



**MINISTÉRIO DA EDUCAÇÃO
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E INOVAÇÕES
E COMUNICAÇÕES**



**UNIVERSIDADE FEDERAL RURAL DA
AMAZÔNIA MUSEU PARAENSE EMÍLIO GOELDI
PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS BIOLÓGICAS**

KARINA DE NAZARÉ LIMA ALVES

**CYPERACEAE JUSS. NA SERRA DOS MARTÍRIOS-ANDORINHAS, SÃO
GERALDO DO ARAGUAIA, PARÁ, BRASIL**

Belém – Pará

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Dissertação apresentada à Coordenação do Programa de Pós-Graduação em Ciências Biológicas – Botânica Tropical da Universidade Federal Rural da Amazônia e do Museu Paraense Emílio Goeldi, como uma das exigências para a obtenção do título de Mestre.

Orientador: Dr. André dos Santos Bragança Gil.

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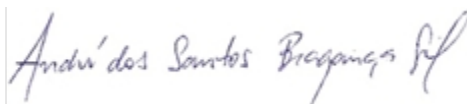
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Prof. Dr. Alessandro Silva do Rosário – 1ª Examinador

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RESUMO

A Serra dos Martírios-Andorinhas está localizada no sudeste do Estado do Pará, e inserida integralmente no município de São Geraldo do Araguaia, no Parque Estadual Serra dos Martírios-Andorinhas (PESAM) e na Área de Proteção Ambiental de São Geraldo do Araguaia (APA Araguaia). Esta região detém os maiores índices de desmatamento da Amazônia, inserida na área conhecida como “Arco do Desmatamento”. Apesar de ser predominantemente coberta por savana amazônica, a Serra está inserida no domínio amazônico. As savanas amazônicas têm como uma das características marcantes, o predomínio de Cyperaceae, com reconhecidos endemismos e distribuição restrita. A intensificação recente dos estudos taxonômicos focados em Cyperaceae na Amazônia vem demonstrando a importância desta família no conhecimento da composição florística das diferentes e singulares fitofisionomias deste Bioma. Este trabalho teve como objetivo realizar um estudo taxonômico de Cyperaceae ocorrentes na Serra dos Martírios-Andorinhas. Foram analisadas amostras provenientes de três expedições de coleta e das coleções dos herbários (CEN, FUEL, HBRA, HUTO, IAN, MBM, MFS, MG e RB). Os táxons foram determinados com consulta à literatura especializada, aos espécimes-tipo e às obras originais. Foram registrados 11 gêneros comportando 70 espécies de Cyperaceae: *Cyperus* L. (18 species), *Rhynchospora* Vahl (18), *Bulbostylis* Kunth (9), *Scleria* P.J.Bergius (9), *Eleocharis* R. Br. (7), *Fimbristylis* Vahl (4), *Calyptrocarya* Nees (2), *Lagenocarpus* Nees (2), *Exochogyne* C.B.Clarke (1), *Fuirena* Rottb. (1), *Hypolytrum* Rich. (1). Desse total sete espécies foram registradas pela primeira vez para o estado do Pará. São apresentadas chaves de identificação, comentários taxonômicos, dados de distribuição geográfica, *habitat*, e ilustrações de espécies e gêneros de Cyperaceae ocorrentes no PESAM e na APA Araguaia, contribuindo para o conhecimento da flora destas importantes unidades de conservação, da flora paraense e brasileira.

Palavras-chave: Amazônia, Cerrado, Cyperoideae, Savanas amazônicas, Taxonomia.

ABSTRACT

The Martírios-Andorinhas mountain range is located in the southeast of Pará state, inserted in the São Geraldo do Araguaia municipality, in the Martírios-Andorinhas State Park (MASP), and, São Geraldo do Araguaia Environmental Protection Area (EPA Araguaia). This region has the highest rates of deforestation in the Amazon, and is inserted in the area known as the “Arch of deforestation”. Despite being predominantly covered by amazonian savanna, the mountain range is part of the Amazon phytogeographic domain. One of the outstanding characteristics of the amazonian savannas is the predominance of herbaceous species, with recognized endemisms and restricted distribution, as in Cyperaceae. The recent intensification of taxonomic studies focused on Cyperaceae in the Amazon has demonstrated the importance of this family in the knowledge of the floristic composition of the different and unique phytophysionomies of this Biome. This taxonomic study is focusing on the genera and species of Cyperaceae occurring in the Martírios-Andorinhas mountain range. Samples from three collection expeditions and the herbaria collections (CEN, FUEL, HBRA, HUTO, IAN, MBM, MFS, MG, and RB) were analyzed. The taxa were determined by consultation of literature, type specimens, and protologues. A total of 72 species were found belonging to 11 genera: *Cyperus* L. (18 species), *Rhynchospora* Vahl (18), *Bulbostylis* Kunth (9), *Scleria* P.J.Bergius (9), *Eleocharis* R. Br. (7), *Fimbristylis* Vahl (4), *Calyptracarya* Nees (2), *Lagenocarpus* Nees (2), *Exochogyne* C.B.Clarke (1), *Fuirena* Rottb. (1), *Hypolytrum* Rich. (1), of these, seven species were registered for the first time in the Pará state. Identification keys, as well as diagnostic characters, illustrations of species, geographical distribution and, preferred habitats of the Cyperaceae species and genera occurring in MASP and EPA Araguaia are provided, contributing to the flora knowledge of these important conservation units, and the Pará state and Brazilian flora.

Key words: Amazon, Cerrado, Cyperoideae, Amazonian Savannas, Taxonomy.

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CONTEXTUALIZAÇÃO

Cyperaceae foi descrita por Jussieu (1789), na *Ordo* “Cyperoideae” (hoje nome conservado da maior subfamília de Cyperaceae), incluindo 11 gêneros e destacando características diagnósticas vegetativas e reprodutivas da família e dos gêneros. No século XIX, Vahl (1805) e Kunth (1837) aprofundaram os estudos taxonômicos e sistemáticos na família. Vahl (1805) tratou taxonomicamente de ca. 380 espécies distribuídas em 16 gêneros e a maioria dos táxons eram novos para a Ciência. O autor descreveu minuciosamente espécies e gêneros, enfatizando seus caracteres diagnósticos e posicionando-os no sistema Lineano de classificação (ausência de táxons supragenéricos). Todavia, Kunth (1837) circunscreveu detalhadamente a família, alocando os cerca de 70 gêneros e 1730 espécies, efetivos na época, em seis tribos, algumas, ainda hoje, bem delimitadas.

Boeckeler (1857, 1849, 1851, 1852, 1874, 1882, 1896), Bentham (1878) e Clarke (1894) também deram importante contribuição ao conhecimento de Cyperaceae, já que em seus tratados taxonômicos, mesmo que algumas vezes de caráter regional, descreveram inúmeras espécies, muitas delas com ocorrência no Brasil.

Os estudos sistemáticos de Kükenthal (1909, 1936, 1949, 1951, 1952), com as monografias mundiais das subfamílias Caricoideae Kostel, Scirpoideae Pax e Rhynchosporoideae Aschers, promoveram grandes avanços no entendimento da relação e delimitação dos táxons infrafamiliares de Cyperaceae. Posteriormente, Koyama (1961, 1962) apresentou um sistema de classificação supragenérico para todas as Cyperaceae, alocando os táxons em quatro subfamílias: Mapanioideae C. B. Clarke, Scirpoideae, Rhynchosporoideae e Caricoideae.

Bruhl (1995), utilizando dados moleculares e morfológicos, reconheceu, pela primeira vez, apenas duas subfamílias, Cyperoideae Beilschm. e Mapanioideae, subdivididas em dez tribos. Posteriormente Goetghebeur (1998), ao estudar a família baseando-se em caracteres morfológicos, a reorganizou em quatro subfamílias: Mapanioideae, Cyperoideae, Sclerioideae Beilschm. e Caricoideae, subdivididas em 17 tribos. Esta classificação foi bem aceita até os recentes avanços na sistemática filogenética, principalmente utilizando dados moleculares.

Os estudos filogenéticos morfológicos e moleculares realizados nas últimas décadas (SIMPSON et al., 2007; MUASYA et al., 2009; HINCHLIFF & ROALSON 2013; JUNG & CHOI 2013; LARRIDON et al., 2011) confirmaram a classificação de Cyperaceae com duas subfamílias e inserida na ordem Poales, como grupo irmão de Juncaceae Juss. (STEVENS, 2001). Mapanioideae conta com duas tribos, seis gêneros e cerca de 180 espécies, amplamente distribuídas nas regiões tropicais e Cyperoideae com 19 tribos, cerca de 92 gêneros e 5.500 espécies, de distribuição cosmopolita (STEVENS, 2001).

Muasya et al. (2009), ao estudar a filogenia de Cyperaceae com base em DNA plastidial, mantiveram a maior parte das circunscrições tribais adotadas por Goetghebeur (1998), como a tribo Schoeneae Dum., onde foram confirmados os gêneros *Rhynchospora* Vahl e *Pleurostachys* Brongn. Contudo, realizaram pequenas modificações em algumas tribos, a exemplo de Cryptangieae Benth., onde foram inseridos *Didymiandrum* Gilly e *Exochogyne* C.B. Clarke.

Dentre os principais estudos filogenéticos recentes, realizados para tribos e gêneros de Cyperaceae estão os trabalhos de Larridon et al. (2011, 2013, 2018), Bauters et al. (2016), Costa et al. (2018) e de Reutemann et al. (2018).

Larridon et al. (2011, 2013) elucidaram as relações filogenéticas em *Cyperus* e gêneros historicamente relacionados, seus resultados promoveram a reinclusão de gêneros anteriormente segregados de *Cyperus* (*Alinula* J. Raynal, *Ascolepis* Nees ex Steud., *Lipocarpha* R.Br., *Kyllinga* Rottb., *Pycreus* P.Beauv., *Queenslandiella* Domin, *Remirea* Aubl., *Sphaerocyperus* Lye e *Volkiella* Merxm. & Czech), formando um grande gênero monofilético, bem sustentado, com cerca de 950 espécies, de distribuição cosmopolita, sendo o segundo maior gênero de Cyperaceae.

Bauters et al. (2016) confirmaram o gênero *Scleria* P. J. Bergius como monofilético, irmão da tribo Bisboeckelereae Pax ex L.T. Eiten, e a subdividiram em quatro subgêneros (*S.* subg. *Browniae*, *S.* subg. *Hypoporum*, *S.* subg. *Scleria*, *S.* subg. *Trachylomia*).

Costa et al. (2018) evidenciaram a tribo Cryptangieae como monofilética e apontaram insuficiência de dados para uma melhor circunscrição das relações filogenéticas dentro deste táxon; de Larridon et al. (2018) que demonstram o

monofiletismo do gênero *Costularia* C.B. Clarke, concluindo que este é composto por quatro linhagens evolutivas diferentes, sendo duas partes do clado *Oreobolus* e duas do clado *Tricostularia*.

Reutemann et al. (2018) concluíram recentemente que *Bulbostylis* forma um clado monofilético com *Nemum atracuminatum* Larridon, Reynders & Goetgh, aumentando assim a circunscrição do gênero.

Espécies de Cyperaceae são mencionadas por sua relevância histórica e cultural para a humanidade. No México foram reportados usos artesanais na confecção de cestos para os gêneros *Cyperus* L. e *Schoenoplectus* (Rchb.) Palla (LUDLOW-WIECHERS & DIEGO-PÉREZ, 2002). *Cyperus papyrus* L., o papiro, era utilizado pelos egípcios na produção de papel há cerca de 5.500 anos (LUDLOW-WIECHERS & DIEGO-PÉREZ, 2002). *Cyperus articulatus* L., conta com rizomas de odor adocicado, e é utilizada na perfumaria (LUDLOW-WIECHERS & DIEGO-PÉREZ, 2002). Algumas espécies são consideradas invasoras de plantações agrícolas, caracterizadas como ervas daninhas, tendo como exemplo *Cyperus rotundus* L., de ampla distribuição geográfica, com elevada capacidade competitiva (SIMPSON & INGLIS, 2001). Ciperáceas também possuem elevado potencial para outros usos, como a ornamentação, alimentação humana e animal (bovinos), ritualístico, e na medicina popular, sendo usadas no tratamento de doenças do sistema endócrino, nervoso, genito-urinário, digestivo, circulatório, além de infecções e inflamações, dentre outras desordens (SIMPSON & INGLIS, 2001).

A primeira publicação completa sobre Cyperaceae para o Brasil foi elaborada por Nees (1842) na *Flora Brasiliensis*, contando com mais de 300 nomes de espécies. Desde então, foram publicados *checklists*, levantamentos florísticos e tratamentos taxonômicos, onde destacam-se os trabalhos de Cyperaceae para o estado de Santa Catarina (BARROS, 1960), para a Flora de Sergipe (PRATA et al., 2013), de revisão do gênero *Bulbostylis* Kunth para o Brasil (PRATA, 2004), o de *Eleocharis* R. Br. para o estado do Rio de Janeiro (GIL & BOVE, 2007), e para o Rio Grande do Sul (TREVISAN & BOLDRINI, 2008), convergindo para descrições de novas espécies e relatos de novas ocorrências publicados como novidades taxonômicas, a exemplo do trabalho de Hefler & Longhi-Wagner (2010) para *Cyperus* subg. *Cyperus* na região sul do Brasil.

Luceño & Alves (1997) publicaram uma chave de identificação para os gêneros de Cyperaceae ocorrentes no Brasil, destacando algumas espécies consideradas raras, além de comentários taxonômicos para aquelas de difícil identificação e ainda uma chave de identificação para as espécies de *Lipocarpha* R.Br. (atualmente alocadas em *Cyperus s.l.*). Alves et al. (2009) publicaram a mais relevante listagem de Cyperaceae no Brasil, com 678 espécies distribuídas em 42 gêneros. Segundo os autores, a região brasileira com maior número de gêneros é a Norte (34 gên.), que também é a mais rica no número de espécies, juntamente com a Sudeste (350 spp. cada). Ainda, esses autores comentaram que, provavelmente, esses números não refletiriam a real diversidade de Cyperaceae do país, uma vez que a região Norte possui ampla extensão, com muitas “lacunas de coleta” e alguns gêneros restritos à Amazônia, como *Mapania* Aubl. e *Bisboecklera* Kuntze.

Dentre estudos documentando a diversidade de Cyperaceae para o cerrado brasileiro destaca-se o trabalho de Munhoz & Proença (1998) que realizaram um levantamento florístico na Chapada dos Veadeiros, estado de Goiás, onde encontraram 46 espécies da família. Vitta & Prata (2009) estudaram as Cyperaceae de Grão Mogol, em Minas Gerais, onde há um mosaico com áreas de cerrado e vegetação campestre, sendo registradas 35 espécies e 14 gêneros. Oliveira et al. (2011) estudaram as Cyperaceae hidrófilas da bacia do rio Araguaia, que perpassa pelos estados de Goiás, Mato Grosso, Tocantins e Pará, e em sua maior extensão localiza-se no cerrado brasileiro, apresentando descrições, distribuições, ilustrações, chaves de identificação e comentários das 31 espécies encontradas. Mais recentemente Araújo & Trevisan (2018), realizaram um levantamento florístico de Cyperaceae para o Mato Grosso do Sul, listando 183 espécies e 21 gêneros. Por fim, Martins (2018) estudou Cyperaceae na Chapada das Mesas, sul do estado do Maranhão, onde registrou 58 espécies e 12 gêneros da família.

Para a Amazônia destaca-se a Flora da Reserva Ducke, no estado do Amazonas, que apresenta quatro tipos de formações vegetais: florestas de platô, florestas de baixio, florestas de vertente e campinaranas (HOPKINS, 2005). Simpson (2006) realizou um tratamento taxonômico para as 23 espécies de Cyperaceae registradas para a Reserva Ducke, pertencentes a 13 gêneros, onde os mais ricos foram *Cyperus* (4 spp.); *Calyptracarya* Nees (3 spp.), *Mapania* (3 spp.), e *Scleria* (3 spp.).

O município de São Geraldo do Araguaia e a Serra dos Martírios-Andorinhas

O município de São Geraldo do Araguaia localiza-se no Sudeste do Estado do Pará, Microrregião Redenção, Regional Marabá, e conta com uma área territorial de aproximadamente 3.169 km² (LOBATO & COSTA, 2008; IBGE, 2017). É um dos municípios inclusos no chamado “Arco do Desmatamento”, região onde se encontram os maiores índices de desmatamento da Amazônia, devido principalmente à expansão agropecuária, constituindo uma região de vulnerabilidade por conta do ateamento de fogo, no processo de ocupação das terras (SILVA, 2009).

De acordo com Cabral & Gomes (2013) o município de São Geraldo do Araguaia foi o segundo de um *ranking* estadual, com 31,9% de taxa de crescimento anual do desmatamento, entre os anos de 2001 e 2009.

Desde 2010 o município integra o Programa Municípios Verdes do Governo do Estado do Pará, tendo alcançado metas como a conclusão de Cadastros Ambientais Rurais e redução do desmatamento, deixando de integrar a lista dos municípios que mais desmatam na Amazônia (PARÁ, 2020).

O Parque Estadual Serra dos Martírios-Andorinhas (PESAM) foi criado por meio da Lei Estadual n.º 5.982, de 25 de julho de 1996 e conta com cerca de 250 km², estando entre as áreas primordiais para a conservação da biodiversidade do cerrado (AMARAL et al., 2008). O Parque localiza-se às margens do Rio Araguaia, na região de fronteira com o estado do Tocantins. Está incluso no Cadastro Nacional de Unidades de Conservação (CNUC), do Ministério do Meio Ambiente (MMA), como uma Unidade de Proteção Integral, com a missão de preservar os ecossistemas naturais nele presentes, oferecendo proteção aos recursos naturais e paisagens, e permitindo o acesso para fins científicos, culturais, educacionais e recreacionais (PARÁ, 1996).

A Área de Proteção Ambiental de São Geraldo do Araguaia (APA Araguaia) foi criada pela Lei Estadual n.º 5.983, de 25 de julho de 1996, abrangendo cerca de 297 km². Situa-se em áreas mais planas, e forma uma zona de amortecimento de possíveis impactos ambientais ao PESAM. Na área existem propriedades privadas de grande e pequena extensão, como fazendas, balneários, e moradias de comunidades tradicionais (COSTA, 2008). Por este motivo a APA é uma Unidade de Conservação de Uso Sustentável com a missão de conservação e recuperação dos ecossistemas locais, para

melhoria das condições de vida das populações locais, por meio do uso sustentado dos recursos naturais (PARÁ, 1996; PARÁ, 2006; MMA, 2018).

Foram realizados estudos no PESAM sobre aspectos gerais da flora, fauna, tipos de solos, hidrologia e sobre questões relacionadas aos efeitos das ações antrópicas para a elaboração do seu Plano de Gestão (aprovado e publicado pela portaria nº. 716/2006 da Secretaria Executiva de Ciência, Tecnologia e Meio Ambiente do estado do Pará).

Amaral et al. (2008) registraram em um levantamento florístico 149 espécies vegetais no PESAM, presentes em diferentes ecossistemas. Contudo a realização de estudos mais aprofundados é necessária, dado o caráter preliminar deste primeiro trabalho, que indica o parque como local de biodiversidade vegetal expressiva (SILVA, 2009).

Organização da dissertação

A dissertação está sendo apresentada na forma de um capítulo: **Cyperaceae Juss. na Serra dos Martírios-Andorinhas, Pará, Brasil**, onde são feitos os comentários taxonômicos de 70 espécies e também são citadas informações de distribuição e *habitat* das mesmas, material examinado, ilustrações e chaves de identificação. Tais resultados devem ser publicados na Revista Iheringia, Série Botânica.

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Cyperaceae Juss. in Serra dos Martírios-Andorinhas, Pará, Brazil

Cyperaceae na Serra dos Martírios-Andorinhas, Pará, Brasil

Karina de Nazaré Lima Alves^{1,2}, Layla Jamylle Costa Schneider^{1,2}, Kauê Nicolas Lindoso Dias⁴ & André dos Santos Bragança Gil¹

¹Museu Paraense Emilio Goeldi - MPEG, Campus de Pesquisa, Coordenação de Botânica - COBOT. Av. Perimetral, 1901, Terra Firme, 66077-530, Belém, PA, Brasil.

²Programa de Pós-graduação em Ciências Biológicas - Botânica Tropical (UFRA/MPEG).

³Instituto Tecnológico Vale, Rua Boaventura da Silva 955, Belém Pará.

⁴Author for correspondence: karinalvesnl@gmail.com

Abreviação do título: Cyperaceae in Serra das Andorinhas

Abstract

This study focus on the Cyperaceae occurring in the Serra dos Martírios-Andorinhas (Serra dos Martírios-Andorinhas State Park, and São Geraldo do Araguaia Environmental Protection Area), in the São Geraldo do Araguaia municipality, State of Pará, Brazil. The Serra is in the “Deforestation Arc”, a high environmentally vulnerable area with the highest deforestation rates in the Amazon Forest. The predominant phytophysiognomy is the amazon savanna, characterized by open environments dominated by herbaceous plants, such as Cyperaceae, in which only four species in a previous floristic inventory were represented. Studying the diversity of Cyperaceae allows us to better understand the herbaceous layer’s dynamics and assisting in the conservation, monitoring, and management of these fascinating and peculiar environments. Therefore, were examined 276 Cyperaceae fieldwork and herbarium samples from Serra dos Martírios-Andorinhas. Currently, Cyperaceae is represented by 11 genera and 72 species in the study area, of which seven represent new records for the State of Pará. A taxonomic identification key, short descriptions with main diagnostic characters, geographic distribution, habitat data, and illustrations for the species and genera are provided.

Keywords: Amazon Forest, Cerrado, Cyperoideae, savannas, Taxonomy.

Resumo

Este estudo trata das Cyperaceae ocorrentes na Serra dos Martírios-Andorinhas (Parque Estadual Serra dos Martírios Andorinhas e Área de Proteção Ambiental de São Geraldo do Araguaia), no município de São Geraldo do Araguaia, Pará, Brasil. A Serra está no “Arco do Desmatamento”, uma área de elevada vulnerabilidade ambiental com os maiores índices de desmatamento da Amazônia. A fitofisionomia predominante é a de Savana Amazônica, caracterizada pelos ambientes abertos com o predomínio de herbáceas, como as Cyperaceae, representadas por apenas quatro espécies em inventário florístico prévio. Estudar a diversidade de Cyperaceae nos permite compreender melhor a dinâmica do estrato herbáceo, contribuindo para a conservação monitoramento e manejo destes peculiares e fascinantes ambientes. Para tanto, foram analisadas 276 amostras de Cyperaceae da Serra das Andorinhas provenientes de coletas de campo e de acervos de herbários. Atualmente, Cyperaceae é representada por 11 gêneros e 72 espécies na área de estudos, das quais, sete são novos registros para o estado do Pará. São apresentadas chave de identificação, descrições sucintas com caracteres diagnósticos, distribuição geográfica, hábitat, ilustrações de espécies e gêneros.

Palavras-chave: Amazônia, Cerrado, Cyperoideae, Savanas, Taxonomia.

Introduction

Serra dos Martírios-Andorinhas (SMA) is located in a transition territory between the Amazon Forest and Cerrado phytogeographic domains. However, it belongs to the Amazon Forest domain (Amaral *et al.* 2008). It is located in the southeastern State of Pará, Northern Brazil, completely inserted in the municipality of São Geraldo do Araguaia. The municipality included in the so-called “Deforestation Arc”, a highly environmentally vulnerable area with the highest deforestation rates in the Brazilian Amazon, caused by illegal fires and land occupation for agriculture (Silva 2009). Between 2001 and 2009, São Geraldo do Araguaia ranked second in the State’s deforestation ranking (Cabral & Gomes 2013). However, since 2010 the municipality has been part of the State’s Green Municipalities program (*Programa Municípios Verdes do Governo do Estado do Pará*), resulting in the reduction of deforestation and the regularization of ruralist registries (Pará 2019).

The SMA includes the first conservation units created in the State of Pará: 1) Serra dos Martírios-Andorinhas State Park (SMASP, an Integral Protection Unit, with about 250 km²); and 2) São Geraldo do Araguaia Environmental Protection Area (EPA Araguaia, a Conservation Unit for Sustainable Use, with about 297 km²) (Pará 2006). These units were created under State laws 5.982 and 5.983, respectively, on July 25th, 1996 (Pará 2006). The EPA Araguaia was created as a buffer zone for possible environmental impacts in the SMA. In the EPA, there are private properties like farms, balnearies, and traditional community housing (Costa 2008).

The predominant phytophysiology in the SMA is the Amazonian savanna, locally called “cerrado”, a term maintained by some authors in works in this area (Silva 1974, Amaral *et al.* 2008). Amazonian savannas differ from the Cerrado domain by their moister soil and climate, with higher relative humidity (Pires & Prance 1985). These savannas are open environments, with sparse shrubs forming vegetation islands, with a predominance of herbaceous plants, such as grasses and sedges (Huber 1897, Amaral *et al.* 2008). The diversity of genera and species occurring in these places allows us to understand the dynamics of the herbaceous layer in savanna environments (Magnusson *et al.* 2008), thus contributing to the monitoring and management of protected areas, further increasing the taxonomic knowledge in the Amazon.

Cyperaceae is the third-largest monocot family, with ca. 109 genera and 5.690 species, a

cosmopolitan distribution and high representation in tropical regions of the globe, inhabiting almost all terrestrial and aquatic environments (Stevens & Davis straightly updated, Gil & Bove 2004, Govaerts *et al.* 2019). It is characteristic of flooded environments such as swamps, ponds, and river banks (Gil & Bove 2004, Simpson *et al.* 2006, Ferreira & Eggers 2008). Its species are essential for the balance of these ecosystems, collaborating in the control of eutrophication and water purification, a potential also explored in the creation of microhabitats by aquarists (Piedade *et al.* 2005).

Brazil has 33 genera and 688 species of Cyperaceae, of which one-third are endemic. The species occur in all Brazilian States and phytogeographic domains. It is especially diverse in the Amazon Forest, to which 296 species are recorded, and approximately one-third inhabit the savannas (Flora do Brasil 2020 in construction).

In the State of Pará, although almost 200 species of Cyperaceae are recorded (Flora do Brasil 2020 in construction), taxonomic studies focused on the family are still recent and incipient. However, they have been expressive, significantly increasing the taxonomic knowledge of Cyperaceae in the State. They also reinforce that a broad understanding of Brazilian flora is untenable without detailed local and regional taxonomic floristic studies. Recently, new records, nomenclatural novelties, new species, and detailed and illustrated local floras were published for the State of Pará (Maciel-Silva *et al.* 2018, 2019, Nunes *et al.* 2016a, 2016b, 2017, 2019, Schneider *et al.* 2017, 2019, Schneider & Gil 2020, in press, Braga-Silva *et al.* in press).

Amaral *et al.* (2008), in the only published floristic survey for the SMA, recorded 149 plant species present in different ecosystems, with only four belonging to Cyperaceae, placed in *Bulbostylis* Kunth and *Cyperus* L. Thus, aiming to expand the taxonomic knowledge of Cyperaceae in the Amazon, this work aimed to carry out a taxonomic study of the sedges occurring in Serra dos Martírios-Andorinhas, presenting identification keys for the species, succinct descriptions, with main diagnostic characteristics, geographic distribution data, habitat, and illustrations.

Material and Methods

The Serra dos Martírios-Andorinhas State Park and the São Geraldo do Araguaia Environmental Protection Area are located in the municipality of São Geraldo do Araguaia, southeastern State of Pará,

between the geographical coordinates 06°04' and 06°23' S, 48°23' and 48°35' W, forming the Serra dos Martírios-Andorinhas (Fig. 1). The climate is of the Aw5 type, according to the Köppen classification, where the rainy season occurs from November to May, and the dry season from June to October, with an annual rainfall of 2.000 mm, an annual mean relative humidity of 78%, and temperature of 26.35 °C (Pará 2006).

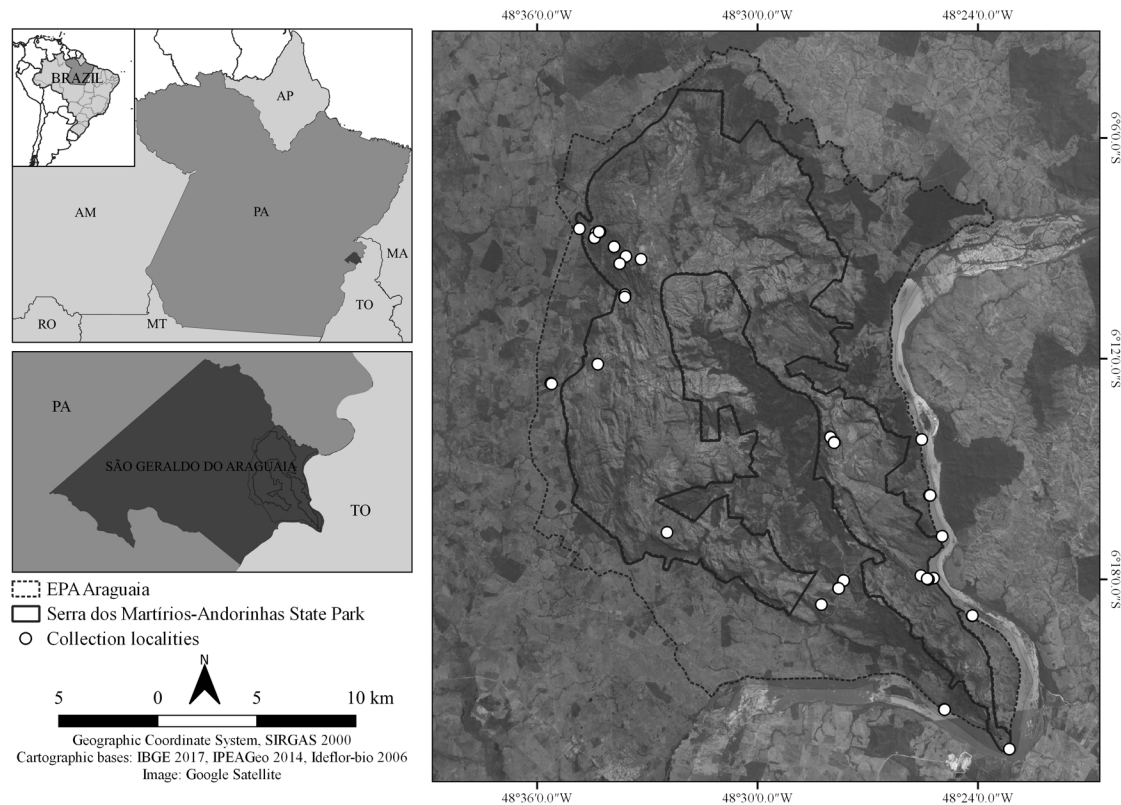


Figure 1 - Location of the study area.

The hydrography of the area consists of rivers, streams, and caves, in which the Araguaia and Sucupira rivers are the most important. The soil is mainly formed by neosols, with minerals or organic matter in its composition. These neosols present a sandy texture, which can be easily eroded if there is no vegetation cover (Pará 2006, MMA 2018). The SMASP presents altitudes from 102 to 594 m a.s.l. The EPA Araguaia has a topographical amplitude ranging from 250 to 300 m (MMA 2018).

The area has a transition physiognomy between the Cerrado and the Amazon Forest domains. For this reason, the classifications of Ribeiro & Walter (1998) were adopted for the Cerrado phytophysionomies, including for savanna formations in this biome: *cerrado s.str.*, *vereda*, *campo sujo*, *campo limpo*, riparian forest, and gallery forest (Fig. 2). The *cerrado s.str.* is characterized by spaced shrubs and subshrubs with twisted trunks, commonly associated with seasonal fires. The *vereda* is

composed of herbaceous plants, shrubs, and *buriti* palms (*Mauritia flexuosa* L.f.) near watercourses formed by groundwater outflow. In the study area, *veredas* were commonly found at the bottom of valleys in flooded areas. The *campo sujo* are formed by herbaceous-shrubby vegetation, with sparse shrubs and subshrubs. The *campo limpo* vegetation has a predominance of herbaceous plants, with rare occurrences of shrubs surrounding the wet areas of the *veredas*. The gallery forests are commonly found at the bottom of valleys, bordering rivers and small streams, forming a closed canopy above the watercourse. The riparian forests consist of forest vegetation that borders medium- and large-sized rivers. Ultimately, when the environments were significantly altered due to anthropic action, the term “anthropized environments” was used.



Figure 2 - a. *Cerrado* s.str. in SMASP. b. *Vereda* in *Morro do Passsat*, SMASP. c. Firty field in Quarta Queda waterfall trail, SMASP. d. *Campo limpo* near *Casa de Pedra*, SMASP. e. Gallery forest in mouth Sucupira river, APA Araguaia. f. Riparian forest near Araguaia river, in EPA Araguaia.

The plant material was collected during three field expeditions in July and August 2018, and May 2019 in the Serra dos Martírios-Andorinhas (MASP and EPA Araguaia). The collection of the specimens followed the walking method for qualitative floristic surveys (Filgueiras *et al.* 1994), while the preparation followed the traditional methods (Fidalgo & Bononi 1984) and the method of walking from Filgueiras *et al.* (1994). The collected specimens were deposited at the João Murça Pires herbarium (MG), and the duplicates were sent to the Jardim Botânico do Rio de Janeiro herbarium (RB). Furthermore, specimens deposited at CEN, FUEL, HBRA, HUTO, IAN, MBM, MFS, MG, and RB (acronyms

according to Thiers, straightly updated) were analyzed in person or were studied online using “SpeciesLink” (<http://www.splink.org.br/>). International herbaria, such as K, MO, NY, US, and P, were also studied online in search of specimens from the study area.

Species determination, and taxonomical and nomenclatural treatment of the species were done based on specialized literature (e.g., Koyama 1970, Muniz & Shepherd 1987, Diego-Pérez 1997, Kral 1971, 1978, 1993, Hennessy 1984, Goetghebeur & Borre 1989, Wujek *et al.* 1994, Faria 1998, Prata 2004, Camelbeke *et al.* 2003, Trevisan 2005, 2009, Vitta 2005, Simpson 2006, Strong 2006, Gil & Bove 2007, Trevisan *et al.* 2007, Trevisan & Boldrini 2008, 2010, Vitta & Prata 2009, Hefler & Longhi-Wagner 2010, Lunkai *et al.* 2010, López 2012, Longhi-Wagner & Araújo 2014, Affonso *et al.* 2015, Alves *et al.* 2015, Ribeiro *et al.* 2015, Nunes *et al.* 2016a, Schneider *et al.* 2017, Maciel-Silva *et al.* 2018, 2019), and websites that provide digitalized original publications and type specimens of the studied species, as: “JSTOR Global Plants” (<https://plants.jstor.org/>); “Biodiversity Heritage Library” (<http://www.biodiversitylibrary.org/>); “Botanicus Digital Library” (<http://www.botanicus.org/>); “Open Library” (<http://openlibrary.org/>); “Kew Royal Botanic Gardens” (http://www.kew.org/collections/herb_types.html); and “NYBG - The New York Botanical Garden” (<http://www.nybg.org/>). When necessary, we consulted the “Taxonomic Literature” (<https://www.sil.si.edu/DigitalCollections/tl-2/>), in search of information on the location of type specimens, in addition to the Domingos Soares Ferreira Penna library at Museu Emílio Goeldi Paraense.

Updated species names and the abbreviation of original works, periodicals, and authors follow: “Tropicos” (<http://www.tropicos.org/>), “World Checklist of Selected Plant Families” (<http://apps.kew.org/>), and Flora do Brasil 2020 in construction (<http://floradobrasil.jbrj.gov.br/>). Species’ geographic distribution data were compiled from “World Checklist of Selected Plant Families”, Flora do Brasil 2020 in construction, “Global Biodiversity Information Facility” (<https://www.gbif.org/>), and from specialized literature.

The selected material examined consists of collections from the study area that are representative of each species’ vegetative and reproductive features. The identification key and descriptions were based exclusively on the examined material. The descriptions of the species are based on diagnostic characters and/or characters of high taxonomic relevance.

The general Cyperaceae terminology follows Kearns *et al.* (1998) and Simpson (2006). We followed Harris & Harris (2001) and Gonçalves & Lorenzi (2007) for the ornamentation and indumentum of the nutlets of all genera, except *Scleria* that followed Hennessy (1985). We followed Reutemann *et al.* (2012) and Ahumada & Vegetti (2009) for the inflorescence architecture and terminology. The measurements for the nutlets' length include the stylopodium, hypogynium, and cupule, when present.

Results and Discussion

We examined 276 specimens from Serra dos Martírios-Andorinhas. Out of these, 36 were analyzed in herbaria, and the remaining 240 were collected during intensive field expeditions. We recorded 72 species of Cyperaceae, distributed in 11 genera: *Cyperus* (18 species), *Rhynchospora* (18 spp.), *Bulbostylis* (9 spp.), *Scleria* (9 spp.), *Eleocharis* (7 spp.), *Fimbristylis* (4 spp.), *Calyptrocarya* (2 spp.), *Lagenocarpus* (2 spp.), *Exochogyne* (1 spp.), *Fuirena* (1 spp.), and *Hypolytrum* (1 spp.).

Bulbostylis jacobinae (Steud.) Lindm., *B. loefgrenii* (Boeckeler) Prata & M.G.López, *B. vestita* (Kunth) C.B.Clarke, *Eleocharis capillacea* Kunth, *E. bicolor* Chapm., *Rhynchospora junciformis* (Kunth) Boeckeler, and *R. tenella* (Nees) Boeckeler were recorded as new occurrences for the State of Pará. Alternatively, *Eleocharis braunii* H.E.Hess and *R. velutina* (Kunth) Boeckeler are here confirmed for the State (Flora do Brasil 2020 in construction).

Cyperaceae Juss. Gen. Pl.: 26 (1789).

Herbs annual or perennial, caespitose, rhizomatous, stoloniferous, or with caudex. Sheaths with the margins smooth or scabrid, apex glabrous, ciliolate or ciliate. Ligule present or absent. Leaf-blades present or absent, papery, coriaceous, chartaceous or membranous, glabrous, pilose or hirsute, apex pseudopremorse or entire. Escapes round, elliptica, triangular, subtriangular, quadrangular or pentagonal in cross-section; glabrous, pilose or hirsute, smooth or scabrid. Inflorescence simple or composite, fasciculate, capituliform, corymbiform, paniculiform, glomeruliform, spiciform or in anthela, lax to congested; inflorescence units consisting of spikelets or spicoids. Spikelets 1- or many-flowered, unisexual, bisexual, androgynous or subandrogynous (male glumes sterile); ovoid, lanceoloid, globose or subglobose. Glumes spiral, distichous or subdistichous, coriaceous or membranous. Flowers unisexual or

bisexual, stamens 1–3 per flower, style bifid, trifold or undivided. Perianth present or absent, perigonal bristles 0–8, developed or rudimentary, sometimes with 3 membranous petaloid blades or 3 hypogynous scales. Nutlets biconvex, trigonous, subtrigonous, or globose, surface smooth, alveolate, foveolate, tuberculate, papillose, punctate, transversely rugose or rugulose. Perigynium (so called utricle) present or absent, glabrous, pubescent or pilose. Stylopodium deciduous or persistent at the apex of the mature nutlets; hypogynium present or absent; cupule persistent at the rachilla or at the nutlet, when present.

Identification key to the species of Cyperaceae in the Serra dos Martúrios-Andorinhas, Pará, Brazil

1. Inflorescence with a solitary spikelet.
 2. Leaf-blades not developed.
 3. Spikelets 1-flowered; two glumes per spikelet.....**4.3. *Eleocharis capillacea***
 - 3'. Spikelets many-flowered; more than two glumes per spikelet.
 4. Spikelets with styles bifid and trifold mixed; nutlets biconvex and trigonous in the same spikelet.....**4.1. *E. bicolor***
 - 4'. Spikelets with styles exclusively bifid or trifold; nutlets biconvex or trigonous in the same spikelet.
 5. Scapes pentagonal in cross-section.....**4.4. *E. filiculmis***
 - 5'. Scapes round, elliptic or quadrangular in cross-section.
 6. Spikelets globose; nutlet biconvex, dark.....**4.5. *E. geniculata***
 - 6'. Spikelets ovoid, lanceoloid or oblongoid; nutlets trigonous, white, olivaceous or yellow.
 7. Spikelets long-oblongoid; perigonal bristles 7–8.....**4.2. *E. braunii***
 - 7'. Spikelets ovoid or lanceoloid; perigonal bristles 5–6.
 8. Scapes quadrangular in cross-section; proliferous spikelets present.....**4.6. *E. nana***
 - 8'. Scapes elliptic in cross-section; proliferous spikelets absent.....**4.6. *E. cf. microcarpa***
 - 2'. Leaf-blades developed.
 9. Leaf-sheaths ciliate at the apex, never lanuginose; glumes ciliate at the margins, never lanuginose.....**1.1. *B. conifera***

- 9'. Leaf-sheaths lanuginose at the apex; glumes lanuginose at the margins.....**1.6. *B. paradoxa***
- 1'. Inflorescence with 2–many spikelets, arranged in capituliform, corymbiform, paniculiform, glomeruliform, spiciform, fasciculate or in anthela inflorescences.
10. Leaf-sheaths ciliate at the apex, lanuginose or ciliolate.
12. Caudex vertical; glumes lanuginose at the margins.....**1.6. *B. paradoxa***
- 12'. Caudex horizontal or absent; glumes ciliate or ciliolate at the margins, never lanuginose.
13. Leaf-blades, escapes or radius of the inflorescences hirsute, pubescent or pilose.
14. Spikelets non-squarrose, glumes mucronate; nutlets $0.8-1 \times 0.4-0.6$ mm, surface reticulated.....**1.9. *B. vestita***
- 14'. Spikelets squarrose, glumes awned; nutlet $0.3-0.5 \times 0.2-0.3$ mm, surface papillose.....**1.7. *B. paraensis***
- 13'. Leaf-blades, scapes and radius of the inflorescences glabrous.
15. Caudex present, involucre bracts glumiform.....**1.2. *B. jacobinae***
- 15'. Caudex absent, involucre bracts foliaceous.
16. Spikelets in congested fascicles (second order of inflorescence); glumes coriaceous.....**1.3. *B. junciformis***
- 16'. Spikelets in a lax anthela (second order of inflorescence); glumes membranous.
17. Nutlets with a reticulated surface.....**1.5. *B. loefgrenii***
- 17'. Nutlets with a papillose surface.....**1.4. *B. lagoensis***
- 10'. Leaf-sheaths glabrous at the apex.
18. Spikelets unisexual.
19. Hypogynium present.
20. Leaf-blades pseudopremorse at the apex; cupule persistent at the nutlet; stylopodium persistent or deciduous at the apex of mature nutlets.
21. Contraligule cuneate at the apex; nutlets $4-7 \times 3.5-5$ mm.....**11.4. *S. macrophylla***
- 21'. Contraligule acute at the apex; nutlets $2.2-3 \times 1.7-2$ mm.....**11.6. *S. microcarpa***

20'. Leaf-blades with apex entire; cupule persistent at the rachilla; stylopodium always deciduous at the apex of mature nutlets.

22. Membranous appendix at the apex of the contraligule absent; hypogynium lobes semirotund.

23. Herbs climbing; stamens 3 per flower.....**11.2. *S. flagellum-nigrorum***

23'. Herbs erect; stamen 1 per flower.....**11.3. *S. gaertneri***

22'. Membranous appendix at the apex of the contraligule present; hypogynium lobes oblong or triangular.

24. Nutlets foveolate; hypogynium lobes oblong.....**11.7. *S. reticularis***

24'. Nutlets smooth or rugulose; hypogynium lobes triangular.

25. Ligule absent; hypogynium lobes lacinate at the apex.....**11.5. *S. martii***

25'. Ligule present; hypogynium lobes with the apex entire.....**11.9. *S. violacea***

19'. Hypogynium absent.

26. Nutlets covered by perigynium puberulent to pilose.

27. Style bifid; nutlets biconvex.....**2.1. *Calyptracarya glomerulata***

27'. Style trifid; nutlets globose to subtrigonus.....**2.2. *C. luzuliformis***

26'. Nutlets not covered by perigynium or perigynium inconspicuous with glabrous surface.

28. Inflorescences spiciform (first order), terminal; hypogynous scales absent at the nutlets base.....**5.1. *Exochogyne amazonica***

28'. Inflorescences paniculiform (first order), terminal and lateral; hypogynous scales present at the nutlets base.

29. Paracladia alternate; nutlets 3–3.3 mm long.....**9.2. *Lagenocarpus rigidus***

29'. Paracladia verticillate; nutlets 1.7–2.2 mm long.....**9.1. *L. verticillatus***

18'. Spikelets bisexual.

30. Inflorescences spiciform (first order).

31. Herbs annual; rhizome absent; leaf-blades and scapes glabrous.....**11.8. *Scleria tenella***

31'. Herbs perennial; rhizome present; leaf-blades and scapes pubescent to glabrescent.....**11.1. *S. distans***

30'. Inflorescences capituliform, corymbiform, paniculiform, umbelliform, fasciculate, glomeruliform or in anthela (first order).

32. Scapes pentagonal in cross-section; perianth composed by membranous petaloid blades.....**7.1. *Fuirena umbellata***

32'. Scapes quadrangular or triangular in cross-section; perianth composed by bristles or absent.

33. Perigonal bristles present.

34. Perigonal bristles plumose throughout their extension.

35. Scapes quadrangular in cross-section; stylopodium spinulose along the margins.....**10.1. *Rhynchospora acanthoma***

35'. Scapes triangular in cross-section; stylopodium unarmed along the margins.

36. Leaf-blades papery, ascendent; nutlets 2.2–2.7 mm long.....**10.10. *R. globosa***

36'. Leaf-blades coriaceous, recurved; nutlets 4.2–4.1 mm long.....**10.6. *R. curvula***

34'. Perigonal bristles non-plumose, or plumose only at the base.

37. Inflorescence capituliform; nutlet winged along the margins; perigonal bristles 4.....**10.2. *R. barbata***

37'. Inflorescence paniculiform; nutlet not winged along the margins; perigonal bristles 6.

38. Leaf-blades with the midrib of the adaxial side puberulent, margins ciliate; glumes coriaceous.....**10.4. *R. cephalotes***

38'. Leaf-blades with the midrib of the adaxial side glabrous, margins glabrous; glumes membranous.....**10.15. *R. rugosa***

33'. Perigonal bristles absent.

39. Androecium and gynoecium under two laminar lateral pieces (floral bracts) and one laminar frontal piece (spicoid bract).....**8.1. *Hypolytrum longifolium***

39'. Androecium and/or gynoecium under a single laminar frontal piece (glume).

40. Glumes spiral.

41. Inflorescence capituliform or glomeruliform (first order).
42. Inflorescence glomeruliform.....**10.8. *R. exaltata***
- 42'. Inflorescence capituliform.
43. Glumes straw-colored, sometimes orange at the base, keel green; stylopodium at the apex of the mature nutlets absent.....**6.4. *Fimbristylis vahlii***
- 43'. Glumes completely white or cream; stylopodium at the apex of the mature nutlets present.
44. Nutlets with the surface transversely rugose; base of the stylopodium tetralobed.....**10.14. *R. puber***
- 44'. Nutlets with the surface transversely rugulose; base of the stylopodium entire.
45. Rhizomes ca. 0.5 cm long, herbs cespitose; nutlets 1–1.3 mm wide.....**10.5. *R. ciliata***
- 45'. Rhizomes 1–3 cm long, herbs solitary; nutlets 1.6–1.8 mm wide.....**10.13. *R. nervosa***
- 41'. Inflorescences paniculiform, corymbiform or in anthela (first order).
46. Inflorescences in anthela.
47. Leaf-sheaths and scapes scabrid; stylopodium at the apex of the mature nutlets present.....**1.9. *B. truncata***
- 47'. Leaf-sheaths and scapes smooth; stylopodium at the apex of the mature nutlets absent.
48. Styles bifid; nutlets biconvex.
49. Styles fimbriated; nutlets 1–1.3 mm long.....**6.2. *F. dichotoma***
- 49'. Styles not fimbriated; nutlets 0.4–0.5 mm long.....**6.1. *F. aestivalis***
- 48'. Styles trifid; nutlets trigonous to subtrigonous.....**6.3. *F. littoralis***

46'. Inflorescences paniculiform or corymbiform.

50. Herb perennial; rhizomes present.

51. Involucral bracts ciliate at the margins; glumes reddish-brown, apex mucronate or acute.....**10.18. *R. velutina***

51'. Involucral bracts glabrous at the margins; glumes brown, apex awned.

52. Leaf-sheaths with an apical ligule; nutlets with the surface reticulated in central region, papillose only along the margins, base long-stipitate; stylopodium with entire base.....**10.9. *R. filiformis***

52'. Leaf-sheaths without an apical ligule; nutlets with the surface transversely rugulose in the central region, papillose at the base and along the margins, base short-stipitate; stylopodium with bilobed base.....**10.16 *R. spruceana***

50'. Herbs annual; rhizomes absent.

53. Leaf and/or scapes pilose or hirsute.

54. Inflorescence rachis retroflexed; nutlets with the surface transversely rugose; stylopodium lunate.....**10.7. *R. divaricata***

54'. Inflorescence rachis ascendent; nutlets with the surface foveolate; stylopodium pyramidal.....**10.11 *R. hirsuta***

53'. Leafs and scapes glabrous.

55. Inflorescences paniculiform (first order); styles undivided; nutlets 0.6–0.8 × 0.6–0.7 mm.....**10.17 *R. tenella***

55'. Inflorescences corymbiform (first order); styles bifid; nutlets 1–4 × 0.7–1.1 mm.

56. Nutlets with weakly reticulated surface, base with papillose protuberances.....**10.3. *R. brevirostris***

56'. Nutlets with transversely rugose surface, base without papillose protuberances.....**10.12. *R. junciformis***

40'. Glumes distichous.

57. Styles bifid.

58. Inflorescences glomeruliform (first order); nutlets $0.6-0.7 \times \text{ca. } 0.2$ mm.....**3.16. *Cyperus subsquarrosus***

58'. Inflorescences capituliform or in anthela (first order); nutlets $0.9-1.4 \times 0.4-0.7$ mm.

59. Spikelets 1-flowered; glumes with scabrid keels....**3.7. *C. hortensis***

59'. Spikelets many-flowered; glumes with smooth keels.....**3.12. *C. macrostachyos***

57'. Styles trifid.

60. Spikelets in spikes (second order).

61. Glumes with vinaceous striations and macules at the margins.....**3.15. *C. sphacelatus***

61'. Glumes without vinaceous striations and macules at the margins.

62. Mature spikelets deciduous, diaspores consisting of one glume, the nutlet and the internode of the winged rachilla, which surrounds the nutlet.

63. Glumes 2-3 per spikelet; nutlets $0.7-1$ mm wide, obovoid.....**3.1. *C. aggregatus***

63'. Glumes 4 or more per spikelet; nutlets $0.3-0.6$ mm wide, ellipsoid.....**3.13. *C. odoratus***

62'. Mature spikelets persistent, not forming diaspores.

64. Inflorescence rachis absent or inconspicuous; inflorescences glomeruliform (first order).....**3.5. *C. gayi***

64'. Inflorescence rachis conspicuous; inflorescences in anthela (first order).

65. Spikes congested, covering the rachis; nutlets $0.5-0.7$ mm long, obovoid.....**3.8. *C. imbricatus***

- 65'. Spikes lax, not covering the rachis; nutlets 1–2 mm long, narrowly ellipsoid.
66. Rachilla flexuose; glumes obtuse; nutlets 1.6–2 × 0.2–0.3 mm.....**3.4. *C. distans***
- 66'. Rachilla straight; glumes mucronate; nutlets 1–1.5 × 0.4–0.6 mm.....**3.3. *C. digitatus***
- 60'. Spikelets in anthela, fascicles, glomeruli or subdigitated (second order).
67. Spikelets in glomeruli (second order).
68. Scapes retrorsively scabrid; nutlets 0.7–0.9 mm long, obovoid.....**3.17. *C. surinamensis***
- 68'. Scapes smooth; nutlets 1–1.3 mm long, ellipsoid to narrowly ellipsoid.....**3.11. *C. luzulae***
- 67'. Spikelets in anthela, fascicles or subdigitated (second order).
69. Leaf-blades membranous when developed; nutlets 0.5–0.8 mm long.
70. Herbs 3–5 cm tall; spikelets squarrose; glumes awned; nutlets 0.7–0.9 × 0.3–0.4 mm, ellipsoid.....**3.2. *C. cuspidatus***
- 70'. Herbs 6–77 cm tall; spikelets non-squarrose; glumes mucronate; nutlets 1–1.5 × 0.7–1.1 mm broadly obovoid.
71. Herbs perennial; scapes winged; stamens 3 per flower; nutlets ovoid to ellipsoid.....**3.6. *C. haspan***
- 71'. Herbs annual; scapes unwinged; stamens 2 per flower; nutlets obovoid.....**3.18. *C. tenuispica***
- 69'. Leaf-blades chartaceous; nutlets 1–1.6 mm long.
72. Glumes with the keels scabrid; nutlets 1–1.2 mm long, white to gray.....**3.14. *C. simplex***

72'. Glumes with the keels smooth; nutlets 1.3–1.6 mm long, straw-colored to dark brown.

73. Rachis prophylls scabrid at the margins; glumes rhomboid, hyaline margins inconspicuous, apex awned; stamens 3 per flower.....**3.10. *C. laxus***

73'. Rachis prophylls smooth at the margins; glumes obovate to rotund, hyaline margins conspicuous, apex mucronate; stamens 2 per flower.....**3.9. *C. iria***

1. *Bulbostylis* Kunth, Enum. Pl. 2: 205 (1837).

The genus comprises about 200 species, occurring in the tropical and subtropical regions of the Americas and Asia (Govaerts *et al.* 2019). In Brazil, 56 species are recorded, 20 of which are endemic, and 14 occurring in the State of Pará (Flora do Brasil 2020 in construction). Species of *Bulbostylis* have dry fields as their main habitat, growing on rocky or sandy soils (Prata 2004).

In the SMA, the nine recorded species of *Bulbostylis* can be distinguished by the vertical caudex, horizontal or absent; leaf-sheaths scabrid or smooth, apex ciliate, ciliolate or glabrous, leaf-blades glabrous or hirsute; scapes scabrid or smooth, glabrous or hirsute; glumiform bracts present or absent; inflorescences composed by one or more spikelets, arranged in capitula, corymbs, panicles, glomerules, spikes, fascicles or anthela, rachis glabrous or hirsute, glumes membranous or coriaceous, with the margins ciliate, ciliolate or lanuginose; and nutlets surface reticulated or papillose.

1.1. *Bulbostylis conifera* (Kunth) C.B.Clarke, Urb., Symb. Antill. 2: 86 (1900). *Isolepis conifera* Kunth, Enum. Plant. Omn. Huc. Cognit. 2: 206 (1837). Figs. 3a, 4a.

The species can be distinguished by its leaf-blades 1/3 to 1/5 the length of the scape, canaliculate; inflorescences terminal, simple, formed by a sole spikelet, oblongoid to oblong-ovoid at the scape apex, glumes membranous, deciduous, basal glume sterile, persistent; nutlets 0.8–1.4 × 0.3–1 mm, obovoid, trigonous, apex cordate, gray to light brown, surface transversely rugose, lustrous, stylopodium discoid. It occurs in South America. In Brazil, it is recorded for the Northern (AM, AP, PA, RO, RR, TO),

Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (PR) regions. In the SMA, it occurs in *cerrado* s.str., anthropized environments, and seasonally flooded *campo limpo*.

Selected specimen examined: BRAZIL. PARÁ: São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha da Casa de Pedra, 6°10'19.5"S, 48°33'36.8"W, 364 m, fl. and fr., 2.VII.2018, *K.N.L. Alves et al.* 25 (MG).



Figure 3 – a-p. Nutlet and inflorescences. a. *Bulbostylis conifera*, inflorescence formed by only one spikelet. b. *B. jacobinae*, anthela. c. *B. junciformis*, anthela congest. d. *B. lagoensis*, spikelets in anthelae. e. *B. loefgreni*, anthela. f. *B. paradoxa*, capitulum-like inflorescence. g. *B. paraensis*, spikelets in anthelae. h. *B. paraensis*, obovoid nutlet. i. *B. truncata*, inflorescences in anthela. j. *B. vestita*, anthela, spikelets in congest fascicles. k. *Calyptrocarya glomerulata*, paniculiform inflorescence, spikelets in glomeruli. l. *C. luzuliformis*, paniculiform inflorescence, spikelets in glomeruli. m. *Cyperus aggregatus*, anthela, spikelets in spikes, rachis developed. n. *C. cuspidatus*, spikelets in fascicles. o. *C. digitatus*, anthela, spikelets in spikes. p. *C. gayi*, glomeruliform inflorescence, spikelets in spikes. a. K.N.L. Alves et al. 25. b. K.N.L. Alves et al. 146. c. K.N.L. Alves et al. 133. d. K.N.L. Alves et al. 43. e. C.S. Nunes et al. 425. f. A. Gil et al. 835. g. A.S.B. Gil et al. 904. h. A.J. Fernandes-Júnior et al. 674. i. A.A. Oliveira et al. 4593. j. A.S.B. Gil et al. 934. k. A.S.B. Gil et al. 935. l. K.N.L. Alves et al. 207. m. G. Pereira-Silva 9042. n. A.S.B. Gil et al. 843. o. A.S.B. Gil et al. 858. Scale bar: h. 1 mm; a, b, c, d, e, f, g, i, j, k, l, m, n, o. 1 cm.

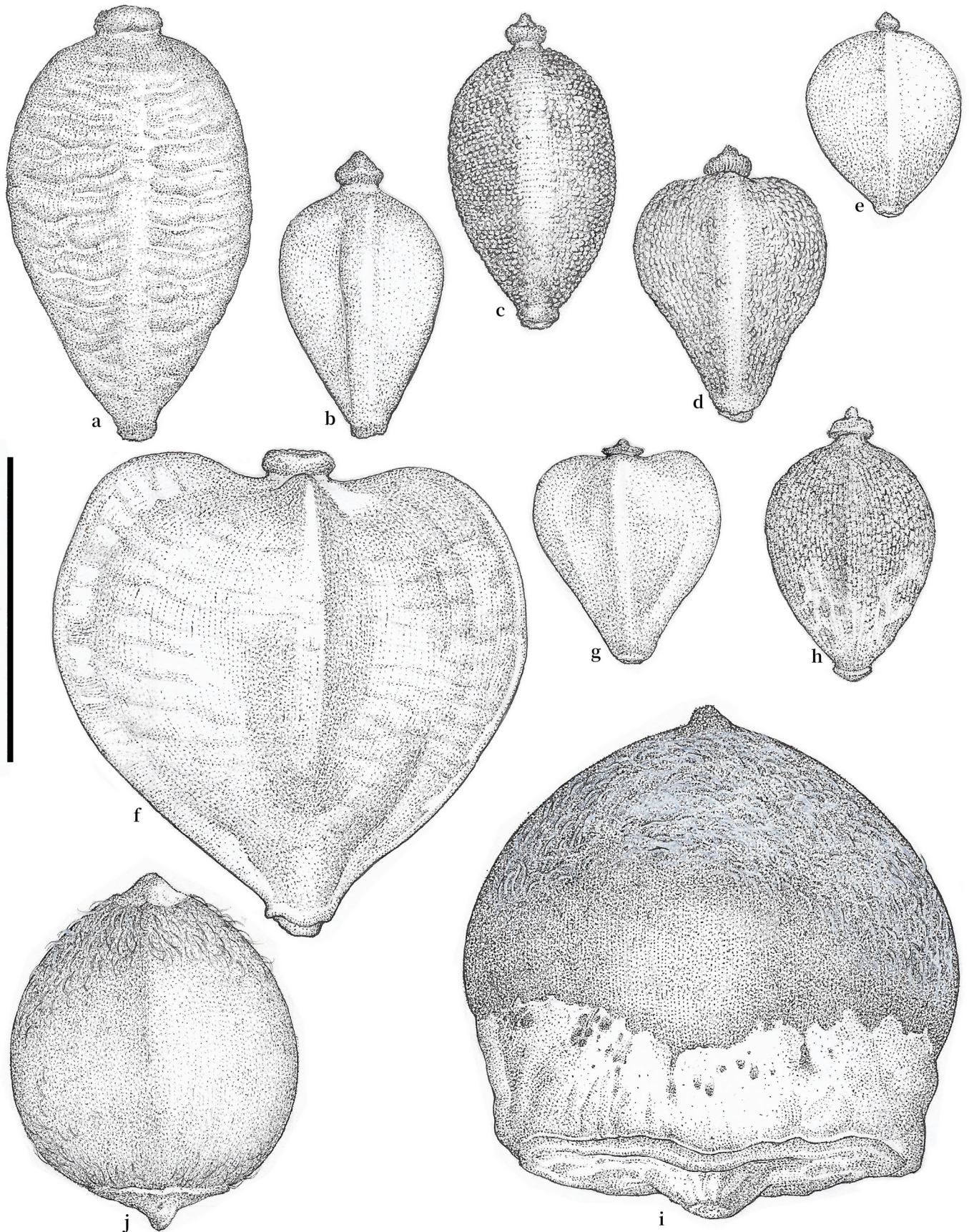


Figure 4 – a-j. Nutlets. a. *Bulbostylis conifera*. b. *B. jacobinae*. c. *B. junciformis*. d. *B. lagoensis*. e. *B. paradoxa*. f. *B. loefgrenii*. g. *B. truncata*. h. *B. vestita*. i. *C. glomerulata*. j. *C. luzuliformis*. a. K.N.L. Alves et al. 25; b. K.N.L. Alves et al. 146; c. K.N.L. Alves et al. 133; d. K.N.L. Alves et al. 43. e. C.S. Nunes et al. 425. f. A.S.B. Gil et al. 904. g. A.J. Fernandes-Júnior et al. 674. h. A.A. Oliveira et al. 4593. i. A.S.B. Gil et al. 934. j. A.S.B. Gil et al. 935. Scale bar: 1 mm.

1.2. *Bulbostylis jacobinae* (Steud.) Lindm., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 26(9): 18 (1900).

Fimbristylis jacobinae Steud., Syn. Pl. Glumac. 2: 111 (1855).

Figs. 3b, 4b, 5a-b.

The species can be distinguished by the presence of a horizontal caudex, reptant; leaf-sheaths membranous, white, leaf-blades, scapes and involucre bracts glabrous, lower involucre bracts never overcoming the inflorescence, inflorescences in anthela, glumes rusty to pink, glumes deciduous; stamens 3 per flower; nutlets 0.6–0.8 × 0.3–0.6 mm, white to straw-colored, obovoid, trigonous, surface reticulated, stylopodium discoid to subpyramidal. It occurs in Bolivia and Brazil. In Brazil, it occurs in Northern (TO), Northeastern (BA, MA, PI), Central-Western (DF, GO, MS, MG), Southeastern (MG, SP) and Southern (PR) regions. It is a new record for the State of Pará. In the SMA, it occurs in *cerrado* s.str., *campo sujo*, and seasonally flooded *campo limpo*.

Selected specimen examined: BRAZIL. PARÁ: São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, campina ca. 500 m a leste da Casa de Pedra, 6°09'06"S, 48°32'47.5"W, fl. and fr., 500 m, 26.VIII.2018, *K.N.L. Alves et al. 146* (MG).



Figure 5 - a-j. Field images. a. *Bulbostylis jacobinae*, inflorescence. b. *B. jacobinae*, caudex. c. *B. junciformis*, inflorescence. d. *B. paradoxa*, habit. e. *Cyperus imbricatus*, inflorescences. f. *Eleocharis capillacea*, stolon. g. *Exochogyne amazonica*, inflorescence. h. *Fimbristylis littoralis*, inflorescence. i. *Fuirena umbellata*, inflorescence. j. *Hypolytrum longifolium*, inflorescence.

1.3. *Bulbostylis junciformis* (Kunth) C.B. Clarke, Trans. Linn. Soc. London, Bot. 4: 512 (1895). *Isolepis junciformis* Kunth, Nov. Genera et Spec. Plant. (4 ed.) 1: 222–223. (1815 [1816]). Figs. 3c, 4c, 5c.

The species can be distinguished by the leaf-sheaths with ciliate apex, cilia white; leaf-blades, scapes and inflorescence rachis glabrous; inflorescences 2–3 order in anthela, lax to congested, with spikelets in congested fascicles; glumes deciduous, coriaceous; nutlets 0.7–1.1 × 0.4–0.6 mm, obovoid, trigonous, white when immature, dark brown to gray when mature, surface papillose and/or reticulated,

stylopodium discoid to subpyramidal. Distributed in Central America, South America, and Mexico. In Brazil, it occurs in Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RS, SE), Central-Western (DF, GO, MS, MG), Southeastern (ES, MG, RJ, SP), and Southern regions (PR). In the SMA, occurs in *cerrado* s.str., *campo sujo*, *veredas* (*Mauritia flexuosa* L.f. palm swamps), and anthropized environments.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, trilha da Casa de Pedra, 6°10'21.7"S, 48°33'48.7"W, fl. and fr., 2.VII.2018, K.N.L. Alves *et al.* 5 (MG).

1.4. *Bulbostylis lagoensis* (Boeckeler) Prata & M.G.López, Kew Bull. 56: 1008 (2001). *Scirpus lagoensis* Boeckeler, Beitr. Cyper. 2: 15 (1890). Figs. 3d, 4d.

The species can be distinguished by the inflorescences with up to three orders in lax anthela, with spikelets in anthela; spikelets oblong-lanceoloid, 2.5–6(–7) mm long, glumes membranous, pubescent, deciduous; nutlets 0.6–0.8 × 0.4–0.6 mm, obovoid, trigonous, light brown to gray, surface papillose, stylopodium discoid to subpyramidal. Distributed in Bolivia and Brazil. In Brazil, it occurs in the Northern (PA, TO), Northeastern (BA), Central-Western (DF, GO, MT), and Southeastern (MG, SP) regions. In the SMA, it occurs in *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, 32 km na estrada sentido São Geraldo-Marabá, 6°8'41"S, 48°34'25"W, fl. and fr., 25.VIII.2018, C.S. Nunes *et al.* 384 (MG).

1.5. *Bulbostylis loefgrenii* (Boeckeler) Prata & M.G.López, Kew Bull. 56: 1008 (2001). Figs. 3e, 4f.

The species can be distinguished by the slender aspect, with capillaceous scapes (0.1–0.3 mm diam.), unarmed; inflorescences with up to 2 orders, with spikelets in lax anthela; spikelets 2–3 per inflorescence, glumes rusty, membranous, deciduous; nutlets 0.4–0.7 × 0.3–0.5 mm, obovoid, subtrigonous, white to light brown, surface reticulated; stylopodium discoid to subpyramidal. Distributed in Bolivia, Paraguay, and Brazil. In Brazil, it is distributed in the Northern (TO), Northeastern (BA, PI),

Central-Western (GO, MT), Southeastern (MG, SP) and Southern (PR, RS) regions. It is a new record for the State of Pará. In the SMA, it occurs in *cerrado* s.str., anthropized environments, and riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha da Casa de Pedra, 6°09'17.7"S, 48°33'10.4"W, fl. and fr., 06.VII.2018, *L. Schneider et al.* 258 (MG).

1.6. *Bulbostylis paradoxa* (Spreng.) Lindm., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 26(9): 17 (1900). *Schoenus paradoxus* Spreng., Syst. Veg. 1: 190 (1824). Figs. 3f, 4e, 5d.

The species can be distinguished by the vertical caudex, leaf-sheaths densely ciliated, lanuginose, cilia white; inflorescences capituliform, occasionally spiciform, with 1–4(–6) spikelets, glumes ciliate to densely ciliate at the margins, lanuginose; nutlets 1–1.8 × 1.2–1.3 mm, obovoid, trigonous, apex cordate, white, surface transversely rugulose; stylopodium discoid. Distributed in Central and South America, and Mexico. In Brazil, it is distributed in the Northern (AM, AP, PA, RO, RR, TO), Northeastern (BA, MA, PB, PI), Central-Western (DF, GO, MS, MT), Southeastern (MG, RJ, SP) and Southern (PR) regions. In the SMA, it occurs in *cerrado* s.str.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Mirante, 6°14'16.4"S, fl. and fr., 48°27'55.0"W, 27.VIII.2018, *C.S. Nunes et al.* 425 (MG).

1.7. *Bulbostylis paraensis* C.B.Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 28 (1908). Fig. 3g-h.

The species can be distinguished by its pubescent leaf-sheaths, with the apex oblique, ciliate; scapes and leaf-blades filiform, blades hirtellous in the abaxial surface, margins scabrid, lower involucral bract the same length or longer than the inflorescence, inflorescences in 1–2 orders, with spikelets in anthela; spikelets squarrose, glumes awned, persistent, styles trifid; nutlets 0.3–0.5 × 0.2–0.3 mm, obovoid, trigonous, white to straw-colored, surface papillose, lustrous; stylopodium subpyramidal. Distributed in Colombia, Venezuela, and Brazil. In Brazil, it is distributed in the Northern (PA, TO), Central-Western (GO, MS, MT), and Southeastern (MG) regions. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual da Serra dos Martírios-Andorinhas, Margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58"S 48°24'09.2"W, fl. and fr., 29.VIII.2018, A. Gil *et al.* 835 (MG).

1.8. *Bulbostylis truncata* (Nees) M.T.Strong, Brittonia 45: 165 (1993). *Oncostylis truncata* Nees in C.F.P.von Martius & auct. suc. (eds.), Fl. Bras. 2(1): 83 (1842). Figs. 3i, 4g.

The species can be distinguished by its small stature (7–14 cm tall); leaf-sheaths scabrid, apex truncate, glabrous; scapes triangular in cross-section, capillaceous, scabrid, leaf-blades scabrid in the adaxial surface; inflorescences in anthela, glumes deciduous; nutlets 0.6–0.8 × 0.4–0.6 mm, obovoid, trigonous, with prominent angles, surface slightly reticulated, apex cordate, stylopodium discoid. Distributed in South America. In Brazil, it is distributed in the Northern (AM, AP, PA, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (PR) regions. In the SMA, it occurs in *cerrado s.str.*

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Morro do Passat, 6°16'58.9"S, 48°32'33.0"W, fl. and fr., 29.VIII.2018, A.J. Fernandes-Júnior *et al.* 674 (MG).

1.9. *Bulbostylis vestita* (Kunth) C.B.Clarke in I.Urban, Symb. Antill. 2: 87 (1900). *Isolepis vestita* Kunth, Enum. Pl. 2: 210 (1837). Figs. 3j, 4h.

The species can be distinguished by the leaf-blades hirsute; scapes triangular in cross-section, hirsute; inflorescences in anthela, with spikelets in congested fascicles, rachis hirsute, glumes membranous, pubescent, persistent; nutlets 0.8–1 × 0.4–0.6 mm, obovoid, trigonous, white, surface reticulated, stylopodium subpyramidal to discoid. Distributed in Central America, South America, and Mexico. In Brazil, it is distributed in the Northern (RR), Northeastern (AL, BA, CE, PB, PE, PI, SE), Central-Western (MS), Southeastern (ES, MG, RJ, SP) and Southern (PR, SC) regions. It is a new record for the State of Pará. In the SMA, it occurs in *cerrado s.str.*

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha entre as Cachoeiras Três e Quatro Quedas, 6°10'51"S, 48°33'39"W, fl. and fr., 02.VI.2018, A.A. Oliveira *et al.* 4593 (MG, IAN).

2. *Calyptrocarya* Nees, *Linnaea* 9: 304 (1834).

Calyptrocarya is constituted by eight species, distributed in Central America, South America, and Mexico (Govaerts *et al.* 2019). Out of the eight species, seven occur in Brazil, and five are recorded for the State of Pará (Flora do Brasil 2020 in construction). These species inhabit evergreen forests, seasonally flooded forests, and wet savannas, occurring next to rivers, streams and lagoons, growing on rocky substrates or sandy soils (Kearns *et al.* 1998).

In the SMA, the two species recorded can be distinguished by leaf-sheaths with the apex glabrous; inflorescences formed by more than one spikelet, paniculiform, with spikelets in glomeruli; spikelets unisexual; styles bifid or trifid; perigynium puberulent to pilose; hypogynium absent; nutlets biconvex, rotund to subtrigonus.

2.1. *Calyptrocarya glomerulata* (Brongn.) Urb. *Symb. Antill.* 2: 169 (1900). *Becquerelia glomerulata* Brongn. in L.I. Duperrey, *Voyage Autour du Monde* 2: 163 (1829). Figs. 3k, 4i.

The species can be distinguished by its central scapes, inflorescences with up to 3 orders, the first and second orders paniculiform, with spikelets in glomeruli, styles bifid; nutlets 1.1–1.7 × 1–1.3 mm, biconvex, white to brown, base truncate-umbonate, and apex apiculate; perigynium puberulent (when mature) to pubescent (when immature). Distributed in Central America, South America, and Mexico. In Brazil, it is recorded for all States. In the SMA, it occurs in gallery forests and *veredas*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, foz do Rio Sucupira, 06°18'01"S, 48°25'21"W, fl. and fr., 25.V.2019, A.S.B. Gil *et al.* 934 (MG).

2.2. *Calyptracarya luzuliformis* T.Koyama, Mem. New York Bot. Gard. 17(1): 44 (1967).

Figs. 3l, 4j.

The species can be distinguished by the presence of central scapes, inflorescences with up to 3 orders, paniculiform, with spikelets in glomeruli, styles trifid; nutlets 1.2–1.4 × 0.8–1.2 mm, rotund to subtrigonus, white, base umbonate, and apex apiculate, covered by a pilose perigynium. Distributed in South America and Costa Rica. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (MA, PI), and Central-Western (MT) regions. In the SMA, it occurs in gallery forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Foz do Rio Sucupira, 06°18'01"S, 48°25'21"W, fl. and fr., 25.V.2019, A.S.B. Gil *et al.* 935 (MG).

3. *Cyperus* L., Sp. Pl.: 44 (1753).

Genus with a cosmopolitan distribution, highly diversified, with about 760 species, including the traditionally recognized *Kyllinga* Rottb., *Lipocarpa* R.Br., and *Pycreus* P.Beauv., among others (Larridon *et al.* 2013, Govaerts *et al.* 2019). In Brazil, it is confirmed the occurrence of 127 species, of which 23 are endemic, and 33 are recorded for the State of Pará (Flora do Brasil 2020 in construction). The species of *Cyperus* occur in a wide variety of habitats, from humid and flooded environments to areas with less water availability, as well as in areas affected by human intervention (Goetghebeur 1998).

In the SMA, the 18 species recorded for the genus are characterized as herbs annual or perennial; leaf-blades membranous or chartaceous; scapes winged or unwinged, unarmed or retrorsely scabrid; inflorescences in anthela, umbelliform, capituliform, spiciform, in fascicles, subdigitate or in glomeruli; rachis' prophylls of the inflorescences with margins unarmed or scabrid, rachis conspicuous, inconspicuous or absent; spikelets squarrose or non-squarrose, persistent or deciduous when mature, 1-flowered or many-flowered, rachilla flexuose or straight, glumes distichous, rhomboid, obovate to rotund, keels unarmed or scabrid, margins hyaline conspicuous or inconspicuous, apex mucronate or awned; styles bifid or trifid; stamens 2–3 per flower; nutlets ovoid, obovoid or ellipsoid, straw-colored to dark brown or white to gray.

3.1. *Cyperus aggregatus* (Willd.) Endl., Cat. Horti Vindob. 1: 93 (1842). *Mariscus aggregatus* Willd., Enum. Pl.: 70 (1809). Figs. 3m, 6a.

The species can be distinguished by its leaf-sheaths membranous, leaf-blades chartaceous; inflorescences with 2–3 orders, arranged in anthela, with spikelets in spikes, often congested, rachis developed or undeveloped, prophylls with biacuminate apex and spinulose margins; spikelets deciduous at maturity, forming diaspores constituted by one glume, one nutlet and one rachilla internode, rachilla winged, involving the nutlet, glumes 2–3 per spikelet; stamens 3 per flower; styles trifid; nutlets 1.7–2 × 0.7–1 mm, obovoid, trigonous, dark brown, slightly reticulated to papillose surface, apiculate apex. Distributed in tropical and subtropical regions of the Americas. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments and *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha para a Casa de Pedra, 6°09'48.8"S, 48°33'19"W, fl. and fr., 06.VII.2018, *L. Schneider et al.* 260 (MG).

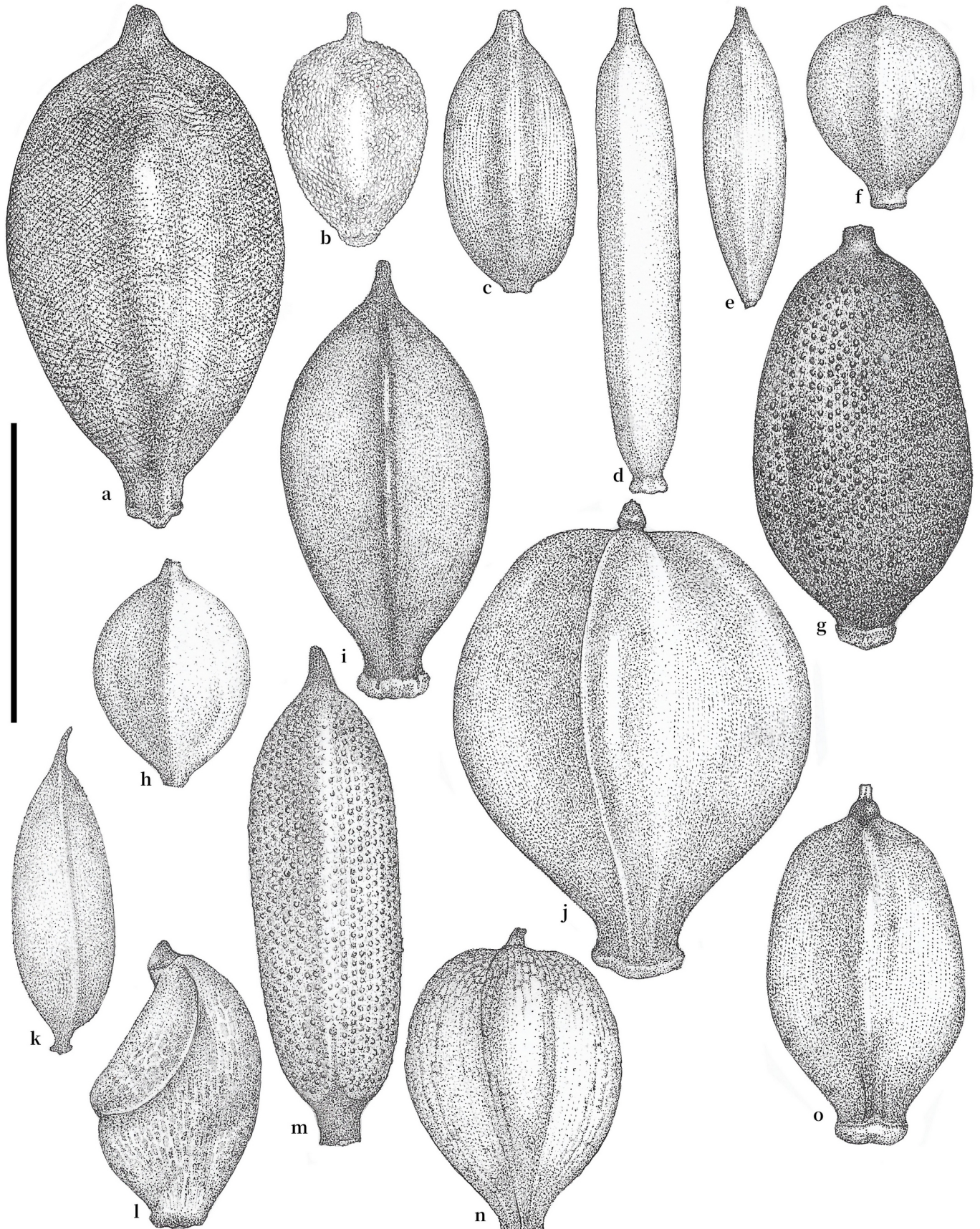


Figure 6 – a-o. Nutlets. a. *Cyperus aggregatus*. b. *C. cuspidatus*. c. *C. digitatus*. d. *C. distans*. e. *C. gayi*. f. *C. haspan*. g. *C. hortensis*. h. *C. imbricatus*. i. *C. iria*. j. *C. laxus*. k. *C. luzulae*. l. *C. macrostachyos*. m. *C. odoratus*. n. *C. simplex*. o. *C. sphacelatus*. a. K.N.L. Alves et al. 207. b. G. Pereira-Silva 9042. c. A.S.B. Gil et al. 843. d. A.S.B. Gil et al. 841. e. A.S.B. Gil et al. 858. f. K.N.L. Alves et al. 197. g. A.S.B. Gil et al. 863. h. A.S.B. Gil et al. 842. i. K.N.L. Alves et al. 204. j. K.N.L. Alves et al. 23. k. K.N.L. Alves et al. 213. l. A.S.B. Gil et al. 838. m. C.S. Nunes et al. 389. n. C.S. Nunes et al. 389. o. C.S. Nunes et al. 412. Scale bar: 1 mm.

3.2. *Cyperus cuspidatus* Kunth in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, Nov. Gen. Sp. 1: 204 (1816). Figs. 3n, 6b.

The species can be distinguished by its small stature (3–5 cm long); inflorescences in a single order, spikelets in fascicles; spikelets 6–15 × ca. 3 mm, squarrose; rachilla flexuous, articulated between the glumes; glumes deciduous, vinaceous, apex awned, 0.9–1.2 mm long; nutlets 0.7–0.9 × 0.3–0.4 mm, ellipsoid, trigonous, dark brown to black, papillose surface, apiculate. Distributed in the tropical and subtropical regions of the world. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO) and Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE) regions. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual das Andorinhas, margem esquerda do Rio Araguaia, 6°18'44.0"S, 48°24'33.0"W, fl. and fr., 130 m, 23.IV.2004, *G. Pereira-Silva et al. 9042* (CEN, RB).

3.3. *Cyperus digitatus* Roxb., Fl. Ind. 1: 209 (1820). Figs. 3o, 6c.

The species can be distinguished by its inflorescences in 3–4 orders, with the first and the second orders in anthela, the third and/or the fourth orders with spikelets in spikes; spikelets reflexed to patent, rachilla not apparent at anthesis, glumes densely imbricate, dorsal side and keels green, styles trifid; nutlets 1–1.5 × 0.4–0.6 mm, narrowly ellipsoid, trigonous, light brown to dark brown, surface papillose and lustrous. Distributed in the tropical and subtropical regions of the world. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP) and Southern (RS) regions. In the SMA, it occurs in herbaceous vegetation in anthropized riparian forests, cooccurring with *C. imbricatus* Retz. and *C. distans* L.f.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, margem do Rio Araguaia, ca. 30 km de São Geraldo do Araguaia sentido norte, 6°16'49.6"S, 48°24'58.6"W, fl. and fr., 29.VII.2018, *A.S.B. Gil et al. 843* (MG).

3.4. *Cyperus distans* L.f., Suppl. Pl.: 103 (1782).

The species can be distinguished by its inflorescences with 3–4 orders, the first and the second orders arranged in anthela, the third and/or the fourth with spikelets in lax spikes, spikelets lineoid, reflexed to patent, rachilla apparent in anthesis, glumes $1.5\text{--}2 \times 0.2\text{--}0.5$ mm, narrowly linear, keels green; stamens 3 per flower; styles trifid; nutlets $1.6\text{--}2 \times 0.2\text{--}0.3$ mm, narrowly ellipsoid, trigonous, straw-colored to dark brown, papillose surface, short-stipitate. Distributed in the tropical and subtropical regions of the world. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (RS) regions. In the SMA, it occurs in anthropized riparian forests, with a predominance of herbaceous plants, cooccurring with *C. digitatus* and *C. surinamensis* Rottb.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, margem do Rio Araguaia, ca. 30 km de São Geraldo do Araguaia sentido norte, $6^{\circ}16'49.6''\text{S}$, $48^{\circ}24'58.6''\text{W}$, fl. and fr., *A.S.B. Gil et al. 841* (MG).



Figure 7 – a-u. Inflorescences and spikelets. a. *Cyperus distans*, anthela. b. *C. haspan*, anthela. c. *C. hortensis*, capituliform inflorescence. d. *C. imbricatus*, anthela, spikelets in spikes. e. *C. iria*, spikelets in fascicles. f. *C. laxus*, anthela, spikelets in fascicles. g. *C. luzulae*, anthela, spikelets in glomeruli. h. *C. macrostachyos*, anthela, spikelets in spikes. i. *C. odoratus*, anthela, spikelets in spikes. j. *C. simplex*, spikelets in fascicle. k. *C. sphacelatus*, spikelets in spikes. l. *C. subsquarrosus*, pseudolateral inflorescence, glomeruliform. m. *C. surinamensis*, anthela, spikelets in fascicles. n. *C. tenuispica*, anthela. o. *E. bicolor*, spikelet. p. *E. braunii*, long-oblongoid spikelet. q. *E. capillacea*, spikelet. r. *E. filiculmis*, spikelet. s. *E. geniculata*, globose spikelet. t. *E. cf. microcarpa*, spikelet. u. *E. nana*, spikelet. a. A.S.B. Gil et al. 841. b. K.N.L. Alves et al. 197. c. g. A.S.B. Gil et al. 863. d. A.S.B. Gil et al. 842. e. K.N.L. Alves et al. 204. f. K.N.L. Alves et al. 23. g. K.N.L. Alves et al. 213. h. A.S.B. Gil et al. 838. i. C.S. Nunes et al. 389. j. C.S. Nunes et al. 389. k. C.S. Nunes et al. 412. l. L. Schneider et al. 265. m. A.S.B. Gil et al. 852. n. K.N.L. Alves et al. 267. o. K.N.L. Alves et al. 82. p. K.N.L. Alves et al. 267. q. A.S.B. Gil et al. 929. r. A.S.B. Gil et al. 832. s. K.N.L. Alves et al. 109B. t. A.S.B. Gil et al. 867. u. A.S.B. Gil et al. 828. Scale bar: a, b, c, d, e, f, g, h, l,

j, k, l, m, n. 1 cm; o, p, q, r, s, t, u. 1 mm.

3.5. *Cyperus gayi* (C.B.Clarke) Kük. in H.G.A.Engler (ed.), *Pflanzenr.*, IV, 20(101): 484 (1936).

Mariscus gayi C.B.Clarke, *Bull. Misc. Inform. Kew, Addit. Ser.* 8: 16 (1908). Figs. 3p, 6e.

The species can be distinguished by its inflorescences with 2–3 orders, glomeruliform, spikelets in densely clustered spikes, rachis absent or inconspicuous, spikelets ovoid with 1.3–1.8 mm long, persistent; nutlets 0.8–1.1 × 0.2–0.3 mm, narrowly ellipsoid, subrotund, exceeding the glumes at maturity, straw-colored to dark brown, punctuated surface, apex apiculate. Distributed in French Guyana and Brazil. In Brazil, it is distributed only in the Northern region, in the States of Amazonas, Roraima (B.L. Stannard, 748), and Pará. In the SMA, it occurs in herbaceous vegetation near riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Margem do Rio Araguaia, ca. 30 km de São Geraldo do Araguaia no sentido norte, 6°15'42.9"S, 48°25'18.2"W, fl. and fr., 29.VIII.2018, A.S.B. *Gil et al.* 858 (MG).

3.6. *Cyperus haspan* L., *Sp. Pl.*: 45 (1753). Figs. 6f, 7b.

The species can be distinguished by its leaves usually reduced to vinaceous leaf-sheaths, membranous, sometimes with poorly developed leaf-blades, scapes triangular in cross-section, winged; involucre bracts 2; inflorescences with 2–3 orders, in anthela, spikelets in fascicles and/or subdigitate; nutlets 0.6–0.8 × 0.3–0.5 mm, ovoid to ellipsoid, trigonous, white to light brown, lustrous, surface reticulated. Distributed in the tropical and subtropical regions of the world. In Brazil, it is recorded for all States. In the SMA, it occurs in flooded and wet environments like *veredas* or near riparian and gallery forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, margem do Rio Araguaia, na Foz do Rio Sucupira, 6°18'00.2"S, 48°25'12.9"W, fl. and fr., 05.VII.2018, K.N.L. *Alves et al.* 83 (MG).

3.7. *Cyperus hortensis* (Salzm. ex Steud.) Dorr, Smithsonian Contr. Bot. 100: 62 (2014). *Kyllinga hortensis* Salzm. ex Steud., Syn. Pl. Glumac. 2: 68 (1854). Figs. 6g, 7c.

The species can be distinguished by the presence of involucre bracts with hyaline proximal margins; inflorescence capituliform, spikelets 1-flowered, in 1–3 spikes, glumes white to straw-colored, with keels green, scabrid; nutlets 1–1.4 × 0.4–0.7 mm, oblongoid, biconvex, straw-colored to darkened, papillose surface, apex apiculate. Distributed in Africa, the USA, Brazil, and northern Argentina. In Brazil, it is recorded for all States. In the SMA, it occurs in riparian forests and *cerrado* s.str.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, 32 km na estrada sentido São Geraldo-Marabá, 06°08'32"S, 48°34'18"W, fl. and fr., 26.V.2019, A.S.B. *Gil et al.* 863 (MG).

3.8. *Cyperus imbricatus* Retz., Observationes botanicae, 5: 12 (1788). Figs. 5e, 6h, 7d.

The species can be distinguished by its purple leaf-sheaths, leaf-blades papery; inflorescences with up to 4 orders, the first in anthela, the second in fascicles, the third and/or the fourth with spikelets in cylindrical spikes, congested, hiding the rachis, inflorescence prophylls with the apex biacuminate, rachis conspicuous; glumes strongly imbricate; nutlets 0.5–0.7 × 0.3–0.4 mm, obovoid, trigonous, light brown to dark brown, lustrous, slightly reticulated surface, apiculate apex. Distributed in the tropical and subtropical regions of the world. In Brazil, it is distributed in the Northern (AM, PA, RO, RR), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (MS), Southeastern (ES, MG, RJ, SP), and Southern (PR, RS, SC) regions. In the SMA, it occurs in herbaceous vegetation near anthropized riparian forests.

Selected specimens examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, margem do Rio Araguaia, ca. 30 km de São Geraldo do Araguaia sentido norte, 6°16'49.6"S, 48°24'58.6"W, fl. and fr., A.S.B. *Gil et al.* 842 (MG).

3.9. *Cyperus iria* L., Sp. Pl.: 45 (1753). Figs. 6i, 7e.

The species can be distinguished by the inflorescences with up to 3 orders, in anthela, spikelets in fascicles; glumes obovate to rotund, straw-colored with hyaline margins, keels green, apex mucronate;

stamens 2 per flower; styles trifold; nutlets 1.3–1.6 × 0.5–0.7 mm, obovoid, trigonous, papillose surface, apiculate apex. Distributed in South America, Northern America, Asia, and Oceania. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments like roadsides and pastures.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, estrada para a Vila Sucupira, 6°19'28.9"S, 8°29'29.4"W, fl. and fr., 24.V.2019, *K.N.L. Alves et al.* 204 (MG).

3.10. *Cyperus laxus* Lam., Tabl. Encycl. 1: 146 (1791).

Figs. 6j, 7f.

The species can be distinguished by its leaf-blades and involucral bracts with margins densely scabrid; inflorescence up to 3 orders, in anthela, spikelets in fascicles, rachis' prophylls of the inflorescence with margins scabrid; glumes rhomboid, awned, keels green; stamens 3 per flower; styles trifold; nutlets 1.3–1.5 × 0.7–1.1 mm, broadly obovoid, trigonous, straw-colored to dark brown, papillose surface; apiculate apex. Distributed in Central America, South America, and Mexico. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, na foz do Rio Sucupira, 6°17'57.9"S, 48°25'12.6"W, fl. and fr., 29.VIII.2018, *A.S.B. Gil et al.* 862 (MG).

3.11. *Cyperus luzulae* (L.) Retz., Observ. Bot. 4: 11 (1786). *Scirpus luzulae* L., Syst. Nat. ed. 10, 2: 868 (1759).

Figs. 6k, 7g.

The species can be distinguished by its triangular scapes in cross-section, unarmed; inflorescences with up to 3 orders in anthela, with spikelets in glomeruli; spikelets 2.5–4.6 × 2–3 mm, ovoid; stamen 1 per flower; styles trifold; nutlets 1–1.3 × 0.3–0.4 mm, ellipsoid to narrowly ellipsoid, trigonous, light brown to dark brown, papillose surface, apiculate apex. Distributed in Central America, South America, and Mexico. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, estrada para a Vila Santa Cruz dos Martírios, 6°13'53.8"S, 48°28'57.1"W, fl. and fr., 24.V.2019, *K.N.L. Alves et al.* 213 (MG).

3.12. *Cyperus macrostachyos* Lam., Tabl. Encycl. 1: 147 (1791).

Figs. 6l, 7h.

The species can be distinguished by its inflorescences with up to 3 orders, in anthela, with spikelets in spikes; glumes deciduous, brown, margins broad, hyaline, preceded by a conspicuous dark brown stripe; styles bifid; stamens 2 per flower; nutlets 0.9–1.2 × 0.4–0.6 mm, obovoid, twisted, biconvex, white to brown, lustrous, punctuated surface, apiculate apex. Distributed in the tropical and subtropical regions of the world. In Brazil, it is distributed in the Northern (PA), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), and Southeastern (ES, MG) regions. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58.9"S, 48°24'09.2"W, fl. and fr., 29.VIII.2018, A.S.B. *Gil et al.* 838 (MG).

3.13. *Cyperus odoratus* L., Species Plantarum: 46 (1753).

Figs. 6m, 7i.

The species can be distinguished by its inflorescences with up to 3 orders, in anthela, with spikelets in spikes; spikelets deciduous at maturity, dividing into diaspores composed by one winged internode of the rachilla, one glume and one nutlet; glumes strongly imbricate; stamens 2 per flower; styles trifid; nutlets 1.4–1.8 × 0.3–0.6 mm, ellipsoid, trigonous, light brown to dark brown, surface papillose, apex apiculate. Distributed in the tropical and subtropical regions of the world. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (RS) regions. In the SMA, it occurs in herbaceous vegetation in anthropized riparian forests, cooccurring with *C. imbricatus* and *C. distans*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, estrada para a Vila Sucupira, 6°19'28.9"S, 48°29'29.4"W, fl. and fr., 24.V.2019, K.N.L. *Alves et al.* 205 (MG).

3.14. *Cyperus simplex* Kunth, in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, Nov. Gen. Sp. 1: 207 (1815). Figs. 6n, 7j.

The species can be distinguished by its leaf-blades and involucral bracts with margins densely scabrid, involucral bracts with midvein abaxially antrorsely scabrid; inflorescences with up to 3 orders, in anthela, with spikelets in fascicles, rachis 2–20 cm long, glumes keels green, scabrid, apex awned, stamens 2 per flower; styles trifid, nutlets 1–1.2 × 0.8–0.9 mm, large-obovoid, trigonous, white to gray, lustrous, surface papillose. Occurs from Mexico to South America. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT) and Southeastern (ES, MG, RJ, SP) regions. In the SMA, it occurs in riparian forests.

Selected specimens examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Trilha da Biodiversidade, 6°13'36.9"S, 48°29'44.2"W, fl. and fr., 28.VIII.2018, C.S. Nunes *et al.* 412 (MG).

3.15. *Cyperus sphacelatus* Rottb., Descr. Pl. Rar.: 26 (1773). Figs. 6o, 7k.

The species can be distinguished by its inflorescences with up to 3 orders, in anthela, with spikelets in spikes, spikelets linear, 1.5–2 mm long; rachilla winged, apparent at maturity, flexuose, strongly articulated between the glumes; glumes deciduous, with vinaceous lines at the margins; stamens 3 per flower; styles trifid; nutlets 1.2–1.4 × 0.6–0.8 mm, obovoid, trigonous, light brown to dark brown, papillose surface, apiculate apex. Distributed in Africa, Madagascar, and Tropical America. In Brazil, it is recorded for all States. In the SMA, it occurs in riparian forests and *campo sujo*.

Selected specimens examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha da Casa de Pedra, rumo a cachoeira Quarta Queda, 06°09'48.8"S, 48°33'19"W, fl. and fr., 06.VII.2018, L. Schneider *et al.* 265 (MG).

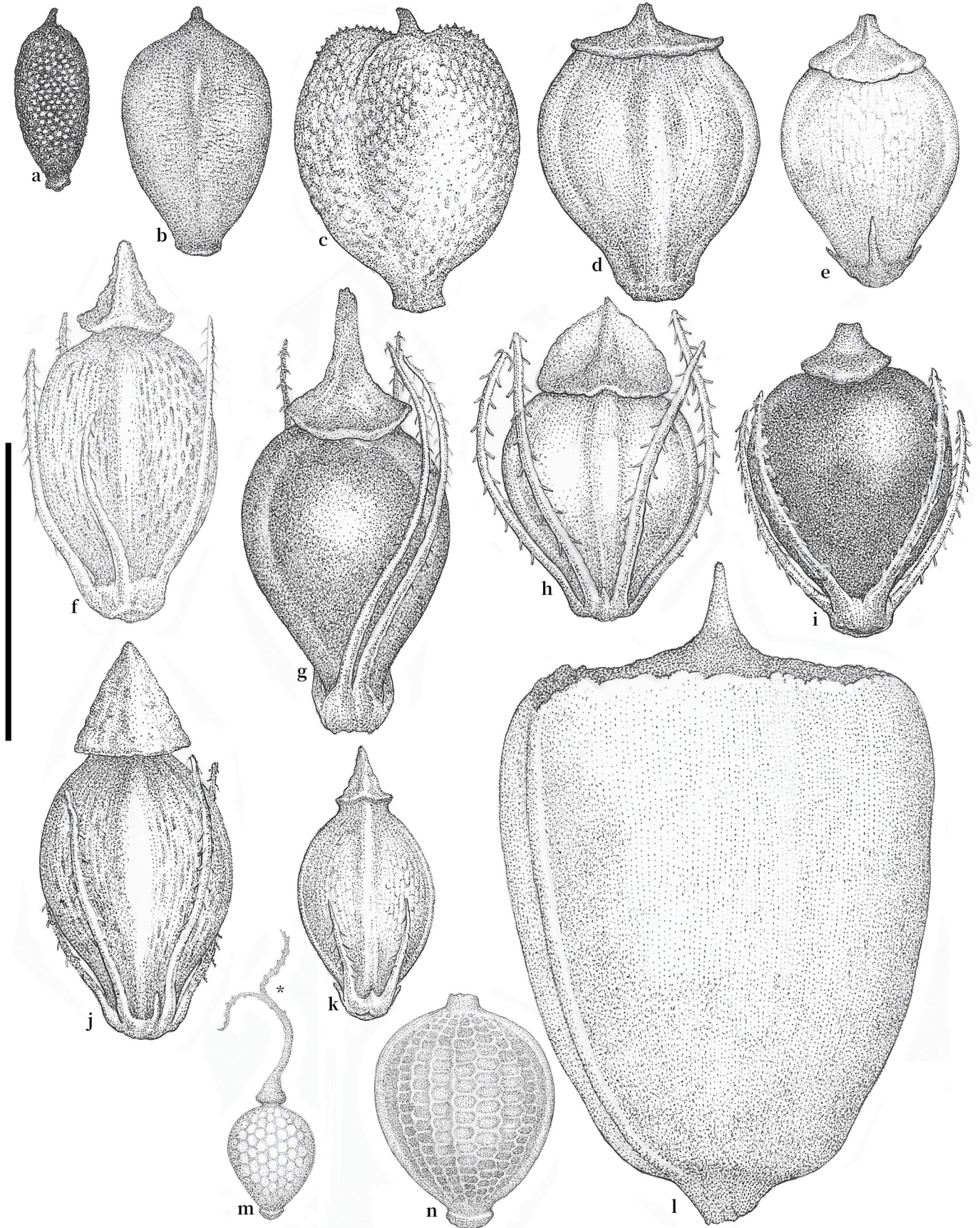


Figure 8 – a-n. Nutlets. a. *C. subsquarrosus*. b. *C. surinamensis*. c. *C. tenuispica*. d-e. *E. bicolor*. f. *E. braunii*. g. *E. capillacea*. h. *E. filiculmis*. i. *E. geniculata*. j. *E. cf. microcarpa*. k. *E. nana*. l. *Exochogyne amazonica*. m. *Fimbristylis aestivalis*, (the asterisk denotes the stamen filaments). n. *F. dichotoma*. a. L. Schneider et al. 265. b. A.S.B. Gil et al. 852. c. K.N.L. Alves et al. 267. d-e. K.N.L. Alves et al. 82. f. K.N.L. Alves et al. 267. g. A.S.B. Gil et al. 929. h. A.S.B. Gil et al. 832. i. K.N.L. Alves et al. 109B. j. A.S.B. Gil et al. 867. k. A.S.B. Gil et al. 828. l. K.N.L. Alves et al. 189. m. A.S.B. Gil et al. 836. n. L. Schneider et al. 268. Scale bar: 1 mm.

3.16. *Cyperus subsquarrosus* (Muhl.) Bauters, *Phytotaxa* 166: 23 (2014). *Scirpus subsquarrosus* Muhl., *Descr. Gram.*: 3 (1817). Figs. 7l, 8a.

The species can be distinguished by its two involucre bracts, one erect appearing to be an extension of the scape; inflorescence pseudolateral, with up to 3 orders, glomeruliform, with spikelets in spikes, spikelets 1-flowered, each flower subtended by 1 glumiform bract, awned; glumes reduced or absent; stamen 1 per flower; styles bifid; nutlets 0.6–0.7 × ca. 0.2 mm, narrowly ellipsoid, curved in lateral view, rotund in cross-section, straw-colored to dark brown, surface papillose, apex slightly apiculate. Distributed in Africa, Madagascar, and the Americas. In Brazil, it is distributed in the Northern (AM, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT) and Southeastern (ES, MG, RJ) regions. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58.9"S, 48°24'09.2"W, fl. and fr., 29.VIII.2018, A.S.B. Gil *et al.* 834 (MG).

3.17. *Cyperus surinamensis* Rottb., *Descr. Icon. Rar. Pl.*: 35 (1773). Figs. 7m, 8b.

The species can be distinguished by its retrorsely scabrid scape; inflorescence congested with 3–4 orders, the first and second orders in anthela, spikelets in fascicles subtended by glumiform bracts, spikelets ovoid, stamen 1 per flower, styles trifid; nutlets 0.7–1 × 0.3–0.4 mm, obovoid, trigonous, dark brown, papillose surface, apiculate apex. Distributed in Tropical and Subtropical Americas. In Brazil, it is recorded for all States. In the SMA, it occurs in gallery forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Foz do Rio Sucupira, 6°17'57.9"S, 48°25'12.6"W, fl. and fr., 05.VII.2018, K.N.L. Alves *et al.* 82 (MG).

3.18. *Cyperus tenuispica* Steud., *Syn. Pl. Glumac.* 2: 11 (1854). Figs. 7n, 8c.

The species can be distinguished by its small stature (6–12 cm long); inflorescences with up to 2 orders, with spikelets in anthela, spikelets lineoid, glumes brown with marginal vinaceous macules; stamens 2 per flower; styles trifid; nutlets 0.5–0.7 × 0.3–0.4 mm, obovoid, trigonous, white to brown,

reticulated to papillose surface, apiculate apex. Distributed in Asia, Europe, Africa, tropical and subtropical regions of the Americas. In Brazil, it is distributed in the Northern (PA), Northeastern (MA) and Central-Western (MT) regions. In the SMA, it occurs in gallery forests and flooded *campo limpo*, next to *veredas*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Foz do Rio Sucupira, 06°18'00"S, 48°25'21"W, fl. and fr., 25.V.2019, A.S.B. Gil *et al.* 929 (MG).

4. *Eleocharis* R.Br., Prodr. Fl. Nov. Holland.: 223 (1810).

Cosmopolitan genus with about 250 species (Govaerts *et al.* 2019, Goetghebeur 1998). Currently, 84 species are recorded for Brazil, of which 21 are endemic, and 25 occur in the State of Pará (Flora do Brasil 2020 in construction). *Eleocharis* occurs in aquatic or swampy environments, lakes, rivers, streams, and *restingas*, wet or flooded soils, emerged or submerged (Maciel-Silva *et al.* 2018).

In the SMA, seven species are recorded and characterized by the absence of leaf-blades; scapes rotund, elliptic, quadrangular or pentagonal in cross-section; inflorescences formed by only one spikelet, globose, ovoid, lanceoloid or oblongoid, 1-flowered or many-flowered, proliferous or non-proliferous; glumes 2 or more per spikelet; perigonal bristles 5–8, persistent on the fruit, rarely rudimentary; nutlets biconvex or trigonous, white, olivaceous, yellow or darkened.

4.1. *Eleocharis bicolor* Chapm., Fl. Southern. U.S.: 517 (1860).

Figs. 7o, 8d-e.

The species can be distinguished by the presence of rudimentary perigonal bristles; styles bifid and trifid in the same spikelet; nutlets 0.8–1.1 × 0.5–0.7 mm, obovoid, biconvex and trigonous in the same spikelet, 2–3 sided, white to straw-colored, reticulated surface, stylopodium conical, brown, apiculated apex. Distributed in the Americas. In Brazil, it is distributed in the Central-Western (DF, MS), Southeastern (SP), and Southern (PR, RS, SC) regions. It is a new record for the Northern region and the State of Pará. In the SMA, it occurs in anthropized riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, área de Proteção Ambiental de São Geraldo do Araguaia, balneário Três Quedas,

em córrego no início do caminho para a Casa de Pedra, 6°10'23.7"S, 48°33'50.6"W, fl. and fr., 26.VIII.2018, *K.N.L. Alves et al. 122* (MG).

4.2. *Eleocharis braunii* H.E.Hess, Ber. Schweiz. Bot. Ges. 67: 91 (1957).

Figs. 7p, 8f.

The species can be distinguished by the presence of elongated stolons, leaf-sheaths with the apex obtuse, inflated, spikelets long-oblongoid (5–)8–10 × 1.5–2.1 mm; glumes with the apex emarginated, margins broad and hyaline, perigonal bristles 7–8, not exceeding the fruit; nutlets 1.2–1.3 × 0.5–0.6 mm, obovoid, trigonous, yellow to olivaceous, reticulated surface, stylopodium elongated pyramidal, not continuous with the fruit. Distributed in Brazil, in the Northern region (AM). It is a new record for the State of Pará. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual da Serra dos Martírios-Andorinhas, margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58.9"S, 48°24'09.2"W, fl. and fr., 111 m, 29.VIII.2018, *A.S.B. Gil et al. 832* (MG).

4.3. *Eleocharis capillacea* Kunth, Enum. Pl. 2: 139 (1837).

Figs. 5f, 7q, 8g.

The species can be distinguished by the presence of stolons with long internodes; scapes capillaceous, elliptic in cross-section; spikelets 1-flowered, glumes 2 per spikelet, distichous, the basal sterile, basal spikelets sometimes without scapes, perigonal bristles 5–7; nutlets 1.2–1.5 × 0.5–0.8 mm, obovoid, biconvex, straw-colored to darkened, lustrous, surface smooth to slightly reticulated; stylopodium conical, apex elongated. Distributed in South America. In Brazil, it is distributed in the Northern (AM, RO, RR), Northeastern (BA, MA), Central-Western (DF, GO, MS, MT), Southeastern (MG, RJ, SP), and Southern (PR, SC) regions. It is a new record for the State of Pará. In the SMA, it occurs in anthropized river streams, next to riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Margem do Rio Araguaia, remanso dos Botos, ca. 20 km de São Geraldo do Araguaia, sentido Norte, 6°22'36.7"S, 48°23'08.8"W, fl. and fr., 26.VIII.2018, *K.N.L. Alves et al. 109B* (MG).

4.4. *Eleocharis filiculmis* Kunth, Enum. Pl. 2: 144 (1837).

The species can be distinguished by its pentagonal scapes in cross-section; fertile glumes deciduous, emarginated apex; lower glume sterile and persistent, obtuse apex; perigonial bristles 6; nutlets $1-1.2 \times 0.5-0.7$ mm, obovoid, trigonous, white to straw-colored, surface smooth, lustrous; stylopodium pyramidal, yellow, with an extension on the sides, compressed horizontally. Distributed in Mexico, Central America and South America. In Brazil, it is distributed in all regions, lacking records only for the States of Alagoas, Amapá, and Espírito Santo. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Serra das Andorinhas, às margens do rio Sucupira, 6°24'02.0"S, 48°33'18.0"W, fl. and fr., 13.VI.1995, *M.N.C. Bastos & M.R. Cordeiro 1908* (IAN).

4.5. *Eleocharis geniculata* (L.) Roem. & Schult., Syst. Veg. 2: 150 (1817). *Scirpus geniculatus* L. Species Plantarum 1: 48 (1753). Figs. 7s, 8i.

The species can be distinguished by its leaf-blades with acute apex: scapes rotund in cross-section; spikelets globose, vinaceous; glumes deciduous, obtuse apex; perigonial bristles 7, retrorsely scabrid; nutlets $1-1.3 \times 0.6-0.9$ mm, obovoid, biconvex, darkened, smooth surface; stylopodium pyramidal, yellow. Distributed in the tropical and subtropical regions of the world, and Northern America. In Brazil, it is distributed in all regions, lacking records only for the States of Amapá, Acre, and Rondônia. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Rio Araguaia, fl. and fr., 25.VIII.2018, *C.S. Nunes et al. 388* (MG).

4.6. *Eleocharis* cf. *microcarpa* Torr., Ann. Lyceum Nat. Hist. New York 3: 312 (1836). Figs. 7t, 8j.

The species can be distinguished by its vinaceous leaf-sheaths with acute apex; scapes elliptic in cross-section, capillaceous; glumes subdistichous to spiral, vinaceous to ochraceous at the sides, apex acute to retuse, fertile glumes deciduous, the lower sterile and persistent; perigonial bristles 6, retrorsely scabrid, not exceeding the fruit; nutlets $0.8-1.2 \times 0.4-0.6$ mm, obovoid, trigonous, 3-sided, prominent

angles, olivaceous, reticulated surface; stylopodium pyramidal to narrowly pyramidal, not continuous with the fruit. For presenting capillaceous scapes, spikelets often proliferous, glumes with brown to vinaceous macules on the sides, deciduous, except the lower one, perigonal bristles shorter than the fruit length, and trigonous nutlets, we believe this specimen to likely represent *E. microcarpa*. However, as it was not possible to analyze the type specimen, we refrain from asserting its identity. It is noteworthy that the fruit's morphology is fundamental for the differentiation of species in *Eleocharis*, which demands a thorough analysis. *Eleocharis microcarpa* occurs in the USA and from the Caribbean to Venezuela. In Brazil, Faria (1998) cites the species for the State of São Paulo and considers it an extremely rare species, locally endangered due to the existence of only one record from 1906 (A. Usteri 14, SP). In case the type analysis confirms it as *E. microcarpa*, it will represent a new record for the State of Pará. In the SMA, it occurs in gallery forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Foz do Rio Sucupira, 6°17'57.9"S, 48°25'12.6"W, fl. and fr., 29.VIII.2018, A.S.B. Gil et al. 866 (MG).

4.7. *Eleocharis nana* Kunth, Enum. Pl. 2: 140 (1837).

Figs. 7u, 8k.

The species can be distinguished by the presence of vertical rhizomes; rigid leaf-sheaths, chartaceous, apex obtuse to acute, scapes quadrangular to subrotund in cross-section; spikelets proliferous, ellipsoid; glumes spiral to subdistichous, apex acute to retuse; perigonal bristles 5, the same length of the fruit or exceeding it; immature nutlets 0.6–0.8 × 0.2–0.3 mm, ellipsoid, trigonous, white, surface smooth to slightly reticulated; stylopodium pyramidal. Distributed in the Americas. In Brazil, it is distributed in the Northern (AM, PA, RR), Northeastern (BA, MA, PB), Central-Western (MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (PR, RS, SC) regions. In the SMA, it occurs in riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58.9"S, 48°24'09.2"W, fl. and fr., 29.VIII.2018, A.S.B. Gil et al. 828 (MG).

5. *Exochogyne* C.B.Clarke, Verh. Bot. Vereins Prov. Brandenburg 47: 101 (1905).

It is a monospecific genus occurring in Venezuela, Guyana, Suriname, and Brazil. Distributed in *campinaranas*, lowland fields, *campo limpo*, *cerrado* s.str., savannas, and *campos rupestres* (Flora do Brasil 2020 in construction, Kearns et al. 1998).

5.1. *Exochogyne amazonica* C.B.Clarke, Verh. Bot. Vereins Prov. Brandenburg 47: 101 (1906).

Figs. 5g, 9a, 8l.

The species can be distinguished by its knotty and conspicuous rhizomes; basal leaf-blades; involucre bracts cymbiform, foliaceous, green to reddish-brown, margins ciliate; terminal inflorescence up to 2 orders, spiciform, with spikelets in spikes, rachis strongly articulated, main rachis flexuose; glumes distichous; nutlets 2–3 × 1.1–1.4 mm, ovoid, reddish-brown to dark brown, surface slightly reticulate, stipitate base; stylopodium pyramidal persistent, apex acuminate. Distributed in South America. In Brazil, it is distributed in the Northern (AM, PA, RO, RR), Central-Western (DF, GO, MT), and Southeastern (MG) regions. In the SMA, it occurs in riparian forests and *veredas*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58.9"S, 48°24'09.2"W, fl. and fr., 26.VIII.2018, *K.N.L. Alves et al. 113* (MG).



Figure 9 – a-q. Nutlet and inflorescences. a. *Exochogyne amazonica*, spiciform inflorescence. b. *Fimbristylis aestivalis*, anthela. c. *F. dichotoma*, anthela. d. *F. littoralis*, anthela. e. *F. vahlii*, capituliform inflorescence. f. *Fuirena umbellata*, corymbiform inflorescence. g. *Hypolytrum longifolium*, corymbiform inflorescence. h. *Lagenocarpus rigidus*, paniculiform inflorescence. i. *L. verticillatus*, spikelet fascicles. j. *Rhynchospora acanthoma*, capituliform inflorescence. k. *R. barbata*, capituliform inflorescence. l. *R. brevisrostris*, corymbiform inflorescence. m. *R. cephalotes*, paniculiform inflorescence, congest. n. *R. ciliata*, biconvex nutlet. o. *R. ciliata*, capituliform inflorescence. p. *R. curvula*, capituliform inflorescence. q. *R. divaricata*, paniculiform inflorescence. r. *R. exaltata*, spikelets glomeruli. a. K.N.L. Alves et al. 189. b. A.S.B. Gil et al. 836. c. L. Schneider et al. 268. d. C. S. Nunes et al. 387. e. A.S.B. Gil et al. 834. f. K.N.L. Alves et al. 258. g. A.S.B. Gil et al. 932. h. K.N.L. Alves et al. 136. i. K.N.L. Alves et al. 196. j. K.N.L. Alves et al. 186. k. C.S. Nunes et al. 399. l. A.S.B. Gil et al. 914. m. C.S. Nunes et al. 445. n. K.N.L. Alves et al. 169. o. K.N.L. Alves et al. 169. p. K.N.L. Alves et al. 145. q. K.N.L. Alves et al. 203. r. K.N.L. Alves et al. 47. Scale bar: n. 1 mm; a, b, c, d, e, f, g, h, i, j, k, l, m, o, p, q, r. 1 cm.

6. *Fimbristylis* Vahl, Enum. Pl. Obs. 2: 285 (1805).

Cosmopolitan genus, composed of ca. 310 species (Govaerts *et al.* 2019), 18 of these species occurring in Brazil (Flora do Brasil 2020 in construction). Eight species occur in the State of Pará (Flora do Brasil 2020 in construction). The species of *Fimbristylis* inhabit temperate to tropical regions (Kral 1971).

In the SMA, the four species recorded are distinguished by the leaf-sheaths unarmed, apex glabrous or ciliolate, scapes rotund or quadrangular in cross-section, smooth; inflorescences formed by one spikelet, capituliform or in anthela, spikelets bisexual, globose, subglobose, ovoid to oblongoid, perigonal bristles absent, androecium and gynoecium in only one frontal laminar piece (glume), styles bifid or trifid, fimbriate or not, nutlets biconvex, trigonous to subtrigonous, stylopodium absent at the apex of the mature nutlets.

6.1. *Fimbristylis aestivalis* (Retz.) Vahl, Enum. Pl. Obs. 2: 288 (1805). *Scirpus aestivalis* Retz., Observ. Bot. 4: 12 (1786). Figs. 8m, 9b.

The species can be distinguished by its cespitose habit; leaf-sheaths glabrous, ligulated, leaf-blades glabrous; inflorescences with up to 4 orders, in lax anthela, spikelets ovoid, glumes deciduous, apex mucronate, stamen 1 per flower, styles bifid, efimbriate; nutlets 0.4–0.5 × 0.3–0.4 mm, obovoid, biconvex, white to straw-colored, surface reticulated to verruculose. Distributed in the tropical and subtropical regions of the world, Asia, Russia, and Australia. In Brazil, it is distributed in the Northern (AM, PA, RR, TO) and Central-Western (MT) regions. In the SMA, it occurs in anthropized riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Rio Araguaia, fl. and fr., 25.VIII.2018, C.S. Nunes *et al.* 391 (MG).

6.2. *Fimbristylis dichotoma* (L.) Vahl, Enum. Pl. Obs. 2: 287 (1805). *Scirpus dichotomus* L., Sp. Pl.: 50 (1753). Figs. 8n, 9c.

The species can be distinguished by its bracts with margins scabrid, the lower one exceeding the inflorescence; inflorescences with up to 3 orders, in anthela, spikelets ovoid; styles bifid, fimbriate;

nutlets 0.9–1.3 × 0.5–0.9 mm, obovoid, biconvex, light-brown to darkened, lustrous, surface reticulated with horizontally compressed cells, apiculate apex. Distributed in the tropical and subtropical regions of the world. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments like trails and roadsides.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, na foz do Rio Sucupira, 6°17'57.9"S, 48°25'12.6"W, fl. and fr., 24.V.2019, A.S.B. *Gil et al.* 864 (MG).

6.3. *Fimbristylis littoralis* Gaudich., *Voy. Uranie*: 413 (1826 [1829]).

Figs. 5h, 9d, 10a.

The species can be distinguished by the flattened leaf-sheaths in the proximal region, ligules ciliate; scapes quadrangular in cross-section; involucre bracts shorter or the same length of the inflorescences; inflorescences with up to 3 orders, in anthela, lax, spikelets globose to subglobose; styles trifid, fimbriate; nutlets 0.5–0.7 × 0.3–0.4 mm, subtrigonous, obovoid, white to straw-colored, surface verruculose and reticulated with horizontally compressed cells, lustrous, apiculate apex. Distributed in the tropical and subtropical regions of the world. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments like trails and anthropized riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58.9"S, 48°24'09.2"W, fl. and fr., 29.VIII.2018, A.S.B. *Gil et al.* 837 (MG).

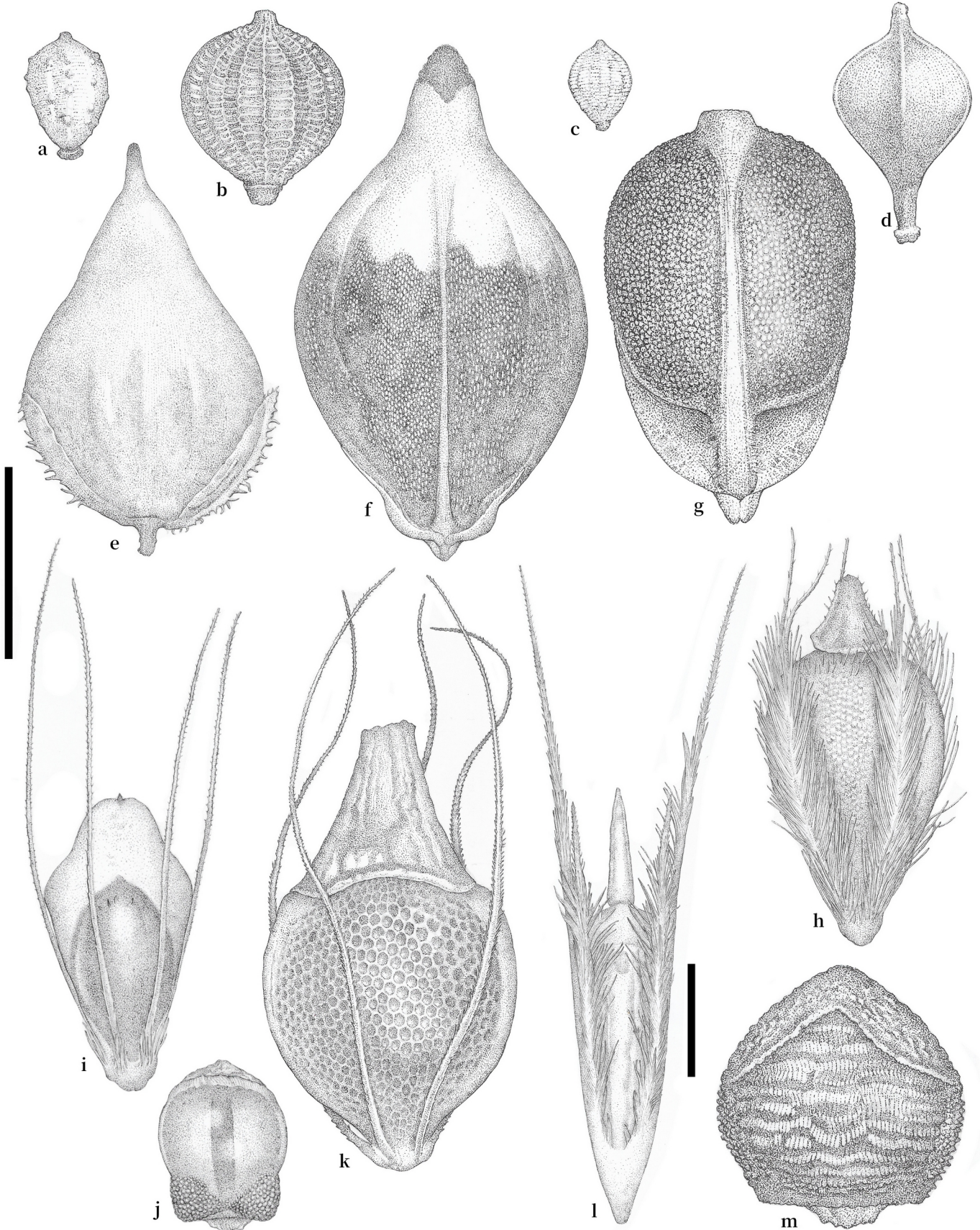


Figure 10 – a-l. Nutlets. a. *Fimbristylis littoralis*. b. *F. vahlii*. c. *Fuirena umbellata*. d. *Hypolytrum longifolium*. e. *Lagenocarpus rigidus*. f. *L. verticillatus*. g. *Rhynchospora acanthoma*. h. *R. barbata*. i. *R. brevirostris*. j. *R. cephalotes*. k. *R. curvula*. l. *R. divaricata*. a. C. S. Nunes et al. 387. b. A.S.B. Gil et al. 834. c. K.N.L. Alves et al. 258. d. A.S.B. Gil et al. 932. e. K.N.L. Alves et al. 136. f. K.N.L. Alves et al. 196. g. K.N.L. Alves et al. 186. h. C.S. Nunes et al. 399. i. A.S.B. Gil et al. 914. j. C.S. Nunes et al. 445. k. K.N.L. Alves et al. 145. l. K.N.L. Alves et al. 203. Scale bar: 1 mm.

(1791).

The species can be distinguished by the cespitose habit; leaf-sheaths pubescent, leaf-blades filiform, scapes subtriangular in cross-section, filiform; involucre bracts 2–4, exceeding the inflorescence; inflorescences simple, capituliform, congested, spikelets ovoid to oblongoid, 3–7 mm de long, glumes with the apex awned; stamen 1 per flower; styles bifid; nutlets 0.4–0.5 × 0.3–0.4 mm, obovoid, biconvex, white to straw-colored, reticulated surface, with rows of rectangular horizontally compressed cells, apiculate apex. Distributed in the Americas. In Brazil, it is distributed in the Northern (AM, PA, RR) and Northeastern (CE, PB, PE, PI, RN) regions. In the SMA, it occurs in anthropized riparian forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Margem do Rio Araguaia, na foz do Rio Sucupira, 6°17'57.9"S, 48°25'12.6"W, fl. and fr., 29.VIII.2018, A.S.B Gil *et al.* 813 (MG).

7. *Fuirena* Rottb., Descr. Icon. Rar. Pl.: 70 (1773).

Genus with a cosmopolitan distribution, composed of 55 species (Govaerts *et al.* 2019). In Brazil, six species are recorded, with *F. lainzii* Luceño & M.Alves being endemic. Currently, only *F. umbellata* Rottb. is confirmed for the State of Pará. These plants occur in wet areas, with most being heliophile, growing in anthropized and swampy environments, lowland fields, *cerrado* s.str., palm groves, savannas, and aquatic vegetation (Flora do Brasil 2020 in construction, Kral 1978).

7.1. *Fuirena umbellata* Rottb., Descr. Icon. Rar. Pl.: 70 (1773).

Figs. 5i, 9f, 10c.

The species can be distinguished by the presence of knotty horizontal rhizomes; leaf-sheaths hirsute, ligules with ciliolate margins, leaf-blades hirsute with ciliolate margins; scapes pentagonal in cross-section; inflorescences with up to 2 orders, corymbiform, terminal and axillary, congested, glumes dorsally trinerved; perianth formed by 3 membranous and petaloid pieces; nutlets 1.2–1.4 × 0.5–0.8 mm, rhomboid, trigonous, straw-colored, surface smooth. Distributed in the tropical and subtropical regions of the world. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments, on pastures and roadsides, always flooded.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental Araguaia, caminho para o Morro do Passat, 6°17'33.6"S 48°32'40.5"W, fl. and fr., 24.V.2019, *K.N.L. Alves et al.* 258 (MG).

8. *Hypolytrum* Pers., Syn. Pl. 1: 70 (1805).

Currently, 62 species are recognized for the genus, distributed in Asia, tropical islands of Oceania, Africa, and Tropical America (Stevens, continuously updated). In Brazil, 27 species are confirmed, of which 11 are endemic. Of these 27 species, 13 are recorded for the State of Pará. Its species inhabit humid and shady environments in tropical forests, being rare in open vegetation and riparian forests (*Alves et al.* 2003, *Flora do Brasil 2020* in construction).

8.1. *Hypolytrum longifolium* (Rich.) Nees, *Linnaea* 9: 288 (1834). *Scirpus longifolius* Rich., *Actes Soc. Hist. Nat. Paris* 1: 106 (1792). Figs. 5j, 9g, 10d.

The species can be distinguished by the presence of ascending rhizomes; leaf-blades trinerved; scapes triangular in cross-section; inflorescences with up to 3 orders, corymbiform, lax, terminal, spikelets in glomeruli, glumes 2 persistent at the base of the fruit, with keels and sometimes margins spinulose; nutlets 2.8–3 × 1.7–2 mm, obovoid, gray, rugulose in the lower portion, brown with dark brown maculae and smooth in the upper portion. Distributed in the North and South America. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (MA), and Central-Western (MG) regions. In the SMA, it occurs in gallery forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Foz do Rio Sucupira, 6°18'01"S, 48°25'16"W, fl. and fr., *A.S.B. Gil et al.* 932 (MG).

9. *Lagenocarpus* Nees, *Linnaea* 9: 304 (1834).

Genus with 30 species, occurring in Central and South America (Govaerts *et al.* 2019). In Brazil, 19 species are recorded, and 10 are endemic (*Flora do Brasil 2020* in construction). Four species are recorded for the State of Pará. The species of *Lagenocarpus* inhabit a wide variety of environments:

campinaranas, fields (altitude, lowland, clean, rocky fields), *cerrado* s.str., gallery forests, *igapó* forests, *terra firme* forests, rainforests, palm groves, sandbanks, savannas, aquatic vegetation, and anthropized environments (Flora do Brasil 2020 in construction). Its species are associated with drylands and rocky outcrops (Longhi-Wagner & Araújo 2014).

In the SMA, the two species recorded are distinguished by the leaf-sheaths with the apex glabrous, inflorescences terminal and lateral, paniculiform, paracladia alternate or verticillate, spikelets unisexual, hypogynium scales present at the base of the nutlets, hypogynium absent; nutlets not covered by perigynium or perigynium inconspicuous with a glabrous surface.

9.1. *Lagenocarpus rigidus* (Kunth) Nees in C.F.P.von Martius & auct. suc. (eds.), Fl. Bras. 2(1):167 (1842). *Scleria rigida* Kunth, Enum. Pl. 2: 355 (1837). Figs. 9h, 10e, 11a.

The species can be distinguished by the habit perennial, rhizomatous; scapes subtriangular to rotund in cross-section; inflorescences with up to 2 orders, paniculiform, with spikelets in fascicles or glomeruli, terminal and axillary, male paracladia proximal and female paracladia distal, alternate; hypogynium scales 3, subtriangular, margins ciliolate, persistent on the fruit; nutlets 3–3.3 × (1.5–)1.7–2 mm, ovoid, dark brown, surface papillose, with 3 longitudinal grooves. Distributed in Central and South America, and the Caribbean. In Brazil, it is recorded for all States. In the SMA, it occurs in clean wet fields and next to the *vereda* at the bottom of the valley.



Figure 11 – a-g. Field images, inflorescences. a. *Lagenocarpus rigidus*. b. *Rynchospora barbata*. c. *R. cephalotes*. d. *R. curvula*. e. *R. exaltata*. f. *R. globosa*. g. *R. rugosa*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, acesso por fazenda ca. 32 km na estrada sentido São Geraldo-Marabá, 06°08'32"S, 48°34'18"W, fl. and fr., 25.VIII.2018, C.S. Nunes *et al.* 382 (MG).

9.2. *Lagenocarpus verticillatus* (Spreng.) T.Koyama & Maguire, Mem. New York Bot. Gard. 12(3): 49. (1965). *Fuirena verticillata* Spreng., Novi Provent.: 47 (1818). Figs. 9i, 10f.

The species can be distinguished by its inflorescences with up to 2 orders, paniculiform, lax, terminal and axillary, spikelets in fascicles, paracladia verticillate, sterile in the basal portion, female paracladia in the distal portion, male paracladia in the proximal portion; nutlets 1.7–2.2 × 1–1.4 mm, obovoid, reddish-brown to darkened, surface papillose, base with 3 grooves along the ciliolate margins. Distributed in South America. In Brazil, it is distributed in the Northern (AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, MA, PI, SE), Central-Western (DF, GO, MS, MT), and Southeastern (ES, MG, RJ, SP) regions. In the SMA, it occurs in rocky terrain, gallery forests, and *cerrado* s.str.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Serra das Andorinhas, Área do Inventário Florístico, 6°13'S, 48°27'W, fl. and fr., 08.VII.1995, I. Aragão & M.N. Bastos 84 (MG, IAN).

10. *Rhynchospora* Vahl, Enum. Pl. Obs. 2: 229 (1805).

Cosmopolitan genus, composed of about 270 species worldwide (Strong 2006, Govaerts *et al.* 2019). Currently, 149 species are recorded for Brazil, 48 of them endemic. In the State of Pará, 40 species are recorded (Flora do Brasil 2020 in construction). The species of the genus inhabit anthropized environments, Caatinga, *campinaranas*, fields, *cerrados* s.str., forests (riparian, gallery, *terra firme*, *várzea*, seasonal, and rain), palm groves, *restingas*, savannas, and aquatic vegetation (Flora do Brasil 2020 in construction).

In the SMA, the 18 recorded species are distinguished by the leaf-blades coriaceous or papery, glabrous or puberulent, margins glabrous or ciliate; scapes triangular or quadrangular in cross-section; inflorescences glomeruliform, capituliform and paniculiform, glumes spiral, coriaceous or membranous; perianth composed by bristles or absent, perigonial bristles 0–6, non-plumose or plumose at the base; stamen and/or gynoecium under only one laminar frontal piece (glume); nutlets with the margins winged or not, stylopodium unarmed or spinulose along the margins.

10.1. *Rhynchospora acanthoma* A.C.Araújo & Longhi-Wagner, Kew Bull. 63: 303 (2008).

Figs. 9j, 10g.

The species can be distinguished by its scapes quadrangular in cross-section; involucre bracts cymbiform with the margins ciliate; inflorescences simple, capituliform, spikelets lanceoloid, 5–8 per inflorescence; perigonal bristles 5, antrorsely scabrid, exceeding the fruit length, plumose in all extension; nutlets (2.2–)2.6–2.7 × 1.1–1.3 mm, obovoid, biconvex, yellow, reticulated surface, spinulose at the apex; stylopodium pyramidal, lobes at the base absent, margins spinulose. Endemic to Brazil, distributed in the States of Pará and Tocantins. In the SMA, it occurs in *cerrado* s.str.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha da Cachoeira Quarta Queda, 6°10'19.1"S, 48°33'59.0"W, fl. and fr., 24.V.2019, K.N.L. Alves et al. 186 (MG).

10.2. *Rhynchospora barbata* (Vahl) Kunth, Enum. Pl. 2: 290 (1837). *Schoenus barbatus* Vahl, Eclog. Amer. 2: 4 (1798).

Figs. 9k, 10h, 11b.

The species can be distinguished by its inflorescences simple, capituliform, congested; perigonal bristles 4, antrorsely scabrid, plumose only at the base; nutlets 1.4–1.8(–2) × 0.3–1 mm, obovoid, biconvex, dark brown, reticulated surface, margins winged, revolute, straw-colored; stylopodium pyramidal, margins winged. Occurs from Mexico to South America. In Brazil, it is distributed in the Northern (AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MT), and Southeastern (MG) regions. In the SMA, it occurs in *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, remanço dos Botos, ca. 20 km de São Geraldo do Araguaia, sentido norte, 6°22'36.7"S, 48°23'08.8"W, fl. and fr., 26.VIII.2018, K.N.L. Alves et al. 106 (MG).

10.3. *Rhynchospora brevirostris* Griseb., Cat. Pl. Cub.: 246 (1866).

Figs. 9l, 10i.

The species can be distinguished by its inflorescences with up to 3 orders, corymbiform, with spikelets in fascicles; nutlets 1.1–1.4 × 0.8–1.1 mm, biconvex, white to gray, often with a longitudinal

grey band at middle, slightly reticulated surface, base short-stipitate, with 2 papery protuberances at each end; stylopodium pyramidal, not continuous with the fruit. Distributed in the tropical regions of the world. In Brazil, it is distributed in the Northern (AM, PA, TO), Northeastern (BA, PE, PI, MA), Central-Western (DF, GO, MT, MS), and Southeastern (MG, SP) regions. In the SMA, it occurs in seasonally flooded *campo limpo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, estrada para a Vila Santa Cruz dos Martírios, Mirante, 06°14'17"S, 48°27'55"W, fl. and fr., 23.V.2019, A.S.B. Gil et al. 914 (MG).

10.4. *Rhynchospora cephalotes* (L.) Vahl, Enum. Pl. Obs. 2: 237 (1805). *Scirpus cephalotes* L. Species Plantarum, Editio Secunda 1: 76 (1762). Figs. 9m, 11c.

The species can be distinguished by its inflorescences simple, paniculiform, congested, oblongoid to ovoid; glumes coriaceous; perigonal bristles 6, antrorsely scabrid, equaling or exceeding the fruit length; nutlets (1.3–)2.1–3.5(–4) × 1.5–2 mm, obovoid, biconvex, 2-sided, straw-colored, reticulated surface; stylopodium pyramidal, lanceolate. Distributed in Central and South Americas and Mexico. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), and Southeastern (MG) regions. In the SMA, it occurs in gallery forests and *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha da Cachoeira Quarta Queda, 6°10'23.1"S, 48°33'51.1"W, 24.V.2019, fl. and fr., K.N.L. Alves et al. 187 (MG).

10.5. *Rhynchospora ciliata* (Vahl) Kük., Bot. Jahrb. Syst., 56(125): 16 (1921). *Dichromena ciliata* Kük., Enum. Pl. 2: 240 (1805). Fig. 9n-o.

The species can be distinguished by its cespitose habit, with rhizomes very short (ca. 5 mm long); involucre bracts white in the basal third of the adaxial surface; inflorescence simple, capituliform, spikelets with white glumes; perigonal bristles absent; nutlets 1.3–1.9 × 1–1.3 mm, biconvex, broadly obovoid to subglobose, brown to dark brown, rare with a dark central stain, transversely rugulose surface

with isodiametric cells, rarely visible along the margins; stylopodium pyramidal, entire base. Distributed in the Central and South Americas. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments with wet soils.

Selected specimen examined: BRAZIL. PARÁ, Área de Proteção Ambiental de São Geraldo do Araguaia, estrada para a Cachoeira Três Quedas, 6°10'25.8"S, 48°35'23.7"W, fl. and fr., 24.V.2019, *K.N.L. Alves et al. 169* (MG).

10.6. *Rhynchospora curvula* Griseb., Fl. Brit. W. I.: 574 (1864).

Figs. 9p, 10k, 11d.

The species can be distinguished by the leaf-blades rigid, coriaceous, recurved; inflorescences simple, capituliform, spikelets lanceoloid, with 8–9 glumes green, darkened to brown in the lateral; perigonal bristles 5–6, plumose, two longer than the others; nutlets 4.1–4.2 × 0.7–1.1 mm (immature), biconvex, punctuate surface, margins winged; stylopodium pyramidal elongated. Distributed in Central and South America. In Brazil, it is distributed only in the Piauí State. The species was first recorded for the State of Pará by Braga-Silva et al. (in press), growing in *campinas* and amazonian savannas in Cametá, northeastern Pará. In the SMA, it occurs in seasonally flooded *campo limpo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, campina ca. de 500 m a leste da Casa de Pedra, 06°09'05"S, 48°32'48"W, fl. and fr., *K.N.L. Alves et al. 145* (MG).

10.7. *Rhynchospora divaricata* (Ham.) M.T.Strong, Contr. U. S. Natl. Herb. 52: 343-344 (2005).

Fimbristylis divaricata Ham., Prodr. Pl. Ind. Occid. 14 (1825).

Figs. 9q, 10l.

The species can be distinguished by its scapes, leaf-blades and inflorescence rachis pilose; inflorescences terminal and axillary, with up to 3 orders, paniculiform, with spikelets in corymbs, ascending to retroflexed rachis; nutlets 1–1.5 × 1.1–1.6 mm, biconvex, yellow to darkened at the maturity, lustrous, surface transversely rugose, base short-stipitate; stylopodium lunate, base bilobate. Distributed in Central and South America. In Brazil, it is distributed in the Northern (AM, AP, PA), Central-Western (GO, MT), and Southeastern (MT) regions. In the SMA, it occurs in gallery forests and anthropized environments (roadsides).

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha da Casa de Pedra, rumo a cachoeira quarta queda, 06°09'48"S, 48°33'19"W, fl. and fr., 06.VII.2018, *L. Schneider et al.* 263 (MG).

10.8. *Rhynchospora exaltata* Kunth, Enum. Pl. 2: 291 (1837). *Dichromena exaltata* (Kunth) J.F.Macbr., Publ. Field Columb. Mus., Bot. Ser. 8: 113 (1930). Figs. 9r, 11e, 12a.

The species can be distinguished by its rhizomes robust, scaly; scapes triangular in cross-section; inflorescences terminal and axillary, with up to 2 orders, formed by series of 3–11 sessile spikelets glomeruli, sometimes twinned; spikelets linear-lanceoid; nutlets 3–4.3 × 1–1.9 mm, obovoid, biconvex, straw-colored to brown, surface transversely rugulose to smooth; stylopodium pyramidal elongated, falciform, white, foveolate surface. Distributed in Central and South America. In Brazil, it is recorded for almost all States, except for Rio Grande do Sul. In the SMA, it occurs in *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, margem do Rio Araguaia, ca. 25 km de São Geraldo do Araguaia, sentido norte, 6°18'58.9"S, 48°24'09.2"W, fl. and fr., 26.VIII.2018, 111 m, *K.N.L. Alves et al.* 115 (MG).

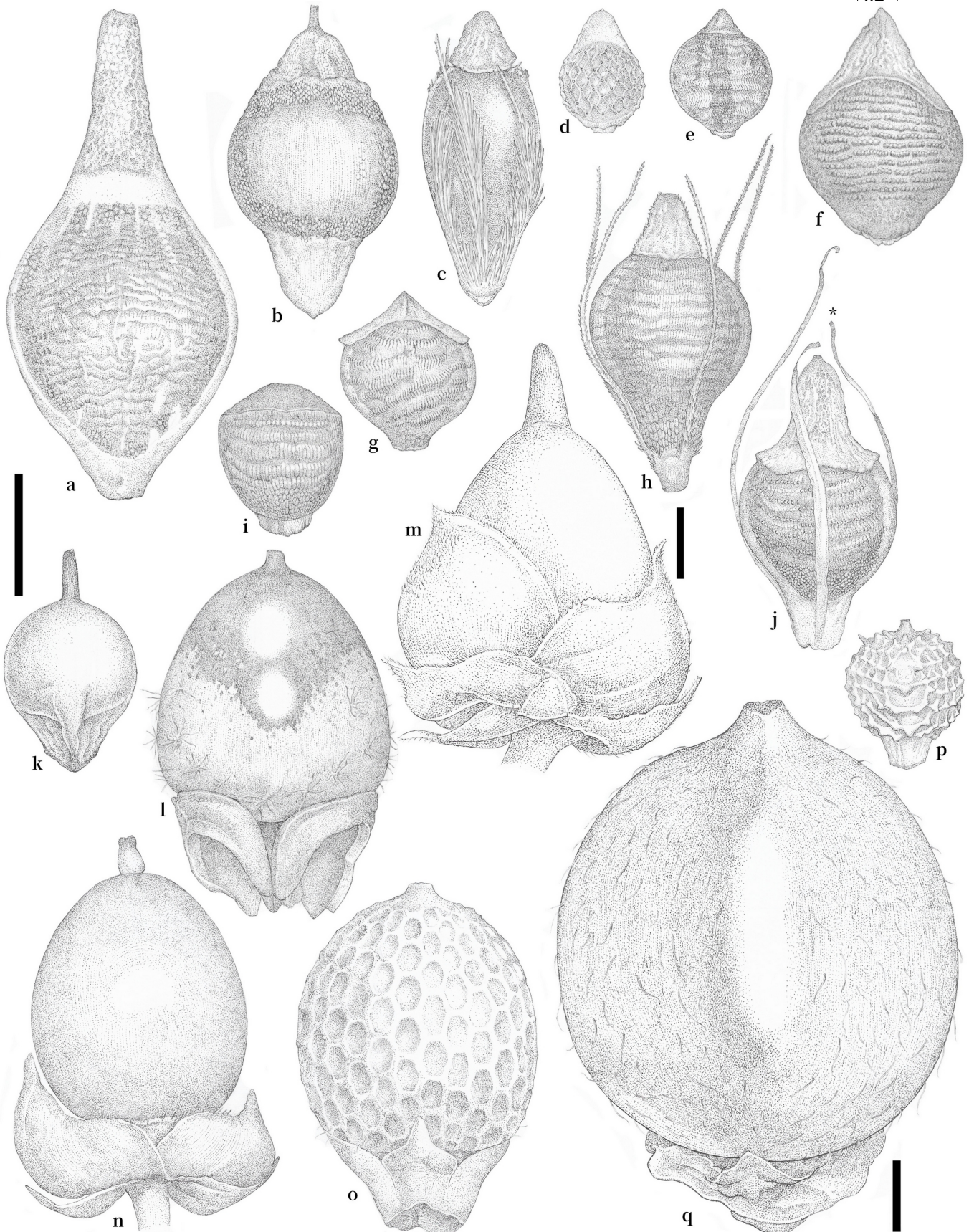


Figure 12 – a-q. Nutlets. a. *Rhynchospora exaltata*. b. *R. filiformis*. c. *R. globosa*. d. *R. hirsuta*. e. *R. junciformis*. f. *R. nervosa*. g. *R. puber*. h. *R. rugosa*. i. *R. spruceana*. j. *R. velutina*, (the asterisk denotes the stamen filaments). k. *Scleria distans*. l. *S. gaertneri*. m. *S. macrophylla*. n. *S. microcarpa*. o. *S. reticularis*. p. *S. tenella*. q. *S. violacea*. a. K.N.L. Alves et al. 47. b. K.N.L. Alves et al. 190. c. C.S. Nunes et al. 380. d. A.S.B. Gil et al. 975. e. C.S. Nunes et al. 411. f. K.N.L. Alves et al. 219. g. A.S.B. Gil et al. 931. h. K.N.L. Alves et al. 224. i. A.J. Fernandes-Junior et al. 699. j. C.S. Nunes et al. 383. k. K.N.L. Alves et al. 221. l. K.N.L. Alves et al. 36. m. K.N.L. Alves et al. 211. n. N.P. Pinto et al. 19. o. A.J. Fernandes-Junior et al. 696. p. A.S.B. Gil et al. 909. q. C.S. Nunes et al. 418. Scale bar: 1 mm.

10.9. *Rhynchospora filiformis* Vahl, Enum. Pl. Obs. 2: 232 (1805).

Figs. 12a, 13b.

The species can be distinguished by its ligules formed by one hyaline band with a thick tissue; inflorescences terminal and axillary, with up to 3 orders, paniculiform, with spikelets in corymbs; spikelets lanceoloid, ochraceous; nutlets $1.6\text{--}2.7 \times 1\text{--}1.5$ mm, obovoid, biconvex, brown, sometimes with a median gray band, surface reticulated at the central portion, papillose at the margins, stipitate base; stylopodium narrowly pyramidal, not continuous with the fruit length. Distributed in Tropical America. In Brazil, it is distributed in the Northern (PA, RR, TO), Northeastern (AL, BA, PB, PE, PI, SE), Central-Western (GO, MT), and Southeastern (MG) regions. In the SMA, it occurs in *campo sujo*, seasonally flooded *campo limpo* next to *veredas*, and in anthropized environments along trails.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental São Geraldo do Araguaia, balneário Três Quedas, no caminho para a Quarta Queda, $6^{\circ}10'19.2''\text{S}$, $48^{\circ}33'39.6''\text{W}$, fl. and fr., 24.V.2019, *K.N.L. Alves et al. 106* (MG).



Figure 13 – a-t. Nutlets and inflorescences. a. *R. filiformis*, spikelets in corymbs. b. *R. globosa*, capitulum inflorescence. c. *R. hirsuta*, spikelets in corymbs. d. *R. junciformis*, spikelets in fascicles. e. *R. nervosa*, capitulum inflorescence. f. *R. puber*, capitulum inflorescence. g. *R. rugosa*, paniculiform inflorescence, spikelets in corymbs. h. *R. spruceana*, paniculiform inflorescence, spikelets in corymbs. i. *R. tenella*, globose nutlet. j. *R. tenella*, paniculiform inflorescence, spikelets in corymbs. k. *R. velutina*, spikelets in corymbs. l. *Scleria distans*, spiciform inflorescence. m. *S. flagellum-nigrorum*, globose nutlet. n. *S. flagellum-nigrorum*, paniculiform inflorescence. o. *S. gaertneri*, paniculiform inflorescence. p. *S. macrophylla*, paniculiform inflorescence. q. *S. martii*, ovoid nutlet. r. *S. martii*, paniculiform inflorescence. s. *S. microcarpa*, paniculiform inflorescence. t. *S. reticularis*, paniculiform inflorescence. u. *S. tenella*, spiciform inflorescence. v. *S. violacea*, paniculiform inflorescence. a. K.N.L. Alves et al. 190. b. C.S. Nunes et al. 380. c. A.S.B. Gil et al. 975. d. C.S. Nunes et al. 411. e. K.N.L. Alves et al. 219. f. A.S.B. Gil et al. 931. g. K.N.L. Alves et al. 188. h. K.N.L. Alves et al. 188. i. C.S. Nunes et al. 383. j. K.N.L. Alves et al. 221. k. N.P. Pinto et al. 45. l. N.P. Pinto et al. 45. m. K.N.L. Alves et al. 36. n. K.N.L. Alves et al. 211. o. C.S. Nunes et al. 442. p. C.S.

Nunes et al. 442. q. N.P. Pinto et al. 19. r. A.J. Fernandes-Júnior et al. 696. s. A.S.B. Gil et al. 909. t. C.S. Nunes et al. 418. Scale bar: i, m, q. 1 mm; a, b, c, d, e, f, g, h, j, k, l, n, o, p, r, s, t. 1 cm.

10.10. *Rhynchospora globosa* (Kunth) Roem. & Schult., Syst. Veg., ed. 15 bis 2: 89 (1817). *Chaetospora globosa* Kunth, Nov. Gen. Sp. 1: 135 (1816). Figs. 11f, 12c, 13b.

The species can be distinguished by its involucre bracts rigid, coriaceous to cartilaginous, yellowish; inflorescences simple, capituliform, congested, spikelets lanceoloid; perigonal bristles 5–6, densely plumose, not exceeding the fruit length; nutlets $2.2\text{--}2.7 \times 1\text{--}1.3$ mm, obovoid, biconvex, 2-sided, straw-colored to light brown, finely reticulated surface; stylopodium pyramidal, elongated. Distributed in Mexico and Central and South Americas. In Brazil, it is recorded for all States. In the SMA, it occurs in *campo limpo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Margem do Rio Araguaia, ca. 15 km de São Geraldo do Araguaia sentido norte, $6^{\circ}21'32''\text{S}$, $48^{\circ}24'55''\text{W}$, 26.VIII.2018, fl. and fr., K.N.L. Alves et al. 102 (MG).

10.11. *Rhynchospora hirsuta* (Vahl) Vahl, Enum. Pl. Obs. 2: 231 (1805). *Schoenus hirsutus* Vahl, Eclog. Amer. 1: 6 (1797). Figs. 10d, 13c.

The species can be distinguished by its leaf-sheaths, scapes, leaf-blades and bracts hirsute; inflorescences terminal and axillary, with up to 3 orders, paniculiform, with spikelets in corymbs, hirsute rachis, glumes vinaceous, apex awned, ciliate; nutlets $0.7\text{--}1 \times 0.5\text{--}0.7$ mm, globose, 2-sided, light brown to gray, sometimes green, surface foveolate with irregular depressions; stylopodium pyramidal horizontally compressed. Distributed in Tropical America. In Brazil, it is distributed in the Northern region (AC, AM, AP, PA, RO, RR), Northeastern region (PI), and Central-Western regions (DF, MT). In the SMA, it occurs in *campo sujo*.

Selected specimen examined: BRASIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Fazenda, $6^{\circ}18'14.6''\text{S}$, $48^{\circ}27'47.6''\text{W}$, fl. and fr., 27.VIII.2018, C.S. Nunes et al. 397 (MG).

10.12. *Rhynchospora junciformis* (Kunth) Boeckeler, Flora 41: 646 (1858). *Dichromena junciformis* Kunth, Enum. Pl. 2: 279 (1837). Figs. 12e, 13d.

The species can be distinguished by its shorter length (up to 10 cm long); leaf-blades canaliculate; inflorescences terminal and axillary, with up to 3 orders, corymbiform, with spikelets in fascicles; spikelets lanceoloid, glumes membranous, brown, deciduous; nutlets 1–1.4 × 0.7–0.9 mm, obovoid, biconvex, white to gray, often with one longitudinal darkened band in the central portion, transversely rugulose surface, base short-stipitate; stylopodium narrow pyramidal. Distributed in South America. In Brazil, it is distributed in the Northeastern (BA, MA, PI), Central-Western (GO, MS, MT), Southeastern (MG, SP), and Southern (PR, RS, SC) regions. The species was first cited for the State of Pará and the Northern region by Braga-Silva *et al.* (in press), growing *campinas* and amazonian savannas of Cametá, northeastern Pará. In the SMA, it occurs in seasonally flooded *campo limpo*, next to *veredas*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Morro do Passat, 6°16'58.9"S, 48°32'32.9"W, fl. and fr., 24.V.2019, K.N.L. Alves *et al.* 262 (MG).

10.13. *Rhynchospora nervosa* (Vahl) Boeck., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn ser. 3, 1: 143 (1869). *Dichromena nervosa* Vahl, Enum. Pl. 2:241 (1806). Fig. 12f, 13e.

The species can be distinguished by its solitary growth, long rhizomes (1–3 cm long), involucrel bracts white at the abaxial basal third; inflorescences simple, capituliform, spikelets with glumes white; perigonal bristles absent; nutlets 1.9–2.2 × 1.6–1.8 mm, biconvex, broadly obovoid to subglobose, brown to darkened, transversely rugulose, sometimes with isodiametric or rectangular cells; stylopodium pyramidal, base whole, margins unarmed. Occurs from Mexico to Paraguay. In Brazil, it is recorded for almost all States, except for Rio Grande do Sul. In the SMA, it occurs in flooded *campo limpo*, next to *veredas*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Mirante, 06°14'17"S, 48°27'55"W, fl. and fr., 24.V.2019, K.N.L. Alves *et al.* 219 (MG).

10.14. *Rhynchospora puber* (Vahl) Boeckeler, *Linnaea* 37: 528 (1873). *Dichromena pubera* Vahl, *Enum. Pl. Obs.* 2: 241 (1805). Figs. 12g, 13f.

The species can be distinguished by its involucre bracts proximally white in both surfaces, sometimes without white maculae; inflorescences simple, capituliform, spikelets ovoid, 3.5–6 mm long, glumes white or cream-colored; nutlets 1–1.3 × 0.8–1.2 mm, obovoid, biconvex, white to brown, surface transversely rugose; stylopodium depressed pyramidal, tetralobed base. Distributed in Mexico, Panama and South America. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (PR) regions. In the SMA, it occurs in *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, 32 km na estrada sentido São Geraldo-Marabá, trilha dos Romeiros, 06°8'42"S, 48°34'10"W, fl. and fr., 26.V.2019, *L. Schneider et al.* 277 (MG).

10.15. *Rhynchospora rugosa* (Vahl) Gale, *Rhodora* 46: 275 (1944). *Schoenus rugosus* Vahl, *Eclogae Americanae* 2: 5 (1798). Figs. 11g, 12h, 13g.

The species can be distinguished by its inflorescences terminal and axillary, with up to 3 orders, paniculiform, with spikelets in corymbs; ochraceous glumes, membranous; perigonal bristles 6, retrorsely scabrid; nutlets 1.8–2.6 × 0.9–1.5 mm, ovoid, biconvex, 2-sided, straw-colored to brown, surface transversely rugulose, sometimes reticulate at the base; stylopodium 0.6–0.8 mm long, narrowly pyramidal, margins spinulose. Distributed in the tropical and subtropical regions of the world. In Brazil, it is recorded for all States. In the SMA, it occurs in *campo sujo* next to gallery forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Trilha da Cachoeira Quarta Queda, 6°10'15.6"S, 48°33'36.7"W, fl. and fr., 24.V.2019, *K.N.L. Alves et al.* 200 (MG).

10.16. *Rhynchospora spruceana* C.B.Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 40 (1908).

Figs. 12i, 13h.

The species can be distinguished by its longer rhizome internodes; scapes longer (50–67 cm long); inflorescences terminal and axillary, with up to 3 orders, paniculiform, with spikelets in corymbs; spikelets ovoid to lanceoloid, ochraceous, glumes with the apex awned; nutlets 1.3–1.7 × 1–1.2(–1.6) mm, obovoid, biconvex, straw-colored to dark brown, transversely rugulose surface, papillose at the base and along the margins, base short-stipitate; stylopodium depressed pyramidal, base bilobed. Distributed in South America. In Brazil, it is distributed in the Northern (PA, RR, PI e TO), Northeastern (BA), Central-Western (MT, MS, DF, GO), Southeastern (MG, SP), and Southern (PR) regions. In the SMA, it occurs in *veredas*.

Selected specimen examined: BRASIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Morro do Passat, 6°16'58.9"S, 48°32'33.0"W, fl. and fr., 29.VIII.2018, A.J. Fernandes-Júnior et al. 694 (MG).

10.17. *Rhynchospora tenella* (Nees) Boeckeler, Linnaea 37: 595 (1873). *Haloschoenus tenellus* Nees in C.F.P.von Martius & auct. suc. (eds.), Fl. Bras. 2(1): 123 (1842). Fig. 12p, 13i-j.

The species can be distinguished by its inflorescences with up to 3 orders, paniculiform, rachilla flexuose; glumes translucent, brown to vinaceous, apex mucronate to awned, scabrid; styles undivided; nutlets 0.6–0.8 × 0.6–0.7 mm, globose, biconvex, 2-sided, straw-colored to light brown, with gray to darkened longitudinal bands, transversely rugulose surface; stylopodium pyramidal, depressed to discoid. Distributed in South America. In Brazil, it is distributed in the Northern (TO), Northeastern (PI), Central-Western (DF, MT), Southeastern (ES, MG, RJ), and Southern (PR, RS, SC) regions. This is the first record of *R. tenella* for the State of Pará. In the SMA, it occurs in *cerrado* s.str. and *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Margem do Rio Araguaia, na Foz do Rio Sucupira, 06°18'00"S, 48°25'21"W, fl. and fr., 25.V.2019, A.S.B. Gil et al. 930 (MG).

10.18. *Rhynchospora velutina* (Kunth) Boeckeler, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1869: 149 (1869). *Dichromena velutina* Kunth, Enum. Pl. 2: 282 (1837). Figs. 12j, 13k.

The species can be distinguished by its inflorescences with up to 3 orders, paniculiform, with spikelets in corymbs, glumes reddish-brown; nutlets 2.3–2.7(–3) × 1.2–1.6 mm, obovoid, biconvex, straw-colored to dark brown, transversely rugose surface, reticulated in the base and the margins, long-stipitate base; stylopodium pyramidal, lanceolate, elongated, white, bilobed base. Distributed in the Americas. In Brazil, it is distributed in the Northern (AM, AP, RR, TO), Northeastern (BA, PE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (PR, RS, SC) regions. This is the first record for the species in the State of Pará. In the SMA, it occurs in *veredas* and *campo sujo*.

Selected specimen examined: BRASIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Mirante, 6°14'17.3"S, 48°27'54.4"W, fl. and fr., 24.V.2019, *K.N.L. Alves et al.* 228 (MG).

11. *Scleria* P.J.Bergius, Kongl. Vetensk. Acad. Handl. 26: 142 (1765).

Genus composed of about 260 species, distributed from the tropical and subtropical regions of the world to Northern America (Goetghebeur 1998, Govaerts *et al.* 2019). In Brazil, 72 species are recorded, of which 18 are endemic. Currently, 26 species of *Scleria* are recorded for the State of Pará (Flora do Brasil 2020 in construction). Its species inhabit shaded forests, open areas, and dry weather (Affonso *et al.* 2015).

In the SMA, the nine recorded species of *Scleria* are distinguished by the habit erect or climbing; ligule present or absent; contraligule with a membranous appendix present or absent, conspicuous or inconspicuous if present; leaf-blades with the apex entire or pseudopremorse; summit persistent on the rachilla or nutlet; hypogynium with triangular, oblong or semirotund lobes, entire or lacinate apex, stamens 1–3 per flower, surface nutlets smooth, rugulose or foveolate; stylopodium persistent or deciduous at the apex of the mature nutlets.

11.1. *Scleria distans* Poir., in J.B.A.M.de Lamarck, Encycl. 7: 4 (1806).

Figs. 12k, 13l, 14f.

The species can be distinguished by its long internodes of horizontal rhizomes; scapes, leaf-sheaths and leaf-blades pubescent to glabrescent; inflorescences with up to 2 orders, spiciform, with spikelets in retroflexed glomeruli; spikelets androgynous; glumes pubescent; nutlets 1.5–1.8 × 1–1.5 mm, globose, white to gray, smooth surface, apiculate apex; hypogynium reduced. Distributed in Africa, Madagascar, and Central and South America. In Brazil, it is distributed in the Northern (AM, PA, RR, TO), Northeastern (AL, BA, CE, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (PR, RS, SC) regions. In the SMA, it occurs in wet *campo limpo*, next to *veredas* dominated by *Scleria reticularis* Michx. and *S. tenella* Kunth.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Mirante, 6°14'16.4"S, 48°27'55.0"W, fl. and fr., 24.V.2019, *K.N.L. Alves et al.* 221 (MG).

11.2. *Scleria flagellum-nigrorum* P.J.Bergius, Kongl. Vetensk. Acad. Handl.26: 144, pl. 4–5. 1765.

Fig. 13m-n.

The species can be distinguished by its climbing habit; scapes and leaf-blades strongly scabrid; inflorescences terminal and axillary, with up to 2 orders, paniculiform; spikelets subandrogynous and staminate; nutlets 4–4.5 × 3–3.2 mm, globose, white to brown with darkened maculae, smooth surface, glabrescent; hypogynium developed, trilobed, semirotund lobes. Distributed in Mexico and Central and South America. In Brazil, it is distributed in the Northern region (AC, AM, RR, AP, PA, RO). In the SMA, it occurs in anthropized environments, along trails, and in the vicinity of old houses.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental São Geraldo do Araguaia, quintal florestal nas proximidades do rio, 6°21'30.5"S, 48°24'53.3"W, fl. and fr., 25.V.2019, *N.P. Pinto et al.* 45 (MG).

11.3. *Scleria gaertneri* Raddi, Atti Reale Accad. Lucchese Sci. 2: 331 (1823).

Figs. 12l, 13o.

The species can be distinguished by its leaf-sheaths winged, inflorescences terminal and axillary, with up to 2 orders, paniculiform, spikelets subandrogynous and staminate; hypogynium developed,

trilobed, semirotund lobes; nutlets $2-3.4 \times 1.6-2.4$ mm, globose, purple to darkened, sometimes white, smooth surface, pilose. Distributed in Africa, Madagascar, Mexico, and Central and South America. In Brazil, it is recorded for all States. In the SMA, it occurs in anthropized environments, like trails and in the vicinity of old houses.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, trilha para a Casa de Pedra, $6^{\circ}08'40.5''\text{S}$, $48^{\circ}34'39.2''\text{W}$, fl. and fr., 04.VII.2018, *K.N.L. Alves et al.* 36 (MG).

11.4. *Scleria macrophylla* J.Presl & C.Presl, Reliq. Haenk. 1: 200 (1828). Figs. 12m, 13p, 14a-c.

The species can be distinguished by its rhizomes robust, knotty; leaf-sheaths winged, scabrid, leaf-blades with pseudopremorse apex; inflorescences terminal and axillary, with up to 3 orders, paniculiform, spikelets subandrogynous and staminate; nutlets $4-7 \times 3.5-5$ mm, globose, white, smooth surface; stylopodium persistent at the apex of the fruit; hypogynium developed, trilobed, covered by the cupule, ciliolate margins, persistent at the fruit. Distributed in Mexico, and Central and South America. In Brazil, it is distributed in the Northern (PA, RO, RR, TO), Northeastern (BA, MA, PE, PI), Central-Western (DF, GO, MS, MT), and Southeastern (MG) regions. In the SMA, it occurs in anthropized environments, next to pastures and roadsides.

Selected specimen examined: BRASIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, Estrada para a Trilha da Biodiversidade (Ninho da Harpia), $06^{\circ}18'01.8''\text{S}$, $48^{\circ}27'39.5''\text{W}$, fl., fr., 03.VII.2018, *L. Schneider et al.* 226 (MG).

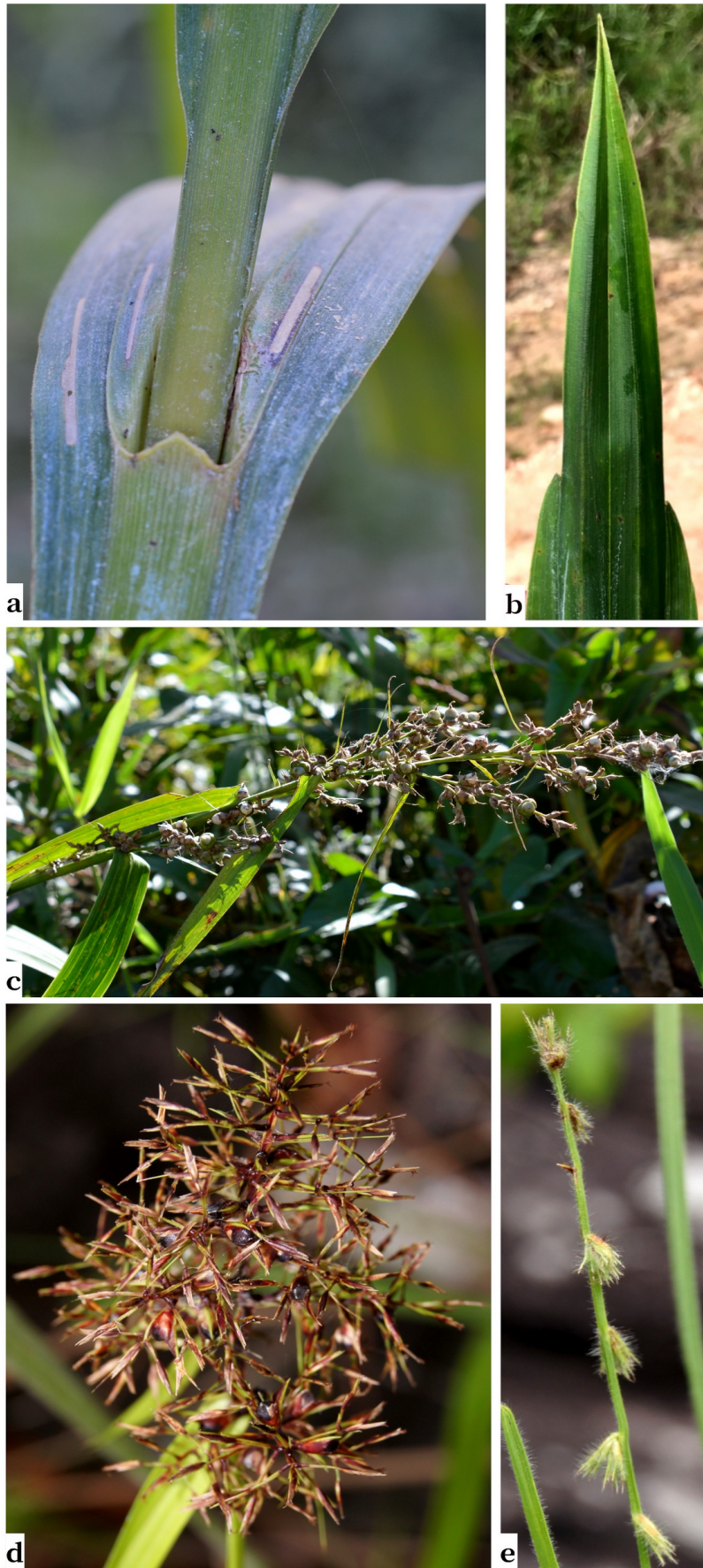


Figure 14 – a-c. *Scleria macrophylla*. a. counter-ligule. b. Pseudopremorse leaf apex. c. inflorescence. d-e. *S. martii*. d. Counter-ligule with membranous appendix. e. Inflorescence. f. *S. distans*, spiciform inflorescence.

11.5. *Scleria martii* (Nees) Steud., Syn. Pl. Glumac. 2: 171 (1855). *Hymenolytrum martii* Nees in C.F.P.von Martius & auct. suc. (eds.), Fl. Bras. 2(1): 176 (1842). Figs. 13q-r, 14d-e.

The species can be distinguished by its leaf-sheaths winged, contraligule with the apex cuneate to rounded, with membranous appendix developed; scapes with retrorsely scabrid angles; inflorescences terminal, with up to 2 orders, paniculiform, pyramidal to subpyramidal, purplish-brown, spikelets pistillate and staminate; nutlets $2.4\text{--}3.8 \times 1.8\text{--}2.4$ mm, ovoid, purple, alveolated surface, pubescent, apex apiculate; hypogynium developed, trilobed. Distributed in South America. In Brazil, it is distributed in the Northern (AM, AP, PA, RO, RR, TO), Northeastern (BA, MA, PI), Central-Western (GO, MS, MT), and Southeastern (MG) regions. In the SMA, it occurs in *campo sujo*, riparian forests, and gallery forests.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, ca. 23 km sentido São Geraldo à Marabá, Parque das águas (Cachoeira do Paulinho), 06°12'41.1"S, 48°35'36.4"W, fl. and fr., 30.VIII.2018, C.S. Nunes et al. 442 (MG).

11.6. *Scleria microcarpa* Nees ex Kunth, Enum. Pl. 2: 341 (1837). Figs. 12n, 13s.

The species can be distinguished by its leaf-sheaths winged, scabrid, leaf-blades with the apex pseudopremorse; inflorescences terminal and axillary, with up to 2 orders, paniculiform, spikelets subandrogynous and staminate; nutlets $2.2\text{--}3 \times 1.7\text{--}2$ mm, ovoid, green *in vivo*, white when dehydrated, lustrous and smooth surface; stylopodium at the apex of the fruit; hypogynium developed, trilobed, covered by the cupule with the margins ciliate, cilia white, persistent at the fruit. Distributed in Central and South America. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (DF, GO, MS, MT), Southeastern (ES, MG, RJ, SP), and Southern (PR, SC) regions. In the SMA, it occurs in anthropized riparian forests, dominating herbaceous plants.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, 6°20'49.2"S, 48°25'48"W, fl. and fr., 25.V.2019, N.P. Pinto et al. 19 (MG).

11.7. *Scleria reticularis* Michx., Fl. Bor.-Amer. 2: 167 (1803).

Figs. 12o, 13t.

The species can be distinguished by its leaf-sheaths winged, purple at the base; contraligules with the apex truncate to rounded, margins ciliate, with a membranous appendix inconspicuous; inflorescences terminal and axillary, with only one order, paniculiform, spikelets subandrogynous to staminate; nutlets 2.5–2.9 × 1.8–2.1 mm, ovoid, white, sometimes with gray median brands, surface foveolate; hypogynium developed, trilobed, oblong lobes. Distributed in Southern Africa, USA, and Central and South America. In Brazil, it is distributed in the Northern (PA, RR), Northeastern (AL, BA, CE, MA, PB, PE, PI, RN, SE), Central-Western (GO), and Southeastern (SP) regions. In the SMA, it occurs in *campo limpo* next to *veredas*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Parque Estadual Serra dos Martírios-Andorinhas, Estrada para a Vila Santa Cruz dos Martírios, Mirante, 06°09'05"S, 48°32'48"W, fl. and fr., 26.VIII.2018, *K.N.L. Alves et al.* 143 (MG).

11.8. *Scleria tenella* Kunth, Enum. Pl. 2: 353 (1837).

Figs. 12p, 13u.

The species can be distinguished by its contraligules with the apex cuneate, a membranous appendix inconspicuous; inflorescences terminal, with up to 3 orders, spiciform, sometimes branched, with spikelets in ascending glomeruli; spikelets androgynous; nutlets 1.2–1.5 × 1–1.5 mm, white, often with gray median brands, subtrigonus, surface crested-tuberculated, base with 4–5 pores on each side; hypogynium reduced. Distributed in Mexico and Central and South Americas. In Brazil, it is distributed in the Northern (AC, AM, AP, PA, RO, RR, TO), Northeastern (BA, MA, PI, SE), Central-Western (DF, GO, MT), Southeastern (MG, SP), and Southern (PR) regions. In the SMA, it occurs in *campo limpo* next to *veredas* and in *campo sujo*.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental São Geraldo do Araguaia, Margem do Rio Araguaia, ca. 30 km de São Geraldo do Araguaia sentido norte, 6°15'42.9"S, 48°25'18.2"W, fl. and fr., *K.N.L. Alves et al.* 144 (MG).

The species can be distinguished by its perennial climbing habit, rhizomatous; leaf-sheaths winged, scabrid, contraligule with the apex cuneate to rounded, with a membranous appendix developed, ligule formed by bands of hyaline trichomes; inflorescences terminal and axillary, with up to 3 orders, paniculiform, subpyramidal, spikelets pistillate and staminate; nutlets 2.8–4.1 × 2.6–3 mm, globose, subtrigonus, cream-colored to dark brown, or gray, lustrous, apparently smooth and pilose surface, apiculate apex; hypogynium developed, trilobed. Distributed in French Guyana and Brazil. In Brazil, it is distributed in the Northern (PA, TO), Northeastern (BA, MA, PI), and Central-Western (MG) regions. In the SMA, it occurs in *campo sujo* and *veredas* at roadsides.

Selected specimen examined: BRAZIL. PARÁ, São Geraldo do Araguaia, Área de Proteção Ambiental de São Geraldo do Araguaia, fazenda na estrada para a Vila Santa Cruz dos Martírios, 6°18'14.6"S, 48°27'47.6"W, fl. and fr., 27.VIII.2018, C.S. Nunes *et al.* 418 (MG).

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List of exsiccatae

Alves KNL 3 (10.9), 5 (1.3), 6 (9.2), 12 (10.9), 11 (5.1), 13 (10.9), 15 (3.6), 16 (2.1), 19 (11.5), 21 (11.5), 23 (3.10), 25 (1.1), 26 (11.8), 27 (3.11), 29 (2.1), 30 (11.3), 31 (11.3), 35 (7.1), 36 (11.3), 37 (6.2), 41 (10.9), 43 (1.4), 44 (11.5), 48 (3.6), 50 (3.1), 51 (3.11), 52 (11.5), 53 (9.2), 74 (1.1), 82 (3.17), 83 (3.6), 84 (11.8), 99 (10.15), 102 (10.10), 103 (10.4), 106 (10.2), 105A (10.4), 105B (1.1), 106 (10.9), 109A (4.1), 109B (4.3), 110A (4.3), 110B (4.1), 114 (9.2), 113 (5.1), 115 (10.9), 116 (11.5), 122 (4.1), 128 (3.15), 133 (1.3), 134 (10.9), 138 (9.1), 141 (10.2), 142 (1.1), 143A (11.7), 143B (1.5), 144 (11.8), 145 (10.6), 146A (5.1), 146B (1.2), 169 (10.5), 170 (3.14), 172 (10.7), 180 (4.6), 181 (10.3), 183 (6.2), 184 (11.3), 185 (3.11), 186 (10.1), 187 (10.4), 188 (10.17), 189 (5.1), 190 (10.9), 191 (11.8), 192 (10.4), 193 (3.18), 194 (10.9), 195 (1.1), 196 (9.2), 197 (3.6), 198 (11.5), 200 (10.15), 202 (10.2), 203 (10.7), 204 (3.9), 205A (3.13), 205B (3.3), 206 (6.3), 207 (3.1), 208 (7.1), 209 (6.2), 210 (11.4), 211 (11.4), 213 (3.11), 214 (3.15), 219 (10.13), 220A (10.16), 220B (10.3), 221 (11.1), 223 (1.3), 224 (10.15), 225 (11.7), 226 (5.1), 227 (2.1), 228 (10.18), 237 (10.9), 262 (10.12), 264 (11.1), 266 (10.3), 267 (3.18), 273A (10.3), 273B (3.6), 274 (10.7), 276 (11.8). **Amaral DD** 176 (1.6), 178 (1.8), 181 (1.1), 182 (1.3). **Bastos MNC** 1907 (10.8), 1908 (4.4), 2083 (9.2), 2084 (10.2), 2111 (11.7). **Cordeiro MR** 1908 (4.4), 2083 (9.2), 2084 (10.2), 2111 (11.8). **Fernandes-Júnior AJ** 674 (1.8), 681 (10.15), 680 (10.10), 681 (10.2), 683 (10.12), 694 (10.16), 696 (11.7), 697 (1.3), 699 (10.16), 701 (10.2), 702 (10.10). **Gil A** 813 (6.4), 814 (6.1), 815 (3.16), 828 (4.7), 831 (6.4), 832A (4.2), 832B (4.6), 834 (3.16), 835 (1.7), 836 (6.1), 837 (6.3), 838 (3.12), 841 (3.4), 842 (3.8), 843 (3.3), 844 (3.13), 846 (3.17), 848 (6.4), 852 (3.16), 856 (3.16), 857 (6.4), 858 (3.5), 860 (3.7), 861 (3.15), 862 (3.10), 863 (3.7), 864 (6.2), 865 (3.6), 866A (4.2), 866B (4.6), 867A (4.5), 867B (4.6), 868 (4.4), 875 (3.6), 876A (4.2), 876B(4.6), 878 (3.7), 891 (1.2), 892 (10.6), 897 (11.8), 902 (10.9), 903 (1.1), 904 (1.5), 909 (11.8), 914 (10.3), 926 (11.8), 928 (4.6), 929 (3.18), 930 (10.17), 931 (10.14), 932 (8.1), 934 (2.1), 935 (2.2), 936 (11.5), 968 (10.7), 969 (10.17), 971 (1.4), 972 (11.8), 975 (10.11), 976 (10.6), 989 (10.8). **Maciel-Silva J** 264 (10.4), 265 (2.1), 266 (10.4), 305 (11.7). **Nunes CS** 377 (9.2), 378 (11.5), 379 (10.8), 380 (10.10), 381 (10.15), 382 (9.1), 383 (10.18), 384 (1.4), 385 (10.9),

386 (3.17), 388 (4.5), 390 (6.4), 391 (6.1), 395 (4.1), 397 (10.11), 399 (10.2), 401 (11.9), 403 (10.15), 404 (3.1), 406 (10.9), 407 (5.1), 411 (10.12), 412 (3.14), 413 (11.7), 416 (2.1), 417 (11.4), 418 (11.9), 425 (1.6), 430 (11.8), 435 (10.15), 437 (10.15), 439 (10.18), 442 (11.5), 443 (11.3), 445 (10.4). **Pinto NP** 19 (11.6). **Rocha AES** 770 (3.8), 782 (3.12), 783 (3.4), 1731 (1.1), 1732 (10.2), 1733 (3.1), 1734 (3.6), 1756 (10.16), 1757 (1.3), 1758 (10.1). **Schneider L** 238 (11.8), 258 (1.5), 259 (1.3), 260 (3.1), 261 (11.5), 264 (11.3), 265 (3.15), 226 (11.4), 267 (11.3), 268 (6.2), 269 (3.15), 270 (1.3), 277 (10.14), 271A (3.14), 271B(3.18), 278 (1.4), 263 (10.7). **Silva FA** 543 (1.3), 551 (1.3), 552 (1.1), 564 (1.1), 565 (10.2), 569 (11.5), 570 (10.4). **Souza MGC** 56 (4.4), 677 (10.4), 689 (6.2).

CONSIDERAÇÕES FINAIS

A região da Serra dos Martúrios-Andorinhas tem uma diversidade grande de espécies da família Cyperaceae, a esta diversidade são somadas a presença de espécies consideradas raras, de distribuição restrita no planeta, outras de ocorrência condicionada a determinados ecossistemas dentro das savanas amazônicas, com diferentes exigências quanto às condições de luminosidade, umidade, e solo, de forma que o equilíbrio deste conjunto de fatores é decisivo para a sobrevivência das espécies como um todo.

O presente trabalho registrou 72 espécies, distribuídas em 11 gêneros de Cyperaceae, para a APA Araguaia e PESAM, na Serra dos Martúrios-Andorinhas, sendo sete destas novas ocorrências para o estado do Pará. Estes resultados contribuem para o conhecimento da flora destas importantes unidades de conservação, bem como da flora paraense e brasileira.

De acordo com os resultados encontrados, as unidades de conservação da APA Araguaia e PESAM mostram-se fundamentais para a preservação das savanas amazônicas presentes na região do Araguaia, marcada pela transição entre dois grandes biomas brasileiros, a amazônia, com grande diversidade de espécies e endemismos, e o cerrado, um dos *hotspots* de biodiversidade mundial.