed leaves and lack cordate bases: *M. bullata* (Ekman) Krapov., *M. dusenii* (Ekman) Krapov., *M. ptarmicifolia* (A.St.-Hil. & Naudin) Krapov., and *M. reitzii* Krapov. From these it can be distinguished by its subshrub habit up to one meter tall, red corolla, smaller petals, smaller staminal tube, linear epicalyx bracts, smaller and non- hirsute mericarps, and by both surfaces of the leaf blade being strigose, with the presence of stellate trichomes. We sum- marize the differences among these species in Table 1. The distribution of the new species is also different from theserelated species. *Monteiroa rubra* occurs in the Planalto Médio region of Rio Grande do Sul while the other four related species occur in Campos de Cima da Serra, Depressão Central, and Litoral regions of Rio Grande do Sul (Fortes 1959) and inthe highlands of Santa Catarina and Paraná states (Brazil). Morphological features of epicalyx bracts and mericarps are important for delimiting infrageneric taxa in Malvaceae, as well as to distinguish species (Krapovickas 2003a; Esteves 2004; Grings et al. 2011). Krapovickas (2003a) also used ves- titure to distinguish species of *Monteiroa*, along with mericarp, epicalyx bract, and leaf morphology. Agreeing with the fea- tures used by these authors to distinguish species in Malva-ceae, especially in *Monteiroa*, we consider the evidence presented in this paper sufficient to consider *M. rubra* as a newspecies (Table 1).

Paratypes—Brazil. —Rio grande do sul: Augusto Pestana, Rosário, 07 Feb 1956 (fl), *Pivetta 1131* (HRCB, PACA); Fontoura Xavier, BR 386, WGS–84–28.926S, -52.380W, 24 Sep 2002 (fl), *A. Knob & S. A. L. Bordignon 7228* (ICN, UNILASSALE); Fontoura Xavier, 696 m alt., WGS–84–28.920S -52.357W, 07 Nov 2018 (fr), *M. Grings et al. 1951* (ICN, CTES, SP, MBM);

TABLE 1. Morphological differences between *Monteiroa rubra* and morphologically similar species. Data from Krapovickas (2003a), field observations,and herbarium specimens.

	M. rubra	*M. bullata*	*M. dusenii*	*M. ptarmicifolia*	*M. reitzii*
Corolla	Red; 5–10 × 4.5–7 mm	Pink; 11–11.5 × 11–12 mm	Dark pink; 11–15 × 7–1.1 mm	Pink; 15–20 × 11–13 mm	Pink to lilac; 12 × 8 mm
Staminaltube	2–3 mm long	3–4 mm long	4 mm long	4–4.5 mm long	4 mm long
Epicalyxbracts	Linear; 4–8 × 0.3–1 mm; margin toothed, with simple or bifid trichomes, 1.5–2 mmlong in the teeth	Lanceolate or ovate, rarely linear; 4–11 × 0.5–5 mm; with stellate trichomes in the margins	Lanceolate to ovate; 6–14× 2–5 mm; with simple trichomes in the margins	Lanceolate or narrowly elliptic; 5–10 × 1.3–3 mm; glabrate or with sparsely arachnoid trichomes in the margins	Lanceolate-ovate; 6–7 × 1.2–6 mm;
Peduncle	0.4–2.9 cm long	1.6–7 cm long	3–10 cm long	4.5–8 cm long	3–8.7 cm long
Mericarp 1.2–2 mm	Sparse trichomes up to 0.3 mm long; 2–3 ×	Densely hirsute; trichomes1–2 mm long; 3.5–4 × 3–3.5 mm	Densely hirsute; trichomes 1–1.5 mm long; 4 × 3 mm	Densely hirsute; trichomes 1–1.5 mm long; 4–5 × 3–4 mm	Densely hirsute; trichomes 1–1.5 mm long; 4 × 3 mm
Leaf blade(size)	0.9–5.6 × 0.3–1.8 cm	2.3–15 × 0.7–3.5 cm	2.9–12.7 × 0.5–5.5 cm	6–17 × 0.5–1.7 cm	3.2–9 × 1.4–2.5 cm
Indumentof leaves	Both surfaces strigose, with stellate trichomes,the abaxial surface denser	Adaxial surface generally with sparse simple trichomes, rarely with stellate trichomes; abaxial surface with dense stellate trichomes	Adaxial surface glabrate, seldom subglabrate with simple or bifid trichomes; abaxial surface subglabrate with stellate trichomes with branches up to 0.5 mm long Glabrate in	Glabrate or with sparsely arachnoid trichomes onthe adaxial surface; glabrate or with arachnoid trichomes at the main vein on the abaxial surface	Adaxial surface with sparse, simple or bifidtrichomes; Abaxial surface with stellate trichomes, 1–1.5 mm long
Indumentof stems	Strigose; dense stellate trichomes	Glabrate in old stems; dense stellate trichomesin young stems	old stems; sparse to dense stellate trichomes in young stems	Glabrate in old stems; young stems with arachnoid trichomes	Glabrate in old stems; sparse to dense stellate trichomes in young stems
Habit and height	Subshrubs up to 1 m	Shrubs up to 2m	Shrubs up to 2m	Shrubs up to 3 m	Shrubs up to 3 m

Fontoura Xavier, 696 m alt., WGS–84–28.920S -52.357W, 22 Dec 2018 (fl), *S. A. L. Bordignon s.n.* (ICN 200139); Fontoura Xavier, 696 m alt., WGS–84–28.920S -52.357W, 02 Mar 2019 (fl, fr), *M. Grings* 2020 (ICN,PACA).

Key to Distinguish *Monteiroa rubra* from Morphologically Similar Species

1. Subshrubs up to 1 m tall; corolla red; petals 5–10 mm long; mericarps 2–3 3 1.2–2 mm, sparsely stellate trichomes apically and on the upper portion of the dorsal face, stellate branches/arms up to 0.3 mm long..... *Monteiroa rubra*

1. Shrubs up to 2 or 3 m tall; corolla pink to lilac; petals more than 10 mm long; mericarps 3.5–5 3 3–4 mm, densely hirsute stellate apically and on the upper portion of the dorsal face, stellate branches/arms to 1.5 or 2 mm long. 2

2. Leaves bullate with simple (rarely stellate) trichomes in the apex of blisters. ..... *Monteiroa bullata*

2. Leaves not bullate, glabrate or with simple trichomes on the upper surface 3

3. Long arachnoid trichomes on young stems and inflorescences; epicalyx inserted 1–2 mm below the calyx. Leaves glabrate or with sparse arachnoid trichomes above and below. ..... *Monteiroa ptarmicifolia*

3. Stems glabrate or with stellate trichomes; epicalyx inserted at the base of the calyx. Leaves with stellate trichomes on the lower surface and glabrate or with simple or bifid trichomes on the upper surface..... 4

4. Upper surface of leaves generally glabrate, rarely with simple trichomes; lower surface of leaves with sparse stellate trichomes, arms/branches of stellate trichomes up to 0.5 mm long..... *Monteiroa dusenii*

4. Upper surface of leaves with simple or bifid trichomes; lower surface of leaves with stellate trichomes only, arms/branches of stellate trichomesup to 1–1.5 mm long ..... *Monteiroa reitzii*

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Author Contributions

MG reviewed herbaria, conducted fieldwork, wrote the manuscript, and provided photographs. SALB conducted fieldwork and reviewed the manuscript. IIB directs the first author's Ph.D. and reviewed the manuscript.

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2.5. THREE NEW SOUTH AMERICAN SPECIES OF *Callianthe* (MALVEAE, MALVOIDEAE, MALVACEAE) FROM ATLANTIC FOREST AND A NEW COMBINATION

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Article

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Three new South American species of *Callianthe* (Malveae, Malvoideae, Malvaceae) from Atlantic Forest and a new combination

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Abstract

Three new species of *Callianthe* (Malvaceae) from southern Brazil and northeastern Argentina are described, and illustrated: *C. flava*, *C. maritima*, and *C. sulcatarinensis*. Morphological descriptions, distribution maps, photographs, ecological notes, and a table comparing these species to two morphologically similar species, *C. amoena* and *C. muelleri-friderici*, are presented. Two of the three newly-described species, *C. maritima* and *C. sulcatarinensis*, so far are considered endemic and according to IUCN criteria, fit into the categories Endangered (EN) and Vulnerable (VU), respectively. A new combination *C. costicalyx*, based on *Abutilon costicalyx*, also is proposed.

Resumo

Três novas espécies de *Callianthe* (Malvaceae) do sul do Brasil e nordeste da Argentina são descritas e ilustradas: *C. flava*, *C. maritima* e *C. sulcatarinensis*. São apresentadas descrições morfológicas, mapas de distribuição, fotografias, notas ecológicas e uma tabela comparando-as com as duas espécies morfologicamente semelhantes, *C. amoena* e *C. muelleri-friderici*. Duas, das três espécies novas descritas, *C. maritima* e *C. sulcatarinensis*, até o momento são consideradas endêmicas e, de acordo com os critérios da IUCN, encaixam-se nas categorias Em Perigo (EN) e Vulnerável (VU), respectivamente. Uma nova combinação *C. costicalyx*, baseada em *Abutilon costicalyx*, é também proposta.

Keywords: Northeastern Argentina, Southern Brazil, taxonomy

Introduction

Callianthe Donnell (2012: 718) (Malveae, Malvoideae, Malvaceae), a Neotropical genus, was proposed to accommodate pluriovulate species of *Abutilon* Miller (1754: 23) and Brazilian species of *Bakeridesia* Hochreutiner (1913: 298) (i.e., *B.* subgen. *Dipteron*), which based on molecular evidence and congruence of morphological and karyological data (Donnell 2012; Takeuchi *et al.* 2014) are distinct from either *Abutilon* s. str. or *Bakeridesia* subgen. *Bakeridesia*. *Callianthe* is primarily South American, but includes some Mesoamerican species, and it comprises 47 species (Donnell 2012, Alverson *et al.* 2014) of which 27 occur in Brazil (Takeuchi 2020) where there is a center of diversity in Atlantic Forest (Takeuchi *et al.* 2014).

Morphological characters that distinguish *Callianthe* from *Bakeridesia* subgen. *Bakeridesia* are leaves toothed and/or lobed (rarely entire), petals without a red basal spot, pubescence various (vs. markedly stellate-ferruginous), and mericarps with or without a conspicuous lacerate dorsal wing (vs. mericarps almost always with a conspicuous lacerate dorsal wing). From *Abutilon* s. str., *Callianthe* can be distinguished by the following morphological characters: always woody plants (vs. sometimes herbaceous plants), ovules 4–13 per carpel (vs. 3 per carpel), petals with deeply impressed veins, inner mericarp walls sparsely stellate-pubescent, staminal column glabrous (vs. staminal column glabrous or pubescent) (Donnell 2012, Takeuchi *et al.* 2014). In addition, species of *Callianthe* share a base chromosome number

of $x = 8$ (vs. 7 in *Abutilon* s. str. and 15 in *Bakeridesia* subgen. *Bakeridesia*), a 25 base-pair deletion in the ITS2 rDNA sequence, and relatively large flowers with petals seldom shorter than 1.5 cm (Donnell 2012, Takeuchi *et al.* 2014). This article describes and illustrates three new species of *Callianthe* from Atlantic Forest in southern South America: two are endemic to regions of Santa Catarina state, Brazil, and one to southern Brazil and northeastern Argentina (Misiones). The three new species can be clearly distinguished from other species of *Callianthe* by characteristics of their leaves, indument, flowers, mericarps, habit, and habitats. The new combination *Callianthe costicalyx* also is proposed.

Materials and methods

As part of a taxonomic study of southern Brazilian Malvaceae, collections were made throughout the states of Rio Grande do Sul and Santa Catarina, and material in herbaria was revised. The descriptions of the three new species proposed here and comparisons with similar species were completed by studying our own collections as well as specimens in the following herbaria: EFC, FLOR, FURB, HAS, HBR, HUCS, ICN, LPB, MBM, PACA, RB, RSPF, UNILASALLE*, UPCB. Herbarium codes follow Thiers (2019) (*not in Index Herbariorum).
The new species described here are morphologically similar to *C. amoena* and *C. muelleri-friderici* and because the types of these last two species were destroyed in Berlin, images of their types and their protologues (Schumann 1891, Gürke 1892) also were analyzed. The conservation status of the three new species was evaluated following IUCN (2017) criteria and the GeoCAT tool (Bachman *et al.* 2011) was used to calculate the area of occupancy (AOO) and extent of occurrence (EOO).

Callianthe flava Grings, *sp. nov.* (Fig. 1, 6)

TYPE:—BRAZIL. Santa Catarina: Painel, SC-370, em direção a Urupema-SC, 1311 m, WGS 84 27.93304°S 049.96914°W, 20 December 2018, *M. Grings 1984* (holotype ICN!, isotypes CTES!, K!, MO!, RB!).

Species morphologically similar to *Callianthe amoena* (K. Schumann) Donnell (2012: 718) but can be distinguished by corolla never white, staminal tube and styles exserted beyond the corolla, staminiferous portion of the staminal tube oblong, and shrubby habit up to 4,5 m tall. Species also similar to *C. muelleri-friderici* (Gürke & K. Schumann) Donnell (2012: 719) but distinguished by stems, petioles and peduncles velutinous, and with the presence of simple trichomes on all of these parts, petals yellow and smaller, by stellate trichomes on the stems smaller and cinereous, and by calyx velutinous with stellate trichomes cinereous and smaller and with the scattered presence of simple trichomes.
Shrubs up to 4,5 m tall; stems velutinous, covered with sparse simple trichomes 1.5–2 mm long, with glandular trichomes 0.3–0.6 mm long and with dense stellate trichomes 0.2–0.4 mm long. Stipules 0.55–1.3 × 0.1–0.3 cm, narrowly elliptic or linear-triangular, velutinous, with stellate and glandular trichomes 0.2 mm long and with simple trichomes mainly on/along the margins. Petioles 1.3–14.2 cm long, indument similar to that of the stems. Leaf blades 5.5–22.5 × 3.6–23.6 cm, widely depressed, 3–lobed, rarely unlobed, basally cordate, 7–nerved, margin crenate-serrate, apex acute, sometimes attenuate, adaxial surface greenish, pubescent, with stellate trichomes and rarely glandular trichomes, abaxial surface cinereous, velutinous, with dense stellate trichomes, glandular trichomes on the main nerves and rarely with simple trichomes on the nerves. Flowers usually solitary in the leaf axils, rarely 2–3 per axil, pendent, peduncles 1–11.9 cm long, indument similar to that of the stems; calyx 2.1–4 cm long, bases 7–11 mm wide, with five narrowly triangular lobes 1.1–3.4 × 0.5–1 cm, velutinous, covered with glandular trichomes 0.3–0.6 mm long, with dense stellate trichomes 0.2–0.4 mm long and with sparse simple trichomes 1.5 mm long at the base of nerves and on/ along margins of lobes; corolla yellow, petals 2.6–4.5 × 1.8–4.1 cm, claw 6–11 × 1–4 mm; staminal tube, including the staminiferous portion, 3.1–4.6 cm long, yellow, staminiferous portion oblong, 1–1.5 × 0.6–1 cm, filaments numerous, styles 8–13, staminal tube and styles exserted 0.1–1.5 cm beyond the corolla; carpels ca. 12, unilocular, 8–9–ovulate. Fruit schizocarpic, 2.1–2.4 × 2.3–3 cm, depressed-globose, partially enclosed by the accrescent calyx; mericarps 11–13, dehiscent, 1.8–2.1 × 0.9–1.5 cm, dorsally strongly papillate, papillae 3–4 mm long, with dense stellate trichomes 2 mm long. Seeds 2.8–3 × 2.4–3 mm, reniform, pubescent, with simple trichomes 0.1 mm long.
Notes:—*Callianthe flava* can be distinguished from *C. amoena* (Fig. 4) and from *C. muelleri-friderici* (Figs. 4, 6) by flower, indument and habit characteristics that are presented in the diagnosis (above) and summarized in Table 1.
Habitat, distribution:—*Callianthe flava* grows along forest edges and in shrubbery in the Atlantic Forest Biome (IBGE 2004), along the slopes and the plateau of the mountainous massif of the Serra Geral, formed by effusive rocks, in the Brazilian states of Rio Grande do Sul, Santa Catarina and Paraná and in the Argentine province of Misiones (Fig.

7). The species grows at elevations ranging from 400 to 1455 m. According to IUCN (2017) criteria, the species can be considered of Least Concern (LC), with an Extent of Occurrence of 200,298.417 km² and an Area of Occupancy of 160 km².

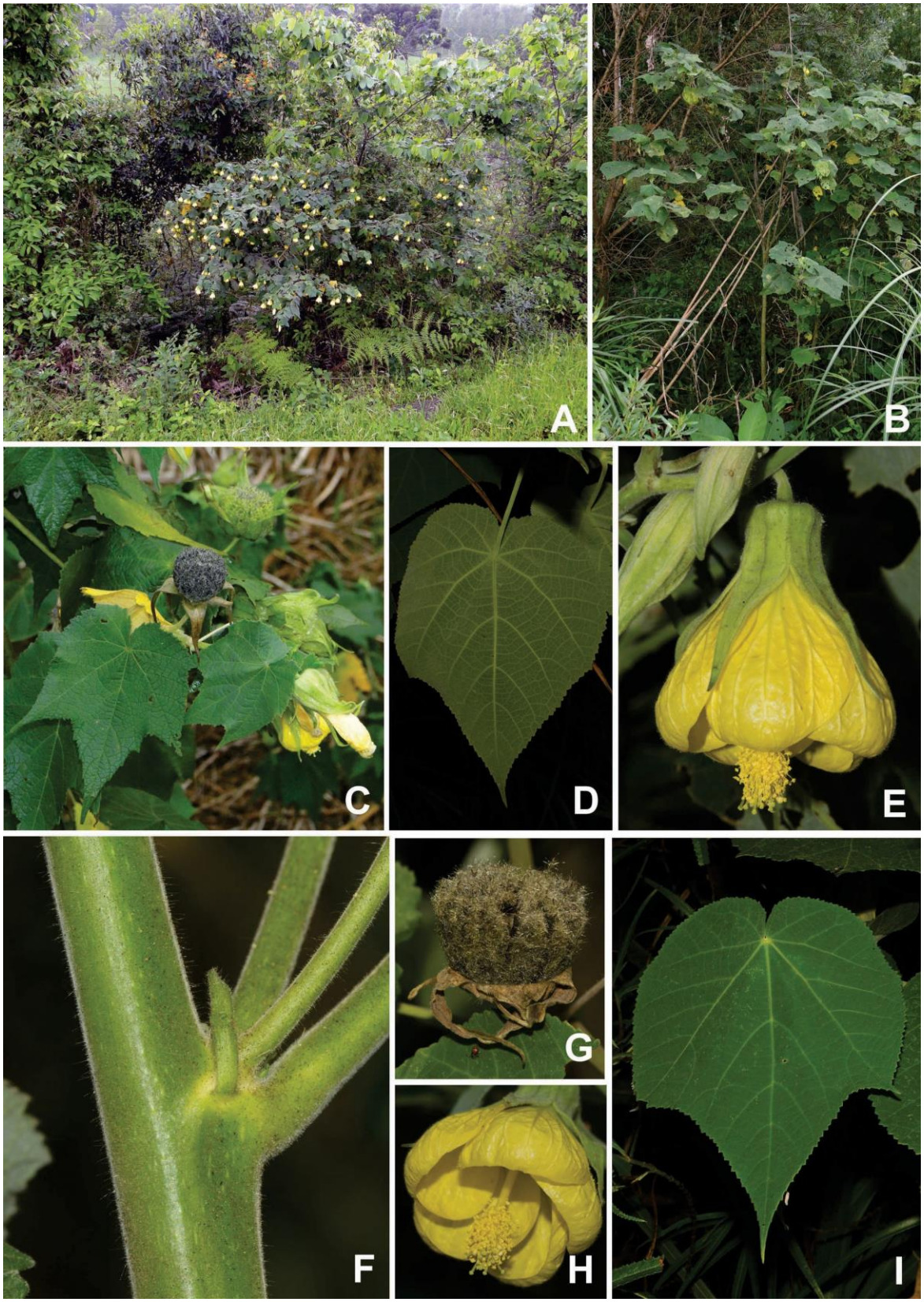

FIGURE 1. *Callianthe flava*. **A.** Habitat and habit. **B.** Habit. **C.** Branch with pendent flowers, flowers buds, and leaves. **D.** Abaxial surface of leaf. **E.** Flower. **F.** Stem and stipule showing indument. **G.** Schizocarp. **H.** Corolla and staminal tube. **I.** Adaxial surface of leaf. Photographs by Martin Grings.

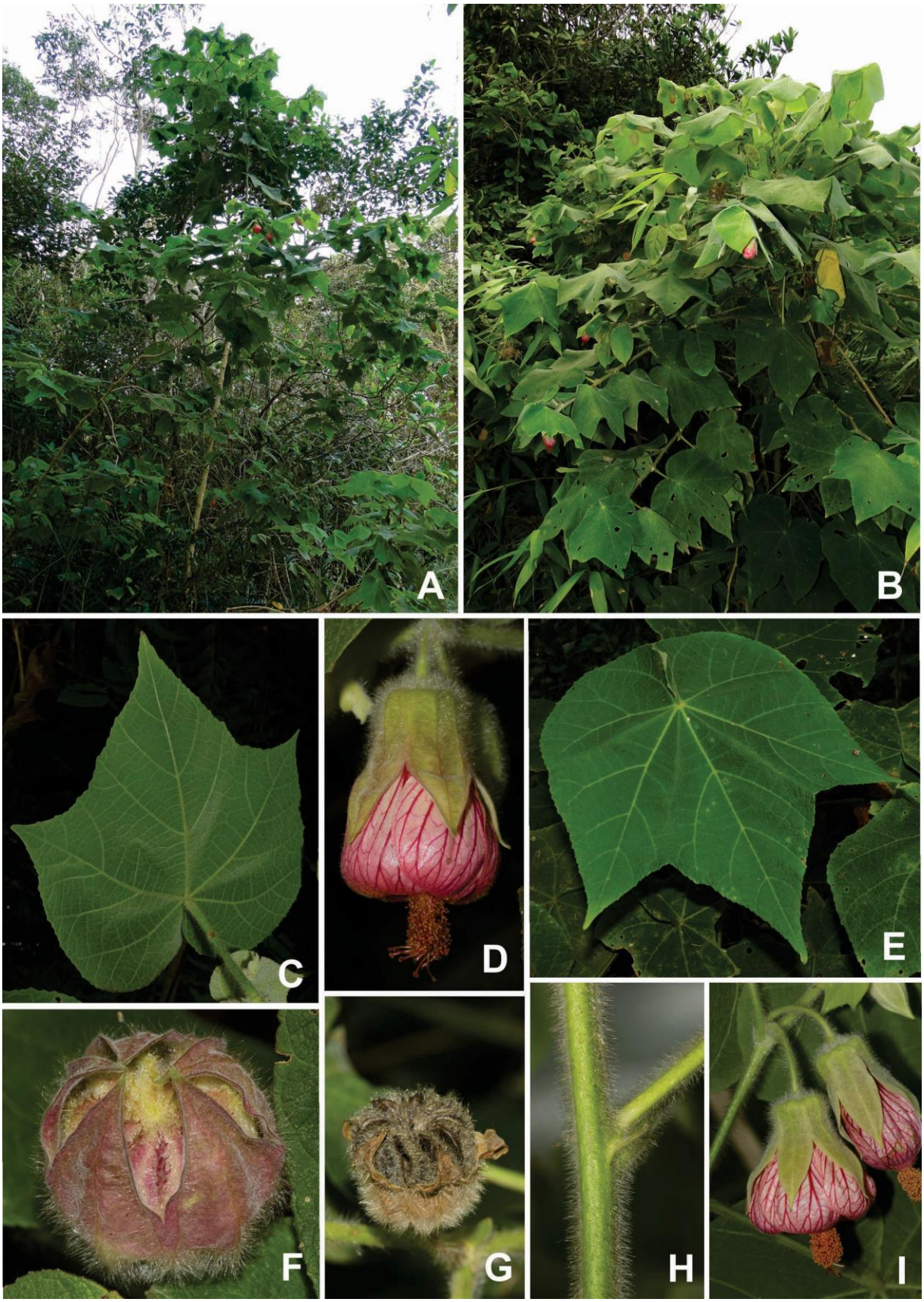

FIGURE 2. *Callianthe maritima*. **A.** Habitat and habit. **B.** Habit, note distichous lateral branches. **C.** Abaxial surface of leaf. **D.** Flower with lanuginose calyx. **E.** Adaxial surface of leaf. **F.** Immature schizocarp with accrescent calyx. **G**. Mature schizocarp. **H.** Stem and stipule with lanuginose indument. **I.** Two pendent flowers in a leaf axil. Photographs by Martin Grings.

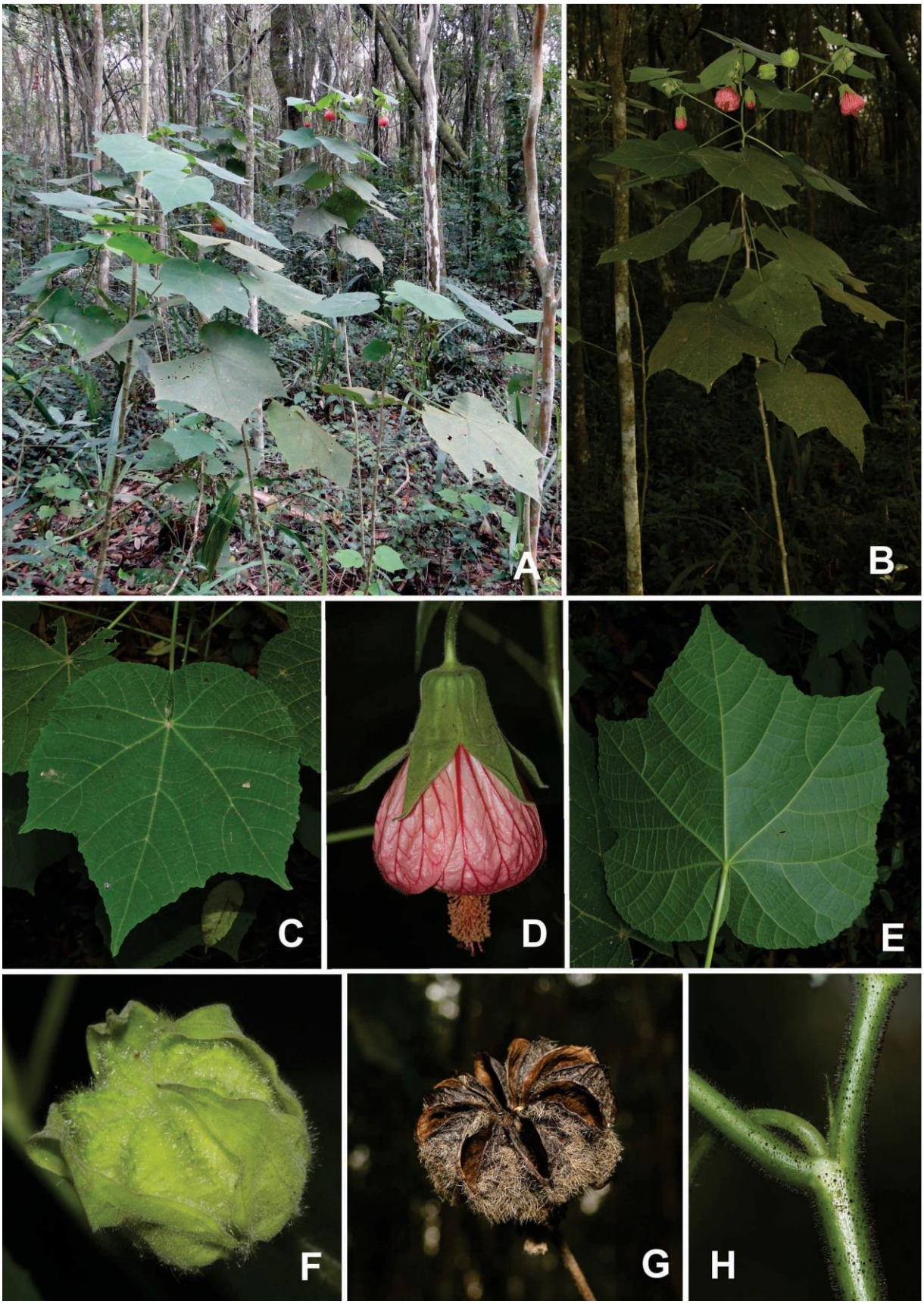

FIGURE 3. *Callianthe sulcatarinensis*. **A.** Habitat and habit. **B.** Habit; lateral branches not distichous. **C.** Adaxial surface of leaf. **D.** Flower. **E.** Abaxial surface of leaf. **F.** Immature schizocarp with accrescent calyx. **G.** Mature schizocarp. **H.** Indument of stem showing a predominance of glandular trichomes. Photographs by Martin Grings.

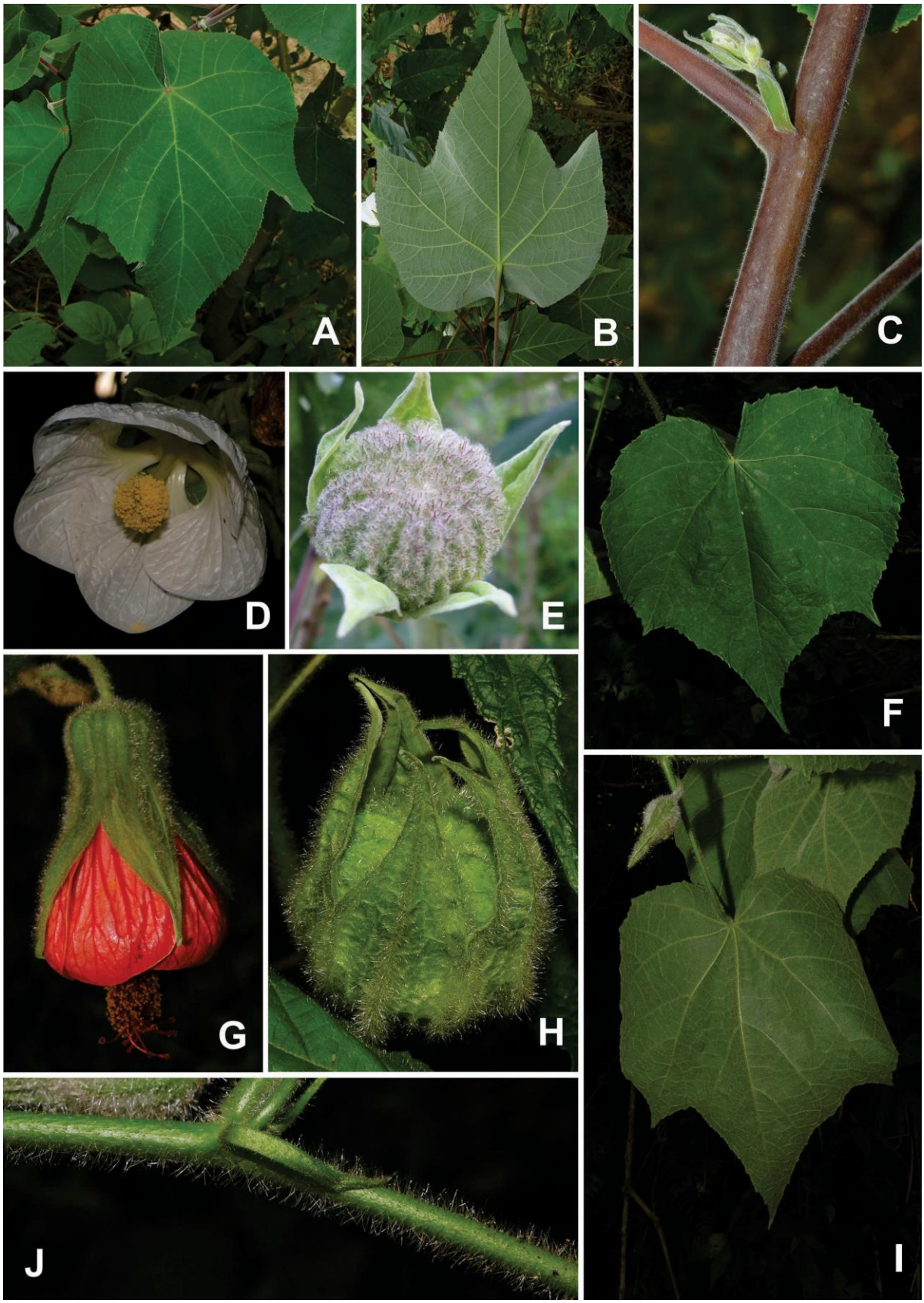

FIGURE 4. A–E. *Callianthe amoena.* **A.** Adaxial surface of leaf. **B.** Abaxial surface of leaf. **C.** Stem, showing velutinous indument. **D.** Flower with short staminal tube and spherical staminiferous portion. **E.** Densely papillate immature schizocarp with accrescent calyx. **F–I.** *Callianthe muelleri-friderici.* **F.** Adaxial surface of leaf. **G.** Flower with hirsute calyx with stellate trichomes. **H.** Immature schizocarp, with accrescent hirsute calyx, mainly on the nerves. **I.** Abaxial surface of leaf. Photographs by Martin Grings. **J.** Stem, showing hirsute indument.

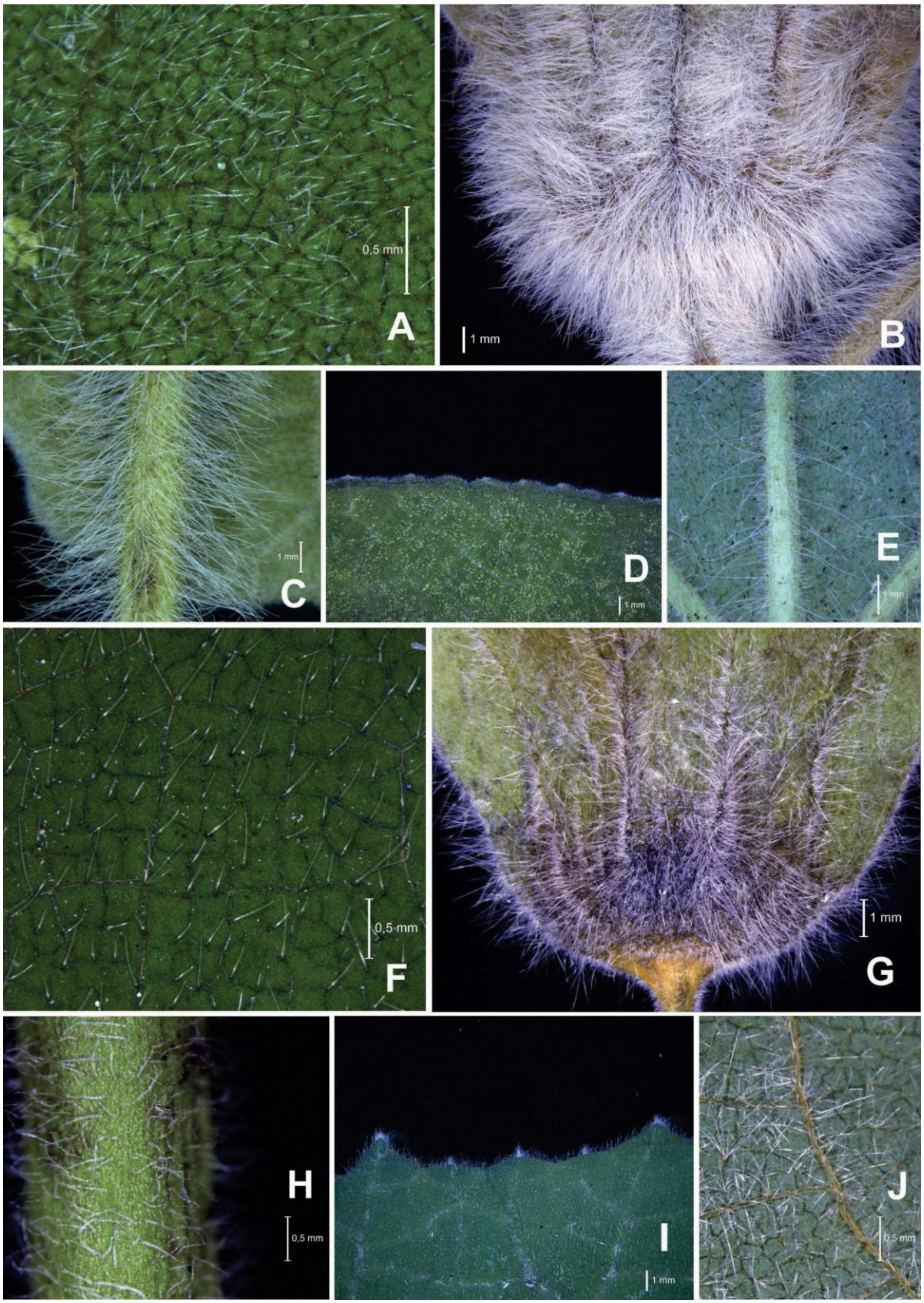

FIGURE 5. A–E. *Callianthe maritima*. **A.** Adaxial surface of leaf showing indument. **B.** Calyx base with lanuginose indument. **C.** Stem with lanuginose indument. **D.** Crenulate leaf margin. **E.** Indument on abaxial surface of leaf. **F–J.** *Callianthe sulcatarinensis*. **F.** Adaxial surface of leaf showing indument. **G.** Calyx base with tomentose indument. **H.** Stem indument. **I.** Dentate-crenate leaf margin. **J.** Abaxial surface of leaf showing indument. Photographs by Martin Grings.

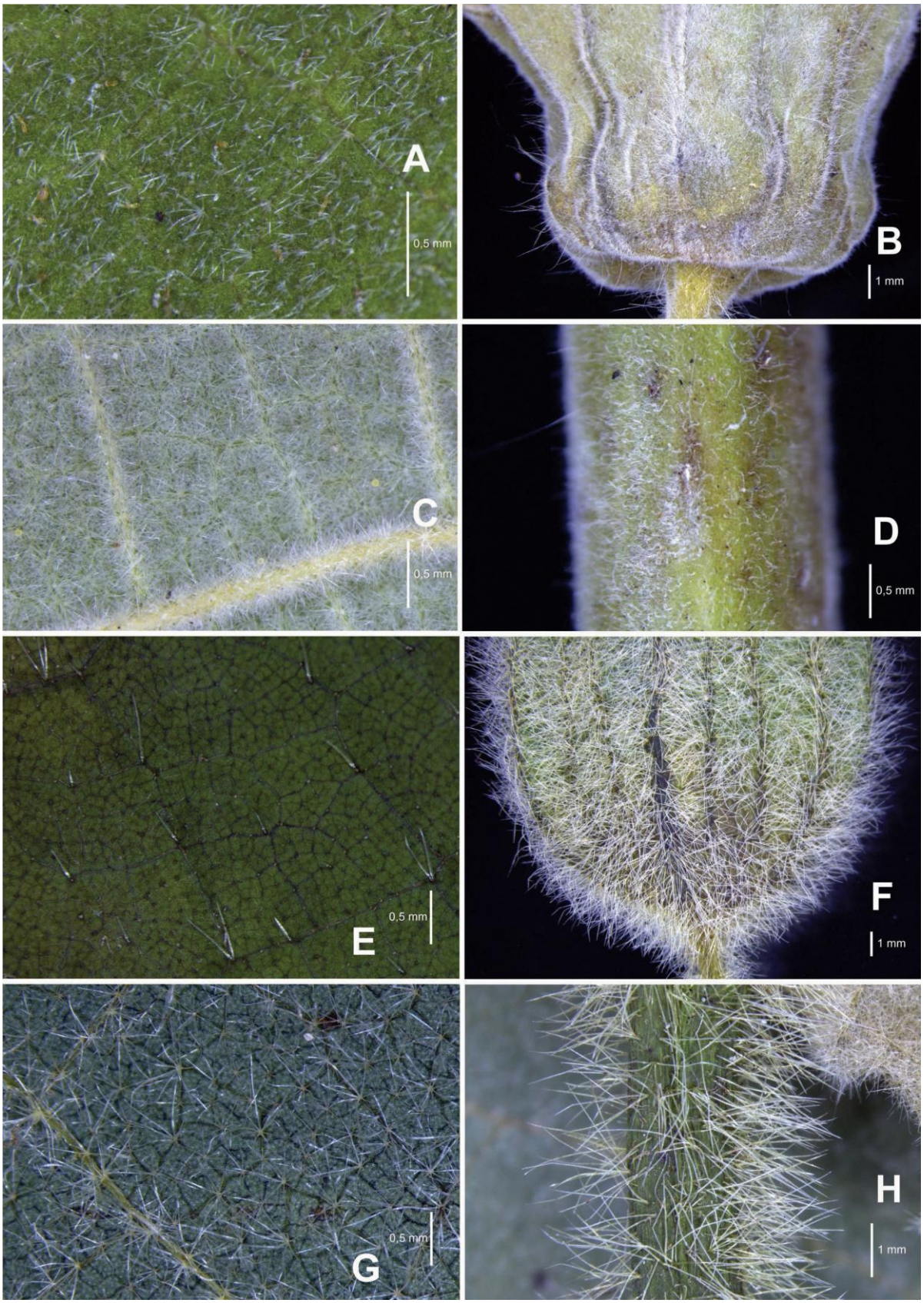

FIGURE 6. A–D. *Callianthe flava*. **A.** Adaxial surface of leaf showing indument. **B.** Calyx base with velutinous indument. **C.** Abaxial surface of leaf showing indument. **D.** Stem showing velutinous indument. **E–H.** *Callianthe muelleri-friderici*. **E.** Adaxial surface of leaf showing indument. **F.** Hirsute calyx base. **G.** Abaxial surface of leaf showing indument. **H.** Stem showing hirsute indument. Photographs by Martin Grings.

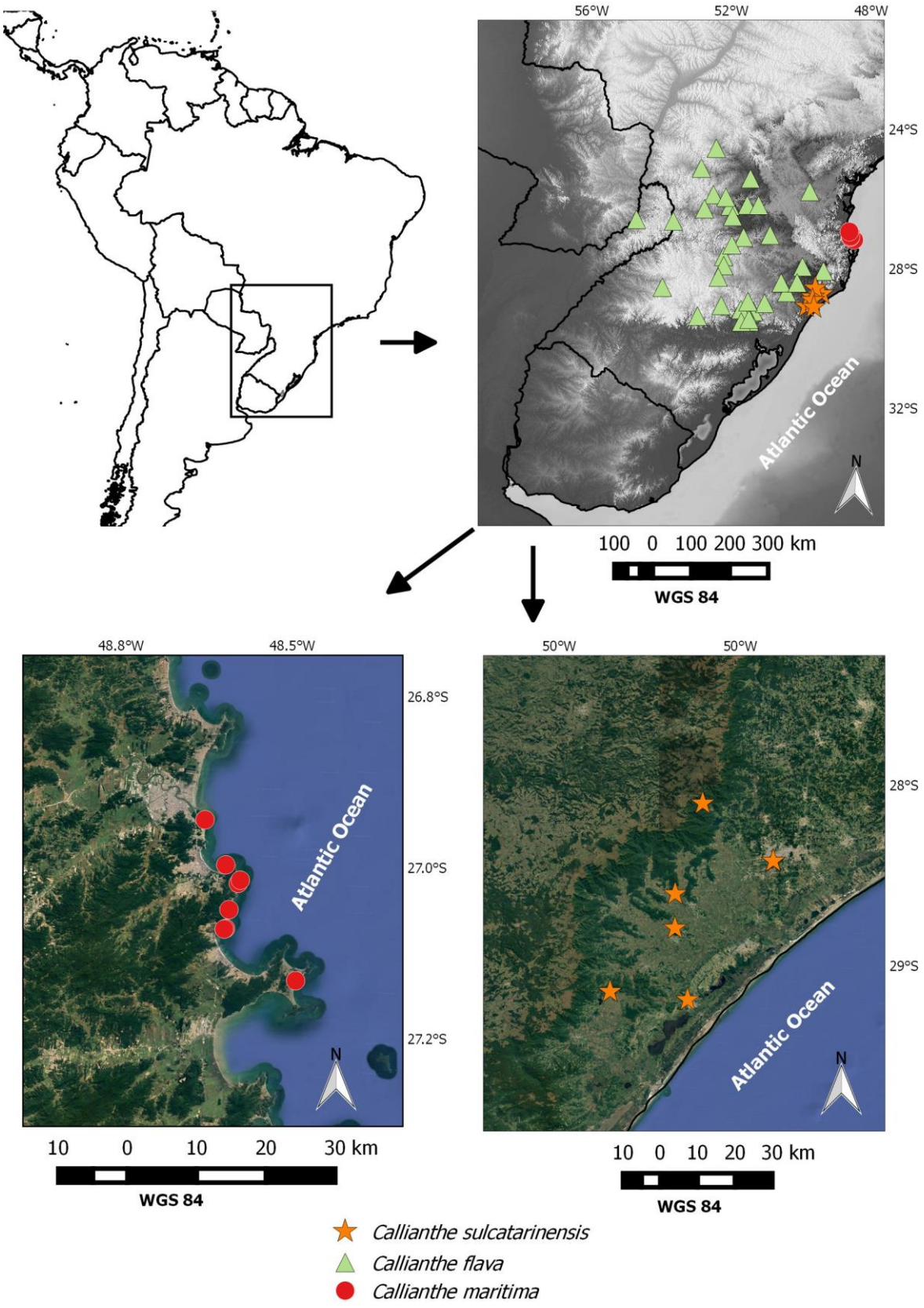

FIGURE 7. Distribution map of *Callianthe flava*, *C. martima*, and *C. sulcatarinensis* in South America.

Phenology:—Flowering the whole year and fruiting from July until January (probably the whole year).
Etymology:—The epithet refers to the yellow color of the corolla, from the Latin “flavus”.

TABLE 1. Morphological comparison of *Callianthe flava*, *C. maritima*, *C. sulcatarinensis* and two morphologically similar species. Data from field observations, and herbarium specimens.

	Callianthe amoena	*Callianthe flava*	*Callianthe maritima*	*Callianthe muelleri-friderici*	*Callianthe sulcatarinensis*
Calyx indument	Cinereous; velutinous; with dense stellate trichomes 0.2–0.3 mm long, sparse glandular trichomes 0.5 mm long and with simple trichomes 1–2 mm long scattered on the main nerves	Cinereous; velutinous; with glandular trichomes 0.3–0.6 mm long, dense stellate trichomes 0.2–0.4 mm long and sparse simple trichomes 1.5 mm long at the bases of the nerves and along margins of lobes	Cinereous; bases lanuginose, with dense simple trichomes 2–4 mm long and in lower density on the lobes, mainly on the nerves, with dense stellate trichomes 0.2–0.4 mm long and sparse glandular trichomes 0.6 mm long	Yellow; hirsute, with dense stellate trichomes, denser at the base and along main nerves, 3 mm long, [sic] 1 mm long scattered	Cinereous; bases velutinous, covered with dense simple trichomes 2 mm long and in lower density on the nerves of the lobes, with dense stellate trichomes 0.2–0.5 mm long and sparse glandular trichomes 0.6–0.8 mm long
Calyx size	2.1–3.2 cm long, bases 11–20 mm wide, lobes 1.5–2.7 × 0.8–1.3 cm	2.1–4 cm long, bases 7–11 mm wide, lobes 1.1–3.4 × 0.5–1 cm,	3.1–3.6 cm long, bases 12 mm wide, lobes 1.7–2.6 × 0.8–1.3 cm	2–4.5 cm long; lobes 1.6–2.6 × 0.7–1 cm	2.3–2.6 cm long, bases 9 mm wide, lobes 1.4–1.6 × 0.7–0.8 cm
Mericarp	2–2.1 × 0.9–1.3, dorsally strongly papillate, papillae 2–3 mm long, with dense stellate trichomes 2 mm long.	1.8–2.1 × 0.9–1.5 cm, dorsally strongly papillate, papillae 3–4 mm long, with dense stellate trichomes 2 mm long.	1.6 × 1.2 cm, dorsally without papillae or sparsely papillate with papillae 0.5–2.2 mm long, lanuginose, with dense stellate trichomes 2–3 mm long or 0.5 mm long and sparse glandular trichomes 0.6 mm long	Yellow hirsute, with stellate trichomes and some sparse glandular trichomes scattered; with sparse papillae 0.5–1.5 mm long	0.8–0.1 × 1.8–2 cm, dorsally without papillae or with sparse papillae 0.5–1 mm long, tomentose, with stellate trichomes 2–3 mm long or 0.5 mm long and sparse glandular trichomes 0.6–0.8 mm long
Habit	Shrubs to small trees up to 8 m tall	Shrubs up to 4,5 m tall	Shrubs up to 4 m tall	Shrubs up to 5 m tall	Shrubs up to 3 m tall
Adaxial surface of leaf blade	Greenish; pubescent, with sparsely stellate and glandular trichomes 0.1–0.3 mm long	Greenish; pubescent, with stellate trichomes and rarely glandular trichomes	Greenish; pubescent, with sparse stellate, bifid or simple trichomes, and rarely glandular trichomes, all erect or inclined and shorter than 0.6 mm long	Yellow; strigose, with simple or bifid appressed trichomes and some stellate trichomes, on the main nerves	Greenish; pubescent, with sparse stellate, bifid or simple trichomes, generally appressed, rarely with glandular trichomes, all shorter than 1 mm long

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TABLE 1 (Continued**)**

Callianthe amoena		*Callianthe flava*	*Callianthe maritima*	*Callianthe muelleri-friderici*	*Callianthe sulcatarinensis*
Abaxial surface of leaf blade	Cinereous; velutinous, with dense stellate trichomes 2–3 mm long	Cinereous; velutinous, with dense stellate trichomes, glandular trichomes on the main nerves and rarely with simple trichomes on the nerves	Cinereous; tomentose or velutinous, with dense stellate trichomes with branches 0.4–1 mm long, with sparse glandular trichomes and long simple trichomes on the main nerves	Yellow; tomentose with dense stellate trichomes, more frequent/denser on the main nerves	Cinereous; tomentose, with dense stellate trichomes with branches 0.5–1.5 mm long
Indument of petioles, peduncles, and stems	Velutinous; with dense stellate trichomes 0.2–0.3 mm long, sparse glandular trichomes 0.5 mm long and with simple trichomes 1–2 mm long scattered	Velutinous; with sparse simple trichomes 1.5–2 mm long, glandular trichomes 0.3–0.6 mm long and dense stellate trichomes 0.2–0.4 mm long	Lanuginose; with dense simple trichomes 2–4 mm long, sparse glandular trichomes 0.6–1 mm long, and rarely stellate trichomes 0.3–0.5 mm long	Yellow; hirsute, with dense stellate trichomes 2–3 mm long, others 1 mm long scattered or forming lines, and some glandular trichomes 1 mm long scattered	Pubescent; covered with glandular trichomes 0.5–0.8 mm long, sparse stellate trichomes 0.3–0.6 mm and rarely with long simple trichomes 1.5–2.2 mm long
Corolla	White, rarely yellow; petals 2.9–4.2 × 4–4.8 cm	Yellow; petals 2.6–4.5 × 1.8–4.1 cm	Pink with red veins and red spot at the base internally; petals 4.1–4.4 × 2–2.6 cm	Orange or orange-salmon; petals 3.2–5.6 × 2–2.9 cm	Pink with red veins and red spot at the base; petals 3.9 × 3.2 cm
Staminal tube	2.3–3 cm long, white	3.1–4.6 cm long, yellow	5.1–5.2 cm long, yellow to red	4.7–5.8 cm long, orange	4.3–5 cm long, pink-orange
Staminiferous portion of staminal tube	Spherical to oblate; 1–1.4 × 0.9–1.5 cm, 0.5–1.6 cm inserted in the corolla, with styles	Oblong; 1–1.5 × 0.6–1 cm, 0.1–1.5 cm exserted beyond the corolla with styles	Oblong; 1.2–1.4 × 0.8–0.9 cm, 1.1–1.5 cm exserted beyond the corolla, with styles	Oblong; 0.7–0.8 × 0.9–1.2 cm, 0.6–1.3 cm exserted beyond the corolla, with styles, rarely equal to the corolla	Oblong, 1.1–1.4 × 0.8–0.9 cm, 0.3–1.4 cm exserted beyond the corolla, with styles

Additional specimens examined (paratypes):—ARGENTINA. Misiones: Monte Carlo, 03 January 1968, *A. Krapovickas & C.L. Cristóbal s.n.* (CTES 13683, MBM!, UPCB!); San Pedro, 01 October 1973, *J.M. González* 28 (CTES, LPB!). BRAZIL. Paraná: Bituruna, Rio Jangada, 17 October 1966, *G. hatschbach 14961* (MBM!); Chopinzinho, Reserva Indígena, 12 August 1971, *G. hatschbach & O. Guimarães 26910* (MBM!); Coronel Domingos Soares, 1043 m, UTM 22J 396135 7102570, 26 June 2019, *M.e. engels 7073 & B.h.G. Carvalho* (MBM, RB, HCF, ICN!); Guaraniaçu, Rod. BR-277, 11 June 1989, *A.C. Cervi 2725 et al.* (MBM!, UPCB!); ibidem, Flor da Serra, 25 October 1975, *G. hatschbach 37349* (MBM!); Guarapuava, September 1951, *A. Frenzel* s.n. (MBM 075216!); ibidem, Rio Jordão, 30 October 1986, *J.M. Silva 243 & P. Ravenna* (MBM!); Honório Serpa, rio Chopim, 736 m, 26º15'58"S 52º24'42"W, 28 April 2020, *M.e. engels 8188 & J. Ripka* (MBM, ICN!); Lapa, Rodovia 476, direção São Mateus do Sul-PR, km 201, 25º46'25"S 49º45'32"W, 1º October 2016 *P. Fiaschi 4666 et al.* (FLOR!); Luiziana, Estação Ecológica Luiziana, 24º32'06.9"S 52º26'16"W, 615 m, 10 December 2010, *M.G. Caxambu et al.* (HCF, MBM!); Mangueirinha, 600 m, 05 February 1992, *h.R.S. Abrão & A.J. Kostin 258* (MBM!); Palmas, RVS dos Campos de Palmas, 14 November 2013, *P.M. hoffmann & e. Gurski s.n.* (EFC 11801!); ibidem, Sete Butieiros, 20 November 1972, *G. hatschbach 30760* (MBM!); Porto Vitória, BR-153, Km 510, 27 January 1985, *A. Krapovickas & C.L. Cristóbal* (CTES 39672, MBM!); Vitorino, 25 October 1969, *G. hatschbach 22677* (MBM!). Rio Grande do Sul: Augusto Pestana, 19 Ocotber 1955, *J. Pivetta 884* (PACA!); Bento Gonçalves, salida a Caxias do Sul, 05 January 1982, *A. Krapovickas & C.L. Cristóbal* (CTES 37582, MBM!, UPCB!); ibidem, 24 September 2019, *e. Valduga 910* (ICN!); Bom Jesus, 16 January 1942, *B. Rambo s.n.* (PACA 9020!); ibidem, Fazenda Caraúna, 06 May 1984, *S. Miotto 947* (ICN!); ibidem, 29 September 2009, *M. Molz s.n.* (ICN 163726!); Erechim, 780 m, 02 September 1993, *A. Butzke et al.* (HUCS 11053!, MBM!); Farroupilha, 12 November 1957, *O.R. Camargo 2512* (PACA!); Garibaldi, 29 October 1957, *O.R. Camargo 2311* (PACA!); Getúlio Vargas, Comunidade Souza Ramos, 25 September 2018, *C.S. Bottin s.n.* (RSPF 14477!); Monte Belo do Sul, Linha 80 da Leopoldina, 470 m, 04 July 2015, *F. Gonzatti 1964* (FURB!, HUCS!); ibidem, Monte Belo do Sul, Linha 80 Leopoldina, 394 m, 29º09'49" S 51º09'10" W, 22 September 2019, *F. Gonzatti 5111* (HUCS!, ICN!); Montenegro, Pinhal, 500 m, 13 March 1950, *A. Sehnem s.n.* (PACA 84701!); ibidem, Linha Campestre, 400 m, 02 October 1950, *A. Sehnem s.n.* (PACA 84702!); ibidem, Linha Júlio de Castilhos, 08 December 1949, *A. Sehnem s.n.* (PACA 84743!); Passo Fundo, Campus I UPF, 29 September 2018, *C.R. Buzatto s.n.* (RSPF 14557!, 14558!, 14559!); Paverama, Linha Brasil, 146 m, 29º31'05"S 51º43º23ºW, 29 October 2013, *A. Knob & S. Bordignon 7503* (UNILSALLE!); Salvador do Sul, Kappesberg, 21 December, 1935 *B. Rambo s.n.* (PACA 2292!); ibidem, ibidem, 25 September 1945, *A. Bruxel s.n.* (PACA 29707!); ibidem, ibidem, 10 Ocotober 1945, *e. Friderichs s.n.* (PACA 32920!); ibidem, ibidem, 27 November 1946, *e. henz s.n.* (PACA 35758!); ibidem, ibidem, 11 September 1949, *B. Rambo s.n.* (PACA 43391!); ibidem, 1º October 1945, *A. Sehnem s.n.* (PACA 84700!); Santa Tereza, 700 m, 14 September 2009, *e. Pasini 283* (HUCS!); São José do Herval, margem da BR-386, 18 October 2011, *M. Grings* & *G.D.S. Seger 1519* (ICN!); ibidem, na margem da BR-386, 686 m, WGS 84 29°02'31.3"S 052°17'52.2"W, 19 September 2018, *M. Grings* & *S.A.L. Bordignon 1923* (ICN!); São Leopoldo, 20 November 1946, *e. henz s.n.* (PACA 35705!); São Marcos, BR-116, 780 m, 03 September 1998, *A. Kegler 39* (HUCS!); Segredo, Serrinha Velha, estrada de acesso para Lagoão-RS, 02 November 2019, *J. Schaefer, G.F. Schaefer, J.F. Schaefer 905* (ICN!); Vacaria, Rod. BR-116, descida ao rio Pelotas, 750 m, 21 Ocotober, 2004, *G. hatschbach et al. 78336* (MBM!); ibidem, próximo do local da barragem Pai-Querê, 26 July 2009, *G.D.S. Seger & J. Durigon s.n.* (ICN 162986!); Veranópolis, 05 December 2000, *A. Knob & S. Bordignon 6616* (UNILASALLE!). Santa Catarina: Catanduvas, 900 m, 25 August 1964, *R.M. Klein 5462* (HBR!); Concórdia, Tamanduá, 16 September 1994, *G. hatschbach & J.M.Silva 61055* (FLOR!, MBM!); Fraiburgo, 1094 m, 27º S 50º56'24" W, 18 April 2019, *A. Kassner-Filho, 5136 & et al.* (FURB!); ibidem, salida para la gruta, 21 January 1992, *A. Krapovickas & C.L. Cristóbal s.n.* (CTES 43961, MBM!); Grão Pará, Serra do Corvo Branco, 1150 m, 28º03'38"S 49º21'47"W, 14 June 2014, *e. Barboza 4100 et al.* (MBM!, ICN!, FLOR!, HUCS!); ibidem, ibidem, 1177 m, 28º03'24"S 49º21'57"W, 13 December 2015, *C. Vogel ely et al. 449* (ICN!); ibidem, ibidem, 1100, 28º03'19.17" S 49º22'03.51" W, 01 October 2014, *L.A. Funez 3470* (FURB!); Painel, SC-438, 10 Km S de Painel, 23 December 1982, *A. Krapovickas & A. Schinini s.n.* (CTES 38261, MBM!); ibidem, 31 km S de Lages, camino a São Joaquim, 17 January 1988, *A. Krapovickas & C.L. Cristóbal s.n.* (CTES 42109, MBM!); Paraíso, 700 m, 03 January 1964, *R. Reitz & R.M. Klein 16982* (HBR!); São Joaquim, 8 km northeast of São Joaquim on the road to Cruzeiro, 1100–1200 m, 17 January 1957, *L.B. Smith & R. Reitz 10278* (HBR!); ibidem, São Sebastião do Arvoredo, 1050 m, 28º23'31"S 50º07'19"W, 11 June 2014, *J. Cordeiro 5189 et al.* (MBM!, HUCS!); ibidem, 10 km S de Encrucilhada, rio Pelotas, 26 December 1982, *A. Krapovickas & A. Schinini s.n.* (CTES 38326, MBM!); ibidem, 1317 m, WGS 84 28.21389ºS 049.98666ºW, 11 November 2019, *M. Grings* 2082 (ICN!); ibidem, 1455 m, WGS 84 28.22759ºS 049.86405ºW, 11 November 2019, *M. Grings 2083* (ICN!); Urubici, 1300 m, WGS 84 28°12'48"S,

49°59’11”W, 03 September 2019, *e. Barboza 5010* (MBM!); Videira, 954 m, UTM 497110 S 7013394 O, 18 January 2008, *S. Dreveck, M. Verdi & M.B. Godoy 175* (FURB!).

Specimens of *Callianthe amoena* examined:—BRAZIL. Rio Grande do Sul: Cambará do Sul, ponte sobre rio Camisa, 18 September 1981, *O. Bueno 3054* (HAS!); Caxias do Sul, São Virgílio, 11 August 1974, *M.C. Sidia & M.L. Porto 68* (HAS!); Derrubadas, Parque Estadual do Turvo, 08 July 1975, *J. Waechter 98* (HAS!); Dois Irmãos, direção Santa Maria do Herval, s.d., *A. nilson s.n.* (HAS 80822!); Farroupilha, Parque dos Pinheiros, 05 September 1978, *O. Bueno et al. 1042* (HAS!); Gramado, beira da RS-235, próximo da entrada do condomínio Aspen Mountain, 830 m, 10 August 2019, *M. Grings 2043* (ICN! HUCS!); Nova Petrópolis, Linha Imperial, na RS-235, próximo da entrada para o CTG e da entrada para o Morro do Properti (Morro dos Luedtke), 690 m, WGS 84 29°21’50.39”S 51° 3’51.49”W, 09 August 2019, *M. Grings 2041* (ICN!, HUCS!); ibidem, RS-235, entre a entrada do CTG e a entrada do Pinhal Alto, 670 m, 10 August 2019, *M. Grings 2044* (ICN! PACA!); São Francisco de Paula, Linha São Paulo, 830 m, 15 July 2001, *R. Wasum 1110* (HUCS!).

Callianthe maritima Grings, *sp. nov.* (Figs. 2, 5)

TYPE:—BRAZIL. Santa Catarina: Balneário Camboriú, Praia do Pinho, 19 m, WGS 84 27.01796º S 048.57618º W, 13 September 2019, *M. Grings 2074* (holotype ICN!, isotypes CTES!, K!, MO!, RB!).

Species morphologically similar to *Callianthe muelleri-friderici* but can be distinguished by the cinereous indument (vs. yellow indument), the absence of long stellate trichomes and by stems, peduncles and petioles lanuginose (vs. hirsute) with the predominant presence of long simple trichomes, by calyx lanuginose with the presence of long simple trichomes and with stellate trichomes shorter, by lateral branches with distichous leaves, adaxial surface of leaves without appressed simple or bifid trichomes, at most inclined, abaxial surface of leaves with long simple trichomes on the main nerves, margin of leaves entire or crenulate, and median lobe of leaves never longer than wide.

Shrubs up to 4 m tall; stems lanuginose, covered with dense simple trichomes 2–4 mm long, with sparse glandular trichomes 0.6–1 mm long, and rarely with stellate trichomes 0.3–0.5 mm long, lateral branches with distichous leaves. Stipules 0.7–0.8 × 0.08–0.11 cm, narrowly elliptic or linear, with sparse stellate trichomes 0.2 mm long, glandular trichomes 0.2 mm long and with simple trichomes 2 mm long on the main nerve. Petioles 2.5–10.6 cm long, indument similar to that of the stems. Leaf blades 13–24.4 × 10.1–22.7 cm, widely depressed, 3–lobed or inconspicuosly 3-lobed, median lobe triangular 3–8 × 4.5–9 cm long, basally cordate, 7–nerved, entire or crenulate, apex acute, adaxial surface pubescent, with sparse stellate, bifid or simple trichomes, and rarely glandular trichomes, all erect or inclined and less than 0.6 mm long, abaxial surface cinereous, tomentose or velutinous, with dense stellate trichomes with branches 0.4–1 mm long, with sparse glandular trichomes and long simple trichomes on the main nerves. Flowers two in the leaf axils, pendent, peduncles 1.8–4.5 cm long, indument similar to that of the stems; calyx 3.1–3.6 cm long, bases 12 mm wide, with five narrowly triangular lobes 1.7–2.6 × 0.8–1.3 cm, bases lanuginose, covered with dense simple trichomes 2–4 mm long and in lower density on the lobes, mainly on the nerves, with dense stellate trichomes 0.2–0.4 mm long and sparse glandular trichomes 0.6 mm long; corolla with 5 petals, pink with red veins and red spot at the base internally, 4.1–4.4 × 2–2.6 cm, claw 7 × 3.5 mm; staminal tube, including the staminiferous portion, 5.1–5.2 cm long, yellow to red, staminiferous portion oblong, 1.2–1.4 × 0.8–0.9 cm, filaments numerous, styles 11–12, staminal tube and styles exserted 1.1–1.5 cm beyond the corolla; carpels unilocular and 8–10–ovulate. Fruit schizocarpic, 1.7–2.4 × 2.4–3 cm, depressed-globose, partially enclosed by the accrescent calyx; mericarps 10–12, dehiscent, 1.6 × 1.2 cm, dorsally without papillae or sparsely papillate with papillae 0.5–2.2 mm long, externally slightly striate, lanuginose, with dense stellate trichomes 2–3 mm long or 0.5 mm long and sparse glandular trichomes 0.6 mm long, internally with sparse glandular trichomes 0.6 mm long. Seeds 2.8–2.9 × 2.8–3 mm pubescent, with simple or bifid trichomes 0.3 mm long, reniform.

Notes:—*Callianthe maritima* can be distinguished from *C. muelleri-friderici* (Fig. 4, 6) and from *C. flava* by floral, indument, fruit, and habit characters that are presented in the diagnosis (above) and in Table 1.

Habitat, distribution:—*Callianthe maritima* grows in forest understory and along forest edges in the Atlantic Forest Biome (IBGE 2004) on slopes of hills near the sea formed by crystalline rocks (Fig. 7). The species occurs at elevations ranging from 10 to 60 m. The Extent of Ocurrence (EOO) of the species corresponds to 83 km² and the Area of Ocupancy (AOO) corresponds to 28 km². According to IUCN (2017) criteria, the species may be considered critically endangered (CR) because its EOO is less than 100 km². However we consider the species endangered (EN) because its AOO is less than 500 km², the number of locations where it occurs is five and we observed a continuing decline in the quality of habitat due to the growing urbanization close to the beaches (IUCN criteria B2ab).

Phenology:—Flowering and fruiting from September until May.
Etymology:—The epithet is derived from "maritimus", the Latin word for sea, which is a reference to the distribution of the species in the coastal region of Santa Catarina state.
Additional specimens examined (paratypes):—BRAZIL. Santa Catarina: Balneário Camboriú, Praia das Laranjeiras, WGS 84 26.99551ºS 048.59744ºW, 13 September 2019, *M. Grings 2075* (ICN!); ibidem, Estaleirinho, 12 m, WGS 84 27.0225ºS 48.5791667W, 31 October 2017, *L.A. Funez 6662* (FURB!); ibidem, Estrada Interpraias, 49 m, 26º59'45"S 48º35'48"W, 11 January 2020, *M.e. engels 8191 et al.* (MBM, RB, HCF, UPCB, ICN!); Bombinhas, 22 December 2019, *S. Lubow* s.n. (MBM 425874!); Itapema, trilha para Praia Grossa a partir do Canto da Praia, 20 m, WGS 84 S 27.088549° W 048.597771°, 08 September 2019, *M. Grings 2068* (ICN!); ibidem, ibidem, 29 July 2019, *A.S. Mello & J. Carvalho 1436* (ICN!); ibidem, Praia Grossa, 20 m, 26 July 2009, *A.S. Mello et al. 410* (FLOR!); ibidem, Canto da Praia, 60 m, WGS 84 27.0894444 S -48.5997222 W, 03 May 2010, *A. Stival-Santos et al. 2680* (FURB!); ibidem, Ilhota, 25 February 1988, *O. Bueno 5306* (HAS!); Itajaí: Cabeçudas, 10 m, 19 November 1961, *R.M. Klein 2801* (HBR!).

Callianthe sulcatarinensis Grings, *sp. nov.* (Figs. 3, 5)

TYPE:—BRAZIL. Santa Catarina: Criciúma, Bairro Universitário, 39 m, WGS 84 28.70998ºS 049.40914ºW, 08 September 2019, *M. Grings 2067* (holotype ICN!, isotypes CTES!, FLOR!, K!, NY!, RB!).

Species morphologically similar to *Callianthe muelleri-friderici* and to *C. maritima* but can be distinguished by the abscence of lateral branches with distichous leaves, by calyx bases velutinous (vs. hirsute or lanuginose) with simple trichomes smaller and in lower density, by the abscence of simple trichomes on the abaxial surface of leaves, by stems, petioles and peduncles not hirsute and with the predominance of glandular trichomes and with stellate trichomes smaller and sparser, by margin of leaves dentate-crenate.
Shrubs up to 3 m tall; stems pubescent, covered with glandular trichomes 0.5–0.8 mm long, with sparse stellate trichomes 0.3–0.6 mm long and rarely with long simple trichomes 1.5–2.2 mm long. Stipules 0.7 × 0.11 cm, linear-triangular, with dense stellate trichomes 0.3–0.6 mm long, sparse glandular trichomes 0.6 mm long and with sparse simple trichomes 1 mm long. Petioles 4.2–10.5 cm long, indument similar to that of the stems. Leaf blades 7.4–23 × 9.6–20 cm, widely depressed, 3–lobed or inconspicuosly 3-lobed, median lobe triangular 3.9–4.3 × 6.1–6.7 cm long, basally cordate, 7–9–nerved, dentate-crenate, apex acute, adaxial surface pubescent, with sparse stellate, bifid or simple trichomes, generally appressed, rarely with glandular trichomes, all smaller than 1 mm long, abaxial surface slightly cinereous, tomentose, with dense stellate trichomes with branches 0.5–1.5 mm long. Flowers solitary or two in the leaf axils, pendent, peduncles 6–6.5 cm long, indument similar to that of the stems; calyx 2.3–2.6 cm long, bases 9 mm wide, with 5 narrowly triangular lobes 1.4–1.6 × 0.7–0.8 cm, bases velutinous, covered with dense simple trichomes up to 2 mm long and in lower density on the nerves of the lobes, with dense stellate trichomes 0.2–0.5 mm long and sparse glandular trichomes 0.6–0.8 mm long; corolla with 5 petals, pink with red veins and a red spot at the base internally, 3.9 × 3.2 cm, claw 7–8 × 3.5 mm; staminal tube, including the staminiferous portion, 4.3–5 cm long, pink-orange, staminiferous portion oblong, 1.1–1.4 × 0.8–0.9 cm, filaments numerous, styles 9–12, staminal tube and styles exserted 0.3–1.4 cm beyond the corolla; carpels unilocular and 5–9–ovulate. Fruit schizocarpic, 2–2.2 × 2–2.6 cm, depressed-globose, partially enclosed by the accrescent calyx; mericarps 9–10, dehiscent, 0.8–0.1 × 1.8–2 cm, dorsally without papillae or with sparse papillae 0.5–1 mm long, externally slightly striate, tomentose, with stellate trichomes 2–3 mm long or 0.5 mm long and sparse glandular trichomes 0.6–0.8 mm long, internally with sparse glandular trichomes 0.6–0.8 mm long. Seeds 1.8–2.5 × 2.1–3.1 mm, pubescent, with simple or bifid trichomes 0.3 mm long, reniform.
Notes:—*Callianthe sulcatarinensis* can be distinguished from *C. muelleri-friderici* (Figs. 4, 6), from *C. flava* and from *C. maritima* by floral, indument, fruit and habit characters that are presented in the diagnosis (above) and in Table 1.
Habitat, distribution:—*Callianthe sulcatarinensis* grows in forest understory and at/along forest edges in the Atlantic Forest Biome (IBGE 2004), along lowlands and the slopes of small hills formed by Cenozoic sediments, in the south of the Brazilian state of Santa Catarina (Fig. 7). The species grows at elevations ranging from 39 to 314 m. The Extent of Ocurrence (EOO) of the species corresponds to 935 km² and the Area of Ocupancy (AOO) corresponds to 28 km². According to IUCN (2017) criteria B2ab, we considered the species Vulnerable (VU) with this EOO and AOO, besides the number of locations where it occurs is six. We also observed a continuing decline in the quality of habitat due to the growing urbanization, agriculture, mining, that is, the devastation of its habitat.

Phenology:—Flowers and fruits were collected from June to September and November.
Etymology:—The specific epithet refers to the distribution of the species, in the southern ("sul" in Portuguese) part of Santa Catarina state, Brazil.
Additional specimens examined (paratypes):—BRAZIL. Santa Catarina: Criciúma, Bairro Universitário (próximo a Unesc), 28.709167°S 49.409167°W, 03 November 2009, *M. Verdi et al. 2898* (FURB!, RB); Jacinto Machado, Tenente, 80 m, WGS 84 29.07S 49.86W, *M. Verdi et al. 2677* (FURB!, RB); Morro Grande, Rio Morto, 60 m, 28.799722°S 49.680000°W, 20 October 2019, *M. Verdi et al. 2853* (FURB!, RB); Siderópolis, Reserva Biológica Estadual do Aguaí, 314 m, 28.549444°S 49.603889°W, 15 June 2009, *M. Verdi et al. 2350* (FURB!, RB); Sombrio, 10 m, 19 September 1945, *R. Reitz 1232* (HBR!); Turvo, São Peregrino, 270 m, 28.894444°S 49.680556°W, 16 October 2009, *M. Verdi et al. 2775* (FURB!, RB).
Specimens of *Callianthe muelleri-friderici* examined:—BRAZIL. Paraná: Tijucas do Sul, Represa de Vossoroca, 29 September 1990, *M.F. Becker 2* (MBM!). Santa Catarina: Blumenau, Morro do Cachorro, 330–775 m, 26º46'24" S 49º02'13" W, 11 September 2017, *L.A. Funez et al. 6538* (FURB!); ibidem, ibidem, 300 m, WGS 84 26.77070º S 049.04014º W, 09 September 2019, *M. Grings & L. Funez 2070* (ICN!, FLOR!); ibidem, ibidem, 200 m, WGS 84 26.76665º W 049.04179º, 09 September 2019, *M. Grings & L. Funez 2071* (ICN!, FLOR! RB!); Ilhota, Parque Botânico do Morro do Baú, 300m, 31 Ocotober 1987, *D. Falkenberg 4517* (FLOR!); ibidem, 450 m, 31 Ocotober 1986, *D. Falkenberg 3554* (FLOR!); Indaial, Warnow Alto, entorno do Parque Nacional da Serra do Itajaí, 179 m, 27º01'21" S 49º13'50" W, *L.A. Funez & A.e. Zermiani 3029* (FURB!); Monte Castelo, Serra da Garganta, 1195 m, 26º49'03.00" S 50º13'24.00" W, 17 September 2010, *A. Korte & A. Kniess 4440* (FURB!, RB); Papanduva, 682 m, UTM 22 J 578345 S 7042714 W, *A.L. de Gasper et al. 1839* (FURB!); Rio dos Cedros, Cachoeira Formosa, 04 February 2018, *L. Funez 7055* (FURB!); Vitor Meireles, Serra da Abelha, 575 m, 26º53'47" S 49º52"21" W, 11 May 2017, *L.A. Funez et al.* 6265 (FURB!, RB).

New combination

Callianthe costicalyx (K. Schumann ex Takeuchi & G.L. Esteves) Grings, *comb. nov.*

Basionym:—*Abutilon costicalyx* K. Schumann ex Takeuchi & G.L. Esteves, *Phytotaxa* 44: 53 (2012). Type:—BRAZIL. São Paulo: Apiaí, 6 June 2010, *C. takeuchi & t. takeuchi 76* (holotype SP!, isotype MAC!)

Abutilon costicalyx K. Schumann ex Takeuchi & G.L. Esteves (Takeuchi & Esteves 2012) has 6–7 seeds per mericarp, petals with deeply impressed veins, shrubby habit up to 4 m tall, and large flowers with petals greater than 1.5 cm long. These characters define *Callianthe*, not *Abutilon* (Donnell 2012; Takeuchi *et al.* 2014), which justifies the new combination proposed here. Takeuchi & Esteves (2012, Fig. 4A–B) illustrate this species.
Specimens examined:—BRAZIL. Paraná: Campina Grande do Sul, Ribeirão da Capoeira, 14 July 1959, *G. hatschbach & R. Lange 6152* (MBM!); ibidem, Terra Boa, 26 July 1998, *J. Carneiro 536* (MBM!); Campo Magro, Estrada do Cerne, 708 m, 25º14'26.1" S 49º35'50" W, 20 April 2008, *A.R. Silva et al. 672* (MBM!); ibidem, Caverna do Sumidouro, 23 July 1996, *A.C. Svolenski & G. tiepolo 222* (MBM!); Castro, Br Castro Carambeí, 23 July 1998, *L.R.M. Souza et al.* (MBM 239786!); Cerro Azul, Tigre, 11 July 1973, *G. hatschbach 32224* (MBM!); Pinhão, Salto Segredo, 06 May 1987, *R.M. Britez 1498* (MBM!). Santa Catarina: Ibirama, 150 m, 18 July 1956, *R. Reitz & R.M. Klein 3474* (HBR!); Itaiópolis, Colônia Becker, 680 m, -26.3363990783691 S -49.9063987731934 W, 23 November 2007, *M. Verdi et al. 37* (FURB!); Papanduva, 814 m, WGS 84 UTM 22 J 0586610 S 7082166 W, 26 October 2018, *M. Grings 1940* (ICN!); Santa Terezinha, interior, 700 m, 26º43'57"S 50º02'52"W, 11 May 2017, *L.A. Funez et al. 6243* (FURB!).

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2.6. SYNOPSIS OF *Sida* (MALVOIDEAE, MALVACEAE) IN THE STATE OF RIO GRANDE DO SUL, BRAZIL

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Synopsis of *Sida* (Malvoideae, Malvaceae) in the state of Rio Grande do Sul, Brazil

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Abstract

Sida is one of the genera with the highest species richness of Malvaceae and one of the less assessed genera in terms of taxonomy in subfamily Malvoideae. Studies on the taxonomy of the genus in Brazil are scarce. In the state of Rio Grande do Sul *Sida* is represented by 23 species. This synopsis includes a taxonomic key, illustrations, informations about habitat, maps with geographical distribution, nomenclatural and taxonomic notes, general comments on the biology, ecology and conservation status for all the species. Two names are new synonyms (*S. krapovickasii* and *S. pseudorubifolia*), seven names were lectotypified (*S. anarthra, S. cerradoensis, S. paradoxa, S. planicaulis, S. riedelii, S. rubifolia, S. viarum*), nine species are new records for the state of Rio Grande do Sul (*S. cerradoensis, S. confusa, S. cordifolia, S. glaziovii, S. lonchitis, S. nemorensis, S. ramoniana, S. reitzii, S. riedelii*). For six species, photos of them in their habitat are presented for the first time, *S. farroupilhensis, S. nemorensis, S. paradoxa, S. potentilloides, S. reitzii,* and *S. rubifolia*.

Keywords: Atlantic Forest, conservation, grasslands, nomenclature, Southern Brazil, taxonomy

Resumo

Sida é um dos gêneros com maior riqueza de espécies e um dos gêneros menos avaliados em termos de taxonomia na subfamília Malvoideae. Estudos com a taxonomia do gênero no Brasil são escassos. No Estado do Rio Grande do Sul *Sida* está representado por 23 espécies. Essa sinopse inclui uma chave, ilustrações, informações sobre habitat, mapas com distribuição geográfica, notas nomenclaturais e taxonômicas, comentários gerais sobre a biologia, ecologia e status de conservação de todas as espécies. Dois nomes são novos sinônimos (*S. krapovickasii* e *S. pseudorubifolia*), sete nomes são lectotipificados (*S. anarthra, S. cerradoensis, S. paradoxa, S. planicaulis, S. riedelii, S. rubifolia, S. viarum*), nove espécies são novos registros para o Estado do Rio Grande do Sul (*S. cerradoensis, S. confusa, S. cordifolia, S. glaziovii, S. lonchitis, S. nemorensis, S. ramoniana, S. reitzii, S. riedelii*). Para seis espécies, fotos das mesmas em seu habitat são apresentadas pela primeira vez, *S. farroupilhensis, S. nemorensis, S. paradoxa, S. potentilloides, S. reitzii* e *S. rubifolia*.

Palavras-chave: Campos, conservação, Mata Atlântica, nomenclatura, Sul do Brasil, taxonomia

Introduction

Sida Linnaeus (1753: 683) is one of the genera with the highest species richness in subfamily Malvoideae (Malvaceae s.s.) (Fuertes Aguilar 1995, Bovini 2017, Yoshikawa *et al.* 2019), with about 200 restricted to Tropical Americas or pantropically distributed (Verdcourt & Mwachala 2009, Bovini 2016, Brandão *et al.* 2017). The genus is still poorly studied, which leads to an inaccurate estimate of the geographic distribution of many species (Bovini 2016, 2017). Mericarp and calyx morphology are diagnostic characters to distinguish *Sida* from related genera. The mericarps are indurate and differentiated into two parts: a lower one-seeded, indehiscent, usually reticulate, an upper, empty, dehiscent, usually smooth, and often with a pair of aristae (one in *S. uniaristata* Gonçalez & Yoshikawa 2019: 184). The calyx is 10-costate at the base with the commissural nerves relatively more prominent and greener than the

mid-ribs of the calyx lobes, which are often yellowish (Fryxell 1978, Fuertes Aguilar 1995). The genus has twelve sections currently recognized: *Cordifoliae* (de Candolle) Fryxell (1985: 77), *Distichifoliae* Krapovickas (2003: 86), *Ellipticifoliae* Fryxell (1985: 82), *Hookerianae* Clement (1957: 77), *Malacroideae* George Don (1831: 498), *Muticae* Carl Presl (1835: 106), *Nelavagae* Borssum-Waalkes (1966: 180), *Oligandrae* Clement (1957: 64), *Pseudonapaea* Asa Gray (1849: 23), *Sidae* Linnaeus (1753: 683), *Spinosae* Small (1933: 849), and *Stenindae* Grisebach (1859: 76) (Fryxell 1985, 1988, 1997, Krapovickas 2003, Brandão *et al.* 2017, Yoshikawa *et al.* 2019). The ITS tree of phylogenetic study with *Sida* Generic Alliance clearly indicates that most sections of *Sida* are not monophyletic, but no new infrageneric classification was proposed (Fuertes Aguilar *et al.* 2003). Therefore, the sectional classification mentioned above is currently the most accepted.

Brandão *et al.* (2017) summarizes the main studies in the world and the status of studies in Brazil with the genus. The most important studies with *Sida* in Brazil were carried out by Schumann (1891) and Monteiro-Filho (1936), which recognized 34 and 54 Brazilian species respectively (Brandão *et al.* 2017). Brandão *et al.* (2017) found 24 species of the genus for Pernambuco state, Northeast of Brazil, and Bovini (2020) cites 108 species for Brazil, from which 65 are endemic.

Studies with the genus *Sida* in the state of Rio Grande do Sul are scarce. Monteiro-Filho (1942) cites the occurrence of 14 species and another 26 species that may occur. Rambo (1967) also recorded 14 species, while Bovini (2020) cites 12 species to this state. Bueno (1995) found three species in a protected area in the central region of Rio Grande do Sul.

The species of the genus are more common in anthropized areas, and some have a cosmopolitan distribution, but many are endemic to some regions (Bovini 2017).

The present work aims to present the 23 native species of the genus *Sida* in Rio Grande do Sul state, Southern Brazil, result of a survey, providing subsidies for their identification. Therefore, a key, in addition to taxonomic and nomenclatural comments, illustrations and images of species are presented. Species distribution in the different vegetation formations of the state are also presented in maps. For some species, it was necessary to perform lectotypifications.

Materials and methods

The state of Rio Grande do Sul with 281,748 km², the ninth largest of the 26 Brazilian states, is the southernmost of Brazil, and is located between the coordinates 27° and 33° S and 49° and 57° W. The state is occupied by two Brazilian biomes (phytogeographic domains), Pampa (grasslands) and Mata Atlântica (Atlantic Forest) (IBGE 2019) and in fourteen ecoregions (Hasenack *et al.*, in press).

Fieldwork expeditions (about 15) were conducted in most ecoregions of Rio Grande do Sul. All collected specimens (about 90) were deposited in ICN, HUCS and UNILASSALE*.

Herbarium collections from BLA, CTES, ECT, FLOR, FURB, HAS, HBR, HDCF, HNIM, HPBR, HRCB, HUCS, HURG, HVAT, ICN, MBM, MPUC, PACA, PEL, SMDB, RSPF, and UNILASALLE* were examined.

Digital collections, including type specimens, of C, CEN, ECT, ESA, G, HUFU, K, LD, LE, LIL, LINN, LP, MBML, MO, MPU, NY, P, RB, RBR, S, SP, TO, UC, US, VIES were also accessed (acronyms according to Thiers 2020, continuously updated). Non-indexed herbaria are marked with an asterisk. For each species, one specimen was chosen by ecoregion and presented in the item "Representative specimens", from which all materials have been examined. The mericarps of the species were photographed with a stereomicroscope Leica M165FC containing a digital camera and integrated analysis software (LAS V4.5). The morphological characteristics that define the sections of *Sida* with species occurring in Rio Grande do Sul are presented in Table 1. The morphological terminology used follows the works of Fryxell (1985, 1988) and Brandão *et al.* (2017). Some species of *Sida* occurring in Rio Grande do Sul are common to the State of Pernambuco, so some steps of the key presented by Brandão *et al.* (2017) were used in the key of the present work, being adapted.

Lectotypifications and nomenclatural decisions are in agreement with the International Code of Nomenclature for algae, fungi, and plants, Shenzhen Code, of 2018 (Turland *et al.* 2018). Lectotypifications were necessary when syntypes were present or when lectotypes were wrongly designated in previous publications. The specimens chosen as lectotypes are those collected and/or seen by the authors of the species and that present material representative of them, that is, with the highest number of diagnostic characters. The most important synonyms for Rio Grande do Sul are presented, that is, those previously used in the state.

For the geographic distribution of species in Rio Grande do Sul, the classification used is in accordance with Hasenack *et al.* (in press) and preferred habitats of the species are based on fieldwork observations and the specimens analyzed during herbaria revisions.

The conservation status of all species was evaluated following IUCN (2017) criteria and the GeoCAT tool (Bachman *et al.* 2011) was used to calculate the area of occupancy (AOO) and extent of occurrence (EOO). The conservation status analysis was based on the geographic distribution of the species observed in the reviewed herbaria, some via digital images available on Species Link (CRIA 2020).

TABLE 1. Sections of *Sida* with species occurring in Rio Grande do Sul state, and their diagnostic features, according to Fryxell (1985) and Krapovickas (2003).

	Diagnostic features
Section *Cordifoliae*	Leaf blades not rhomboid, basally cordate or subcordate, and serrate-crenate throughout. Mericarps, styles and stigma, 7 or more; the aristae, when present, with retrorse or stellate trichomes.
Section *Distichifoliae*	Stems with distichous lateral branching and leaf arrangement usually flattened; stipules subfalcate to falcate and subequal, dimorphic.
Section *Malacroideae*	Mericarps 5–7, often muricate; flowers and fruits apically congested with leaves and stipules so as to appear involucellate; leaf blades basally rounded, calyx not ribbed.
Section *Nelavagae*	Leaf blades cordate, apex acuminate; calyx lobes with dark green margins, bi-colored; five mericarps.
Section *Sidae*	Leaves more or less rhomboid, basally entire and truncate or cuneate, and distally dentate; mericarps 5–14, usually glabrous.
Section *Spinosae*	Leaf blades cordate, dentate to the base, apex acute to rounded; five mericarps, flowers in leaf axils, and calyx lobes not bi-colored, uniformly colored.
Section *Stenindae*	Leaf blades entire, narrowly linear or linear-lanceolate; flowers and fruits often aggregated into terminal umbelliform inflorescences, essentially leafless; and mericarps indehiscent.

Results

Sida Linnaeus (1753: 683). Lectotype (designated by Britton & Brown 1913: 520):—*Sida alnifolia* Linnaeus (1753: 684).

Perennial subshrubs or shrubs, erect, prostrate, decumbent or scandent, glabrous or pubescent, with simple, glandular or stellate trichomes. Leaves alternate, petiolate, stipulate, distichous or helicoidal, blades ovate, elliptic, rhombic, linear, lanceolate, suborbicular, narrowly elliptic, narrowly oblong or oblong, usually crenate-serrate or serrate (rarely entire and sometimes entire only at the base), rounded at the base, truncate, cuneate, cordate or subcordate. Solitary flowers, glomerules or umbelliform inflorescences, rarely bracteolate; flowers bisexual, 5-merous, dichlamydeous and heterochlamydeous, epicalyx absent; calyx often 10-ribbed, 10-costate at the base; corolla yellow, pink, salmon, orange, white, sometimes with a red or purple center; petals asymmetric; stamens aggregated at the apex of the staminal tube; styles 5–14. Schizocarps with 5–14 mericarps, indurate, differentiated into two parts: a lower one-seeded, indehiscent (sometimes dehiscent), usually reticulate; an upper, empty, dehiscent, usually smooth, muticous, submuticous or biaristate (rarely with one aristae); seeds solitary, glabrous.

Key to species of *Sida* from Rio Grande do Sul state (Adapted from Brandão *et al.* 2017)

1. Leaf blades entire; flowers and fruits often aggregated into terminal umbelliform inflorescences; and mericarps indehiscent .... *Sida linifolia*
- Leaf blades crenate, irregularly serrate or basally entire (or subentire, with three teeth at the apex); flowers and fruits often solitary or aggregated into glomerules; mericarps apically dehiscent (indehiscent in *S. tuberculata* var. *pseudo-rhombifolia*)..... 2

2. Stems with distichous lateral branching and leaf arrangement usually flattened; stipules subfalcate to falcate and subequal, dimorphic 3
- Stems with alternate and helicoidal leaf arrangement; stipules linear to linear-lanceolate, equally arranged, sometimes subfalcate, but not dimorphic 4
3. Mericarps 7–8, aristae 2 mm long, flowers in axillary glomerules ..... *Sida planicaulis*
- Mericarps 8–10, aristae 2–4 mm long, flowers in terminal glomerules ..... *Sida reitzii*
4. Leaf blades linear, elliptic or rhomboid, basally entire, truncate, cuneate or basally rounded, and distally serrate or serrate-crenate, or subentire, with three teeth at the apex 5
- Leaf blades cordate, lanceolate, ovate, narrowly oblong or suborbicular, basally cordate or subcordate, and serrate-crenate throughout 14
5. Mericarps often muricate; flowers and fruits apically congested with leaves and stipules so as to appear involucellate; leaf blades basally rounded, calyx not ribbed 6
- Mericarps smooth in the upper portion and reticulate in the lower portion; flowers and fruits not apically congested with leaves and stipules not so as to appear involucellate; leaf blades basally rhomboid, truncate or cuneate; calyx usually 10-ribbed 7
6. Leaf blades linear (rarely linear-lanceolate), serrate in the upper half; flowers 2 cm in diameter; fruits with 7–8 mericarps ..... *Sida anomala*
- Leaf blades cuneate-truncate, subentire, with three teeth at the apex; flowers 2.5 cm in diameter; fruits with 5 mericarps ..... *Sida paradoxa*
7. Mericarps 5; stipules persistent in the stems after the leaves fall ..... *Sida viarum*
- Mericarps 6–14; stipules not persistent in the stems after the leaves fall 8
8. Flowers in glomerules with bifid bracts ..... *Sida lonchitis*
- Flowers solitary or in glomerules without bifid bracts 9
9. Flowers in terminal or axillary glomerules; calyx base, pedicels and veins of abaxial surface of leaves with simple trichomes ..... *Sida ramoniana*
- Flowers solitary, axillary or congested in the apex of stems; calyx base, pedicels and veins of abaxial surface of leaves without simple trichomes 10
10. Mericarps 6–8; calyx with simple trichomes at the apex of lobes ..... *Sida tuberculata*
- Mericarps 9–14; calyx without simple trichomes at the apex of lobes 11
11. Yellowish foliage; aristae and apex of mericarps with yellowish stellate trichomes ..... *Sida glaziovii*
- Greenish foliage; aristae and apex of mericarps with whitish stellate trichomes 12
12. Adaxial surface of leaf blades only with small stellate trichomes; abaxial surface farinaceous with small stellate trichomes ..... *Sida rhombifolia*
- Adaxial surface of leaves with simple trichomes; abaxial surface of leaves tomentose or with sparse stellate trichomes 13
13. Leaf blades ovate-rhombic or lanceolate-rhombic; abaxial surface glabrescent, with sparse stellate trichomes and with tertiary veins forming a characteristic reticulate; mericarps aristae 1 mm long ..... *Sida farroupilhensis*
- Leaf blades narrowly elliptic, narrowly oblong or oblong; abaxial surface tomentose, with tertiary veins not forming a reticulate; mericarps aristae greater than 1 mm long ..... *Sida potentilloides*
14. Mericarps, styles and stigmas uniformly 5, the aristae, when present, with antrorse trichomes 15
- Mericarps, styles and stigmas 7 or more, the aristae, when present, with retrorse or stellate trichomes 19
15. Leaf blades ovate to lanceolate (if cordate, apex not acuminate), apex acute to rounded; calyx lobes uniformly colored 16
- Leaf blades cordate, apex acuminate; calyx lobes with dark green margins 18
16. Prostrate herbs; leaf blades suborbicular or cordate; mericarps muticous ..... *Sida confusa*
- Erect subshrubs; leaf blades broadly ovate, lanceolate or narrowly oblong, subcordate; mericarps 2-spined 17
17. Mericarps dorsal face covered only by a hyaline membrane easily breakable ..... *Sida riedelii*
- Mericarps dorsal face hard and reticulated, not easily breakable ..... *Sida spinosa*
18. Decumbent or scandent herbs; mericarps muticous or submuticous ..... *Sida urens*
- Erect subshrubs; mericarps aristate ..... *Sida nemorensis*
19. Mericarps muticous or submuticous; aristae up to 0.5 mm long 20
- Mericarps aristate; aristae greater than 0.5 mm long 21
20. Prostate or decumbent subshrubs; petals 20 mm long, yellow or pink; mericarps 4 × 2.5 mm ..... *Sida rubifolia*
- Erect subshrubs; petals 10–14 mm long, pink; mericarps 3 × 2 mm ..... *Sida regnellii*
21. Leaf blades ovate or cordiform, rarely suborbicular, with base cordate or subcordate (rarely truncate) ..... *Sida cordifolia*
- Leaf blades lanceolate or narrowly oblong with base subcordate or truncate 22
22. Petioles sulcate; leaf blades narrowly ovate, with margin undulate; calyx with trichomes 1–2 mm long; corolla orange or salmon, often with a red spot at the adaxial base of petals ..... *Sida cerradoensis*
- Petioles cylindrical; leaf blades narrowly oblong, with margin not undulate; calyx with trichomes 0.5 mm long; corolla pink (rarely light yellow), without a red spot at the abaxial base of petals ..... *Sida dubia*

Taxonomic treatment

1. ***Sida anomala*** A.Saint-Hilaire (1825: 177) (Figures 1A–F, 2, 14A). Lectotype (designated by Rodrigo 1944: t. 2):—URUGUAY. Paisandú, "près le village de Sando", *A. St.-Hilaire C2/2470* (P barcode 02285362! [digital image]; isolectotypes P barcode 02285364! [digital image], P barcode 02285363! [digital image]).

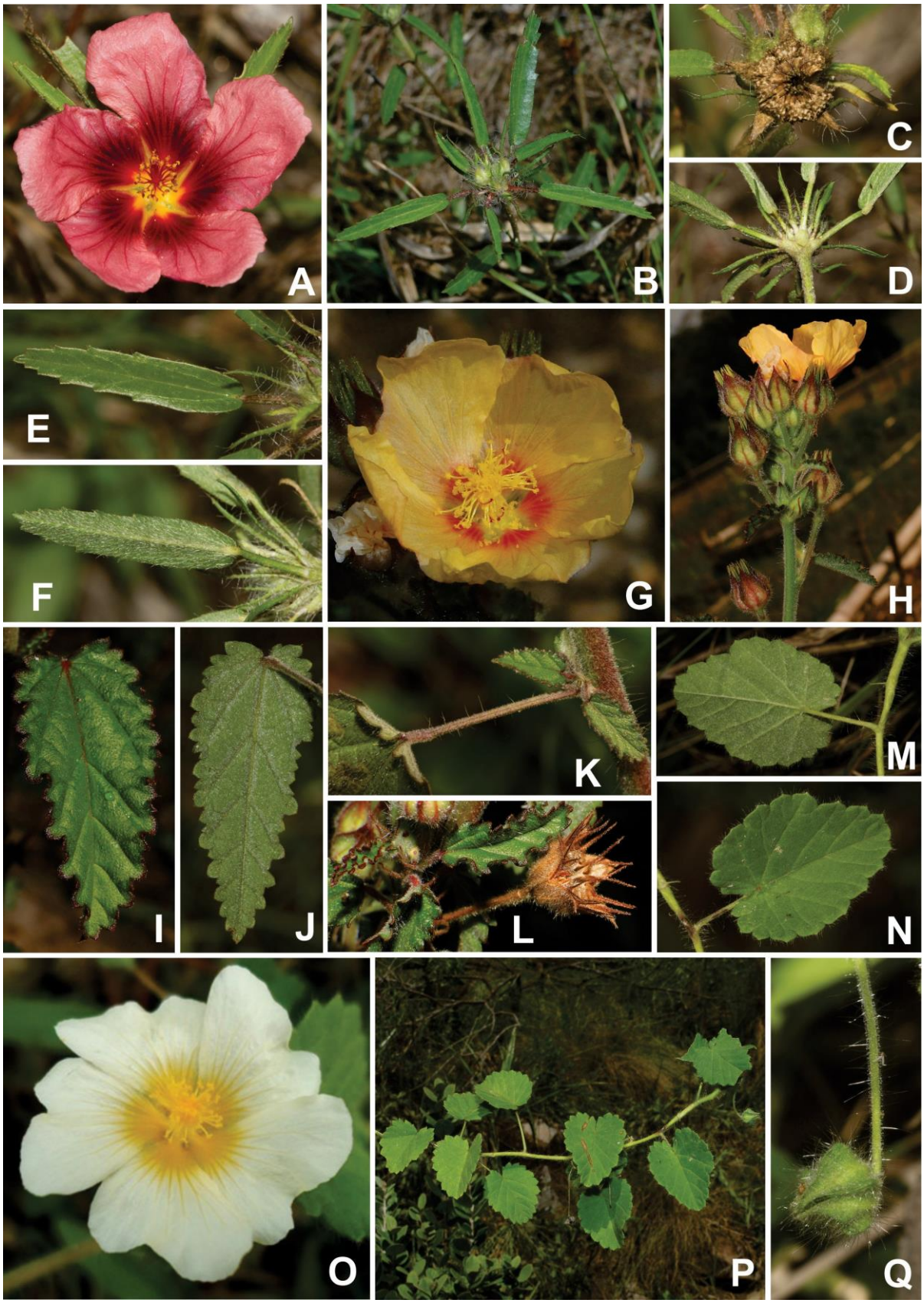

FIGURE 1. A–F. *Sida anomala*. **A.** Flower. **B.** Branch with flowers buds and leaves. **C.** Schizocarp. **D.** Branch leaves and stipules. **E.** Adaxial surface of leaf. **F.** Abaxial surface of leaf. **G–L.** *Sida cerradoensis*. **G.** Flower. **H.** Schizocarps and flower. **I.** Adaxial surface of leaf. **J.** Abaxial surface of leaf. **K.** Sulcate petiole. **L.** Schizocarp. **M–Q.** *Sida confusa*. **M.** Abaxial surface of leaf. **N.** Adaxial surface of leaf. **O.** Flower. **P.** Branch with schizocarp and leaves. **Q.** Peduncle and immature schizocarp. Photographs by Martin Grings and Marcio Verdi (**O**).

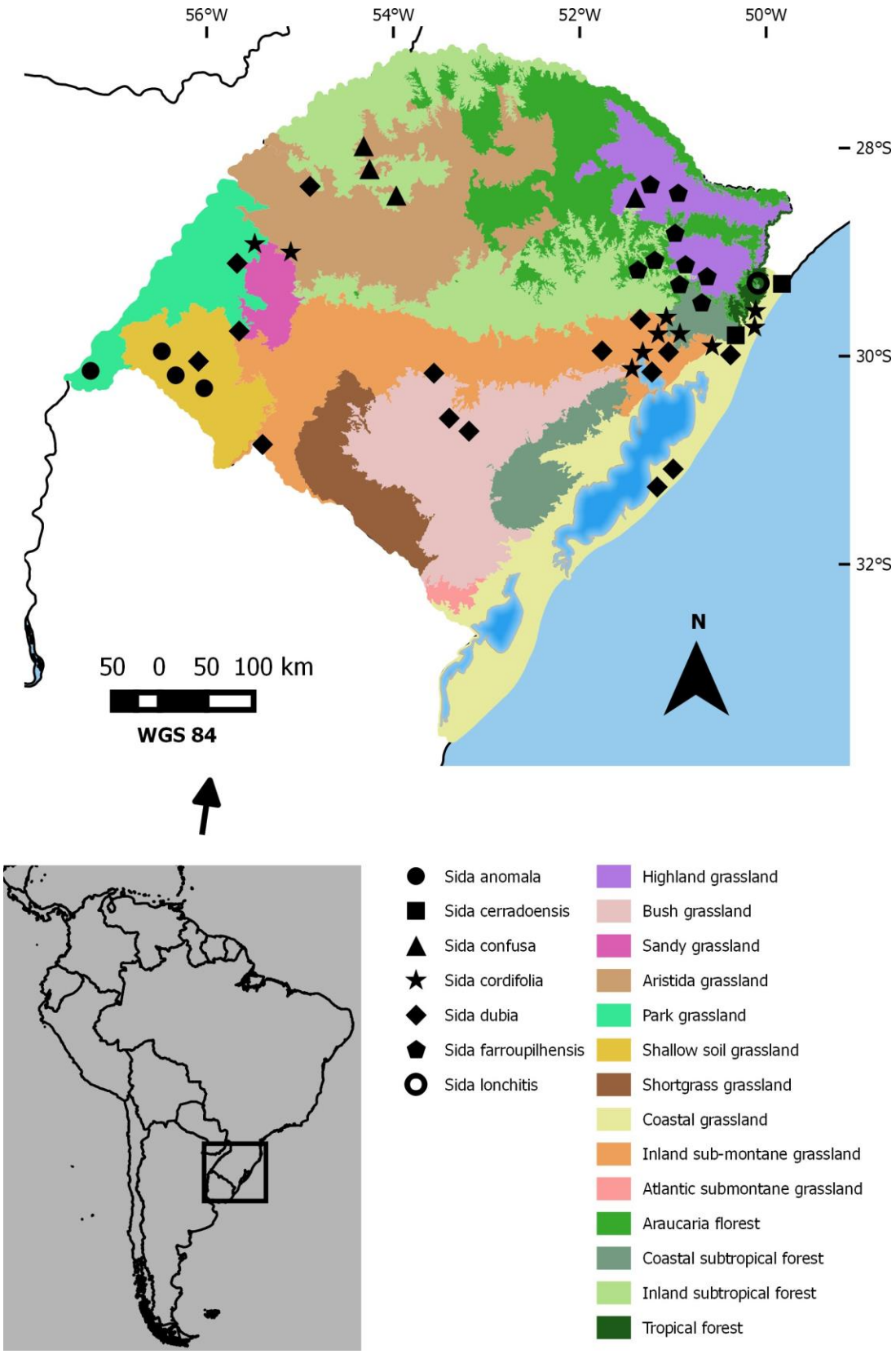

FIGURE 2. Distribution map of *Sida anomala*, *S. cerradoensis*, *S. confusa*, *S. cordifolia*, *S. dubia*, *S. farroupilhensis* and *S. lonchitis* in Rio Grande do Sul state, Brazil.

≡ *Sida ciliaris* L. var. *anomala* (A. Saint-Hilaire) Hochreutiner, Ann. Cons. & Jard. Bot. Gen. 6: 35. 1902.

Taxonomic notes:—The species is referred as a variety of *Sida ciliaris* Linnaeus (1785: 1145) by Hochreutiner (1902: 35). However, we adopt the Rodrigo (1944) species concept, which separates *S. anomala* from *S. ciliaris* by linear leaf blades, flowers with 2 cm in diameter, and mericarps with large irregular prominences (muricate) at the dorsal face (vs. suborbicular or cuneate-truncate leaves, flowers with 1.5 cm in diameter, and mericarps fine reticulate, with short spinose prominences only at the lateral angles). After analyzing herbarium materials, we believe that these diagnostic characters are sufficient to separate the two species. Rodrigo (1944) states that *S. anomala* has erect habit and *S. ciliaris* decumbent or semidecumbent habit in the field. However, we also observed individuals of *S. anomala* with decumbent or semidecumbent habit. Therefore its habit does not serve as a diagnostic character. The species can be distinguished from *Sida paradoxa*, also from section *Malacroideae* (Table 1), by linear leaf blades (rarely linear-lanceolate), serrate in the upper half; flowers 2 cm in diameter; fruits with 7–8 mericarps (Figures 1A–F, 14A) (vs. cuneate-truncate leaf blades, subentire, with three teeth at the apex; flowers 2.5 cm in diameter; fruits with 5 mericarps).

Distribution, habitat and conservation status:—This species is known from Argentina, Uruguay, Paraguay, Bolivia and Brazil (Krapovickas 2007b, Zuloaga *et al.* 2008, Alverson *et al.* 2014, Bovini 2020). For Brazil the species is known from Mato Grosso, Mato Grosso do Sul and Rio Grande do Sul states (Bovini 2020). In the latter, it occurs only in southwest region in Park grassland and Shallow soil grassland (Figure 2). According to IUCN (2017) criteria, the species is Least Concern (LC) with an Extent of Occurrence (EOO) of 1,095,931.709 Km² and an Area of Occupancy of 220 Km². Furthermore, it does not meet the criterion B(b) and B(c).

Representative specimens:—BRAZIL. Rio Grande do Sul. Barra do Quaraí, Parque Estadual do Espinilho, 46 m, WGS 84 S -30.19196º W -057.52877º, 02 December 2020, *M. Grings et al. 2196* (ICN); Quaraí, Fazenda Posto Branco, UTM 21S 554226.40 m E 6658863.09 m S, 04 February 2018 *M. Grings 1915* (HUCS); Uruguaiana, BR-290, 29º52'09"S 56º49'45"W, 03 December 2010, *G.A. Dettke 487* (ICN).

2. ***Sida cerradoensis*** Krapovickas (1969: 11) (Figures 1G–L, 2, 14E). Type:—*Sida potentilloides* A. Saint-Hilaire (1825: 178) subsp. *elata* Hassler (1910a: 38). Lectotype (designated here):—PARAGUAY. Sierra do Amambay, "in campis 'Serrados", Jul., *Hassler 10552* (P barcode 02285398! [digital image]; isolectotypes LIL 393646! [digital image], NY barcode 00222039! [digital image], UC barcode 941206! [digital image], MPU barcode 016973! [digital image]).

Nomenclatural notes:—Brandão *et al.* (2017) presented the type of the species as a holotype, deposited in herbarium P. However, there are several specimens from the collection *Hassler 10552* in other herbaria, and so all specimens are syntypes. According to the International Code of Nomenclature of algae, fungi and plants, 2018, from January 1, 2001, a lectotypification will only be effective when accompanied by the term "lectotypus" or by its abbreviation or its equivalent in a modern language (Art. 9.23, Turland *et al*. 2018), and when including the phrase "designated here" (Art. 7.11). Therefore, a lectotypification was necessary.

Taxonomic notes:—The species belongs to Sect. *Cordifoliae* (Monteiro-Filho 1936, Brandão *et. al.* 2017) (Table 1), and is easily distinguished from related species by the presence of two long aristae in the mericarps, undulate (wavy) leaf margin, apex of the calyx and leaf margins dark-red or violaceous-purplish, calyx with trichomes 1–2 mm, and sulcate petioles (Krapovickas 1969, Brandão *et al.* 2017). Another diagnostic feature of this species are its relatively large, 16 × 10 mm, yellow-orange (sometimes salmon) petals, often with a red adaxial basal spot (Figures 1G–L, 14E).

Distribution, habitat and conservation status:—This species is known from Bolivia, Paraguay and Brazil (Hassler 1910a, Krapovickas 1969, Zuloaga *et al.* 2008, Alverson *et al.* 2014, Bovini 2020). In Brazil, the species occurs in North, Northeast, Central-West, Southeast and South regions, but not in all states (Bovini 2020). In Southern Brazil occurs in Paraná, Santa Catarina (first record) and Rio Grande do Sul (first record) states, found only in two localities in the latter, in Coastal grassland (Figure 2), in ruderal environments and anthropized grasslands. According to IUCN (2017) criteria, the species is here considered Least Concern (LC) with an EOO of 4,253,166.732 Km² and an AOO about 1,200 Km² and because it is a species that also occupies ruderal environments. Furthermore, it does not meet the criterion B(b) and B(c).

Representative specimens:—BRAZIL. Rio Grande do Sul. Osório, próximo a Lagoa do Peixoto, 29º51'25"S, 50º14'05"W, 21 November 2015, *J. Gaio et al. 496* (HUCS); Torres, Campo Bonito Olhos d'água, WGS 84 29°20'39.95"S 49°46'28.19"W, 1º January 2020, *M. Grings 2119* (ICN). Santa Catarina. Ascurra, Centro, próximo do trevo de acesso para a BR-470, 78 m, 26º57'34"S 49º02'24"W, *L.A. Funez 4628* (FURB).

3. ***Sida confusa*** Hassler (1910b: 119) (Figures 1M–Q, 2, 14B). Lectotype (designated by Rodrigo 1944: t. 15):—PARAGUAY. "In altoplanitie Yeruti", *Hassler 5768* (NY barcode 00222025! [digital image]; isolectotypes P barcode 02285390! [digital image], S-R-11248! [digital image], UC barcode 941239! [digital image], MO barcode 1574099! [digital image]).

= *Sida krapovickasii* H.A. Keller (2021: 2). *Syn. nov.* Holotype:—ARGENTINA. Corrientes. *Dep. Santo Tomé, San Alonso, Establecimiento Timbauva*, 27°59'36,78"S, 55°55'19,47"W, 101 m, 08 January 2021, *H. A. Keller & J. L. Rojas 14386* (CTES).

Taxonomic notes:—The species was never included in any section in the studies in which it was treated, before Keller (2021) (Hassler 1910b, Rodrigo 1944, Monteiro-Filho 1936, 1942). Fuertes Aguilar (1995) comments that the species *Sida abutilifolia* Miller (1768: Sida no. 12, as "abutifolia"), section *Spinosae,* has two related species in Argentina and Brazil, *Sida argentina* K.Schum (1891: 315) and *S. confusa*. According to Fuertes Aguilar (1995), in the present work, the species *S. confusa* was included in the section *Spinosae*. Fryxell (1985) pointed out the characters that define section *Spinosae* (Table 1), which we observed in *S. confusa*: cordate leaf blades, dentate to the base, apex acute to rounded; five mericarps, flowers in leaf axils, and calyx lobes not bi-colored, uniformly colored. Although Keller (2021) includes *S. krapovickasii* in the section *Nelavagae*, we maintain the view mentioned above, keeping *S. confusa* in the section *Spinosae* (Table 1). The species of section *Nelavagae* have acuminate leaves, feature not present in the species. *Sida confusa* is distinguished from the other species from Rio Grande do Sul by its prostrate habit; leaf blades ovate to suborbicular, crenate-serrate; stems, petioles and peduncles with long simple trichomes (ca. 2 mm long) and with short stellate and glandular trichomes (ca. 0.1–0.2 mm long); petals white or light yellow with dark yellow basal spot; mericarps muticous (Figures 1M–Q, 14B). Keller (2021) published the species *Sida krapovickasii*, synonymized here for the first time. All the characters presented by the author for *S. krapovickasii*, muticous mericarps, prostrate herbs, indument, leaf and flower morphology, confer with *S. confusa*, a previously published species. For these reasons the species is here synonymized. Although Rodrigo (1944) considers that the mericarps of *S. confusa* are indehiscent, we observe that they are dehiscent at the apex, as also observed by Keller (2021).

Distribution, habitat, and conservation satus:—*Sida confusa* occurs in Paraguay (Caaguazú and Concepción), northeast Argentina (Corrientes and Misiones) and Brazil (Santa Catarina and Rio Grande do Sul). In Rio Grande do Sul the species occurs in Highland grassland and in Aristida grassland (Figure 2), usually in rocky grasslands, with the presence of shrubs. The species presents an EOO of 159,265.052 Km² and an AOO of 36 Km². Therefore, due to its AOO and its habitat is being increasingly fragmented due to the growth of crops (Andrade *et al.* 2015), the species is here considered EN (Endangered), under IUCN (2017) criterion B2abiii.

Representative specimens:—BRAZIL. Rio Grande do Sul. Augusto Pestana, Boca da Picada, 16 February 1956, *J. Pivetta s.n.* (HRCB 44476); Giruá, Granja Sodal, 14 February 1966, *K. Hagelund 4090* (CTES, HAS); Muitos Capões, Ituim, Granja Bela Vista, 641 m, 28º24'01"S 51º20'39"W, 08 February 2012, *M. Verdi & B.O. Boeni 6146* (FURB); WGS 84 S 28.53293º W 051.37276º, 11 March 2021, *M. Grings 2247* (ICN). Santa Catarina, Capinzal, Morro em frente ao Hotel São Cristóvão, 715 m, 27º22'20"S 51º35'23"W, 28 November 2018 *A. Kassner-Filho 4107* (FURB).

4. ***Sida cordifolia*** Linnaeus (1753: 684) (Figures 2, 3A–E, 14F). Holotype:—"Habitat in India, cordifolia. 4", s.d., s.c., s.n. (LINN 866.12! [digital image]).

Taxonomic notes:—The species belongs to sect. *Cordifoliae* (Monteiro-Filho 1936, Brandão *et. al.* 2017) Table 1, and is distinguished from the other species in this section in Rio Grande do Sul by its denser stellate trichomes, yellow flowers (sometimes with a red basal spot), and by the shape of leaves, generally ovate or cordiform (Figures 3A–E, 14F). It is one of the most polymorphic species of the genus *Sida* (Brandão *et al.* 2017).

Distribution, habitat and conservation satus:—This species is widely distributed in pantropical and subtropical regions (Fryxell 1985, Brandão *et al.* 2017), and, therefore, is here considered Least Concern (LC). In Brazil, according to Bovini (2020), the species occurs throughout the country. In the present work, we confirm the occurrence of *S. cordifolia* to the states of Santa Catarina and Rio Grande do Sul. In the latter state, the species occurs in Inland sub- montane grassland, *Aristida* grassland, Sandy grassland and in Coastal grassland (Figure 2), also growing in ruderal environments.

Representative specimens:—BRAZIL. Rio Grande do Sul. Itacurubi, em direção a Maçambará, RS-447, 22 February 2017, *A. Nuernberg et al. 1895* (FLOR); Porto Alegre, Morro Santa Tereza, in campestribus dumetosis, *B. Rambo 41313* (PACA); São Francisco de Assis, estrada para Jacaquá, 170 m, WGS 84 S -29.61047º W -055.15408º, 03 December 2020, *M. Grings et al. 2205* (ICN); São Leopoldo, herba in pascuis, 18 June 1965, *A. Sehnem 8408* (PACA); Torres, Campo Bonito, próximo da Fruteira Pelé, 30 m, WGS 84 -29.353413°S -49.769940°W, 02 November 2020, *M.*

Grings 2168 (ICN). Santa Catarina. Florianópolis, Morro da Caixa D'água, UFSC, 23 August 1984, *D. Falkenberg & R. Silva 679* (FLOR); Itajaí, 30 September 1971, *R. Klein 2566* (HBR).

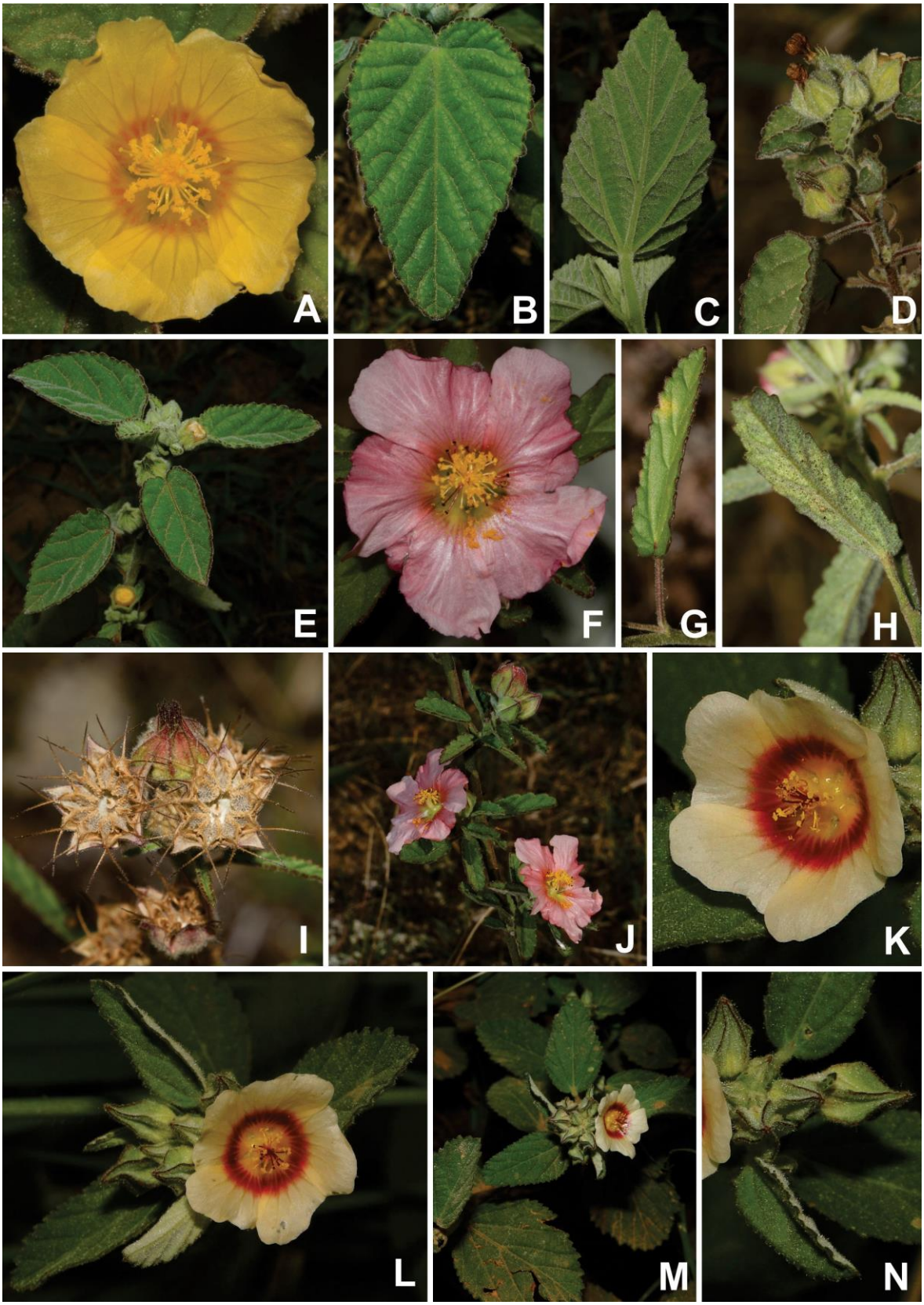

FIGURE 3. A–E. *Sida cordifolia*. **A.** Flower. **B.** Adaxial surface of leaf. **C.** Abaxial surface of leaf. **D.** Branch with leaves and schizocarps. **E.** Branch with leaves, flowers buds and schizocarps. **F–J.** *Sida dubia*. **F.** Flower. **G**. Adaxial surface of leaf. **H.** Abaxial surface of leaf. **I.** Schizocarps and mericarps. **J.** Branch with leaves, flowers and buds. **K–N.** *Sida glaziovii*. **K.** Flower. **L.** Flowers, buds and leaves. **M.** Branch. **N.** Buds. Photographs by Martin Grings.

5. ***Sida dubia*** A. Saint-Hilaire & Naudin (1842: 50) (Figures 2, 3F–J, 14G). Holotype:—BRAZIL. s.l., s.d., *C. Gaudichaud 1220* (P barcode 02285395! [digital image]).

= *Sida multicrena* Hochreutiner (1905: 295) Holotype**:**—PARAGUAY. *in campo Apepu (Tapiraguay)*, Aug., *Hassler 4351* (G barcode 00306074! [digital image]).

Taxonomic and nomenclatural notes:—The species *S. multicrena*, was synonymized by Krapovickas (2005), which we agree after analyzing the types of both. *Sida dubia* belongs to section *Cordifoliae* by the indument densely stellate-tomentose; leaf blades lanceolate, dentate-crenate throughout, basally more or less cordate, features pointed out by Fryxell (1985) for this section (Table 1). The species can be recognized by its erect habit, pink corolla (rarely yellow), 11–13 mericarps with aristae 1–3 mm long (Figures 3F–J, 14G).

Distribution, habitat and conservation satus:—*Sida dubia* occurs in northeastern Argentina, Paraguay, Uruguay, and Brazil (Krapovickas 2005, Zuloaga *et al.* 2008, Bovini 2020). Specifically in Brazil, the species occurs only in State of Rio Grande do Sul, in Shallow soil grassland, Bush grassland, Inland sub-montane grassland, Sandy grassland, Coastal grassland, and *Aristida* grassland (Figure 2). With the available records, the species presents an EOO of 298,741.879 Km² and an AOO of 400 Km². Although it can be considered EN by the AOO, conditions B(a), B(b) and B(c) were not met. Therefore, the species is here considered Least Concern (LC). However the situation of the species must be monitored, since it is restricted to Pampa grasslands which has suffered great losses in area (30% from 1985 to 2019) due to conversion to crops in the state of Rio Grande do Sul, Brazil (Andrade *et al.* 2015, Mapbiomas 2020).

Representative specimens:—BRAZIL. Rio Grande do Sul. Alegrete, Reserva Biológica do Ibirapuitã S 29º54’59.5” W 55º46’00.0”, 14 December 2009, *M. Grings & R. Paniz 1916* (ICN); Cerro Largo, São Luiz, January 1943, *P. Buck s.n.* (PACA 11127); Mostardas, Lagoa do Peixe, 21 February 1970, *E. Vianna et al. s.n.* (ICN 7529); Porto Alegre, Morro Teresópolis, 27 May 1980, *S. Martins 315* (ICN); Santana da Boa Vista, BR 392, WGS 84 S 30º47’54.3” W 053º11’24.9”, 23 November 2018, *M. Grings & J. Schaefer 1975* (ICN); São Francisco de Assis, Gruta São Tomé, 20 April 2008, *E. Mundeleski 58* (ICN).

6. ***Sida farroupilhensis*** Krapovickas & Bueno (2014: 87) (Figures 4A–F, 2, 14C). Holotype:—BRAZIL. Rio Grande do Sul: Farroupilha, “Parque dos Pinheiros, Parque dos Pinheiros, erva com aproximadamente 1 m de altura, bastante frequente nos lugares úmidos e sombreados, flores amarelas que se fecham ao ser coletadas”, 23 May 1978, *O. Bueno 676* (HAS!; isotype CTES!).

Taxonomic notes:—*Sida farroupilhensis* is distincted from other species of section *Sidae* (Table 1) by the presence of aristae smaller than the mericarp body, mericarps dehiscent only at the apex, solitary flowers without bifid bracts, leaf blades ovate-rhombic and with simple trichomes in adaxial surface (Figures 4A–F, 14C) (Krapovickas 2014). A relevant diagnostic feature of the species is the reticulate leaf’s abaxial surface, formed by the tertiary veins, which is covered by sparse, small stellate trichomes. Calyx also with tertiary veins forming a characteristic reticulate and with very sparse small stellate trichomes. In the present work, photos of the species in its habitat are presented for the first time.

Distribution, habitat, and conservation status:—The species is endemic to Araucaria Forest of northeast of Rio Grande do Sul, Brazil (Figure 2), in the edges or understory of Forests, and rarely in Highland grassland. With an EOO of 3,813.842 Km² and an AOO of 40 km² *S. farroupilhensis* could be considered Endangered (EN). However, the species is usually abundant in places where it occurs and does not show subpopulations, locations, EOO and AOO declines or fluctuations. That is, the species does not meet the conditions B (a), B(b) and B(c) and is considered Least Concern (LC).

Representative specimens:—BRAZIL. Rio Grande do Sul. Canela, Flona, WGS 84 -29.321389°S -50.816667°W, 23 March 2019, *F. Gonzatti 5061* (HUCS); Caxias do Sul, Bairro Nossa Senhora do Rosário, WGS 84 -29.130833°S -51.154167°W, 29 September 2019, *M. Grings 2078* (ICN); Gramado, Bairro Moura, 06 May 2020, *M. Grings 2130* (ICN); São Francisco de Paula, próximo ao lago São Bernardo, WGS 84 -29.459764°S -50.570602°W, 08 June 2012, *M. Grings 2112* (ICN); Vacaria, Parque de Rodeios, WGS 84 -28.481828°S -50.910969°W, 27 April 2019, *M. Grings & A.S. Mello 2034* (ICN).

7. ***Sida glaziovii*** K. Schumann (1891: 322) (Figures 3K–N, 5, 14D). Lectotype (designated by Krapovickas 2014: 90):—BRAZIL. Minas Gerais: “probabiliter in campis provinciae Minas Geraes” [Casa Branca a Ouro Preto, “route du Sabara”] 26 February 1884, *Glaziou 14510* (P barcode 02285408! [digital image]; isolectotypes K barcode 000528433! [digital image], R barcode 000007653! [digital image], C barcode 10014417! [digital image]).

Taxonomic notes:—*Sida glaziovii* is recognized by its light-yellow foliage and by mericarps covered by yellowish stellate trichomes at the apex and aristae (Figures 3K–N, 14D) (Krapovickas 2014).

Distribution, habitat and conservation status:—The species occurs in Northeast, Southeast, Midwest and South of Brazil (Bovini 2020). This is the first record of *Sida glaziovii* to Rio Grande do Sul state where the species is known only from one locality in Coastal grassland (Figure 5), in ruderal environment. With the available records, the species presents an EOO of 1,017,999.948 Km² and an AOO of 1,500 Km². Although it can be considered Vulnerable (VU) by the AOO, conditions B(a), B(b) and B(c) were not met. So, the species is considered Least Concern (LC).

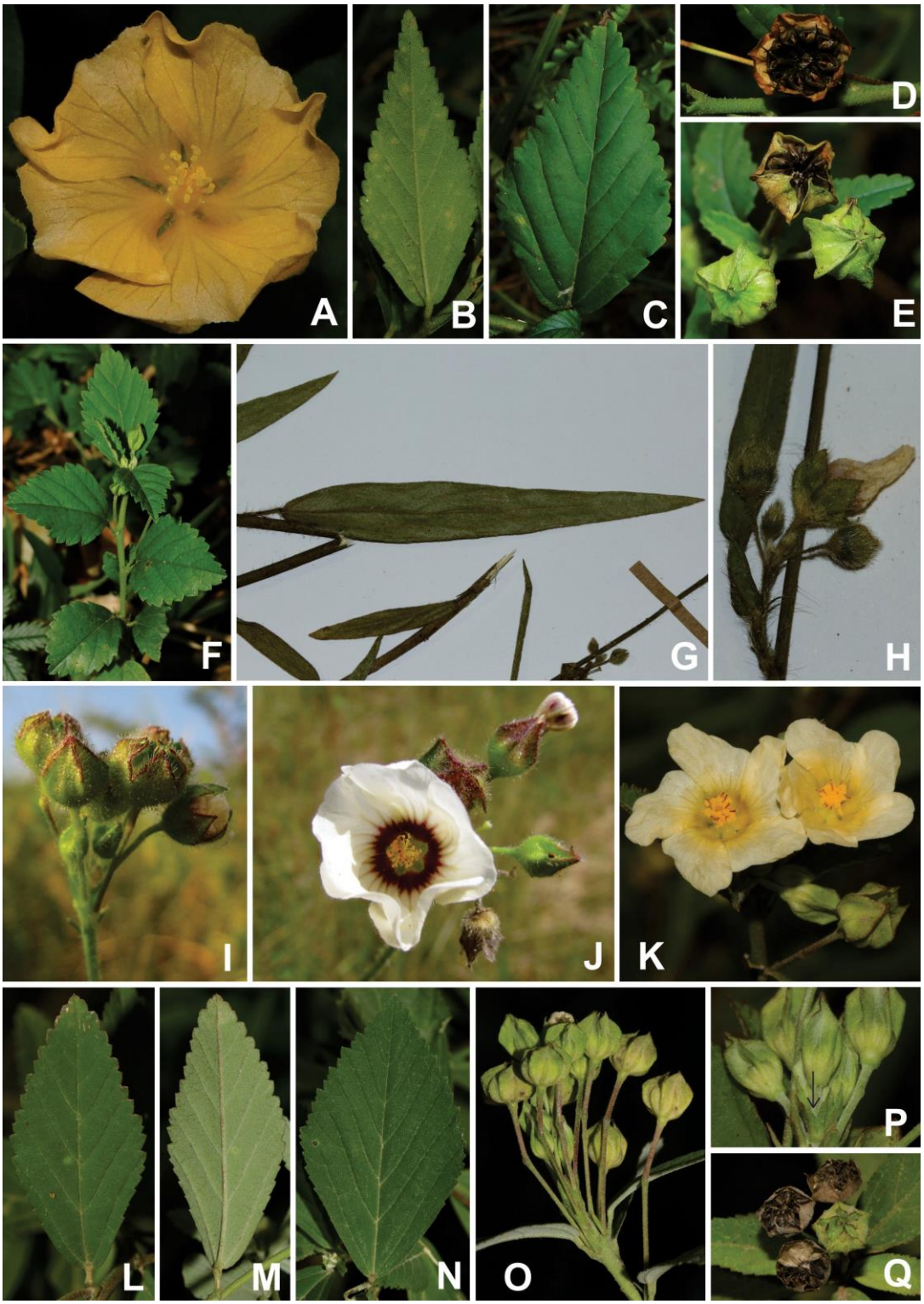

FIGURE 4. A–F. *Sida farroupilhensis*. **A.** Flower. **B.** Abaxial surface of leaf. **C.** Adaxial surface of leaf. **D.** Mature schizocarp. **E.** Mature and immature schizocarps. **F.** Branch with leaves and flowers buds. **G–J** *Sida linifolia*. **G.** Abaxial surface of leaf. **H.** Buds in terminal umbelliform inflorescence. **I.** Schizocarps and buds in terminal umbelliform inflorescence **J.** Branch with flowers and buds. **K–Q.** *Sida lonchitis*. **K.** Flowers. **L**, **N.** Adaxial surface of leaf. **M.** Abaxial surface of leaf. **O.** Terminal inflorescence. **P.** Bifid bracts (black arrow). **Q.** Schizocarps. Photographs I–J by Luís Funez, all others by Martin Grings (G–J from *N.i. Matzenbacher*, ICN 123026).

Representative specimens:—BRAZIL. Rio Grande do Sul. Santo Antônio da Patrulha, BR-101, Km 14, Lagoa dos Quadros, 28 November 1988, *O. Bueno 5675* (HAS).

8. ***Sida linifolia*** Cav. (1785: 14) (Figures 4G–J, 5, 14H). Lectotype (designated by Fryxell 1988: 398):—"In insula Caienae et Peru*", Jussieu s.n*. (P barcode 00680406! [digital image]; isolectotypes P barcode 05435313! [digital image], P barcode 05435312! [digital image]).

Taxonomic notes:—*Sida linifolia* is a species of section *Stenindae* (Table 1), easily distinguished from other species of the genus by its entire, narrowly linear or broadly lanceolate leaf blades and by the indehiscent mericarps (Figures 4G–J, 14H).

Distribution, habitat and conservation status:—The species is widely distributed, from Mexico to Brazil, in parts of Africa, and Fiji (Fryxell 1985). In Brazil *Sida linifolia* occurs in all states (Bovini 2020) and in Rio Grande do Sul only in two localities in Inland sub-montane grassland (Figure 5). The species is here considered Least Concern (LC) because it has large EOO and AOO, since it is a frequent and often ruderal species and is present in more than one continent.

Representative specimens:—BRAZIL. Rio Grande do Sul. Guaíba, Fazenda São Maximiano, BR-116, Km 308, 07 June 1998, *N.i. Matzenbacher 2287* (ICN); ibidem, 22 April 2006, *L.F. Lima s.n.* (ICN 153925); Sapiranga, Cabanha Itapema, 22 April 2006, *C. Mondin 3106* (MPUC).

9. ***Sida lonchitis*** A. Saint-Hilaire & Naudin (1842: 50) (Figures 2, 4K–Q, 14I). Lectotype (designated by Krapovickas 2007a: 97):—BRAZIL. Rio de Janeiro, 1831-33, *Gaudichaud 938* (P barcode 02285430! [digital image]; isolectotype P barcode 02285431! [digital image]).

Taxonomic notes:—*Sida lonchitis* is distinguished from other species of section *Sidae* (Table 1) by the flowers arranged in glomerules and by the presence of bifid bracts (Figures 4K–Q, 14I) (Krapovickas 2007a, Yoshikawa *et al.* 2019).

Distribution, habitat and conservation status:—The species occurs in southeast, south, and "Distrito Federal" of Brazil (Bovini 2020). The species is mentioned to Argentina by Krapovickas (2007), but without a voucher. In State of Rio Grande do Sul *S. lonchitis* was recorded only in Tropical Forest (Figure 2), in edges or ruderal environments. With the available records, the species presents an EOO of 1,030,158.204 Km² and an AOO of 120 Km². Although it can be considered EN by the AOO, conditions B(a), B(b) and B(c) were not met. Thus, the species is here considered Least Concern (LC).

Representative specimens:—BRAZIL. Rio Grande do Sul. Morrinhos do Sul, rio Negro, caminho para Morro de Dentro, 90 m, WGS 84 S -29.378807° W -49.974588°, 02 January 2021, *M. Grings & L. Gauer 2217* (ICN); Três Cachoeiras, Morro Azul, beira do rio Negro, 28 February 1984, *K. Hagelund 14827* (ICN, HAS, HUCS).

10. ***Sida nemorensis*** Martius ex Colla (1833: 416) (Figures 5, 6A–D, 14J). Lectotype (designated by Fryxell 1976: 591, as "holotype"): Brazil. Bahia: "Rio Belmonte [Rio Jequitinhonha]", 1816, *Anonymous* [Wied] *s.n.* (TO! [digital image]).

Taxonomic notes:—Colla (1833) and Fryxell (1976) attributed the type collection to Martius, who never collected at Rio Jequitinhonha. Wied collected over 100 species at "Rio Belmonte" (Moraes *et al.* 2013). *Sida nemorensis* can be distinguished from other species of section *Nelavagae* by the aristate mericarps, by the presence of glandular trichomes in the stems, and by the erect habit (Figures 6A–D, 14J; Table 1) (Krapovickas 2006). In the present work, photos of the species in its habitat are presented for the first time.

Distribution, habitat and conservation status:—*Sida nemorensis* occurs in Bolivia, Paraguay, Argentina and southeast, midwest and south of Brazil (Krapovickas 2006, Bovini 2020). In state of Rio Grande do Sul, the species was found so far only in two places, in Coastal grassland associated with *Butia catarinensis* Noblick & Lorenzi (2010: 164) and in Inland subtropical Forest (Figure 5), in edges. With the available records, the species presents an EOO of 2,734,283.060 Km² and an AOO of 170 Km². Although it can be considered EN by the AOO, conditions B(a), B(b) and B(c) were not met. Therefore, the species is here considered Least Concern (LC).

Representative specimens:—BRAZIL. Rio Grande do Sul. Derrubadas, Parque Estadual do Turvo, s.d., *P. Brack et al. 1721* (ICN); Torres, Campo Bonito, BR 101 Km 06, 10 February 1983, *A. Krapovickas & C.L. Cristóbal* 38480 (CTES, HAS).

11. ***Sida paradoxa*** Rodrigo (1937: 105) (Figures 5, 6E–J, 14K). Lectotype (designated here):—ARGENTINA. Corrientes. Mercedes, "Arroyo Las Garzas", November 1936, *A.P. Rodrigo 605* (LP barcode 004331! [digital image];

isolectotypes LP barcode 004334! [digital image], LP barcode 004335! [digital image]; NY 00222038! [digital image], K 000528458 [digital image]).

Nomenclatural notes:—*Sida paradoxa* was described by Rodrigo (1937) who designated the collection "Rodrigo 605" deposited in LP as type. However, there are three specimens under this collection number in the LP herbarium. Therefore, a lectotypification was necessary. An image of one of the specimens deposited in the LP herbarium was used by Rodrigo (1937) as a figure in the original description of the species. This specimen was chosen to be the lectotype.

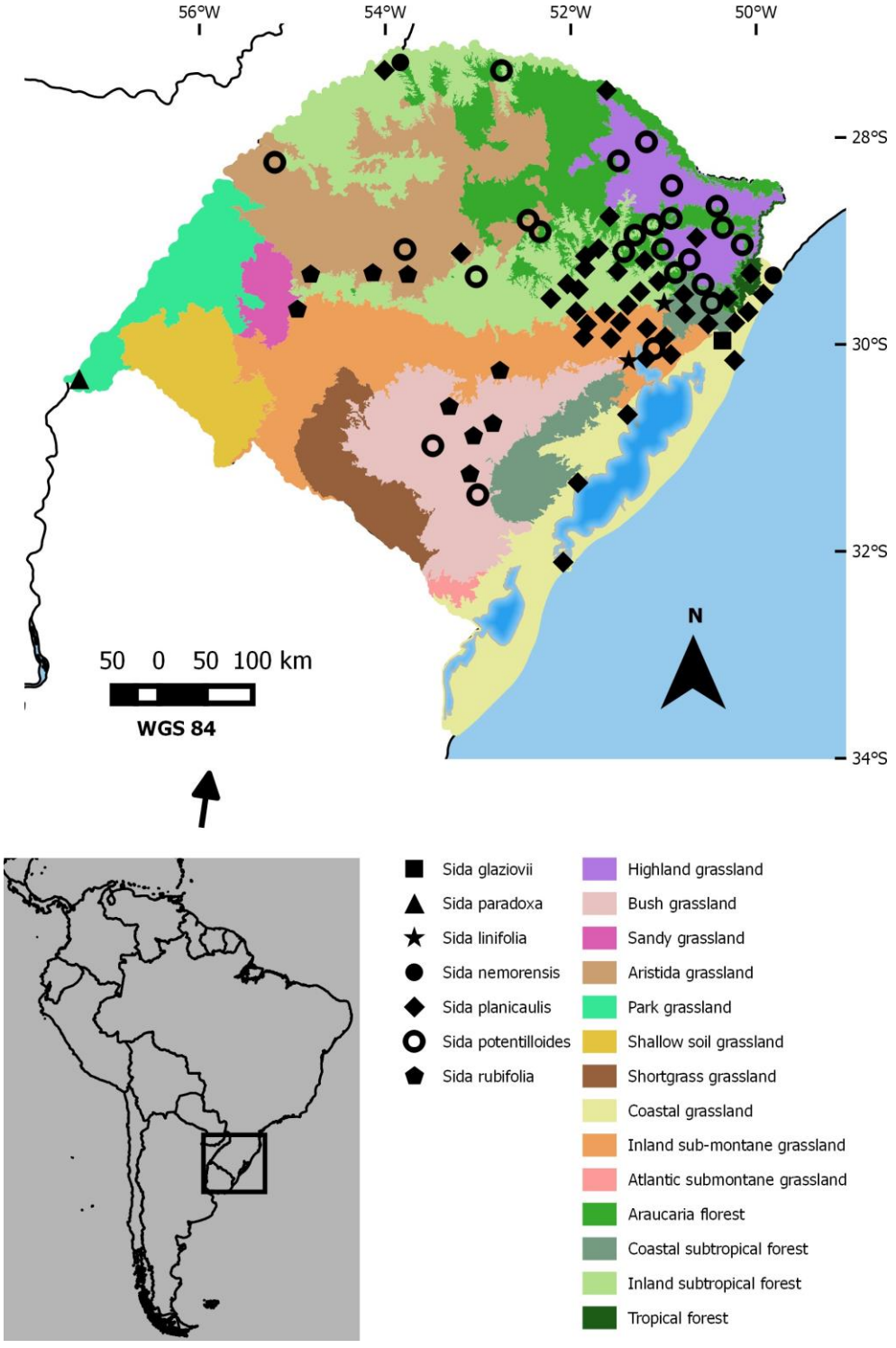

FIGURE 5. Distribution map of *Sida glaziovii*, *S. paradoxa*, *S. linifolia*, *S. nemorensis*, *S. planicaulis*, *S. potentilloides* and *S. rubifolia* in Rio Grande do Sul state, Brazil.

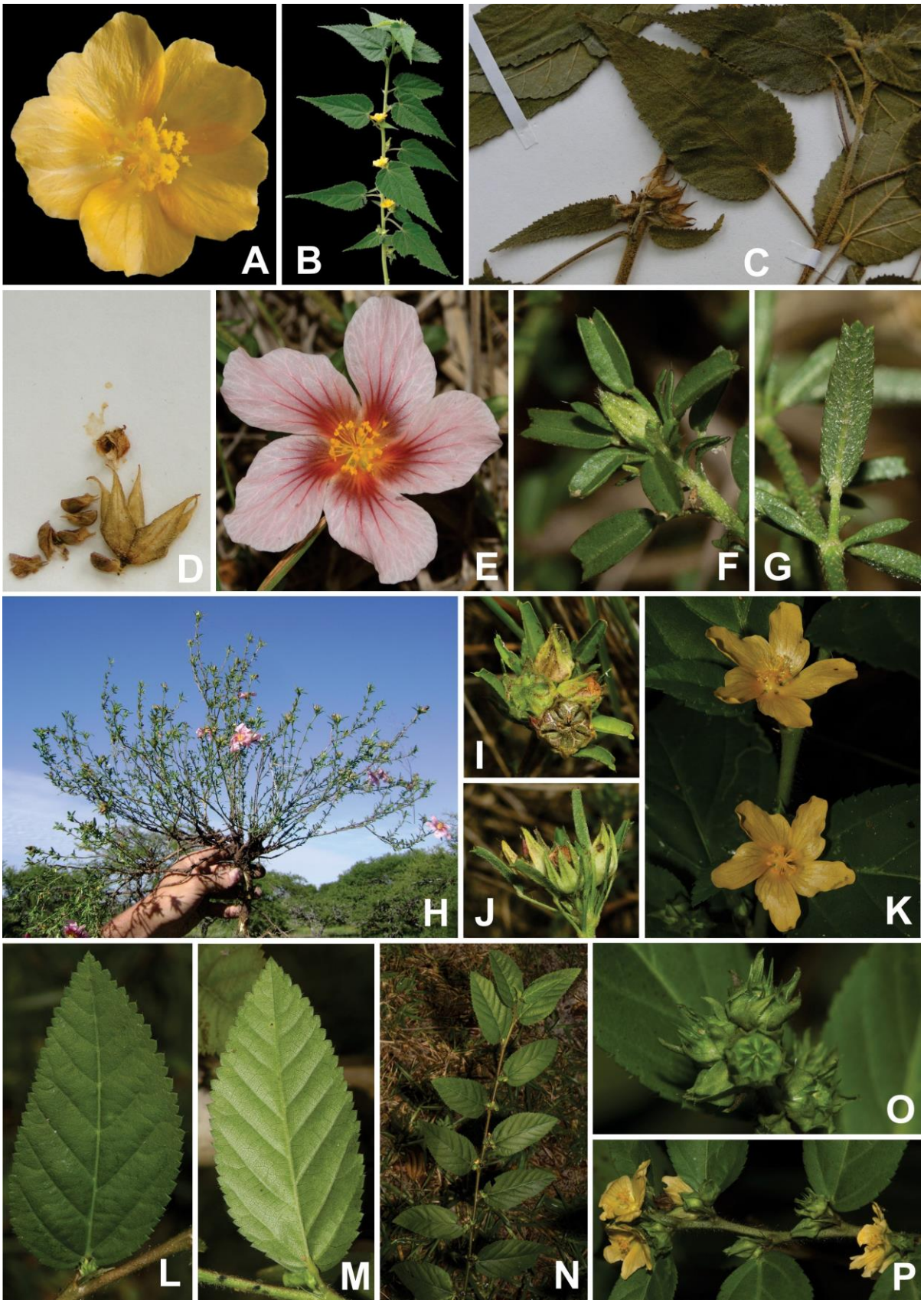

FIGURE 6. A–D. *Sida nemorensis.* **A.** Flower. **B.** Branch with leaves and flowers. **C.** Leaves and schizocarps. **D.** Calyx and mericarps. **E–J.** *Sida paradoxa.* **E.** Flower. **F.** Branch with leaves and stipules. **G.** Abaxial surface of leaf. **H.** Habit. **I–J.** Schizocarps. **K–P.** *Sida planicaulis.* **K.** Flowers. **L.** Adaxial surface of leaf. **M.** Abaxial surface of leaf. **N.** Branch with distichous leaves arrangement. **O.** Schizocarps. **P.** Branch with flowers and schizocarps. Photographs A–B by Amaury Junior, C–P by Martin Grings (C–D from *Krapovickas & Cristóbal* 38480, HAS).

Taxonomic notes:—The species is distinguished from other species of section *Malacroideae* by its stems without roots; subentire margin of leaves, only with three apical teeth; staminal tube glabrous; petals 17 mm long (Figures 6E– J, 14K; Table 1) (Krapovickas 2006). *Sida paradoxa* can be distinguished from the other species of Sect. *Malacroideae* of Rio Grande do Sul, *Sida anomala*, by the cuneate-truncate leaf blades, subentire, with three teeth at the apex; flowers 2.5 cm in diameter; fruits with 5 mericarps (vs. linear leaf blades, serrate in the upper half; flowers 2 cm in diameter; fruits with 7–8 mericarps). In the present work, photos of the species in its habitat are presented for the first time.
Distribution, habitat and conservation status:—*Sida paradoxa* occurs in Argentina (only in Corrientes province) and in Brazil, only in state of Rio Grande do Sul (Krapovickas 2005, Zuloaga *et al.* 2008, Bovini 2020), in Park grassland (Figure 5). With the available records, the species presents an EOO of 46,921.776 Km² and an AOO of 100 Km². The species is here considered Endangered (EN), criterion B2b(i, ii, iii)c(i, ii), due to the continuous reduction observed in its habitat and its area of occupancy (Mapbiomas 2020).
Representative specimens:—BRAZIL. Rio Grande do Sul. Barra do Quaraí, Parque Estadual do Espinilho, 50 m, 30º11'22.5"S 57º29'46.5"W, 12 December 2009, *M. Grings & R. Paniz 889* (ICN).

12. ***Sida planicaulis*** Cavanilles (1785: 24) (Figures 5, 6K–P, 14L). Lectotype (first step designated by Krapovickas 2003: 104, second-step lectotypification designated here):—BRAZIL. Rio de Janeiro, June–July 1767, *Commerson* (P barcode 02273667! [digital image]; isolectotypes P barcode 02273666! [digital image], P barcode 02273665! [digital image], P barcode 00671945! [digital image]).

=*Sida carpinifolia* Linnaeus, f. Suppl. 307. 1781. "*in Madera in Horto Monasteri Sti. Francisci, F. Masson".*
NON Miller 1768.
Nomenclatural notes:—Krapovickas (2003) chose the collection of Commerson in Rio de Janeiro, deposited in the herbarium P, as lectotype. However, there are four specimens of this collection in P herbarium. Therefore, according to Art. 9.17, of the International Code of Nomenclature for algae, fungi, and plants (Turland *et al.* 2018) a second step of lectotypification was necessary. The specimen P barcode 02273667 was chosen as lectotype because it is more representative, with the presence of fruits.
Taxonomic notes:—Krapovickas (2003) creates the section *Distichifoliae* and presents a taxonomic study of this section. Before this study, many authors treated the species in this section as belonging to a few polymorphic species, as in the case of *Sida acuta* Burman f. (1768: 147)(Fryxell 1988, Fuertes Aguilar 1995). Therefore, *Sida planicaulis* can often be found identified as *S. acuta* in herbaria. *Sida planicaulis* is distinguished from other species of section *Distichifoliae* by the presence of 7–8 mericarps, aristae 2 mm long, flowers in axilar glomerules, yellowish corolla, staminal tube glabrous (Figures 6K–P, 14L; Table 1) (Krapovickas 2003).
Distribution, habitat and conservation status:—This species occurs in Argentina (Misiones), and Brazil, in northeast, southeast, midwest and south (Zuloaga *et al.* 2008, Bovini 2020). The species expanded to Indian and Pacific Oceans regions (Krapovickas 2003). In state of Rio Grande do Sul the species occurs in Inland subtropical forest, Coastal subtropical Forest and Tropical Forest (Figure 5), in edges of Forests and in ruderal shaded environments, from 0 to 400 m of elevation. *Sida planicaulis* is here considered Least Concern (LC) because it has large EOO and AOO, since it is a frequent and often ruderal species and is present in more than one continent.
Representative specimens:—BRAZIL. Rio Grande do Sul. Machadinho, Linha Copueiro, February 2001, *E. Peloso s.n.* (HAS); Porto Alegre, Morro da Tapera, 04 December 2008, *M. Grings 808* (ICN); Nova Petrópolis, São Jacó, entre a primeira e a segunda barragem, 340 m, WGS 84 29°23'14.75"S 51° 5'49.11"O, 17 May 2020, *M. Grings, 2139* (ICN); São Lourenço do Sul, 1º Distrito, Passo do Coqueiro, 1º January 2003, *G. Heiden 259* (ECT); Torres, Colônia São Pedro, 10 February 1984, *K. Hagelund 14953* (ICN); Venâncio Aires, Porto Mariante, 21 May 1955, *Pivetta 882* (PACA).

13. ***Sida potentilloides*** A. Saint-Hilaire (1825: 178) (Figures 5, 7A–E, 14M). Lectotype (designated by Rodrigo 1944: t. 22):—BRAZIL. Rio Grande do Sul. "Secus silvam prope São Nicolao, in provincia Missionum", s.d., *A. St.-Hilaire C2/2708 bis* (P barcode 02285462! [digital image]; isolectotypes P barcode 02285461! [digital image], P barcode 02285460! [digital image], MPU barcode 016972! [digital image], US barcode 00097962! [digital image]).

= *Sida anarthra* Ekman (1910: 15) Lectotype (designated here):—ARGENTINA. Misiones. Posadas, Bonpland, in campo humido in marginibus silvulae, etc, 15 January 1908, *E.L. Ekman 145* (S 14-46283! [digital image]; isolectotype S 14-46282! [digital image], LD barcode 1691486! [digital image], LP barcode 004304! [digital image], NY barcode 00222011! [digital image]).
Nomenclatural notes:—Ekman (1910) designated the collection Ekman 145 as type from *Sida anarthra*.

However, there are five specimens of this collection, all syntypes, deposited in herbaria S, LD, LP and NY. The specimen S 14-46283 was designated as a lectotype, because it is representative of the species.

Taxonomic notes:—According to the description of sections of *Sida* from Fryxell (1985) we included the species in section *Sidae* by the leaves basally entire and distally dentate (dentate almost to the base in this species), base cuneate, sometimes more or less rhomboid, and number of mericarps 7–11 (Table 1). Striking features of this species are leaves dentate almost to the base, blades generally narrowly elliptic, narrowly oblong or oblong, abaxial surface tomentose, with margins coarsely serrate; corolla dark yellow, and mericarps with long aristae, greater than 1 mm long (Figures 7A–E, 14M). In the present work, photos of the species in its habitat are presented for the first time.

Distribution, habitat and conservation status:—*Sida potentilloides* occurs in Paraguay, Argentina, Uruguay, and in southeast, and south of Brazil (Zuloaga *et al.* 2008, Bovini 2020). In state of Rio Grande do Sul the species grows generally in Araucaria Forest, sometimes associated with Highland grassland, but also in Inland subtropical Forest and Bush grassland (Figure 5), in edges of Forests, in ruderal environments and shrubland. The species is Least Concern (LC) because it has large EOO and AOO, since it is a frequent and often ruderal species.

Representative specimens:—BRAZIL. Rio Grande do Sul. Bagé, Galpão de Pedra, 03 November 2010, *M. Grings & P.J. Silva-Filho 1113* (ICN); Fontoura Xavier, 696 m, -29.088611S -51.029444W, 07 November 2018, *M. Grings et al. 1950* (ICN); Jaquirana, Passo do S, 839 m, 29º05'32.6"S 50º21'51.6"W, 27 November 2009, *M. Grings 819* (ICN); Nonoai, March 1945, *B. Rambo s.n.* (PACA 28083); Nova Petrópolis, Morro Korb, 700m, 02 November 2008, *M. Grings 677* (ICN, HUCS); Tupanciretã, 26 January 1942, *B. Rambo s.n.* (PACA 9164).

14. ***Sida ramoniana*** Krapovickas (2014:104) (Figures 7F–I, 8). Holotype:—ARGENTINA. Misiones: Dep. Oberá., "Arroyo Ramón, 5 km E de ruta nac. 14 y acceso a ciudad de Oberá", 27º27'56,4"S-55º02'08,4"W, 269 m, bañado, 16 February 2012, *H. A. Keller & N. G. Paredes 10825* (CTES, isotypes FCQ, K, LIL, MBM, MO, NY!, SI).

Taxonomic notes:—*Sida ramoniana* can be distinguished from other species of section *Sidae* (Table 1) by its axillary flowers solitary or in glomerules, pubescent leaves, pedicel and calyx with simple trichomes, muticous or submuticous mericarps, and simple trichomes at the nerves of the abaxial surface of leaves (Figure 7F–I) (Krapovickas 2014).

Distribution, habitat and conservation status:—The species was known only from the type locality in Oberá, Misiones, Argentina (Krapovickas 2014). In the present work, its distribution area is expanded with the first record of the species to Brazil, where the species was found only in one locality in the state of Rio Grande do Sul, in Aristida grassland (Figure 8). It was not possible to calculate the EOO of the species because it is known from only two locations. The AOO of the species is 8 Km², allied to the fact that its habitat is showing a great loss of area (Andrade *et al.* 2015), in addition to invasion by exotic species, the species is here considered Critically Endangered (CR), criterion B2ab(iii, v)c(iv).

Representative specimens:—BRAZIL. Rio Grande do Sul. Giruá, Granja Sodal, March 1964, *K. Hagelund 2228* (HAS).

15. ***Sida reitzii*** Krapovickas (2003: 107) (Figures 7J–O, 8, 14N). Holotype:—BRAZIL. Santa Catarina. S. Amaro da Imperatriz, camino de Santo Amaro da Imperatriz a Fazenda Jomar, 20 m, 8 February 1994, *Krapovickas y Cristóbal 44836* (HBR!; isotypes CTES, G, MBM!, NY, SI, SP, HAS!).

Taxonomic notes:—*Sida reitzii* can be distinguished from other species of section *Distichifoliae* by the presence of 8–10 mericarps with longer aristae (2–4 mm long), staminal tube glabrous, abaxial surface of petals with small glandular trichomes, mericarps glabrous or with glandular trichomes, adaxial surface of leaves with simple adpressed trichomes, abaxial surface of leaves subglabrous with small stellate trichomes (Figures 7J–O, 14N; Table 1) (Krapovickas 2003). In the present work, photos of the species in its habitat are presented for the first time

Distribution, habitat and conservation status:—According to Krapovickas (2003) the species occurs only in state of Santa Catarina, Brazil. Bovini (2020) also mentioned the species to the state of Rio de Janeiro, Brazil. This work presents the first record of the species for the state of Rio Grande do Sul, where it occurs in Tropical forest (Figure 8), in edges or understory of Forests. With the available records, the species is here considered Least Concern (LC) with an EOO of 87,118.693 km² and an AOO of 56 km². Although it can be considered EN by the AOO, conditions B(a), B(b) and B(c) were not met.

Representative specimens:—BRAZIL. Rio Grande do Sul. Arroio do Sal, Balneário Rondinha Velha, 24 March 1989, *M.G. Rossoni 134* (ICN); Torres, perto aeroporto, 10 February 1984, *K. Hagelund* 14867 (HAS, ICN); ibidem, em Itapeva, 17 November 1989, *N. Silveira s.n.* (HAS 95645); ibidem, São Jacó, 26 February 1993, *J. A Jarenkow* 2337 (PEL).

16. ***Sida regnellii*** R.E. Fries (1908: 33) (Figures 8, 9A–E, 14O). Lectotype (designated by Rodrigo 1944: t. 24):—BRAZIL. Rio Grande do Sul. Porto Alegre, Menino Deus, "in campo dumetoso", 03 March 1902, *G. O. A:n Malme* (S 13-21620! [digital image]).

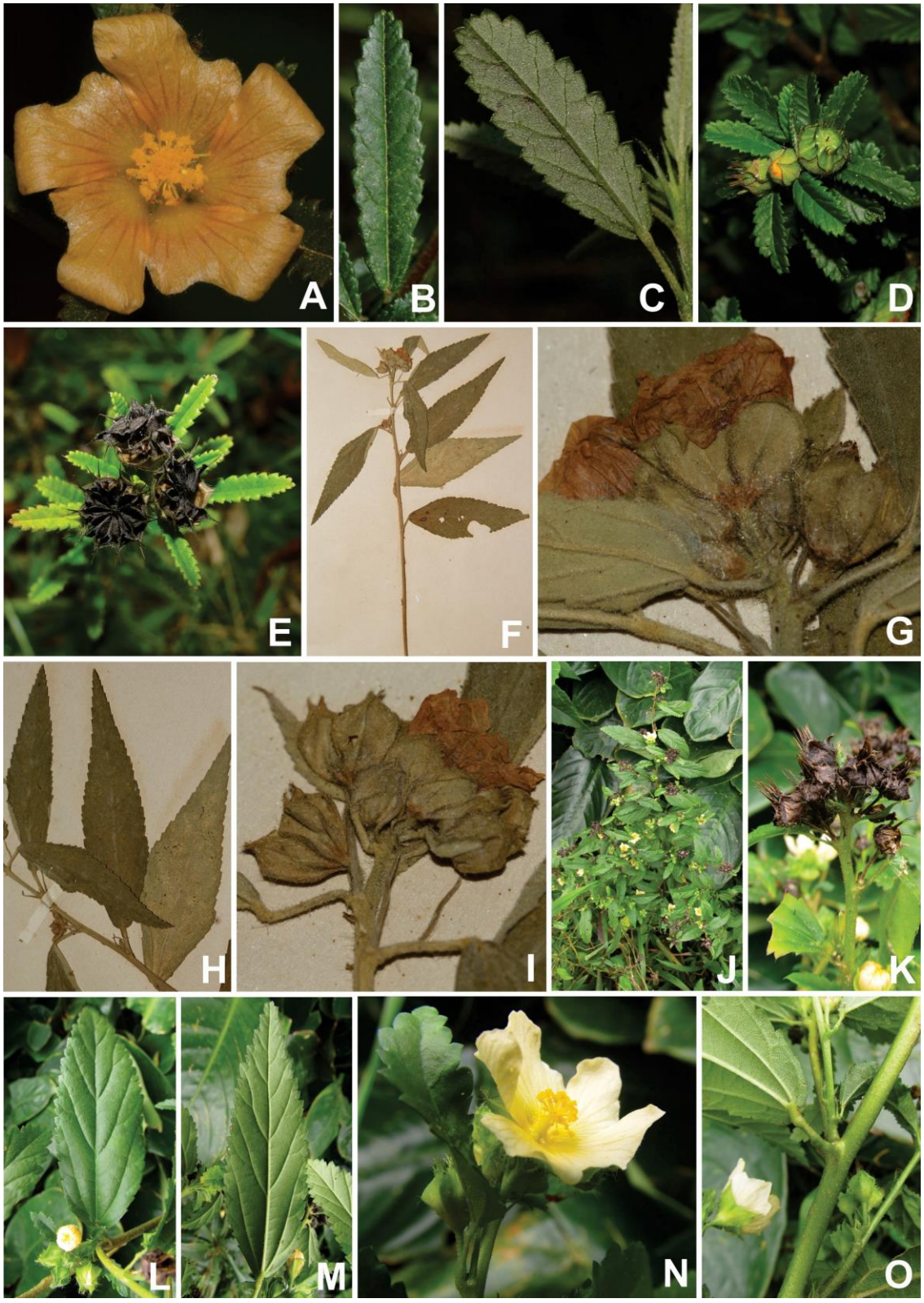

FIGURE 7. A–E. *Sida potentilloides*. **A.** Flower. Adaxial surface of leaf. **C.** Abaxial surface of leaf. **D.** Branch with leaves, immature schizocarps and flower bud. **E.** Branch with leaves and mature schizocarps. **F–J.** *Sida ramoniana*. **F.** Abaxial surface of leaf indument. **G.** Calyx basis indument tomentose. **H.** Stem indument pubescent. **I.** Margin of leaf dentate-crenate. **J–O.** *Sida reitzii*. **J.** Habit. **K.** Schizocarps in terminal glomerules. **L.** Adaxial surface of leaf. **M.** Abaxial surface of leaf. **N.** Flower. **O.** Branch. Photographs A–I by Martin Grings (F–J from *K. Hagelund* 2228, HAS) and J–O by Luís Funez.

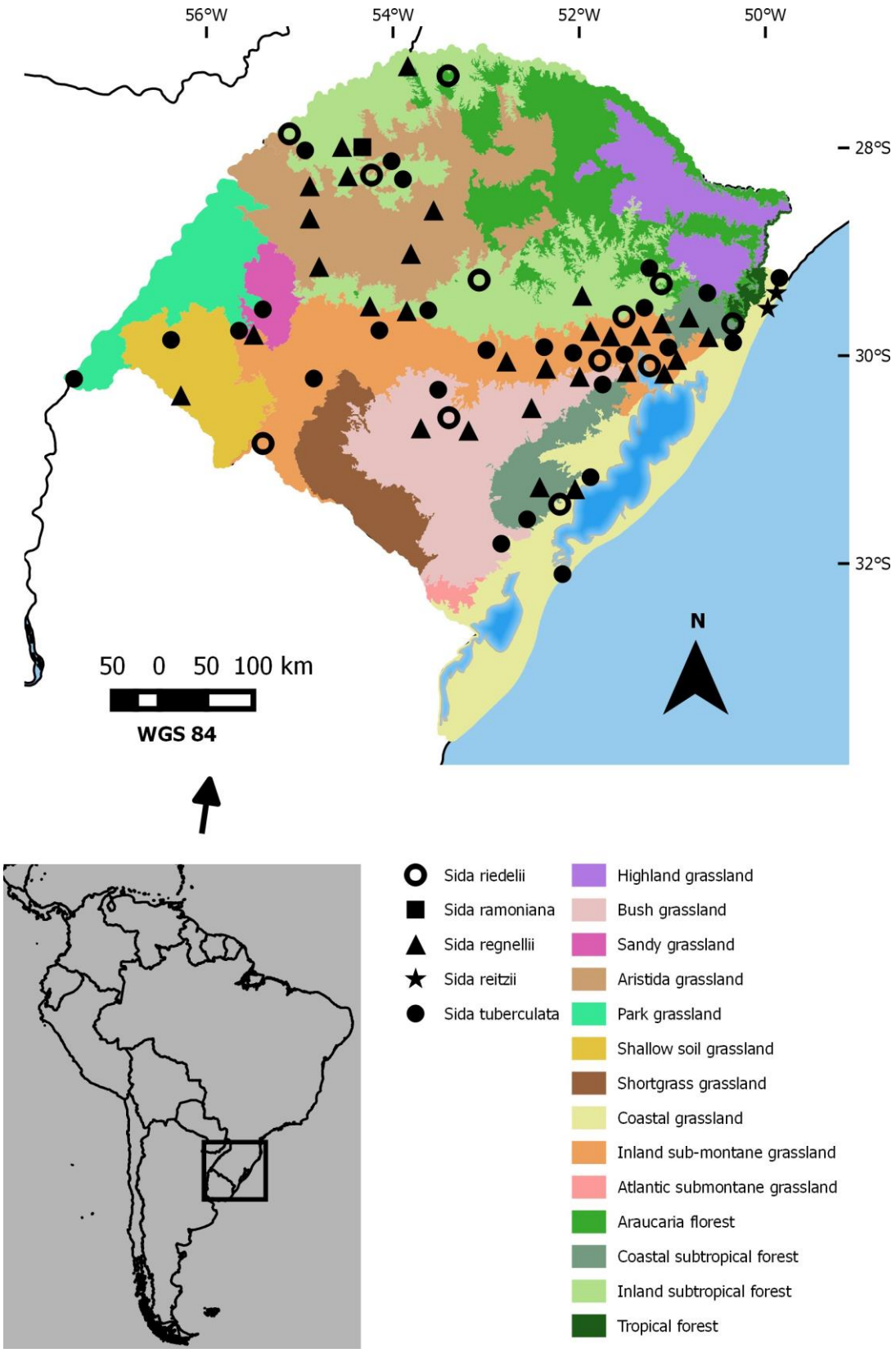

FIGURE 8. Distribution map of *Sida riedelii*, *S. ramoniana*, *S. regnellii*, *S. reitzii* and *S. tuberculata* in Rio Grande do Sul state, Brazil.

Taxonomic notes:—*Sida regnellii* belongs to section *Cordifoliae* by the indument densely stellate-tomentose; leaf blades lanceolate to ovate, dentate-crenate throughout, basally more or less cordate, features pointed out by Fryxell

(1985) for this section (Table 1). It can be distinguished from similar species by its muticous or submuticous mericarps (with aristae up to 0.5 mm long) and by the pink corolla (Figures 9A–E, 14O).

Distribution, habitat and conservation status:—*Sida regnellii* occurs in Argentina, Paraguay and Brazil (Minas Gerais, Paraná and Rio Grande do Sul states) (Zuloaga *et al.* 2008, Bovini 2020). In Rio Grande do Sul the species occurs in Inland sub-montane grassland, Bush grassland, Coastal grassland, Aristida grassland, and in Shallow soil grassland (Figure 8). With the available records, the species is here considered Least Concern (LC) with an EOO of 974,636.157 km² and an AOO of 304 km². Although it can be considered EN by the AOO, conditions B(a), B(b) and B(c) were not met. In addition, the species is common in its area of occurrence, mainly in the state of Rio Grande do Sul, which is not reflected in the number of records in herbaria.

Representative specimens:—BRAZIL. Rio Grande do Sul. Bossoroca, Projeto de Assentamento Noel Guarany, 04 April 2009, *M. Grings 815* (ICN); Caçapava do Sul, beira da BR-153, 26 April 2009, *M. Grings 2057* (ICN); Porto Alegre, Glória, 03 February 1950, *A. Sehnem 4403* (PACA); Quaraí, Fazenda do Jarau, January 1945, *B. Rambo s.n.* (PACA 26087); Taquari, Cerro Pelado, 06 December 2000, *A. Knob & S. A.L.Bordignon 6620* (UNILASALLE).

17. ***Sida rhombifolia*** Linnaeus (1753: 684) (Figures 9F–J, 10, 14P). Lectotype designated by Rodrigo 1944: t. 28):—"Habitat in India utraque, rhombifolia. 2", s.d., s.c., s.n. (LINN 866.3! [digital image], isolectotype S).

Taxonomic notes:—The species can be distinguished from others in section *Sidae* (Table 1) Series *Sida* by its stellate-puberulous or farinaceous indumentum, presence of 8–14 mericarps with two awns 2 mm long and without a basal prominence, bracts absent in the flowers, calyx puberulous without long simple trichomes, adaxial surface of leaves subglabrous only with sparse and small stellate trichomes (Figures 9F–J, 14P) (Krapovickas 2014, Yoshikawa *et al.* 2019). Although Krapovickas (2014) stated that the petals of *Sida rhombifolia* do not have a red basal spot, individuals with this feature were observed in Rio Grande do Sul.

Distribution, habitat and conservation status:—*Sida rhombifolia* is a pantropical species almost cosmopolitan (Krapovickas 2014, Brandão *et al.* 2017), extending into temperate zones (Fryxell 1988, Brandão *et al.* 2017). In Rio Grande do Sul the species is also widely distributed, occurring in all regions (Figure 10), in ruderal environments and anthropized grasslands. For these reasons, the species is here considered Least Concern (LC).

Representative specimens:—BRAZIL. Rio Grande do Sul. Bagé, rio próximo à cidade, 04 April 1975, *B. irgang et al. s.n.* (ICN 027419); Caçapava do Sul, margem da BR-153, 26 April 2009, *M. Grings 2058* (ICN); Caxias do Sul, Bairro Nossa Senhora da Saúde, 12 April 2011, *J. Gaio 21* (HUCS); Fontoura Xavier, 696 m, WGS 84 28°55'12.5"S 052°21'28.2"W, 02 March 2019, *M. Grings 2023* (ICN); Iraí, Balneário Osvaldo Cruz, 24 January 1990, *A. Krapovickas & C.L. Cristóbal 43499* (CTES, HAS); Júlio de Castilhos, na BR-392 estrada para Cruz Alta, 28 April 1988, *N. Silveira et al.7228* (HAS, ICN); Quaraí, Garopá, 14 January 1941, *B. Rambo s.n.* (PACA 4175); Rio Grande, Estação Ecológica do Taim, March 1981, *J.L. Waechter 1831* (HAS); Santa Maria, Distrito de Santo Antão, Pedra do Lagarto, 230 m, WGS 84 29°37'38.52"S 53°52'25.40"W, 26 December 2018, *M. Grings et al. 2005* (ICN); Uruguaiana, Campus Universitário da Unipampa, BR 472, Km 585, 15 April 2011, *H.S da Rosa s.n.* (ICN 167493); Vacaria, Parque de Rodeios, 27 April 2019, *M. Grings 2031* (ICN).

18. ***Sida riedelii*** K. Schumann (1891: 296) (Figures 8, 9L–P, 14Q). Lectotype (designated here)**:**—BRAZIL. "Habitat in fruticetis provinciae S. Paulo prope Sorocaba", February 1834, *Riedel 2021* (P barcode 02285468! [digital image]; isolectotypes K barcode 000528438! [digital image], NY barcode 00021252! [digital image], US barcode 00131232! [digital image], US barcode 00097968! [digital image], LE barcode 00015022! [digital image], LE barcode 00015021! [digital image], LE barcode 00015020! [digital image]).

Nomenclatural notes:—Schumann (1910) designated the collection Riedel 2021 as type from *Sida riedelii*. However, there are eight specimens of this collection, all syntypes, deposited in herbaria P, K, NY, US, and LE. Therefore, one of the specimens, from the herbarium P, was designated as a lectotype, because it is representative of the species.

Taxonomic notes:—*Sida riedelii* is a species very similar to *Sida spinosa*, from which it is distinguished by the hyaline and crumbly dorsal face of its mericarps (Figures 9L–P, 14Q) (Schumann 1891, Krapovickas 2005).

Distribution, habitat and conservation status:—Pantropical species according to Krapovickas (2005). Occurs in Paraguay, Argentina and Brazil according to Zuloaga *et al.* (2008) and in Bolivia according to Alverson *et al.* (2014). In state of Rio Grande do Sul occurs in Coastal grassland, Shadow soil grasslands, Aristida grassland, Araucaria Forest, Inland subtropical Forest, and in Coastal subtropical Forest (Figure 8), in ruderal environments and anthropized grasslands. The species is here considered Least Concern (LC) because it has large EOO and AOO, since it is a frequent and ruderal species.

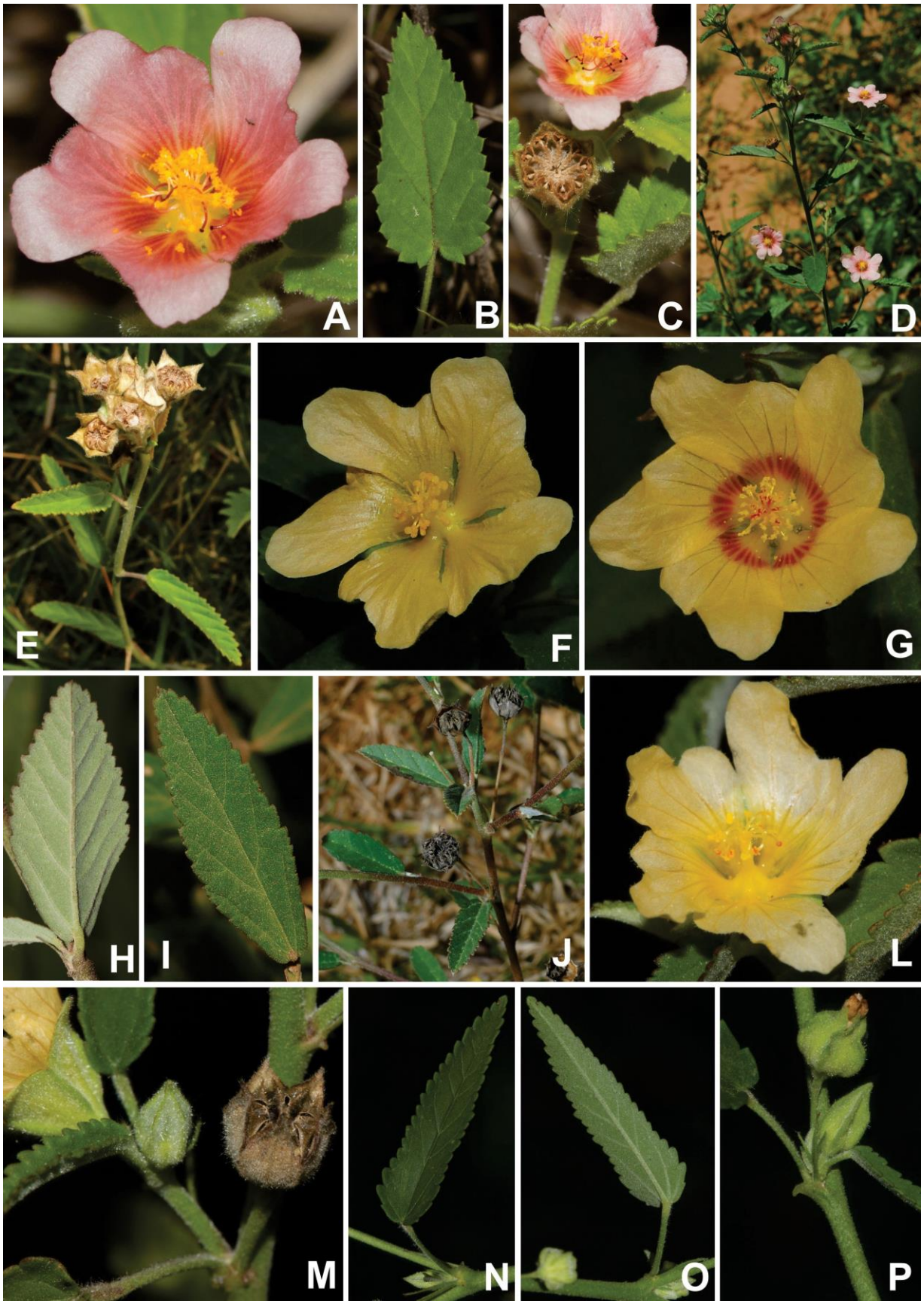

FIGURE 9. A–E. *Sida regnellii*. **A.** Flower. **B.** Adaxial surface of leaf. **C.** Branch with flower, leaves and mature schizocarp. **D.** Habit. **E.** Branch with leaves and mature schizocarps. **F–J.** *Sida rhombifolia*. **F, G.** Flowers. **H.** Abaxial surface of leaf. **I.** Adaxial surface of leaf. **J.** Branch with mature mericarps. **L–P.** *Sida riedelii*. **L.** Flower. **M.** Branch with leaves, flower bud and mature mericarp. **N.** Adaxial surface of leaf. **O.** Abaxial surface of leaf. **P.** Branch with tubercle at petiole base. Photographs by Martin Grings and Sérgio A.L. Bordignon (D).

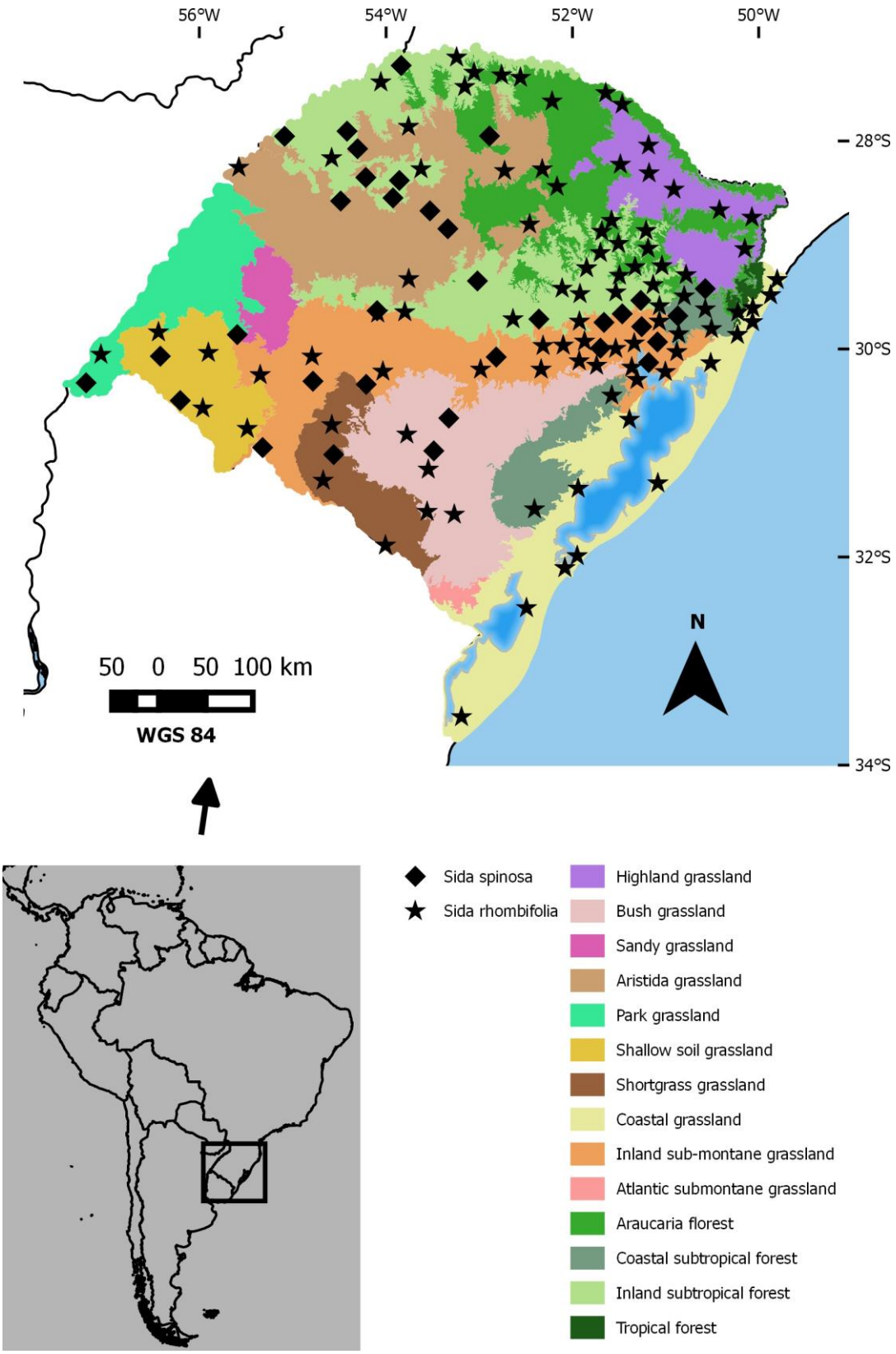

FIGURE 10. Distribution map of *Sida spinosa* and *S. rhombifolia* in Rio Grande do Sul state, Brazil.

Representative specimens:—BRAZIL. Rio Grande do Sul. Frederico Westphalen, Castelinho, Posto Atlântico, 28 October 1976, *L. Arzivenco s.n.* (ICN 48510); Montenegro, Polo Petroquímico, 03 November 1977, *O. Bueno 748*

(HAS); Nova Petrópolis, Bairro Pousada da Neve, 04 May 2020, *M. Grings 2141* (ICN); Santana do Livramento, BR 293, 09 December 1986, *O. Bueno 4820/*A (HAS); Santo Ângelo, Granja Piratini, 25 January 1969, *K. Hagelund 5575* (HAS); São Lourenço do Sul, 7 Km da ponte de divisa com Camaquã, 07 January 1980, *O. Bueno 2071* (HAS).

19. ***Sida rubifolia*** A. Saint-Hilaire (1825: 183–184) (Figures 5, 11A–D, 14R). Lectotype (designated here)**:**—BRAZIL. Rio Grande do Sul. 1820–1821, *A. St.-Hilaire C2/2759* ^{bis} (P barcode 02285470! [digital image]; isolectotypes P barcode 02285472! [digital image], P barcode 02285471! [digital image], MPU barcode 016967! [digital image]).

= *Sida pseudorubifolia* Krapovickas & Bueno (2007a: 203). *Syn. nov*. Holotype**:**—BRAZIL. Rio Grande do Sul. Tupanciretan, in campo, 29 January 1942, *Rambo 9472* (PACA!; isotype LIL).

Taxonomic notes:—According to Krapovickas (2007a) the species belongs to the section *Cordifoliae* due to the presence of subcordate leaves and 10 mericarps (Table 1). *Sida rubifolia* can be distinguished from other species in the section by the prostate or decumbent habit; mericarps 4 × 2.5 mm; petals 20 mm long, yellow or pink. In the present work, photos of the species in its habitat are presented for the first time (Figures 11A–D, 14R).

Nomenclatural notes:—The specimen P 02285470, chosen as a lectotype, has two labels, the one on the right referring that the collection was carried out in Rio Grande do Sul state under number C2/2759 bis and the left label with informations that the collection was carried out in Minas Gerais state, as stated in the protologue. In Herter (1945) we can see that the collection C2/2759 bis of A. Saint-Hilaire was carried out in the state of Rio Grande do Sul, in a region that includes the locations of Quaraim (Quaraí), Ibicui, Santa Borja (São Borja), São Luis (São Luiz Gonzaga), São Miguel (São Miguel das Missões), São João, Rio Pardo, where the species actually occurs. In Dwyer (1955) we can also see that collections 2567–2797 of A. Saint-Hilaire were carried out in State of Rio Grande do Sul. In other words,
A. St.-Hilaire was in Rio Grande do Sul on the date of collection of *Sida rubifolia*. Examining the type materials, we found that they are in accordance with the morphology of the species found in Rio Grande do Sul. The morphology of *S. rubifolia*, including mericarps, in the illustration presented by A. Saint-Hilaire (1825) is also in accordance with the morphology of the plant that occurs in the state of Rio Grande do Sul. In addition, the species was never found again in Minas Gerais, as mentioned in the protologue. There seems to be an error in the location shown in the protologue. Krapovickas and Bueno (2007a), in the description of *Sida pseudorubifolia*, do not morphologically distinguish it from *Sida rubifolia*. After analyzing the type and protologue of both, it was concluded that *Sida pseudorubifolia* Krapovickas & Bueno is the same species already described as *Sida rubifolia* A.St.-Hilaire. Therefore, we propose the synonymization of *Sida pseudorubifolia*.

Distribution, habitat and conservation status:—This species is endemic to Rio Grande do Sul, where it occurs in distinct types of grasslands: Aristida grassland, Sandy grassland, Bush grassland and Inland sub-montane grassland (Figure 5). According to IUCN (2017), criterion B2ab(iii), the species is considered Vulnerable (VU), with an Extent of occurrence of 32,319 km², an Area of occupancy of 44 km², and occurring in about 11 locations. In addition, state of Rio Grande do Sul is facing an increase in loss of grasslands, converted or degraded, mostly by soybean cropland (Andrade *et al.* 2015).

Representative specimens:—BRAZIL. Rio Grande do Sul. Cachoeira do Sul, BR-290 próximo ao km 177, March 1985, *O. Bueno 4368* (HAS); Encruzilhada do Sul, Serra dos Pedrosos, -30.7697223º S -52.9111111º W, 1º December 2012, *M. Verdi & J.A. Jarenkow 6335* (FURB); Santiago, S 29º06'18" W 54º58'35", 28 November 2019, *S. Bordignon & J.R. Stehamnn, 5919* (UNILASALLE); São Francisco de Assis, RST 377 km 320, WGS 84 -29.616944º S -55.051111º W, 21 November 2008, *E. Freitas 619* (ICN).

20. ***Sida spinosa*** Linnaeus (1753: 683–684) (Figures 10, 11E–K, 14S) Holotype**:**—"Habitat in India" (LINN 866.1! [digital image]).

Taxonomic notes:—*Sida spinosa* belongs to section *Spinosae* (Fryxell 1985) (Table 1). One of its striking features is the presence of a small projection, tubercle, such as a spine, but not sharp, in the base of petioles. This feature can also be found in *Sida riedelii*, a very similar species, that is distinguished by the hyaline and crumbly dorsal face of its mericarps (Schumann 1891, Krapovickas 2005), vs. mericarps with complete and reticulated dorsal face, which does not easily break (Figures 11E–K, 14S). The species *Sida tuberculata* can also present a tubercle at the base of the petioles, which are generally smaller. However, *Sida tuberculata*, has more than five mericarps.

Distribution, habitat and conservation status:—This species is pantropical, and also occurs in adjacent temperate zones (Fryxell 1985, Fuertes Aguilar 1995, Brandão *et al.* 2017). In Brazil *S. spinosa* occurs in northeast, southeast, midwest and south (Bovini 2020) and in all regions of Rio Grande do Sul state (Figure 10), in ruderal environments and anthropized grasslands, except in Coastal grassland. The species is here considered Least Concern (LC) because it has

large EOO and AOO, since it is a frequent and ruderal species, widely distributed.

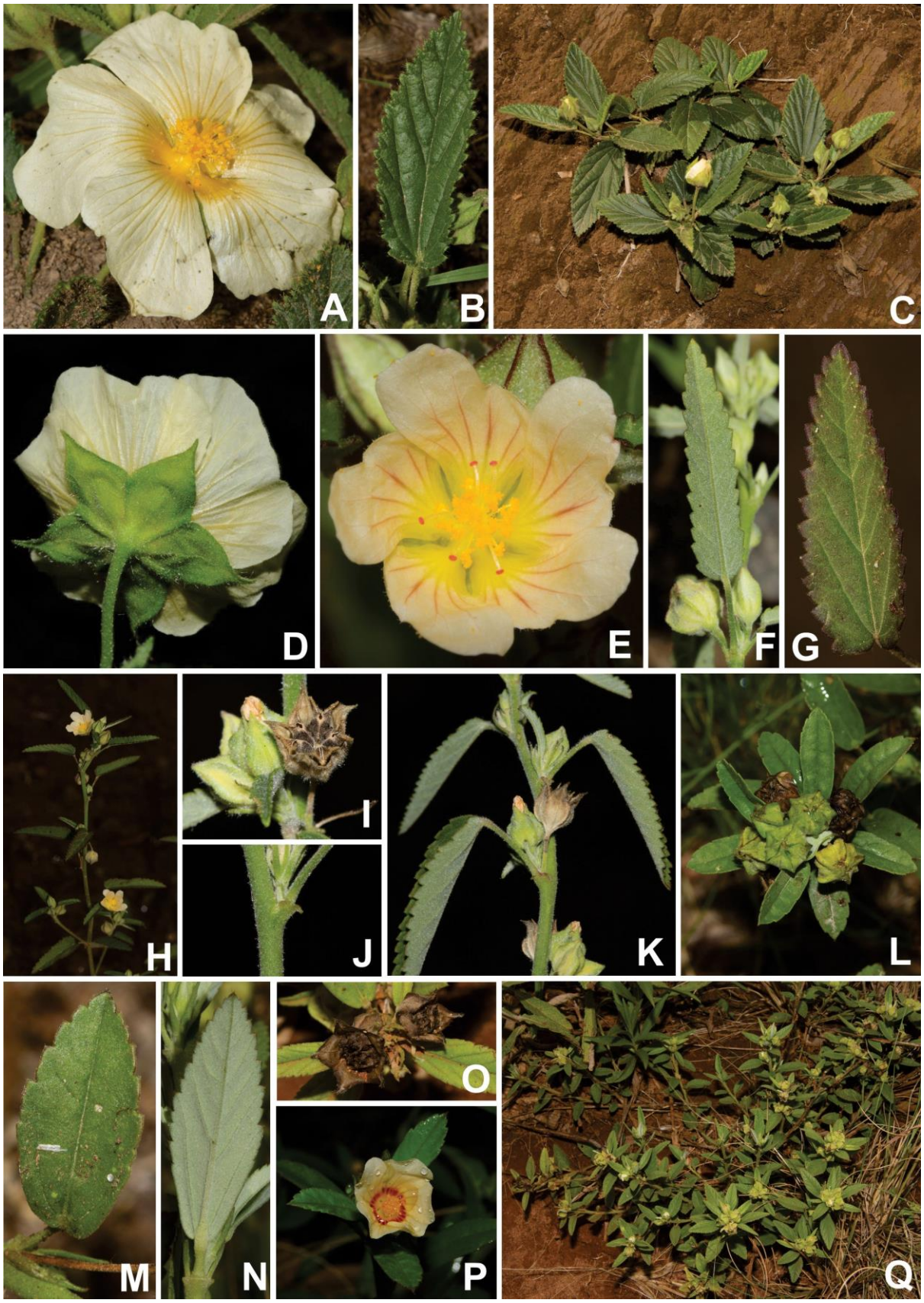

FIGURE 11. A–D. *Sida rubifolia*. **A.** Flower. **B.** Adaxial surface of leaf. **C.** Prostrate habit. **D.** Calyx and corolla. **E–K.** *Sida spinosa*. **E.** Flower. **F.** Abaxial surface of leaf. **G.** Adaxial surface of leaf. **H.** Habit. **I.** Mature schizocarp. **J.** Branch with tubercle at petiole base. **K.** Branch. **L–Q.** *Sida tuberculata*. **L.** Branch with leaves, mature and immature schizocarps. **M.** Adaxial surface of leaf. **N.** Abaxial surface of leaf. **O.** Mature schizocarps. **P.** Branch with flower. **Q.** Habit. Photographs by Martin Grings.

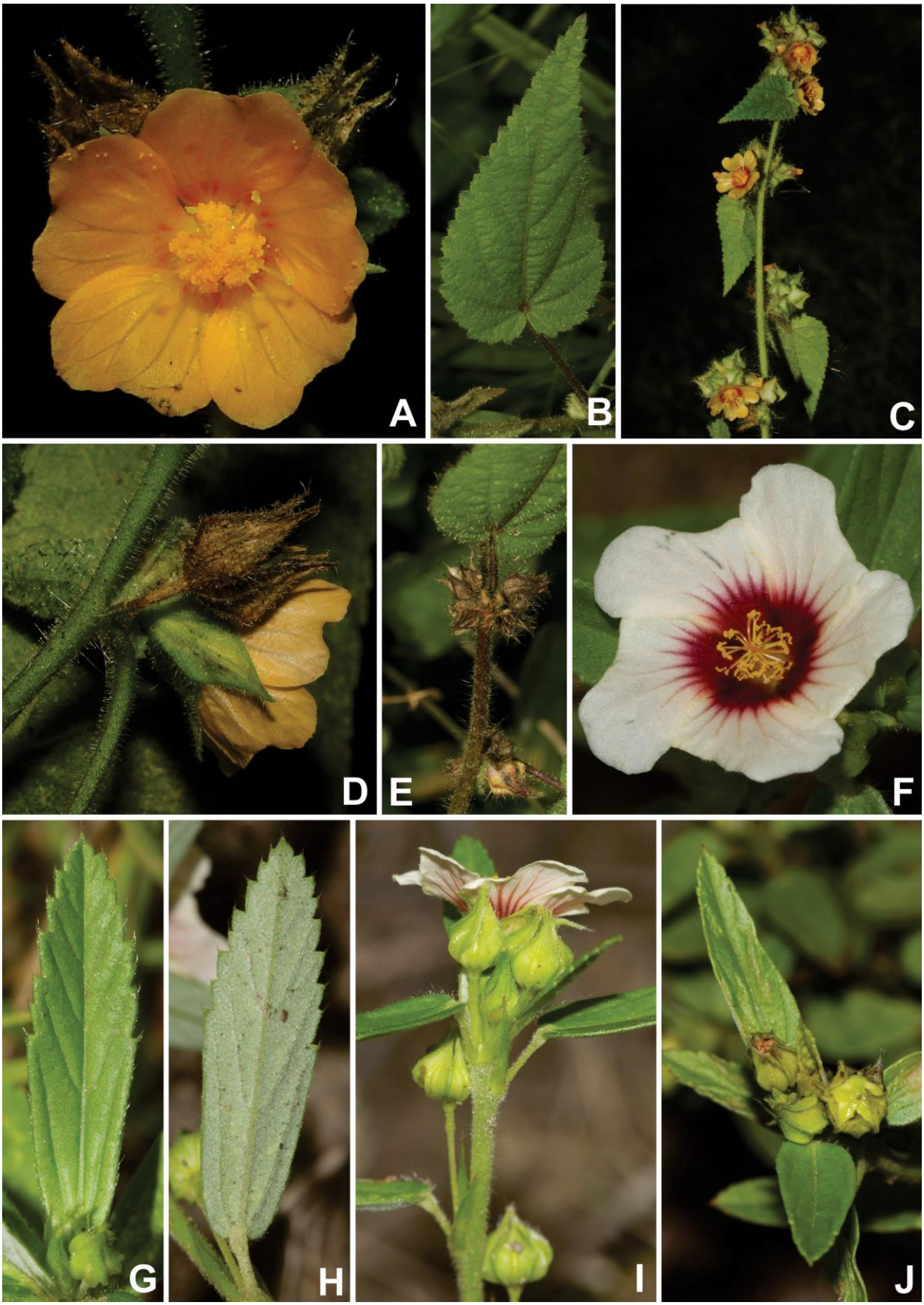

FIGURE 12. A–E. *Sida urens*. **A.** Flower. **B.** Adaxial surface of leaf. **C.** Branch with flowers and flowers buds. **D.** Schizocarp. **E.** Branch with mature schizocarps. **F–J.** *Sida viarum*. **F.** Flower. **G.** Adaxial surface of leaf. **H.** Abaxial surface of leaf. **I.** Branch. **J.** Immature schizocarps and leaves. Photographs by Martin Grings.

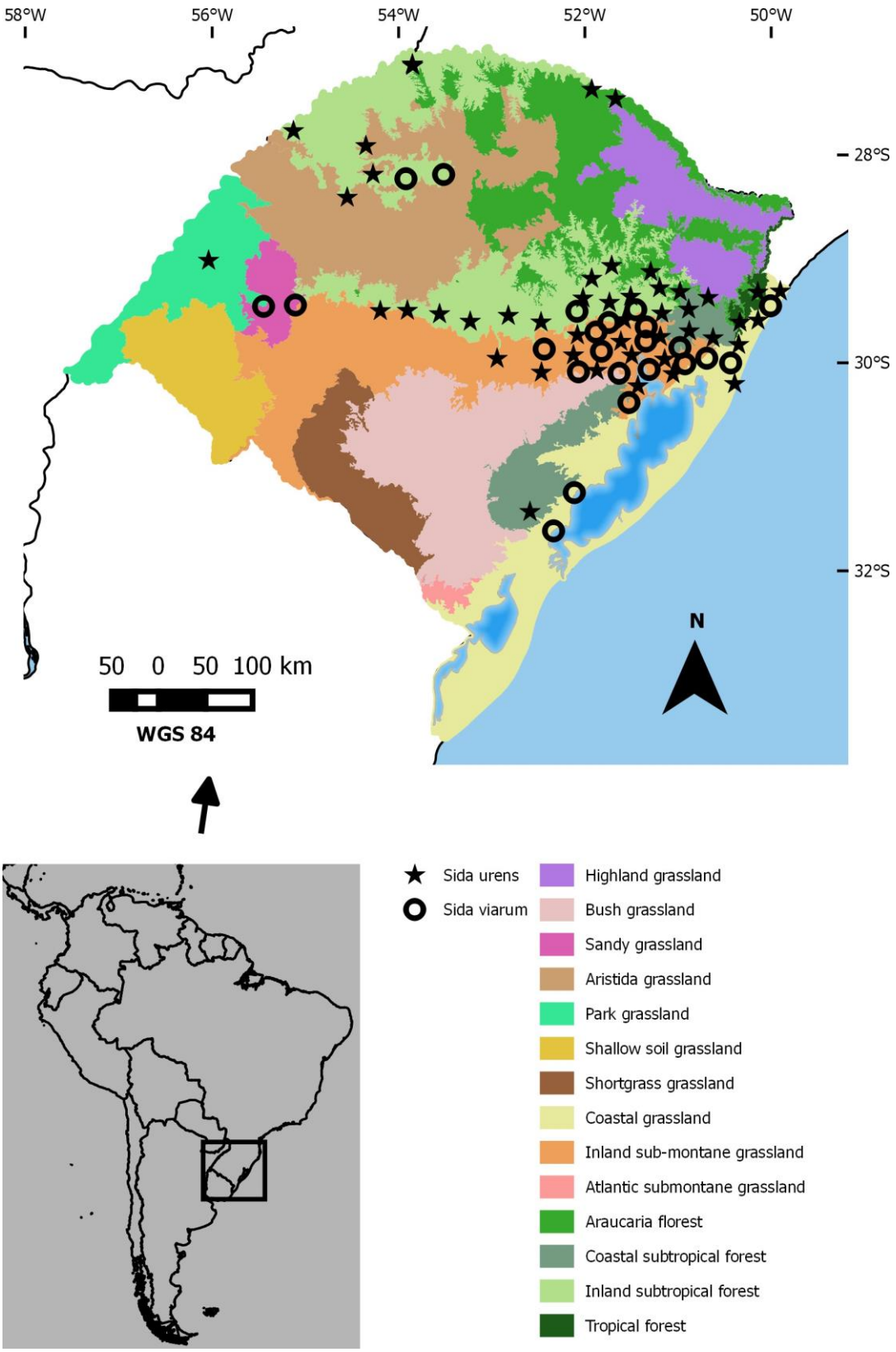

FIGURE 13. Distribution map of *Sida urens* and *S. viarum* in Rio Grande do Sul state, Brazil.

Representative specimens:—BRAZIL. Rio Grande do Sul. Augusto Pestana, Rosário, 19 February 1954, *J. Pivetta 879* (ICN, PACA); Barra do Quaraí, Parque Estadual do Espinilho, 30º11'22.5" S 57º29'46.5" W, 16 December

2019, *M. Grings & R. Paniz 908* (ICN); Boa Vista do Incra, Projeto de Assentamento 28 de abril, 03 April 2009, *M. Grings 2060* (ICN); Caçapava do Sul, próximo a Pedra do Segredo, 23 November 2018, *M. Grings & J. Schaefer 1971* (ICN); Derrubadas, Parque Estadual do Turvo, December 1982, *D.B. Falkenberg 302* (FLOR); Gravataí, Cachoeirinha, 07 January 1949, *B. Rambo s.n*. (PACA 39567); Uruguaiana, BR-290, 154 m, WGS 84 S -29.86468º W -056.88529º, 03 December 2020, *M. Grings et al. 2198* (ICN).

21. ***Sida tuberculata*** R.E. Fries (1908: 33) var. ***pseudo-rhombifolia*** Monteiro (1949: 522) (Figures 8, 11L–Q, 14T) Lectotype (designated by Krapovickas 2014: 111):—BRAZIL. Minas Gerais: Belo Horizonte, 29-I-1934. *H. Monteiro 711* (RBR!, isotype US!).

Taxonomic notes:—*S. tuberculata* var. *pseudo-rhombifolia* belongs to section *Sidae* (Table 1) and is a species morphologically related to *Sida viarum* and *Sida rhombifolia* (Krapovickas 2014, Monteiro-Filho 1949). It differs from these species by the presence of 6–8 mericarps (rarely nine), vs. 5 mericarps in *S. viarum* and 9–14 mericarps in *S. rhombifolia*; presence of simple trichomes on the margins of the calyx lobes; flowers solitary or crowded in subsessile axillary glomerules, the pedicels up to 15 mm long on solitary flowers (Figures 11L–Q, 14T) (Krapovickas 2005, Brandão *et al.* 2017).

Distribution, habitat and conservation status:—The species occurs in Venezuela, Bolivia, Paraguay, Argentina, Uruguay and Brazil (northeast, midwest, southeast and south) (Krapovickas 2014, Bovini 2020). In Rio Grande do Sul the species occurs in Park grassland, Sandy grassland, Shallow soil grassland, Inland sub-montane grassland, Bush grassland, Highland grassland, Aristida grassland, Coastal grassland and Inland subtropical Forest (Figure 8). The species is here considered Least Concern (LC) because it has large EOO and AOO, since it is a frequent and ruderal species, and widely distributed.

Representative specimens:—BRAZIL. Rio Grande do Sul. Alegrete, Estação do Tigre, 23 November 1958, *J. Mattos 6223* (HAS); Barra do Quaraí, Parque Estadual do Espinilho, 54 m, WGS 84 S -30.202154° W -57.505048°, 02 December 2020, *M. Grings et al. 2197* (ICN); Caçapava do Sul, defronte a Pedra do Segredo, 25 March, 1995, *O. Bueno et al. 4198* (HAS); Caxias do Sul, Água Azul, 10 January 1981, *O. Bueno 2882* (HAS); Giruá, Granja Sodal, 04 April 1966, *K. Hagelund 4223* (HAS); Porto Xavier, 28 Km SE de Porto Xavier, 18 February 1978, *A. Krapovickas & C.L. Cristóbal s.n.* (ICN 45915); Cristal, 7 Km da ponte de divisa com Camaquã, BR-116, 07 January 1980, *O. Bueno 2064* (HAS); São Pedro do Sul, 03 December 1981, *O. Bueno 3425* (HAS).

22. ***Sida urens*** Linnaeus (1759: 1145) (Figures 12A–E, 13, 14U) Lectotype (designated by Rodrigo 1944: t. 17):—JAMAICA. *Browne s.n.* (LINN *866.20*! [digital image]).

Taxonomic notes:—The species belongs to section *Nelavagae* and is characterized by the presence of muticous or submuticous mericarps, stems with glandular trichomes and with long simple trichomes, and by decumbent or scandent habit (Figures 12A–E, 14U; Table 1) (Krapovickas 2006).

Distribution, habitat and conservation status:—*Sida urens* has a wide distribution, and occurs in tropical Africa, the Caribbean, and tropical America, from southern Florida and Mexico to northern Argentina and Brazil, where it is found in all regions, but not in all states (Krapovickas 2006, Brandão *et al.* 2017, Bovini 2020). In Rio Grande do Sul the species occurs in Aristida grassland, Park grassland, Inland subtropical grassland, Coastal grassland, Araucaria Forest, Coastal subtropical Forest and in Tropical Forest, in ruderal environments and anthropized grasslands (Figure 13). The species is here considered Least Concern (LC) because it has large EOO and AOO, since it is a frequent and often ruderal species and is present in more than one continent.

Representative specimens:—BRAZIL. Rio Grande do Sul. Barra do Ribeiro, Coxilha das Lombas, WGS 84 -30.291099º S -51.301101º W, 15 December 2008, *M. Grings 652* (ICN); Derrubadas, Parque Estadual do Turvo, acesso 2, alojamento, 436 m, WGS 84 -27.249794º S -53.949206º W, 03 Ocotober 2015, *F. Gonzatti 2183* (HUCS); Maquiné, E.E.F., June 1992, *N. Silveira 11520* (HAS!); Monte Belo do Sul, Linha 80 da Leopoldina, 470 m, WGS 84 - 29.162799º S -51.631698º W, 16 March 2015, *F. Gonzatti 2038* (ICN); Santa Maria, Distrito Boca do Monte, próximo ao Balneário Timbaúva, 175 m, WGS 84 -29.699722º S -54.045833º W, 26 December 2018, *M. Grings et al. 2002* (ICN); São Miguel das Missões, 251 m, S-28.404444, W-54.542778 WGS84, 09 February 2011, *A.A. Schneider 1726* (ICN!); Sapiranga, Morro Ferrabráz, próximo ao monumento Muckers, WGS 84 -29.638099º S -51.006900º W, 04 October 2008, *M. Grings 654* (ICN, HUCS); Torres, Morro do Elisário (Morro do Tamburiki), WGS 84 -29.374769° S -49.792087° W, 20 April 2019, *M. Grings 2074* (ICN).

23. ***Sida viarum*** A.St.-Hil. (1825: 182) (Figures 12F–J, 13, 14V). Lectotype (first step inadvertently designated by Fryxell 1985: 76, corrected from “type”; second-step lectotypification designated here):—BRAZIL. Minas Gerais.

Comarca do rio das Mortes, *A. St-Hilaire D/352* (P barcode 02285493! [digital image]; isolectotypes P barcode 02285494! [digital image], P barcode 02285495! [digital image], MPU barcode 017042! [digital image]).

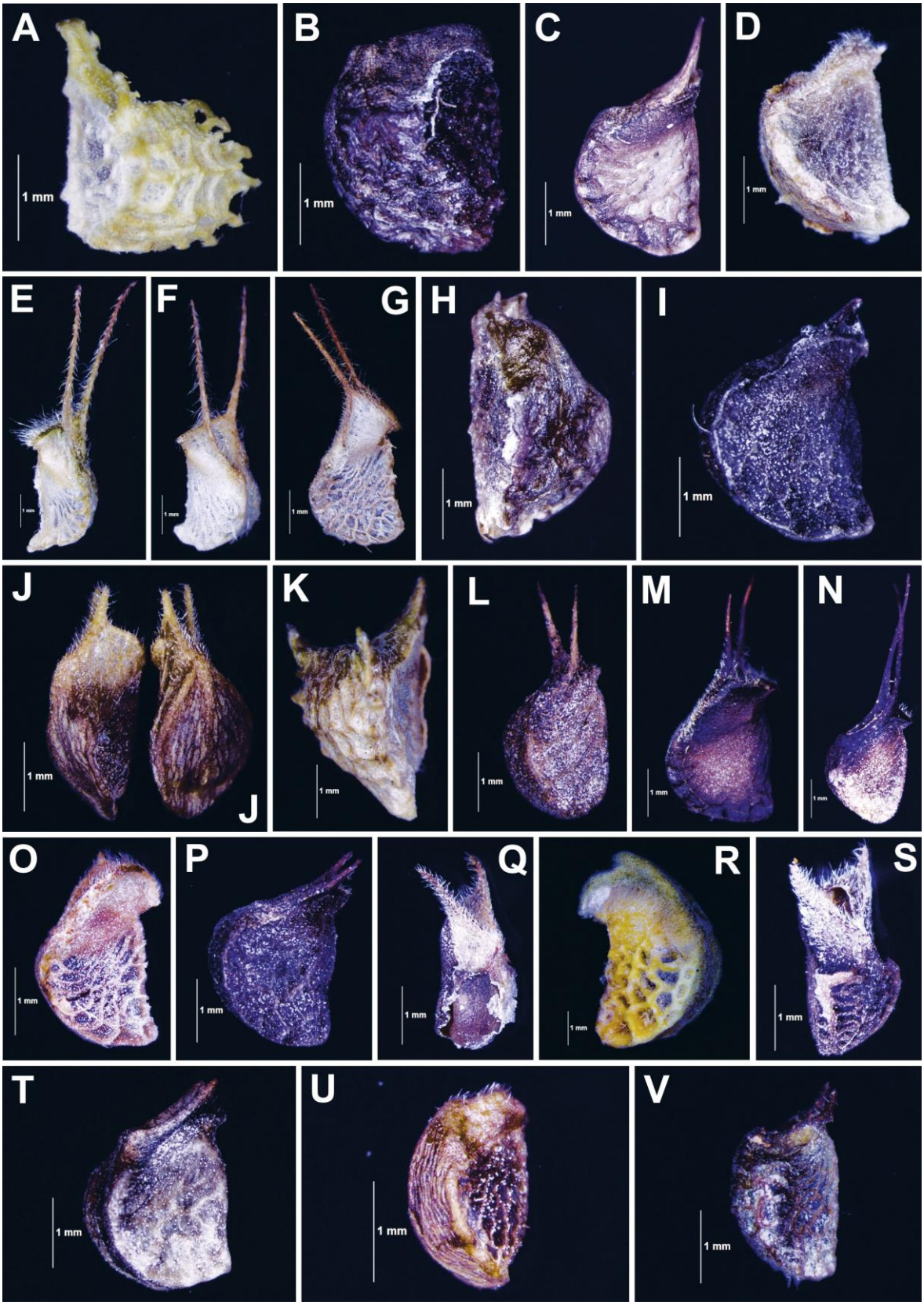

FIGURE 14. Mericarps. **A.** *Sida anomala.* **B.** *Sida confusa.* **C.** *Sida farroupilhensis.* **D.** *Sida glaziovii.* **E.** *Sida cerradoensis*. **F.** *Sida cordifolia*. **G.** *Sida dubia.* **H.** *Sida linifolia.* **I.** *Sida lonchitis.* **J.** *Sida nemorensis.* **K.** *Sida paradoxa.* **L.** *Sida planicaulis.* **M.** *Sida potentilloides.* **N.** *Sida reitzii.* **O.** *Sida regnellii.* **P.** *Sida rhombifolia.* **Q.** *Sida riedelii*. **R.** *Sida rubifolia.* **S.** *Sida spinosa.* **T.** *Sida tuberculata.* **U.** *Sida urens.* **V.** *Sida viarum.* Photographs by Martin Grings.

Taxonomic notes:—The species belongs to section *Sidae* (Table 1) Series *Viarumae*. This Series is characterized by the presence of 5 mericarps (Krapovickas 2014). The species is also characterized by the persistent stipules after leaf fall, by calyx 5 mm long (Monteiro-Filho 1949) and corolla white with adaxial red basal spot (Figures 12F–J, 14V).
Distribution, habitat and conservation status:—*Sida viarum* is a South American species (Argentina, Brazil, Bolivia and Paraguay) that reaches as far north, southern Mexico (Fryxell 1988, Zuloaga *et al.* 2008, Alverson *et al.* 2014). In Brazil the species occurs in north, northeast, midwest, southeast and south region, but not in all states (Zuloaga *et al.* 2008, Bovini 2020). In Rio Grande Sul, the species is distributed in Bush grassland, Inland sub-montane grassland, Sandy grassland, Coastal grassland, and occasionally in Aristida grassland (Figure 13). The species is here considered Least Concern (LC) because it has a large EOO (greater than 3,000,000 km²) and an AOO around 2,000 with the available records.
Representative specimens:—BRAZIL. Rio Grande do Sul. Arroio dos Ratos, Granja Faxinal, 01 February 1977, *K. Hagelund 11101* (ICN); Ijuí, Km 352 da BR-285, November 1984, *O. Bueno et al. 3902* (HAS); Osório, butiazal, 29 November 2014, *F. Gonzatti 1445* (ICN); Porto Alegre, Morro da Tapera, 14 December 2008, *M. Grings 804* (ICN); São Francisco de Assis, entre S. F. de Assis e Santiago, 8 km após a primeira, 09 February 1990, *D. Falkenberg & M. Sobral 5064* (ICN); São Sebastião do Caí, Conceição, 14 December 1948, *B. Rambo s.n.* (PACA 38797).

Conclusions

As mentioned before, the state of Rio Grande do Sul has two Brazilian biomes, the Pampa and the Atlantic Forest. Among the 23 species that occur in the state, 18 are found in Pampa biome (*S. anomala, S.confusa, S. cordifolia, S. dubia, S. glaziovii, S. linifolia, S. paradoxa, S. planicaulis, S. potentilloides, S. ramoniana, S. regnellii, S. rhombifolia, S. riedelii, S. rubifolia, S. spinosa, S. tuberculata, S. urens, S. viarum*), and 15 are found in the Atlantic Forest biome (*S. cerradoensis, S. confusa, S. cordifolia, S. farroupilhensis, S. linifolia, S. lonchitis, S. nemorensis, S. planicaulis, S. potentilloides, S. reitzii, S. rhombifolia, S. riedelii, S. spinosa, S. tuberculata, S. urens*). Two species are restricted to the territory of Rio Grande do Sul, *Sida rubifolia*, endemic in the Pampa biome, and *Sida farroupilhensis*, endemic in the Atlantic Forest Biome. In relation to the habitat, 11 occur in grasslands (*S. anomala, S. confusa, S. cordifolia, S. dubia, S. paradoxa, S. ramoniana, S. regnellii, S. riedelii, S. rubifolia, S. tuberculata, S. viarum*), 6 occur in Forests or edges of Forests (*S. farroupilhensis, S. lonchitis, S. nemorensis, S. planicaulis, S. potentilloides, S. reitzii*) and 12 are ruderal (*S. cerradoensis, S. cordifolia, S. glaziovii, S. linifolia, S. lonchitis, S. planicaulis, S. potentilloides, S. rhombifolia, S. riedelii, S. spinosa, S. tuberculata, S. urens*). Regarding the conservation status evaluation of the species, one is considered vulnerable (VU), *S. rubifolia*, two are considered endangered (EN), *S. confusa* and *S. paradoxa* and one is considered critically endangered (CR), *S. ramoniana*. Concerning to new synonyms and lectotypifications, two names are new synonyms (*S. krapovickasii* and *S. pseudorubifolia*) and seven names were lectotypified (*S. anarthra, S. cerradoensis, S. paradoxa, S. planicaulis, S. riedelii, S. rubifolia, S. viarum*). For six species, photos of them in their habitat are presented for the first time, *S. farroupilhensis, S. nemorensis, S. paradoxa, S. potentilloides, S. reitzii*, and *S. rubifolia*. Finally, nine species are new records for the state of Rio Grande do Sul (*S. cerradoensis, S. confusa, S. cordifolia, S. glaziovii, S. lonchitis, S. nemorensis, S. ramoniana, S. reitzii, S. riedelii*).

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2.7. FLORA DE SANTA MARIA, REVISITADA, ANGIOSPERMAS NATIVAS E NATURALIZADAS – MALVACEAE

Capítulo do livro publicado pela Editora UFSM (2022), páginas 206 a 229.

MALVACEAE JUSS.

MARTIN GRINGS, MATHEUS GAZZOLA & ILSI IOB BOLDRINI

Ervas, subarbustos, arbustos, lianas ou árvores, geralmente com tricomas estre- lados e/ou tricomas simples, bifurcados ou glandulares. Folhas simples ou com-postas, alternas, com estípulas, em geral palmatinérveas, margem geralmente recortada, raro inteira. Inflorescências cimosas ou racemosas, axilares, terminais ou reduzidas a uma única flor. Epicálice com três ou mais bractéolas, logo abaixo do cálice, presente ou ausente. Flores geralmente vistosas, bissexuadas, raro unissexuadas, geralmente actinomorfas, diclamídeas, com frequência apresen- tando androginóforo ou tubo estaminal. Cálice geralmente com cinco sépalas, unidas ou não. Corola em geral com cinco pétalas livres, prefloração imbricada,às vezes persistente. Estames numerosos ou em número igual ao das pétalas,livres ou unidos em tubo estaminal, anteras em geral rimosas. Nectários florais presentes na forma de tricomas glandulares na base da face ventral das sépalas, raramente na base das pétalas ou do tubo estaminal e androginóforo. Ovário súpero, 2-pluricarpelar, 2-plurilocular (raro unicarpelar), placentação axial. Óvulos um a muitos. Frutos geralmente esquizocarpos ou cápsulas, podendo apresentar ainda bagas, sâmaras ou drupas.

A família Malvaceae é cosmopolita (exceto Antártida e Ártico), essencialmente pantropical, com cerca de 243 gêneros e 4.300 espécies (BAYER; KUBITZKI, 2003).No Brasil são cerca de 80 gêneros e 840 espécies (*Malvaceae in* Flora do Brasil2020, 2021). Para o município de Santa Maria-RS são reconhecidas 23 espécies nativas da família Malvaceae.

Chave para identificação de gêneros de Malvaceae em Santa Maria

1. Árvores; flores com estames dispostos em falanges unidas entre si formando um anel; estaminódios fimbriados até a metade da porção apical.....*Luehea divaricata*

1'. Ervas, subarbustos ou arbustos eretos, prostrados, decumbentes ou apoiantes; estames formando tubo estaminal.....2

2. Arbustos apoiantes; ramos aculeados, frutos com acúleos cônicos...*Byttneria gracilipes*

2' Ervas, subarbustos e arbustos apoiantes ou não, raro com ramos aculeados (às vezes em *Hibiscus striatus* Cav.); frutos sem acúleos cônicos.....3

3. Fruto cápsula 4

3.' Fruto esquizocarpo.....6

4. Arbustos algumas vezes com acúleos nos ramos; flores com epicálice de 10 a 12 bractéolas, pétalas 6-8 cm compr., rosa-forte .....*Hibiscus striatus* Cav.

4'. Arbustos ou plantas de outros hábitos sem acúleos nos ramos; flores sem epicálice, pétalas de até 1 cm compr. amarelas 5

5. Plantas decumbentes, suberetas a prostradas; fruto cápsula obovoideunicarpelar; muitas vezes com folhas apicais dos ramos totalmente esbranquiçadas ..*Waltheria communis*

5'. Plantas eretas, prostradas ou apoiantes; fruto cápsula globosa ou piramidal, pentáptera 5- carpelar; sem folhas apicais dos ramos esbranquiçadas .....*Mel ochia*

6. Estiletes em número duplo em relação ao de carpelos; epicálice com cinco ou mais bractéolas .....*Pavonia*

6'. Estiletes em número igual ao de carpelos; epicálice ausente ou com três bractéolas.....7

7. Flores com epicálice composto de três bractéolas.....8

7'. Flores sem epicálice 9

8. Ervas ou subarbustos eretos, nunca radicantes nos nós; corola amarela .....*Malvastrum coromandelianum*

8'. Ervas prostradas com ramos floríferos eretos, radicantes nos nós; corola alaranjada .....*Modiolastrum malvifolium*

9. Mericarpos com três a numerosas sementes; arbustos eretos ou apoiantes 10

9'. Mericarpos com uma só semente; ervas prostradas ou apoiantes ou subarbustos eretos..... 11

10. Arbustos apoiantes; folhas 3-5 profundamente lobadas ou partidas; flores pendentes, pétalas amarelo-alaranjadas ou alaranjadas com nervuras vermelhas.....*Callianthe picta*

10'. Arbustos eretos; folhas inteiras ou levemente lobadas; flores patentes e pétalas amarelas, alaranjado-avermelhadas, salmão, com coloração uniforme .....*Ab utilon*

11. Cálice acrescente na maturidade do fruto; ervas prostradas ..... *Krapovickasia*

11'. Cálice não acrescente na maturidade do fruto; ervas apoiantes ou subarbustos eretos ..... *Sida*

ABUTILON MILL.

Subarbustos ou arbustos eretos, tricomas estrelados ou simples. Folhas cordadas ou levemente lobadas, margem crenada ou dentada. Flores axilares solitárias,geminadas ou em umbelas terminais, epicálice ausente. Corola pentâmera, dediversas cores; tubo estaminal com numerosas partes dos estames livres, agrupa- das no ápice; estiletes igual ao número dos carpelos. Fruto esquizocarpo com 5 a muito mericarpos, com as faces laterais lisas, biaristados ou múticos, deiscentes quase até a base quando maduros, sem constrições ou divisões internas.

Chave para identificação de espécies de *Abutilon* em Santa Maria

1. Arbustos com flores amarelas, face abaxial das folhas verdes, não incanas.....2
1'. Arbustos com flores alaranjado-vermelhas
ou salmão, folhas com face abaxial incana.....*Abutilon pauciflorum*
2. Flores dispostas em umbelas apicais;
folhas com ápice longo-acuminado..... *Abutilon umbelliflorum*
2'. Flores solitárias ou geminadas;
folhas com ápice agudo ou levemente acuminado ..... *Abutilon grandifolium*

1. ***Abutilon grandifolium*** (Willd.) Sweet

Figura 35-G-J.
Abutilon molle (Ort.) Sweet

Arbustos de até 2,5 m alt., ramos estrelado-velutinos e com alguns tricomassimples, longos. Pecíolos de até 10 cm de comprimento. Folhas cordiformes, 16 x 14 cm, palmatinervadas, ápice agudo ou levemente acuminado, margem den-tado-crenada, ambas faces com tricomas estrelados curtos, esparsos, algo mais densos na face adaxial. Flores axilares, solitárias ou geminadas, pétalas amarelas, de até 2 cm de comprimento; tubo estaminal ca. 7 mm de comprimento. Fruto esquizocarpo com cerca de 11 mericarpos ca.1,2 cm diâm., ca. 0,8 cm compr., deiscentes na porção superior, com muitas sementes. Ocorre em campos arbus- tivos, borda de florestas e vegetação ruderal.

Espécime testemunho: Distrito de Boca do Monte, BR-287, direção a SãoPedro do Sul-RS, *M. Grings et al. 1996,* 26 dez. 2018 (ICN).

3. ***Abutilon pauciflorum*** A.St.-Hil.

Figura 35-A-C.

Arbustos de até 1,5 m de alt., ramos hirsutos, tricomas simples longos, estrela-dos e glandulares. Folhas com até 20 x 18 cm, base cordada, margem crenada a serreada, ovadas, inteiras a 3-sublobadas, face adaxial verde-escuro, face abaxial geralmente incana, ambas com tricomas estrelados. Flores alaranjado-averme-lhadas, solitárias, com até 2 cm de diâmetro. Fruto esquizocarpo de 2,5 x 2,5 cm, 9-12 mericarpos, face dorsal hirsuta, com duas aristas de 1 mm cada. Ocorre em borda de florestas, em contato com campo, campos arbustivos ou em ambientes alterados (lavouras abandonadas e beira de estradas).

Espécime testemunho: Distrito de Boca do Monte, próx. Balneário Timbaúva, WGS 84 S 29.69996º W 054.04593º, *M. Grings et al. 2003,* 26 dez. 2018 (ICN).

4. ***Abutilon umbelliflorum*** A.St-Hil.

Figura 35-D-F.

Arbustos de até 3 m de alt., ramos geralmente hirsutos, tricomas simples, longos e tricomas estrelados e glandulares. Folhas simples, cordiformes, pubescentes ou tomentosas, 20 x 13 cm, ápice longo-acuminado, face adaxial pubérula, face abaxial tomentosa, margem serreada. Flores amarelo-alaranjadas, ca. 2,5 cm diâm., inflo- rescências umbeliformes. Fruto esquizocarpo ca. 1 cm compr., ca. 1,7 cm diâm., 10-13 mericarpos com ca. 1 cm compr., com duas aristas de 1 mm. Ocorre em borda de florestas, principalmente de encostas, florestas em contato com campo e ambientes alterados.

Espécime testemunho: subida da serra, *K. Hagelund 11913,* 08 out. 1977 (ICN).

5. ***Byttneria gracilipes*** Decne. ex Baill.

Figura 35-A-D.

Arbustos apoiantes de até 2,5 m alt., ramos canaliculados, aculeados, acúleos recurvados e com tricomas estrelados. Folhas membranáceas, lâminas ovado-lan- ceoladas a oblongo-lanceoladas, ca. 6-9 x 3-4 cm, base arredondada ou cordada, nectários da base da lâmina multiaperturados. Cimeiras com 3-5 flores, arroxeadas, unhas 1-2 mm compr., lâminas membranáceas 3,5-5 mm compr., estreitamenteelípticas, margem ciliada. Fruto de 8-12 mm diâm., acúleos cônicos, 1-2 mm compr. (Adaptado de Cristóbal 2007, Cruz e Esteves 2009). Ocorre em interior ou borda de florestas de encostas.

Espécime testemunho: Chácara Linck, *Fleig, M. 43*, 24 jul. 1976 (ICN).

5. ***Callianthe picta*** (Gillies ex Hook. & Arn.) Donnel

Abutilon pictum (Gillies ex Hook. & Arn.) Walp.
Abutilon striatum Dicks. ex Lindl.
Callianthe striata (Dicks. ex Lindl.)
Donnel

Figura 35-K-M.

Arbustos apoiantes, 3 m alt.. Lâminas foliares 3-5 lobadas ou partidas, margem irregularmente serreadas, lobos ca. 9 x 8 cm. Flores solitárias, pendentes, cam-panuladas, pétalas amarelo-alaranjadas ou alaranjadas com nervuras vermelhas. Tubo estaminal exserto e porção livre dos estames avermelhados. Fruto esqui-zocarpo com 12 a 13 mericarpos múticos e deiscentes. Ocorre em ambientes sombreados no interior de florestas de encostas ou florestas ribeirinhas.

Comentários: A sinonimização de *C. striata* em *C. picta* está de acordo comKrapovickas (2005) e Alverson *et al.* (2014).

Nome popular: lanterna-chinesa, lanterna-japonesa

Espécime testemunho: Estrada Pinhal – Três Barras, *J.N.C. Marchiori s.n.,* 23ago. 1982 (HDCF 683).

6. ***Hibiscus striatus*** Cav.

Hibiscus cisplatinus A.St.-Hil.
Hibiscus lambertianus Kunth.
Hibiscus selloi Gürke in Martius
Hibiscus urticifolius A.St.-Hil. & Naudin
Figura 40-E-H.

Arbustos de até 2,5 metros de altura, muitas vezes aculeado nos ramos e pecíolos. Folhas com grandes pecíolos, as superiores lanceoladas e as inferiores 3-5 loba- das, com margem dentado-crenada, de 7-15 x 3-7 cm. Flores axilares, solitárias; epicálice com 10 a 12 bractéolas lineares, com metade ou menos do comprimento do cálice; pétalas de coloração rosa-forte, com mancha basal escura, 6-8 cm decomprimento. Fruto cápsula híspida coberta pelo cálice. Ocorre em banhados.

Comentários: Embora *Malvaceae in* Flora do Brasil 2020 (2021) não cite aocorrência da espécie para o Brasil, Rigueiral *et al.* (2019) citam a sua ocorrência para o país, inclusive para o Estado do Rio Grande do Sul. A identificação da espé- cie está de acordo com bibliografia publicada para o gênero *Hibiscus* (Blanchard 1976, Krapovickas 2005, Rigueiral *et al.* 2019).

Espécime testemunho: Distrito de Santa Flora, *L.Essi 1347 et al.*, 13 abr. 2019 (SMDB).

KRAPOVICKASIA FRYXELL

Ervas perenes, prostradas. Folhas oblongo-ovadas, rotundo-ovadas, triangular-o- vadas a subrotundas. Flores axilares, solitárias, ou em fascículos com 2 a várias flores, sem epicálice. Cálice acrescente, tornando-se reticulado-membranáceo na maturidade dos frutos. Corola rósea a avermelhada. Fruto esquizocarpo com 5-9 mericarpos, estes indeiscentes e sem ornamentações, com uma semente em cada. (Adaptado de: Fryxell 1978, Grings 2020).

Chave para identificação de espécies de *Krapovickasia* em Santa Maria

1. Inflorescências em fascículos axilares com 4-16 flores ..... *Krapovickasia urticifolia*
1.' Flores solitárias axilares,
ou em fascículos axilares com 2-3 flores..... *Krapovickasia flavescens*

7. ***Krapovickasia flavescens*** (Cav.) Fryxell

Figura 36-E-G.

Ervas perenes, prostradas, ca. 40 cm de largura. Lâmina foliar 3 x 3cm, geralmentemais longa do que larga, base cordada. Flores solitárias ou em fascículos, 2-3 flores por axila, raro 4-5 flores por axila; epicálice ausente; cálice acrescente nofruto, 4-9 mm diâm.; pétalas branco-rosada a rosa-salmão, 8 x 5 mm. Fruto esqui- zocarpo com 5 mericarpos, coberto pelo cálice acrescente, mericarpos múticos 3 x 2 mm. Ocorre em campos baixos (campos limpos) e campos pedregosos, emsolos bem drenados.

Nome popular: erva-de-ovelha.

Espécime testemunho: Distrito de Santa Flora, WGS 84 S 29.83158º W 052.76917º, *M. Grings 2010 et al.,* 27 dez. 2018 (ICN, SMDB).

8. ***Krapovickasia urticifolia*** (A.St.-Hil.) Fryxell Figura 39-Q e Figura 40-A-D.

Ervas perenes, prostradas. Ramos com tricomas estrelados diminutos e com grandes tricomas simples e setosos. Folhas 7 x 4 cm, ovadas a triangular-ovadas, margem crenada, base cordada. Flores em fascículos de 4 a 16 nas axilas dasfolhas; corola com até 1,3 cm diâm., pétalas róseas a róseo-avermelhadas; cálice acrescente no fruto, densamente coberto por tricomas estrelados amarelados. Fruto esquizocarpo envolto pelo cálice acrescente, com 5 mericarpos lisos, sem ornamentações (Grings 2020).

Espécime testemunho: Linha da Fronteira, Rau, G. s.n., 14 nov. 1938 (SMDB 318).

9. ***Luehea divaricata*** Mart.

Figura 36-H-J.

Árvores a arvoretas até 30 m alt. Casca externa descamante em placas mais ou menos retangulares e pequenas. Lâminas foliares 4-14 x 2-6 cm., obovadas a oblongas, fortemente discolores, trinervadas desde a base, margem irregularmenteserreada. Inflorescência terminal e axilar. Flores 1,5-2,5 cm compr., pétalas bran- cas a róseas, amareladas na base. Fruto cápsula lenhosa na madurez, de 1,5-2,5 cm de comprimento. Ocorre em florestas de encostas e em florestas de galeria como espécie secundária-inicial, mas podendo permanecer na floresta climácica, devido a sua longevidade.

Nome popular: açoita-cavalo.

Espécime testemunho: Passo do Verde, *R. Beltrão s.n.,* jan 1953 (SMDB).

10. ***Malvastrum coromandelianum*** (L.) Garcke

Figura 36-K-N.

Erva a subarbusto de até 1,5 m de altura. Folhas 1,5 x 6 cm com lâminas triangu- lares, margem crenado-serreada, ambas as faces cobertas por tricomas estrelados simples esparsos, ou ramificados. Flores axilares e solitárias ou em glomérulos ao longo do caule, subsésseis ou com pedúnculos curtos, epicálice com três bractéolas filiformes ca. 5 mm compr., corola amarela; pétalas ca. 7 x 3 mm. Fruto esquizocarpo com 12 mericarpos 2 x 3 mm, uniseminados, sem aristas, deiscentesem pequena porção da região ventral; ápice hirsuto e com duas aristas subapicais horizontais e uma arista apical, ereta; faces laterais com projeções convergentes. (Adaptado de Krapovickas 1957). Espécie ruderal, ocorre em beira de estradas,lavouras abandonadas, ou campos antropizados.

Nome popular: guanxuma.

Espécime testemunho: Distrito de Boca do Monte, WGS 84 29°38’39.93”S53°55’37.11”O, *M. Grings et al. 2006,* 27 dez. 2018 (ICN, SMDB).

MELOCHIA L.

Ervas a subarbustos eretos, prostrados ou decumbentes, ramos com tricomas sim-ples, bifurcados, estrelados ou glandulares. Folhas pecioladas, simples, inteiras, margem serreadas ou crenadas. Flores perfeitas, dispostas em cimeiras terminais,axilares ou opostas às folhas. Corola pentâmera. Estames 5, soldados, formando um tubo estaminal. Estaminódios 5 ou ausentes. Estiletes 5, livres ou soldadosna base. Flores longistilas com estames totalmente concrescidos ou até certa altura tornando-se livres e flores brevistilas com estames concrescidos até certa altura tornando-se livres. Fruto cápsula com distintas morfologias, 1-2 sementes por lóculo. (Adaptado de Cristóbal 2007).

Chave para identificação de espécies de *Melochia* em Santa Maria

1. Pétalas amarelas; fruto cápsula globosa ..... *Melochia pilosa*
1'. Pétalas rosadas, lilases ou roxas;
fruto cápsula piramidal pentáptera ..... *Melochia pyramidata*

11. ***Melochia pilosa*** (Mill.) Fawc. & Rendle

Melochia
venosa Sw.
Figura 37-A-C.

Subarbustos eretos de 0,5-2 m alt., ramos com tricomas amarelados ou ferrugí-neos. Folhas 6-10 x 3-6 cm, lâminas ovado-lanceoladas, ovadas ou oblongo-lan- ceoladas, diminuindo de tamanho em direção ao ápice dos ramos, ápice agudo,base arredondada ou cordada, margem profundamente serreada. Inflorescência em cimeiras axilares ou terminais com 4-8 flores, pétalas amarelas 7-11 mm compr., tubo estaminal 3-4 mm, filetes totalmente concrescidos. Fruto cápsula globosa 3-4 mm diâm., rostro 1-1,5 mm compr. Ocorre em beira de estradas e outras áreas ruderais.

Espécime testemunho: s.l., *R. Beltrão s.n.,* jan 1952 (SMDB 677).

12. ***Melochia pyramidata*** L.

Figura 37-D-E.

Ervas a subarbustos até 3 m alt., eretos ou decumbentes. Lâminas foliares subor- biculares na base dos ramos ca. 4 x 2 cm compr., lanceoladas a ovado-lanceoladas em direção ao ápice dos ramos ca. 9,5 x 4,5 cm compr., margem serreada ou crenado-serreada. Inflorescência em cimeiras glomeruliformes, 3 a 10 flores oumais; pétalas rosadas, lilases ou roxas 0,7-1 cm compr., tubo estaminal até 2,5 mm compr. Fruto cápsula piramidal pentáptera e estipitada, ca. 5 mm compr., rostro1-2 mm compr., com alas. Ocorre em bordas de florestas de galeria.

Espécime testemunho: s.l., *M. Sobral, S. Longhi & J. Marchiori, 4899*, jan. 1986 (ICN).

13. ***Modiolastrum malvifolium*** (Griseb.) K.Schum.

Figura 39-N-P.

Erva perene, prostrada, radicante nos nós, ramos floríferos eretos até 25 cm alt.Lâmina palmatinervada, suborbicular 5,5 x 6,5 cm, 5-lobada a 5-partida, lobos crenados; ambas faces com tricomas estrelados esparsos. Flor solitária, pedún- culo até 9 cm compr., maior que a folha subtendida, epicálice com três bractéolas lanceoladas de 9 mm de comprimento por 2,5 mm de largura; corola alaranjada. Fruto esquizocarpo com 15 mericarpos, cada um com 3 x 2,5 mm, dividido emduas cavidades separadas por endoglossa; a inferior com a semente, é indeiscentee costada; a superior estéril, deiscente e lisa. Ocorre em vegetação campestrebaixa ou vegetação ruderal.

Espécime testemunho: Sítio Dr. Cesar Schelp (morro), *K. Hagelund s.n.*, 1º dez. 1983 (ICN).

PAVONIA CAV.

Ervas prostadas a decumbentes, subarbustos prostrados, eretos a decumbentes ou arbustos eretos ou apoiantes. Indumento constituído de tricomas estrelados, podendo estes ser acompanhados de tricomas simples, bifurcados e/ou glan- dulares. Folhas pecioladas, alternas, geralmente discolores; margem serreada, crenada, crenado-serreada, raro dentada, sinuada ou inteira; palmatinérveas, 3-9 nervuras basais. Estípulas filiformes. Flores casmógamas e cleistógamas solitá- rias, dispostas em inflorescências terminais subumbeliformes, precedidas por longos pedúnculos e/ou em inflorescências apicais congestas, pedicelos em geral articulados; epicálice com apenas um verticilo de bractéolas, com 5-10 bractéolas nos mais variados formatos. Cálice gamossépalo 5-lobado, persistente; corola das flores casmógamas com 5 pétalas livres entre si e geralmente assimétricas. Tubo estaminal das flores casmógamas ereto, de comprimento menor ou maior que odas pétalas; geralmente com numerosas partes livres dos estames; estiletes 10, livres na porção distal, passando por dentro do tubo estaminal e sobressaindo dele. Frutos esquizocarpos; mericarpos 5, geralmente indeiscentes, sem endo- glossa, múticos, apiculados ou aristados, nervura média carenada, costada ou não saliente, ornamentados ou lisos. Sementes reniformes ou obovoides, lisas ou estriadas, glabras ou com dois tufos de tricomas, um em cada lado do hilo (Adaptado de GRINGS & BOLDRINI, 2013).

Chave para identificação de espécies de *Pavonia* em Santa Maria

1. Mericarpos triaristados; pétalas amarelas; lâminas foliares com um tufo de tricomas curtos na base da face abaxial; folhas com base não hastada, sagitada ou truncada, com base arredondada ou subcuneada; arbustos preferencialmente de interior de floresta..... *Pavonia sepium*

1'. Mericarpos múticos, no máximo apiculados; pétalas brancas ou branco-rosadas, com nervuras vináceas e mancha basal vinácea; folhas geralmente sagitadas, hastadas ou truncadas; arbustos de áreas abertas 2

2. Tricomas glandulares capitados presentes em toda a planta, raros somente nos ramos 3

2'. Tricomas glandulares capitados ausentes com presença de tricomas glandulares não capitados 4

3. Mericarpos levemente tuberculados; folhas patentes; presença de tufo de tricomas simples e setosos na base da face abaxial das lâminas foliares; base geralmente truncada ou levemente arredondada, ou hastada .....*Pavonia xanthogloea*

3’. Mericarpos reticulados; folhas reflexas, de base profundamente sagitada, sem tufo de tricomas na base da face abaxial.....*Pavonia reticulata*

4. Ramos com indumento estrelado-tomentoso ou estrelado-velutino, ferrugíneo; bractéolas do epicálice geralmente obovadas.....*Pavonia distinguenda*

4’. Ramos com indumento diverso, nunca ferrugíneo; bractéolas do epicálice lanceoladas, ovadas ou ovado-lanceoladas 5

5. Botão floral esférico; bractéolas do epicálice envolvendo completamente o cálice no botão sem estreitamento basal; cálice densamente estrelado-hirsuto, tricomas amarelos.....*Pavonia aurigloba*

5’. Botão floral não esférico; bractéolas do epicálice não envolvendo completamente o cálice no botão com estreitamento basal; cálice não hirsuto, tricomas gríseos.....*Pavonia hastata*

14. ***Pavonia aurigloba*** Krapov. & Cristóbal

Figura 37-F-H.

Subarbustos decumbentes a ereto-decumbentes até 1,5 m alt. Folhas com lâmi- nas subtriangulares, triangular-ovadas ou lanceoladas, 1,2-5,2 x 0,4-2,5 cm, base hastada, arredondada ou levemente sagitada. Flores axilares solitárias, epicálice esférico no botão, com cinco bractéolas ovado-lanceoladas ou ovado-elípticas,7-9 x 3-6 mm; cálice densamente estrelado-hirsuto, tricomas longos, amarelados; corola branca a branco-rosada, com nervuras vináceas e mancha basal vinácea naface adaxial das pétalas 2,4-3,1 x 1,8-2,5 cm. Mericarpos, 4 x 3 mm, reticulados,às vezes com algumas nervuras laterais um pouco mais salientes que as demais, na porção superior, formando pequenos tubérculos, múticos, carenados. Ocorre em capoeiras e em campos arbustivos, onde pode formar densas populações.

Espécime testemunho: Distrito de Boca do Monte, WGS 84 S 29.63147º W 053.94020º, *M. Grings et al. 2008,* 27 dez. 2018. (ICN, SMDB).

15. ***Pavonia distinguenda*** A.St.-Hil. & Naudin

Figura 37-I-L.

Arbustos eretos até 2,5 m de altura; ramos tomentoso-ferrugíneos a velutino-fer- rugíneos. Folhas com lâminas subtriangulares, ovado-lanceoladas ou oblongo-lan- ceoladas, 1,5-9 x 0,7-2,5 cm, base hastada, truncada ou sagitada. Flores axilares solitárias, epicálice com cinco bractéolas geralmente obovadas, às vezes elípticas ou estreitamente elípticas, 7-11 x 2-5 mm; corola branca a branco-rosada, com as nervuras vináceas, mais visíveis na face abaxial e mancha basal vinácea na face adaxial das pétalas, 2,2-3 x 2-3 cm. Mericarpos 4-5 x 3-3,5 mm, tuberculados, às vezes alguns tubérculos agudos, com nervura média fendida longitudinalmente, pubescentes, múticos, raro levemente apiculados. Cresce em banhados e outros locais com pouca drenagem, podendo também ser encontrada em capoeiras, em solos bem drenados.

Espécime testemunho: Distrito de Palma, margem da BR-287, WGS 84 S29.73158º W 053.54524º, *M. Grings et al. 1995,* 26 dez. 2018 (ICN, SMDB).

16. ***Pavonia hastata*** Cav.

Figura 38-A-C.

Arbustos eretos até 2,5 m alt. Folhas com lâminas subtriangulares, lanceoladasou ovado-lanceoladas, de 1,3-7, 4 x 0,5-2 cm, base hastada ou levemente sagitada. Flores axilares solitárias, epicálice com cinco bractéolas, ovado-lanceoladas a elípticas, com estreitamento basal, 5-7 x 1,5-3 mm; corola branca a branco-rosada,nervuras vináceas, mais visíveis na face abaxial e mancha basal vinácea na face adaxial das pétalas, 1,8-3 x 1,4-2,5 cm. Mericarpos 4 x 3 mm, uniformemente reticulados, às vezes com algumas rugosidades e linhas laterais um pouco proemi-nentes, pubescentes, múticos. Ocorre em campos arbustivos, capoeiras e bordas de florestas, nas várzeas adjacentes a grandes cursos d'água.

Espécime testemunho: Distrito de Palma, margem da BR-287, WGS 84 S29.73158º W 053.54524º, *M. Grings et al.1994,* 26 dez. 2018. (ICN, SMDB).

17. ***Pavonia reticulata*** Garcke

Figura 38-D-F.

Ervas a subarbustos, decumbentes a ereto-decumbentes até 1 m alt, xilopódiopresente ou não. Folhas com lâminas triangular-ovadas, dispostas paralelamente aos ramos (reflexas), ciliadas, 1-4,8 x 0,5-2,3 cm, nervação reticulada, base pro- fundamente sagitada. Presença de tricomas glandulares em toda a planta, inter- calados com os tricomas estrelados. Flores axilares solitárias, epicálice com cinco bractéolas, totalmente vermelhas ou apenas no ápice, ovado-lanceoladas a ovado-
-elípticas, 10-14 x 0,3-0,7 mm; corola branca a branco-rosada, nervuras vináceas ou não, mancha basal vinácea na face adaxial das pétalas, às vezes não presente, 0,9-1,8 x 0,3-1,2 cm. Mericarpos 4-5 x 3-3,5 mm, com pubescência proeminente, múticos, carenados, reticulados. Geralmente encontrada em campos rupestres,podendo ocorrer também em bordas de floresta e outras formações campestresem solos bem drenados.

Espécime testemunho: Est. Silvicultura, *J. Mattos 29940 & N. Mattos,* 23 out. 1986. (HAS).

18. ***Pavonia sepium*** A.St.-Hil.

Figura 38-G-I.

Arbustos até 2 m de altura. Folhas com lâminas ovadas a ovado-lanceoladas ou ainda elípticas, 1,5-12,5 x 0,5-5 cm, base arredondada ou subcuneada. Face abaxial com um tufo de tricomas estrelados finos, curtos e densos na base, entre as axilas das principais nervuras. Flores axilares solitárias, epicálice com seis bractéolas, lanceoladas ou estreitamente elípticas, trinervadas, 4-8 x 0,5-1 mm;corola amarela, 1,2-2 x 0,6-1,4 cm. Mericarpos 4-5 x 2-3 mm (excluindo aristas), as duas faces laterais retas, glabras e lisas, reticulados na face dorsal, indeiscentes, triaristados, uma arista central e duas laterais divergentes, todas com tricomas setosos, retrorsos, arista central 3,5-5 mm, as duas laterais 4-6 mm. Os tricomas retrosos e rígidos são responsáveis pela dispersão exozoocórica dos mericarpos. Ocorre no sub-bosque ou borda de florestas.

Espécime testemunho: Cidade dos Meninos - Camobi, *R. L. C. Bortoluzzi s.n.,19 abr. 1995* (SMDB 5918).

19. ***Pavonia xanthogloea*** Ekman

Figura 38-J-L.

Arbustos com até 2 m de altura; ramos e outros órgãos da planta estrelado-tomen-tosos, e com tricomas glandulares. Folhas com lâminas triangulares, subtriangu- lares ou lanceoladas, raro ovadas, 1,5-6,5 x 0,7-3 cm, base geralmente truncada oulevemente arredondada, podendo ser também hastada. Flores axilares solitárias; pedicelos 1-2,7 cm compr.; epicálice com cinco bractéolas, ovado-lanceoladasou elípticas, agudas, branco-amareladas e estreitas na base, 6-8 x 1,5-3,5 mm; corola branca a branco-rosada, nervuras vináceas, e mancha basal vinácea na face adaxial das pétalas, 1,5-2,2 x 1,3-1,9 cm. Mericarpos 3,5-4 x 2,5-3 mm, carenados,levemente tuberculados, pubescentes, múticos. Ocorre em capoeiras, camposarbustivos e bordas de florestas.

Comentários: Embora *Malvaceae in* Flora do Brasil 2020 (2021) não cite a ocorrência da espécie para o Brasil, Grings & Boldrini (2013) confirmam a ocor-rência da mesma para o país em tratamento taxonômico para o gênero *Pavonia*realizado para o Estado do Rio Grande do Sul.

Espécime testemunho: Distrito de Boca do Monte. WGS 84 S 29.60612º W 053.96365º, *M. Grings et al. 2011,* 27 dez. 2011 (ICN, SMDB).

SIDA L.

Ervas, subarbustos ou arbustos com tricomas simples ou estrelados. Folhas geral- mente inteiras, raro lobadas, margem serreada ou crenada. Epicálice ausente;cálice não acrescente; corola com cinco pétalas, assimétricas, cores variadas, muitas vezes com mancha basal vermelha. Partes livres dos estames numerosase agrupadas no ápice do tubo estaminal. Estiletes em igual número ao de carpe- los. Fruto esquizocarpo com cinco a numerosos mericarpos, deiscentes no ápice ou indeiscentes, ápice mútico, biapiculado ou biaristado, com ou sem projeçõesnas faces laterais.

Chave para identificação de espécies de *Sida* em Santa Maria

1. Ervas apoiantes; ramos com tricomas amarelados;
folhas ovadas, base cordada; mericapos 5 .....*Sida urens*
1'. Subarbustos eretos; ramos com tricomas esbranquiçados; folhas
de outros formatos, nunca ovadas, base arredondada ou subcordada 2
2. Corola rosada; ramos com tricomas estrelado-
pubescentes e com tricomas simples e longos
esparsos; lâminas foliares
estreitamente oblongas ou oblongo-lanceoladas .....*Sida regnellii*
2'. Corola amarela com ou sem mancha basal vermelha a vinácea;
ramos com tricomas estrelados muito curtos; lâminas foliares
obovado-rômbicas, rômbicas ou lanceolado-rômbicas..... *Sida rhombifolia*

20. ***Sida regnellii*** R.E.Fr.

Figura 39-A-C.

Subarbustos eretos até 1 m de altura. Ramos com tricomas estrelado-pubescentes e tricomas simples, longos, esparsos. Lâminas foliares estreitamente oblongas ou oblongo-lanceoladas, base arredondada ou subcordada, margem serrado-dentada da base ao ápice. Flores solitárias ou em pequenos grupos nas axilas das folhas. Pétalas de coloração rosa. Fruto esquizocarpo, 11-13 mericarpos com aristas curtas, porção basal indeiscente fortemente reticulada. Ocorre em campos secos e campos pedregosos.

Espécime testemunho: Distrito de Boca do Monte, BR-287, direção a SãoPedro do Sul-RS, *M. Grings et al 1999,* 26 dez. 2018 (ICN).

21. ***Sida rhombifolia*** L.

Figura 39-D-G.

Subarbusto ereto até 1 m de altura. Lâmina foliar obovado-rômbica, rômbica ou lanceolado-rômbica, discolor, crenada nos 2/3 superiores, geralmente com 2-3,5 x 1-1,5 cm ou maior. Face abaxial densamente coberta por tricomas estrelados muito curtos. Flores solitárias, axilares, pedicelos de comprimento igual ou maior que as folhas. Pétalas amarelas, assimétricas, 7-12 x 10 mm, podendo apresentar mancha basal vermelha a vinácea. Fruto com 9 a 14 mericarpos reticulados nametade basal, com duas aristas rudimentares. Muito abundante em ambientesalterados como beira de estradas, lavouras e áreas abandonadas.

Nome popular: guanxuma.

Espécime testemunho: Distrito de Santa Flora, WGS 84 S 29.87047º W 053.78662º, *M. Grings et al. 2009,* 27 dez. 2018 (ICN).

23. ***Sida urens*** L.

Figura 39-H-J.

Erva decumbente e apoiante, ramos até 1,5 m compr., tricomas estrelados, simples e glandulares que conferem à planta coloração amarelada. Folhas ovadas, 2-8 x 2-5 cm base cordada, ápice acuminado, margem crenada. Flores em glomérulos axilares ou espigas na porção terminal dos ramos. Pétalas amarelas com mancha basal vinácea na base. Fruto esquizocarpo com seis mericarpos, trígonos, múticos, 2-3 mm compr., 1,5 mm larg. dorsal, 1 mm larg. lateral.

Nome popular: guanxuma.

Espécime testemunho: Distrito de Palma, margem da BR-287, WGS 84 S29.73158º W 053.54524º, *M. Grings et al. 1997,* 26 dez. 2018 (ICN, SMDB).

23. ***Waltheria communis*** A. St.Hil.

Waltheria douradinha A.St.-Hil.
Figura 39-K-M

Ervas a subarbustos, 15 a 20(-90) cm alt., em geral decumbentes ou suberetos a prostrados com xilopódio. Indumento muito variável, podendo apresentar colora- ção esbranquiçada, principalmente nas folhas mais próximas das inflorescências. Folhas com lâminas elípticas, obovadas a ovadas, 3-8 x 2-4 cm compr., nervuras impressas na face adaxial, proeminentes na face abaxial; margem serreada. Inflo- rescências monocásios, geralmente apicais, brácteas lineares. Flores com pétalas amarelas 4-9 x 1-3 mm. Fruto cápsula obcônica 2-3 x 2 mm, unicarpelar. Ocorreem campos secos e campos pedregosos.

Nome popular: douradinha-do-campo.

Espécime testemunho: Distrito de Santo Antão, Pedra do Lagarto, WGS 84 29°37’38.52”S 53°52’25.40”O, *M. Grings et al. 2004,* 26 dez. 2018 (ICN, SMDB).

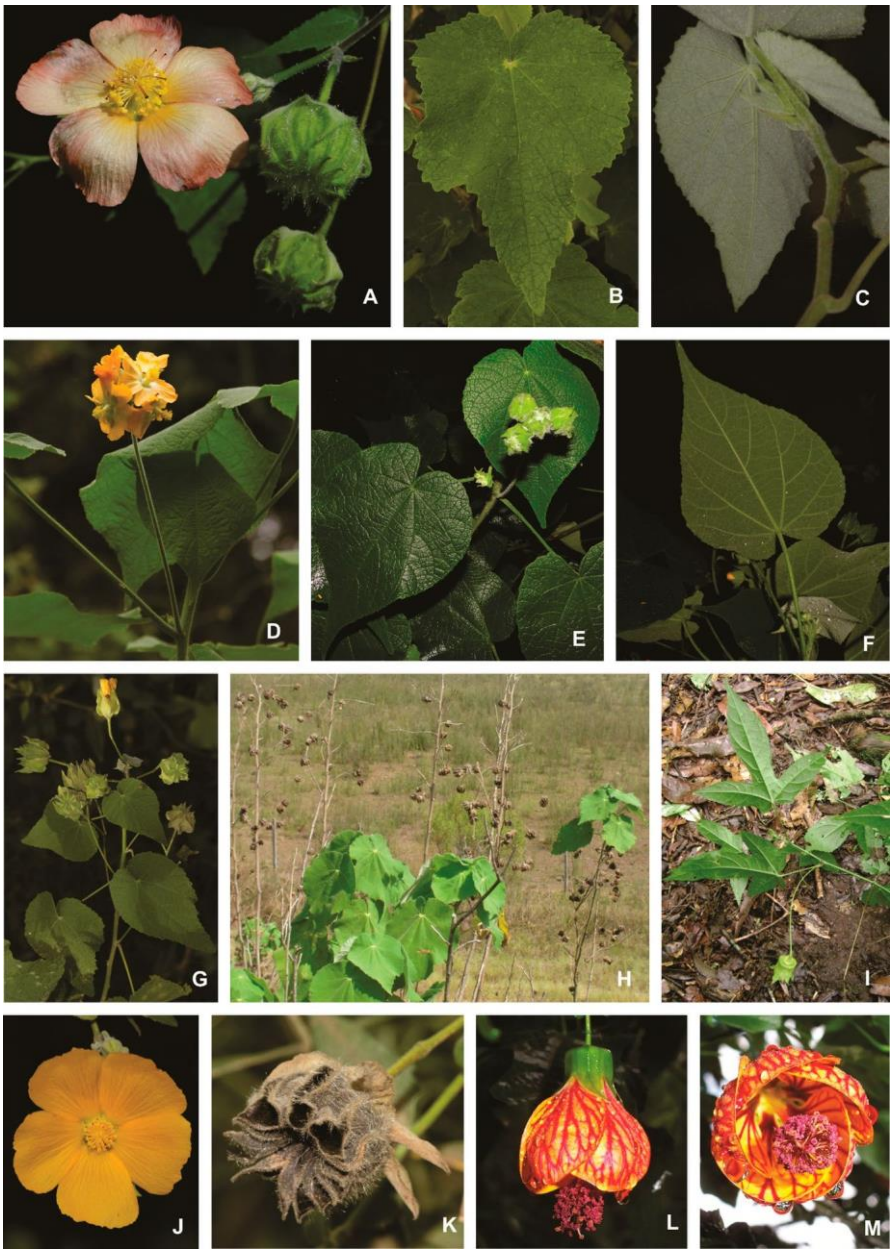

Figura 35: Malvaceae de Santa Maria. A-C. *Abutilon pauciflorum.* D-F. *Abutilon umbelliflorum* (Foto D: Adriano Becker). G-J. *Abutilon grandifolium*. K-M. *Callianthe picta* (Fotos L e M: Greta Aline Dettke; Demais fotos: Martin Grings).

Figura 36: Malvaceae de Santa Maria.. A-D. *Byttneria gracilipes.* E-G. *Krapovickasia flavescens*. H-J. *Luehea divaricata*. K-N. *Malvastrum coromandelianum*. (Fotos: Martin Grings).

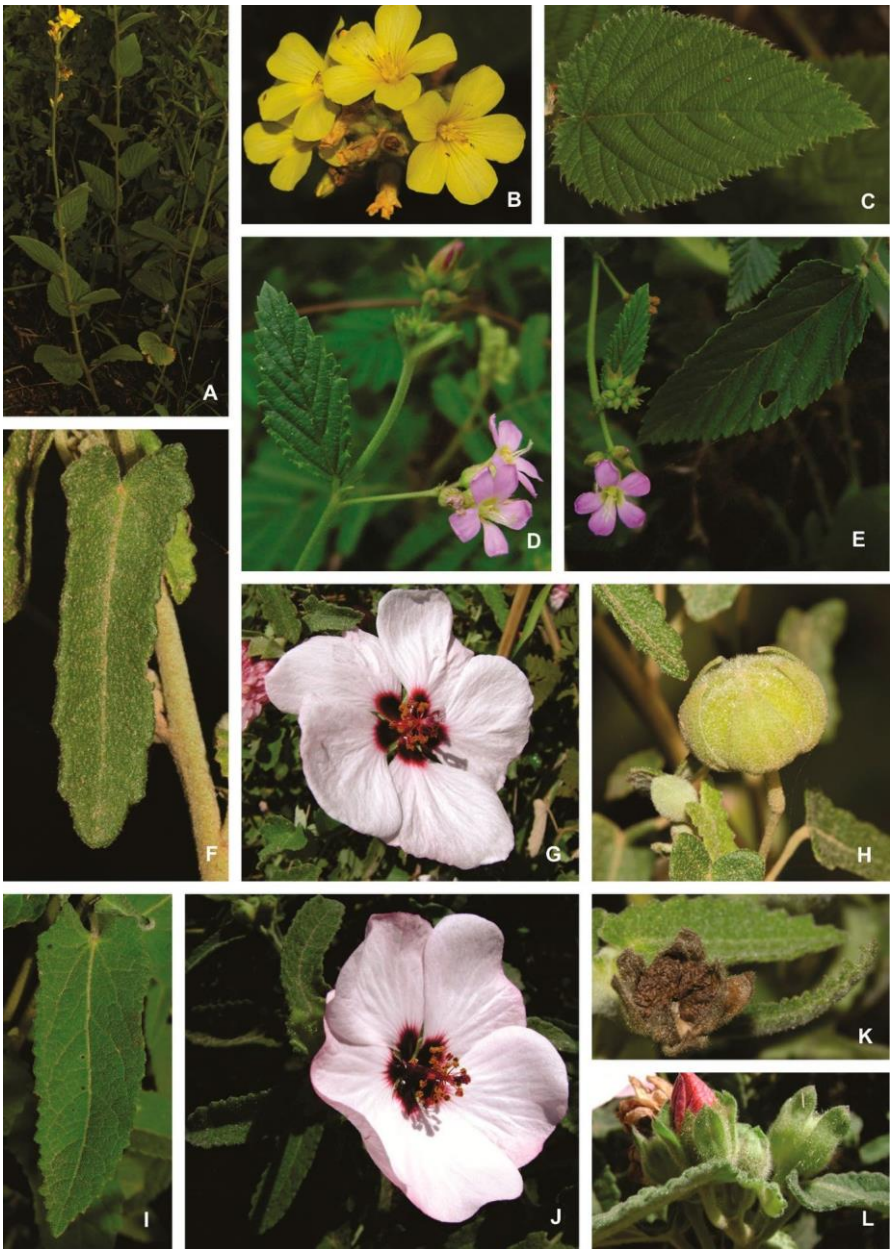

Figura 37: Malvaceae de Santa Maria. A-C. *Melochia pilosa.* D-E. *Melochia pyramidata*. F-H. *Pavonia aurigloba*. I-L. *Pavonia distinguenda*. (Fotos: Martin Grings).

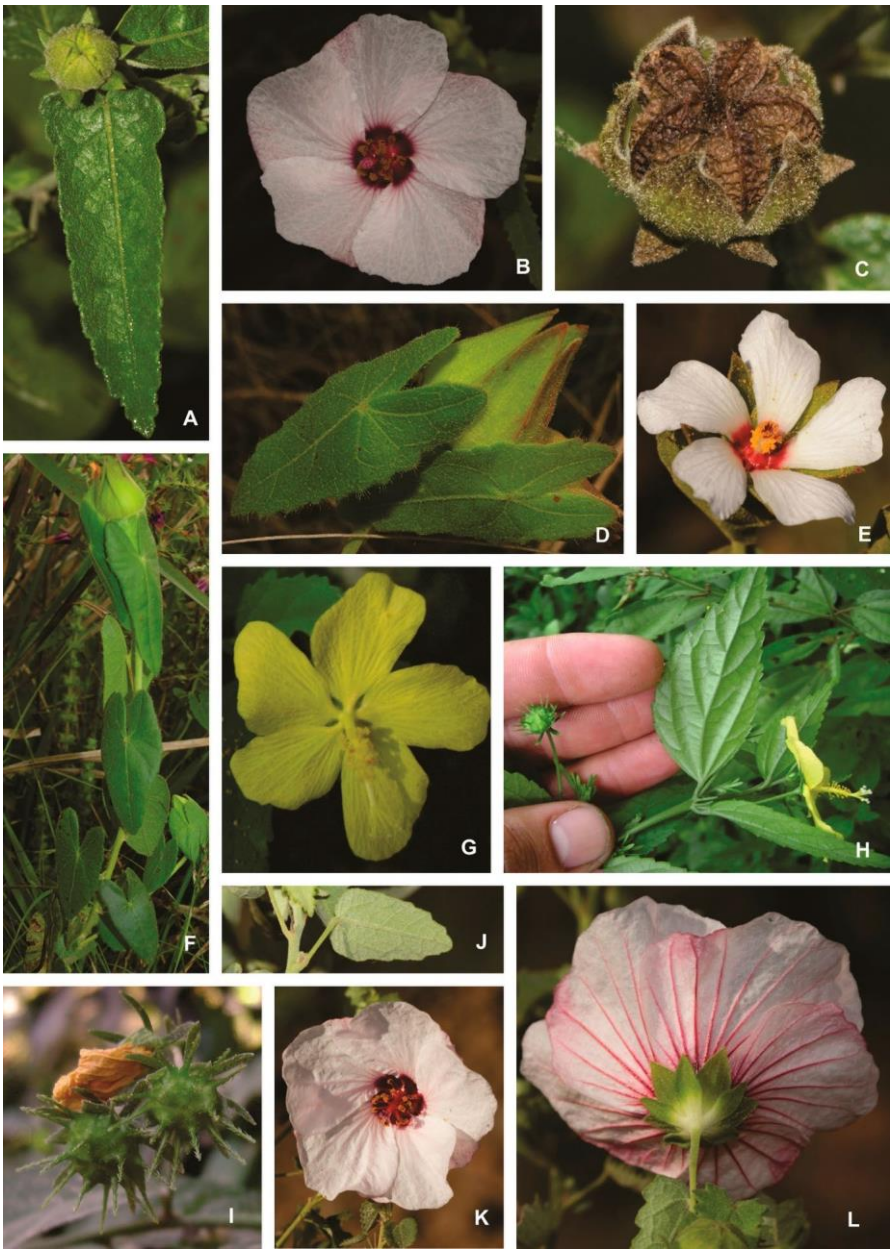

Figura 38: Malvaceae de Santa Maria. A-C. *Pavonia hastata*. D-F. *Pavonia reticulate* (Foto E: Sérgio Augusto de Loreto Bordignon). G-I. *Pavonia sepium.* J-L. *Pavonia xanthogloea*. (Foto E: Sérgio Augusto de Loreto Bordignon; Demais fotos: Martin Grings).

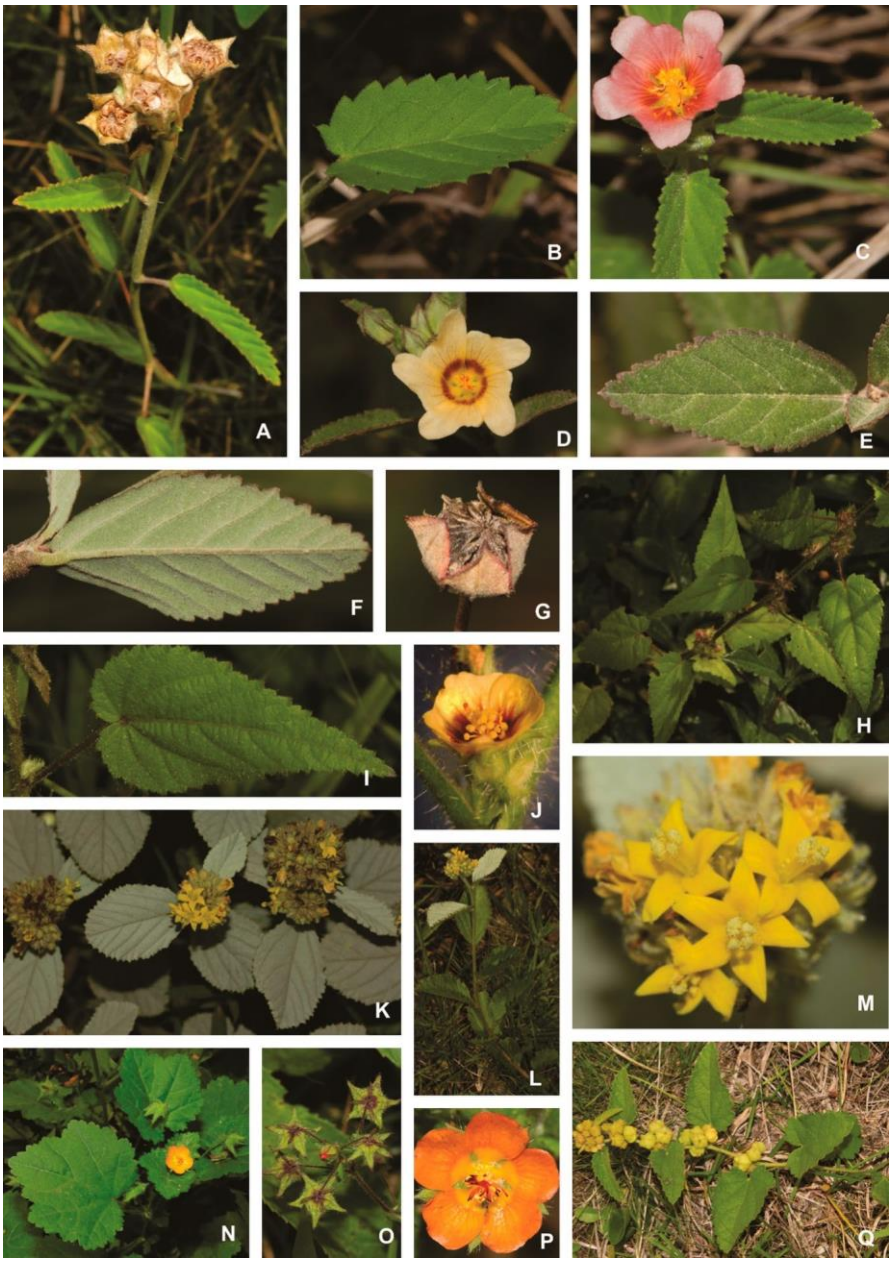

Figura 39: Malvaceae de Santa Maria. A-C. *Sida regnellii*. D-G. *Sida rhombifolia*. H-J. *Sida urens*. K-M. *Waltheria communis*. N-P. *Modiolastrum malvifolium*. Q. *Krapovickasia urticifolia*.(Fotos: Martin Grings).

Figura 40: Malvaceae de Santa Maria. A-D. *Krapovickasia urticifolia*. E-H. *Hibiscus striatus*.(Fotos: Martin Grings).

3. CONSIDERAÇÕES FINAIS

- Foram realizados tratamentos taxonômicos para a família: 1) A família Malvaceae para o município de Santa Maria, Rio Grande do Sul, já publicado; 2) Sinopse do gênero *Sida* para o RS, já publicado; 3) Sinopse do gênero *Monteiroa*; 4) Sinopse dos gêneros *Calyculogygas*, *Modiola*, *Modiolastrum* e *Tropidococcus*. Os dois últimos ainda não publicados.
- Foram descritas quatro espécies novas para a ciência: *Monteiroa rubra* Grings, *Callianthe flava* Grings, *Callianthe maritima* Grings e *Callianthe sulcatarinensis* Grings.
- Foram realizadas três novas combinações: *Callianthe costicalyx* (K. Schumann ex Takeuchi & G.L. Esteves) Grings, *Modiola australe* (Krapovickas) Grings, *Modiola gilliesii* (Steudel) Grings.
- Dois nomes foram revalidados, *Modiola lateritia* (Hooker) K. Schumann e *Modiola malvifolia* Grisebach.
- Dez nomes foram lectotipificados: *Malvastrum bullatum* e *Malvastrum dusenii*, basiônimos de *Monteiroa bullata* e *Monteiroa dusenii*, respectivamente; *Sida anarthra* (sinônimo de *S. potentilloides*), *S. cerradoensis*, *S. paradoxa*, *S. planicaulis*, *S. riedelii*, *S. rubifolia*, *S. viarum; Malva prostrata*, sinônimo de *Modiola caroliniana*.
- Foi confirmado o monofiletismo dos gêneros *Monteiroa*, *Calyculogygas* e *Tropidococcus*.
- O gênero *Modiola*, até o momento tido como monoespecífico, na verdade engloba a maior parte das espécies descritas em *Modiolastrum* (quatro das cinco espécies), com exceção de *Modiolastrum palustre* (Ekman) Krapovickas que permanece como *incertae sedis*.

- A partir dos registros de herbário e coletas próprias, foi possível categorizar o status de conservação de 46 espécies analisadas na presente tese. Destas 19 são consideradas ameaçadas: duas na categoria Vulnerável (VU) (*Callianthe sulcatarinensis* e *Sida rubifolia*), quatorze Em perigo (EN) (*Callianthe maritima*, *Calyculogygas serrana*, *C. uruguayensis*, *Modiola australe*, *M. gilliesii*, *Modiolastrum palustre*, *Monteiroa dusenii*, *M. hatschbachii*, *M. ptarmicifolia*, *M. rubra*, *M. smithii*, *Sida confusa*, *S. paradoxa* e *Tropidococcus pinnatipartitus*); três como Criticamente em Perigo (CR) (*Monteiroa leitei* e *M. triangularifolia* e *Sida ramoniana*).
- Nas revisões de herbários foram revisadas 5000 exsicatas de 33 herbários.
- Os gêneros *Abutilon* e *Callianthe*, para o Estado do Rio Grande do Sul, também foram estudados na presente tese, tendo sido revisado material de herbários, realizadas coletas e fotografias das espécies. Porém não houve tempo hábil para redigir artigo.
- Quanto ao material coletado em campo e posteriormente herborizado, 230 coletas foram incorpordas aos herbários ICN e HUCS e duplicatas foram distribuídas a outros herbários do país e do exterior.
- Quanto à sinopse do gênero *Sida* L. para o Estado do Rio Grande do Sul, foi registrada a ocorrência de 23 espécies para o Estado; duas espécies foram sinonimizadas (*S. krapovickasii* e *S. pseudorubifolia*); nove espécies são novos registros para o Rio Grande do Sul (*S. cerradoensis*, *S. confusa*, *S. cordifolia*, *S. glaziovii*, *S. lonchitis*, *S. nemorensis*, *S. ramoniana*, *S. reitzii*, *S. riedelii*).
- Foram reconhecidas 23 espécies da família Malvaceae para o município de Santa Maria-RS, pertencentes a 10 gêneros.

- Quanto a continuidade de estudos com os gêneros aqui tratados, sugere-se: 1) Estudo filogeográfico do gênero *Monteiroa*, para entender melhor a delimitação das espécies *Monteiroa reitzii*, *M. dusenii* e *Monteiroa* bullata. 2) Estudos citogenéticos e filogenômicos para compreender melhor o clado *Calyculogygas-Modiola-Modiolastrum-Tropicococcus*.

4. ANEXO – DEMAIS PRODUÇÕES

4.1 REVISOR DE PERIÓDICO

2019 – Periódico: PESQUISAS SÉRIE BOTÂNICA (1 artigo revisado)

2019 - Periódico: SYSTEMATIC BOTANY (1 artigo revisado)

2019 - Periódico: PHYTOTAXA (1 artigo revisado)

2020 - Periódico: SYSTEMATIC BOTANY (1 artigo revisado)

2020 - Periódico: FLORA (1 artigo revisado)

2020 - Periódico: PHYTOTAXA (1 artigo revisado)

2021 - Periódico: SYSTEMATIC BOTANY (3 artigos revisados)

2021 - Periódico: DARWINIANA (2 artigos revisados)

2023 - Periódico: PHYTOTAXA (1 artigo revisado)

2023 - Periódico: BLUMEA (1 artigo revisado)

4.2 CO-AUTORIA EM ARTIGOS

BFG - The Brazil Flora Group. Brazilian Flora 2020: Innovation and collaboration to meet Target 1 of the Global Strategy for PlantConservation (GSPC). RODRIGUÉSIA (IMPRESSO). v.69, p.1513 - 1527, 2018.

BGF. The Brazil Flora Group. GOMES DA SILVA, J., FILARDI, F. L., BARBOSA, M. R. V., BAUMGRATZ, J. F. A., BICUDO, C. E., CAVALCANTI, T. B., COELHO, M. A. N., COSTA, A. F., COSTA, D. P., DALCIN, E. C., LABIAK, P., LIMA, H. C., LOHMANN, L. G., MAIA, L. C., MANSANO, V. F., MENEZES, M., MORIM, M. P., MOURA C. W. N., LUGHADHA, E. N., ... PERALTA, D. F. (2022). Brazilian Flora 2020: Leveraging the power of a collaborative scientific network. Taxon. 71: 178-198. https://doi.org/10.1002/tax.12640.

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