

UNIVERSIDADE FEDERAL DA INTEGRAÇÃO LATINO AMERICANA
INSTITUTO LATINO AMERICANO DE CIÊNCIAS DA VIDA E DA NATUREZA
PROGRAMA DE PÓS-GRADUAÇÃO STRICTO SENSU EM BIODIVERSIDADE
NEOTROPICAL– NÍVEL MESTRADO

**Sinopse Taxonômica de Bignoniaceae, Plantaginaceae e
Scrophulariaceae (Lamiales) nos Parque Nacionais do Iguaçu e
Iguazú (Brazil e Argentina).**

ELMAR J. HENTZ JÚNIOR

FOZ DO IGUAÇU-PR

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**Dissertação apresentada à Universidade
Federal da Integração Latino-Americana,
como parte das exigências do Programa
de Pós-Graduação em Biodiversidade
Neotropical e Evolução, para obtenção do
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RESUMO

Apesar da Argentina e do Brasil estarem entre os países com a maior riqueza de plantas vasculares no mundo, a flora de ambos permanece pouco estudada, especialmente nas áreas de Floresta do Alto Paraná. Uma parte desta formação florestal é mantida conservada no oeste do Paraná e na província de Misiones, região onde se encontram os Parques Nacionais do Iguazu e Iguazú. Assim, tendo em vista a baixa quantidade de estudos florísticos realizados nestes parques, realizamos a sinopse taxonômica das famílias Bignoniaceae, Plantaginaceae e Scrophulariaceae dos Parques, dando continuidade aos estudos da Ordem Lamiales nos mesmos. Apresentamos chaves de identificação, ilustrações e pranchas de fotos, comentários sobre a distribuição das espécies, seu habitat e fenologia, com o objetivo de enriquecer o conhecimento acerca da diversidade vegetal da região. Entre as três famílias 41 espécies foram aqui estudadas. Bignoniaceae é a família com a maior riqueza representada por 29 espécies, seguida de Plantaginaceae com 10 e Scrophulariaceae com duas. Para Bignoniaceae os gêneros *Dolichandra* e *Fridericia* foram os que apresentaram maior riqueza, com cinco espécies cada. Para Plantaginaceae o gênero com maior riqueza é *Stemodia* com quatro espécies e para Scrophulariaceae. Vale ressaltar a presença de espécies classificadas com algum grau de perigo e que são encontradas nos parques, sendo, *Handroanthus impetiginosus* e *Mecardonia grandiflora* listadas como quase ameaçada, e *Stemodia hyptoides* como vulnerável. Desta maneira, nossos resultados demonstram a importância de se expandir o conhecimento sobre a flora da região, contribuindo para a manutenção de planos de manejo e facilitando projetos de conservação.

ABSTRACT

Although Argentina and Brazil are among the countries with the highest vascular plant richness in the world, the flora of both remains little studied, especially in the areas of the Upper Paraná Atlantic Forest. Sites of this forest formation are maintained conserved in the west of Paraná and in the province of Misiones, where the Iguaçu and Iguazú National Parks are located. Thus, considering the low amount of floristic studies carried out in these parks, taxonomic synopsis for Bignoniaceae, Plantaginaceae, and Scrophulariaceae of the Parks were executed, continuing the surveys of the Order Lamiales. Herein, identification keys, illustrations, photo boards, comments on species distribution, their habitat, and phenology, were provided. Among the three families, 41 species were studied. Bignoniaceae is the family with the highest richness, with 29 species, followed by Plantaginaceae with 10 and Scrophulariaceae with two. For Bignoniaceae, the genera *Dolichandra* and *Fridericia* were the ones with highest richness, with five species each. For Plantaginaceae, *Stemodia* with four species, and for Scrophulariaceae, *Buddleja*. It is worth highlighting the presence of species classified with some degree of danger and found in the parks, with *Handroanthus impetiginosus* and *Mecardonia grandiflora* being listed as near threatened, and *Stemodia hystoides* as vulnerable. This way, our results demonstrate the importance of expanding knowledge on the region's flora, contributing to the maintenance of management plans, and facilitating conservation projects.

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Introdução Geral

A Mata Atlântica é formada por 15 ecorregiões que vão do litoral brasileiro até o Paraguai e Argentina, e a biodiversidade presente nessas áreas estão entre as mais ameaçadas, sendo que apenas 7,4% de sua extensão natural se mantém conservada. Dentre as ecorregiões, a Floresta do Alto Paraná era a mais extensa, com 471.204 km², estendendo-se desde a Serra do Mar, no Brasil, até o leste do Paraguai e a Província de Misiones, na Argentina, e, apesar de sua fragmentação, esta ainda é a formação vegetal que mais apresenta remanescentes com proteção integral, sendo os maiores deles o Parque Nacional do Iguaçu (Brasil) e o Parque Nacional Iguazú (Argentina) (Di Bitetti *et al.*, 2003; Giraudo *et al.*, 2005).

O Parque Nacional do Iguaçu, Brasil, apresenta aproximadamente 186 mil hectares de Mata Atlântica, sendo formado predominantemente por Floresta Estacional Semidecidual e Floresta Ombrófila Mista (ICMBio, 2018). Já o Parque Nacional Iguazú, Argentina, é localizado na região Norte da província de Misiones, é totalmente coberto por Floresta Estacional Semidecidual, denominada de Selva Paranaense. Ainda, Misiones é a província Argentina com a maior área de Floresta do Alto Paraná preservada, com 40% de sua cobertura original (SIB 2020).

O estado do Paraná e a província de Misiones, regiões políticas onde estão localizados os Parques estudados nesse manuscrito, demonstram uma grande importância para a diversidade vegetal dos países. O Paraná é sétimo estado brasileiro em relação à riqueza de plantas, com 5.891 espécies (BGF, 2018). Já Misiones, apresenta cerca de 3.148 espécies de plantas vasculares em seu território, ou seja 7,33% da flora de toda a Argentina, sendo a província com a maior riqueza de espécies de plantas do país. Destas 792 são encontradas apenas nesta província e compartilhadas com o Brasil e Paraguai, o que corresponde a 25% de toda flora da província (Giraudo *et al.*, 2005; Zanotti *et al.*, 2020).

Apesar do enorme valor científico desta região, apenas alguns estudos foram realizados nos Parques, como o das espécies de Orquídeas para o Parque Argentino (Johnson 2001). Para o Parque Brasileiro, algumas floras e sinopses taxonômicas foram realizadas ou estão em processo de construção: Acanthaceae (Hammes *et al.* 2021), Asteraceae (Benatti *et al.* in prep.), Cyperaceae e Poaceae (Jesus 2017), Leguminosae (Rauber *et al.*, in press), Moraceae (Mano *et al.* in prep.), Orchidaceae (Boff 2016), Rubiaceae (Rauber *et al.* in press), Verbenaceae (Hammes 2017), e um levantamento florístico com todas espécies de angiospermas (Trochez *et al.* 2017). Assim, visando dar continuidade aos trabalhos já realizados em Lamiales, com as famílias Acanthaceae e Verbenaceae, aqui são tratadas as famílias Bignoniaceae, Plantaginaceae e Scrophulariaceae (Tabela 1).

A Ordem Lamiales é representada por 24 famílias, 1.059 gêneros e 23.755 espécies, as quais correspondem à 12,3% da diversidade de todas eudicotiledôneas (APG IV, 2016). O monofiletismo de Lamiales é corroborado por dados moleculares (Schäferhoff *et al.* 2010; Refúlio-Rodrigues & Olmstead 2014) e tem como sinapomorfias morfológicas e fisiológicas a presença de tricomas glandulares, o armazenamento de carboidratos como oligossacarídeos, folhas com estômatos especializados (diacíticos), tecido parenquimático que se estende desde o conectivo das anteras até os lóculos, endosperma com conspícuo haustório micropilar e inclusões proteicas nos núcleos das células do mesófilo (Judd *et al.*, 2009). As Lamiales são mais facilmente reconhecidas por serem, em sua grande maioria, herbáceas, com folhas opostas, flores simpétalas, geralmente pentâmeras com corolas zigomorfas (Endress, 1994).

Tradicionalmente, Scrophulariaceae era a maior família da Ordem, com uma ampla distribuição (Olmstead *et al.*, 1993). Uma das explicações para o grande número de espécies terem sido posicionadas na família foi o fato de que muitas eram inseridas nesta por não se encaixar em táxons com sinapomorfias morfológicas mais definidas (Acanthaceae, Bignoniaceae, Gesneriaceae, Lamiaceae), o que dificultou o seu reconhecimento, uma vez que as espécies eram posicionadas em Scrophulariaceae pela ausência de caracteres, e não pela presença desses (Olmstead *et al.*, 2001; Tank *et al.*, 2006).

Assim, percebendo a falta de características únicas que definissem a família, Olmstead & Reeves (1995) realizaram o primeiro estudo filogenético para a mesma, no qual indicaram seu polifiletismo. Estudos mais recentes, baseados em dados moleculares e morfológicos indicaram que muitos gêneros como *Bacopa* Aubl., *Mecardonia* Ruiz & Pav., *Scoparia* L. e *Stemodia* L., que eram reconhecidos como representantes de Scrophulariaceae, foram transferidos para Plantaginaceae (Albach 2005; Oxelman 2005), motivo pela qual optou-se em estudar ambas famílias para a região, uma vez que maioria dos trabalhos trata as espécies de Plantaginaceae em sua antiga classificação.

A região da Floresta Atlântica do Alto Paraná tem registro de nove famílias nativas da ordem, sendo, Acanthaceae, Bignoniaceae, Gesneriaceae, Lamiaceae, Lentibulariaceae, Oleaceae, Plantaginaceae, Scrophulariaceae e Verbenaceae (Jabot, 2021; *SpeciesLink*, 2021; *Reflora*, 2021). Destas, apenas Verbenaceae e Acanthaceae, já foram estudadas. Entretanto, os dados publicados são insuficientes, uma vez que poucas coletas são realizadas em ambientes alagáveis no Parque e a maior concentração de pesquisas ocorre na área de Floresta Estacional Semidecidual, com espécies arbóreas, assim pouco se conhece da vegetação herbáceo-arbustiva e lianas, hábitos comuns em Bignoniaceae, Plantaginaceae e Scrophulariaceae (Tabela 1).

Isto demonstra a carência de estudos florísticos na área, sendo que, para conservação de ecorregiões, o estudo de grupos taxonômicos, sua riqueza e endemismo deveriam ser enfatizados,

uma vez que apenas através de um bom entendimento da biodiversidade local será possível garantir um conhecimento adequado de nossa flora, o qual resultará em melhores medidas de preservação e estimulará o desenvolvimento sustentável (Di Bitteti *et al.*, 2003; BFG, 2018). Ainda, de acordo com Giulietti *et al.* (2005) este progresso só será atingido através de um maior número de taxonomistas com experiência de campo, que possam se especializar em famílias, e façam levantamentos em projetos nacionais e/ou regionais, mantendo as coleções dos herbários atualizadas.

A dissertação foi organizada em dois capítulos, seguindo as normas da revista *Phytotaxa*. Capítulo 1: Taxonomic Synopsis for the Plantaginaceae and Scrophulariaceae of the Iguazu and Iguazu National Parks (Brazil and Argentina), e Capítulo 2: Taxonomic Synopsis for the Bignoniaceae of the Iguazu and Iguazu National Parks (Brazil and Argentina).

Tabela 1. Informações sobre a riqueza das Lamiales estudadas para os Parques Nacionais do Iguazu e Iguazú, e suas características diagnósticas.

FAMÍLIAS	RIQUEZA DAS FAMÍLIAS	CARACTERÍSTICAS DIAGNÓSTICAS
Bignoniaceae	Possuí cerca de 199 gêneros e 827 espécies (Lohmann & Tarabay, 2010). No Brasil ocorrem 34 gêneros e 420 espécies (Lohmann <i>et al.</i> , 2020). Na província de Misiones, na Argentina, ocorrem 33 espécies (Zanotti <i>et al.</i> , 2020).	Possui flores vistosas, com cálice pentâmero e gamopétalo. Possui 4 estames didínamos, um estaminódio e disco nectarífero geralmente presente. Seu ovário é súpero, com gineceu bicarpelar, fruto do tipo cápsula, raramente baga, e sementes aladas. (Souza & Lorenzi, 2012; Gentry, 1973).
Plantaginaceae	Plantaginaceae apresenta distribuição cosmopolita, incluindo aproximadamente 200 gêneros distribuídos em 2500 espécies. No Brasil ocorrem 150 espécies distribuídas em 28 gêneros (Souza <i>et al.</i> , 2020). Na província de Misiones, na Argentina, ocorrem 23 espécies (Zanotti <i>et al.</i> , 2020).	São ervas anuais ou perenes, ocasionalmente arbustos ou subarbustos. Possui folhas rosuladas, alternas ou opostas, podendo ser muito reduzidas. Inflorescência em espiga alongada ou capituliforme. Flores bissexuadas, com brácteas. Possui corola com 4 pétalas e cálice com 4 ou 3 sépalas. O fruto é do tipo aquênio ou cápsula (Souza & Souza, 2002).
Scrophulariaceae	Representada por 35 gêneros e 1500 espécies. Quase todos os gêneros tradicionalmente reconhecidos nesta família foram transferidos para outras famílias, principalmente Plantaginaceae e Orobanchaceae. No Brasil possui 7 gêneros, distribuídos em 22 espécies (Souza <i>et al.</i> 2020). Na província de Misiones, na Argentina, ocorrem 6 espécies (Zanotti <i>et al.</i> , 2020).	É representada principalmente por ervas, com folhas alternas ou opostas. Sua inflorescência é cimosa ou racemosa, podendo ser reduzida a apenas uma flor. Possui flores vistosas, diclamídeas com 4-5 pétalas gamopétalas. O cálice apresenta 4-5 sépalas. Seu fruto é do tipo cápsula, raramente drupa ou esquizocarpo (Souza & Lorenzi, 2012).

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Capítulo 1. Taxonomic Synopsis for the Plantaginaceae and Scrophulariaceae of the Iguazu and Iguaçu National Parks (Brazil and Argentina).

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O Artigo segue as normas da revista *Phytotaxa*.

Abstract

Although Argentina and Brazil are among the countries with the highest vascular plant diversity, the flora of both countries remains understudied. The Iguazu region, where the Iguaçu National Park (Brazil) and the Iguazu National Park (Argentina) are located, is an example of a region that remains poorly known botanically. Even though non-trees taxa represent most of the Atlantic Forest biodiversity, some botanical families such as Plantaginaceae and Scrophulariaceae, few floristic treatments are available for this plant family for the Southern Cone, a region encompassing Chile, Argentina, Uruguay, Paraguay, and Southern Brazil. Here, we provide a floristic account for the Plantaginaceae and Scrophulariaceae from the Iguazu and Iguaçu National Parks, including identification keys, illustrations, comments on the distribution, habitat, and phenology. A total of 12 species and six genera were documented. Of these, *Stemodia* is the most diverse genera in the region, with four species, followed by *Buddleja*, *Mercadonia* and *Scoparia* with two species each. The genera *Bacopa* and *Plantago* are represented by a single species. Two out of the 12 species present some degree of threat, *Mecardonia grandiflora* as near threatened and *Stemodia hyptoides* as vulnerable. This way, our findings expand the knowledge about the flora of the Southern Cone, contributing important information for the establishment of biodiversity management plans and conservation priorities.

Keywords: *Stemodia*. Iguaçu Region, Neotropical Flora, taxonomy.

Introduction

Plantaginaceae is characterized by its habit, usually herbaceous, its simple opposite leaves, stipules absent and usually zygomorphic corollas with fused petals (when present). However, it can be wrongly identified, due to its high heteromorphy, and surveys on its genera are still linked with other families names, specially Scrophulariaceae, in which many of its genera were circumscribed, and later separated with the aid of phylogenetic surveys (Olmstead & Reeves 1995, Olmstead *et al.* 2001; Albach *et al.*, 2005).

It is well known for the large number of ornamental species, and also by medicinal species such as those of the genus *Plantago* L., used for the treatment of intestinal pain, urinary infections and tumors (Samuelsen, 2000; Judd *et al.*, 2009). It has a cosmopolitan distribution, and include about 100 genera and 2,000 species. Of these, 45 genera and 370-400 species are native in the Neotropics (Souza 2012). In Brazil, it is represented by 28 genera and 150 species, of which 68 are considered endemic (Souza & Hassemer 2015). In Argentina, it is represented by 132 species, 23 for the Misiones province (Flora Argentina 2018; Zanotti *et al.*, 2020).

Scrophulariaceae, on the other hand, has 35 genera and 1500 species worldwide. It is represented by 7 genera, distributed in 22 species in Brazil (Souza *et al.* 2020). In Argentina it is also represented by 22 species, 6 for the Misiones province (Flora Argentina 2018; Zanotti *et al.*, 2020). This family does not have a specific morphological characterization, and it can be confused by Plantaginaceae, especially since most of the genera traditionally recognized as Scrophulariaceae have been transferred to the latter, which is the reason for presenting both families in this synopsis.

However, despite the fact that the state of Paraná includes 5,891 species (Giulietti *et al.* 2005; BFG 2015, 2018; S.I.B 2020), and the province of Misiones includes 3,418 species (Zanotti *et al.* 2020), the Iguazu and Iguazu National Parks remain poorly studied botanically, specially for non-trees groups (Gris & Temponi, 2017; Souza *et al.* 2017). And, as indicated by Giulietti *et al.* (2005), to progress in the biodiversity conservation field, more regional projects need to be made, increasing floristic collections.

Some focused surveys have tackled the following plant families: Acanthaceae (Hammes *et al.* 2021), Asteraceae (Benatti *et al.* in prep.), Bignoniaceae (Hentz Júnior *et al.* in prep.), Cyperaceae and Poaceae (Jesus 2017), Leguminosae (Rauber *et al.*, in press), Moraceae (Mano *et al.* in prep.), Orchidaceae (Boff 2016), Rubiaceae (Toderke 2015, Rauber *et al.* in press), Verbenaceae (Hammes 2017), and a floristic survey encompassing all angiosperms has also been conducted (Trochez 2017).

Therefore, this study will provide a taxonomic synopsis for the Plantaginaceae and Scrophulariaceae species of the Iguazu and Iguazu National Parks, substantial remnant of the Atlantic

Forest, in order to better its management plans, and knowledge on herbaceous species of the Atlantic Rainforest, including identification keys and illustrations of the species collected, as well as comments on the distribution, habitat, and phenology.

Material and methods

The Iguaçú and Iguazu National Parks are located within the Atlantic Rainforest, within the Upper Paraná Forest which includes 471,204 km² and extends from the Serra do Mar in Brazil to the eastern portions of Paraguay and the Province of Misiones in Argentina (Di Bitetti *et al.* 2003). Despite the high fragmentation levels of this region, this area includes the highest number of protected forest remnants within the Iguazu region. The Iguazu climate is categorized as Cfa (wet subtropical climate) under the Köppen classification (Peel *et al.* 2007), a transition between tropical and temperate climates, with hot summers, lack of dry seasons, and a few frosts (Alvares *et al.* 2013).

The Iguaçú National Park (ParNa Iguaçú) is a conservation unit (25°05'–25°41'S, 53°40'–54°38'W) located within the state of Paraná, Brazil. The Park has 185,262.5 hectares in length and a perimeter of 420km, of which 300km include pristine vegetation. The ParNa Iguaçú includes Seasonal Semideciduous Forest and Mixed Ombrophilous Forest with *Araucaria angustifolia* (Bertol.) Kuntze, representing the largest remnant of Atlantic Forest in Brazil (IBAMA 1999). The Mixed Ombrophilous Forests are mostly composed of montane vegetation growing in areas above 500m. The Seasonal Semideciduous Forest is found in Submontane formations growing in areas up to 500m, representing the most common vegetation type within the Park. Montane vegetation is also found at altitudes above 500m, intermingled with Mixed Ombrophilous Forests (IBAMA 1999).

The Iguazu National Park (ParNa Iguazu), on the other hand, is located at the northern portion of the province of Misiones between 25°31'–25°43'S, 54°08'–54°32'W). This National Park was established in 1934 and includes 67,620 hectares divided into a National Reserve (in Puerto Iguazu) and the National Park itself (SIB 2020). The Park is composed of a Seasonal Semideciduous Forest vegetation, known as “Selva Paranaense” or Interior Atlantic Forest (Di Bitetti *et al.* 2003). Misiones is the most preserved province, with 40% of its original forest cover (SIB 2020).

For this study, we divided our focal study site into five main areas, as follows: (i) Céu Azul, (ii) Matelândia/Serranópolis do Iguaçú, (iii) Capanema, (iv) Foz do Iguaçú and the (v) Iguazu National Park (Argentina) (Fig. 1 Modified from Hammes *et al.*, 2021). No field work was conducted in the Iguazú National Park, but specimens deposited at the CTES Herbarium, were studied instead.

Monthly visits to the Iguaçú National Park were carried out between February 2019 and February 2020, during which time Plantaginaceae and Scrophulariaceae specimens were collected and incorporated into the EVB herbaria following Bridson & Forman (2004). Some species were

personally identified through the analysis of herbarium specimens deposited at the CTES, EVB, HCF, MBM, PUC-PR, UNOP, and UPCB herbaria (Thiers B. [continuously updated]), indicated by “!” in the Specimens Examined. Data was also analyzed through virtual herbaria, namely, *Jabot* (2021), *Reflora* (2021) and *SpeciesLink* (2021), and through the following literature: Souza & Giuliette 2009, Hefler 2011, Scatigna & Mota 2017, Coelho & Miotto 2018, Lannoy *et al* 2018.

Conservation status was assessed using distribution data and the GeoCAT Tool (Bachman *et al.* 2011), in which, using occurrence data from the *SpeciesLink* Platform, we obtained the extent of occurrence (EOO), which was used to categorize the species.

Results and Discussion

In this study we documented 10 Plantaginaceae species and two Scrophulariaceae species for the Iguaçu and Iguazu National Parks. One species is endemic to Argentina (i.e., *Stemodia diplohyptoides*), and besides this one, all other species are native to Brazil. *Stemodia* was the most representative genera with 4 species, followed by *Buddleja*, *Mercadonia*, and *Scoparia* with 2 species each. *Bacopa* and *Plantago* were represented by only one species each.

Key to the Plantaginaceae from the Iguaçu and Iguazu National Parks

1. Well defined spike-like inflorescences ... *Plantago australis*.
 - Not defined spike-like inflorescences or solitary flowers ... 2.
2. Aquatic herbs, leaves with entire margin ... *Bacopa australis*.
 - Terrestrial herbs, leaves with serrated margins ... 3.
3. Well developed anther connective ... 4.
 - Underdeveloped anther connective ... 5.
4. Sepals equal among themselves, lilac or purple corolla, and may present a yellow tube ... 6.
 - Outer sepals wider than the inner ones, yellow corolla ... 7.
5. Sepals-4, white corolla ... *Scoparia dulcis*.
 - Sepals-5, yellow corolla ... *Scoparia montevidensis*.
6. Pedicelated leaves ... *Stemodia verticillata*.

- Sessile leaves ... 8.

7. Branches erect, leaves elliptic with round base, calyx larger than 1.1 cm ... *Mercadonia grandiflora*.

- Branches erect or creeping, leaves lanceolate, rarely elliptic or linear with acute base, calyx with 0,3 - 0,8 cm ... *Mecardonia procumbens* subs. *flagellaris*

8. Leaves not very serrated, dense inflorescences ... *Stemodia stricta*.

- Highly serrated leaves, lax inflorescences... 9.

9. Hirsute leaves ... *Stemodia hyptoides*.

- Slightly pubescent leaves ... *Stemodia diplohyptoides*.

1. *Bacopa* Aublet (1775: 128).

Aquatic. Herbs, glabrous or pubescent. *Leaves* opposite, rarely verticillate. *Leaf blade* entire, rarely pinnatisect or pinnatifid, elliptic, ovate, orbicular, obovate or oblong, rounded, apex obtuse or acute, base rounded, acute, margin entire or serrate, glabrous or variously pubescent, generally with glandular punctuations on both surfaces. *Flowers* slightly zygomorphic, axillary, solitary or 2-3 per axil, sometimes in a racemose inflorescence. *Calyx* pentamerous, rarely tetramerous. *Corolla* bilabiate, pentamerous, white, blue, pink, red or violet. *Fruits* loculicide -capsules. *Seeds* numerous.

1.1. *Bacopa australis* Souza (2001: 58). (Fig. 2 A-B).

Distribution and Habitat:— Herb. Native from South America, occurring from Mato Grosso do Sul to Rio Grande do Sul, also in Argentina (Corrientes), specially in flooded areas (Souza & Giuliette 2009; Sosa *et al.* 2018).

Phenology:— Found flowered in November.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 1,407,140.670 km² and the estimated area of occupancy is 164.000 km² (cell width of 2 km).

Taxonomic Notes:— Characterized by the entire leaves, with a rounded base. It is closely related to *Bacopa repens* from which it distinguishes by the stamen-4 (vs. stamen-2 in *B. repens*). Also, the

specimen collected in the Park was previously identified as *B. salzmännii*, from which it is distinguished by the adherent trichomes and bifid style (vs. erect trichomes and entire style in *B. salzmännii*) (Souza & Giuliette 2009).

During the analysis of this specimen we found that in some virtual herbariums it is still identified as *Bacopa salzmännii* (Bentham 1836: 58) Wettstein ex Edwall (1897: 181) (UB 167026), even though it is a isotype (US 2631536).

Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, *Lindemann, J.C & de Hass, J.H.* 3358, 23 Nov 1966 (K; MBM!; NY; UB; US).

Additional Specimen Examined:— **BRAZIL.** Mato Grosso do Sul: Corumbá, Baía do Búfalo, próximo ao Caapão de Ingá. *Pott V.J.* 1321, 3 Apr 1990 (MBM).

2. *Plantago* Linnaeus (1753: 112).

Terrestrial. Herbs. *Leaves* alternate, rosette. *Leaf blade* entire or dentate, sessile or pedunculated, linear to elliptic-ovate, membranaceous, chartaceous or coriaceous, glabrous to pubescent. *Spike* globose or cylindrical, dense or lax. *Flowers* actinomorphic to slightly zygomorphic, tetramerous, protected by a bract. *Calyx* tetramerous (2 anterior and 2 posterior sepals), identical or with larger ones (posterior), persistent. *Corolla* tetramerous, various shades of brown. *Fruits* capsule with transversal dehiscence. *Seeds* one to numerous, elliptic.

2.1 *Plantago australis* Lamarck in Lamarck & Poiret (1792: 339) (Fig. 2 G).

Distribution and Habitat:— Herb. Widely distributed throughout Latin America (Tolaba & Fabbioni 1998). In Brazil it is concentrated in the South and Southeast regions (Hefler 2011). In the Park it was found in Céu Azul and Foz do Iguaçu. Probably occurs in all areas.

Phenology:— Usually flowers from September to February (Hefler 2010). In the Park it was found flowered in May.

Conservation:— Native. This species has been categorized as LC [Least Concern] (CNCFlora 2021, following the IUCN criteria).

Taxonomic Notes:— Leaves arranged in rosettes, inflorescence spike. Also, *Plantago australis* can be differentiated from other *Plantago* species by the leaves with scarce ciliated pubescence, and the scape with adpressed antrorse trichomes.

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, borda do Parque, *Rauber, C.R. 56*, 24 May 2018 (UNOP!); Foz do Iguaçu, trilha das cataratas, *Hefler, S.M. 35*, 9 Nov 2011 (UPCB!); Foz do Iguaçu, trilha em frente ao museu, *Hefler, S.M. 34*, 11 Nov 2011 (SMBD, UPCB!); Foz do Iguaçu, borda do Parque, 25°39'24.5"S 54°26'14.9"W, *Caxambu, M.G. 6485*, 4 Jun 2015 (HCF!); Foz do Iguaçu, Trilha das Bananeiras, *Hentz Júnior, E.J. 101*, 15 Jul 2019 (EVB!).

3. *Mecardonia* Ruiz & Pavón (1794: 95).

Aquatic or terrestrial. Herbs, glabrous to pubescent. *Leaves* opposite. *Leaf blade* usually dentate, sessile or pedunculated, linear, elliptic, lanceolate, oval to **oboval**. *Flowers* axillary, solitary, zygomorphic. *Calyx* pentamerous, unequal sepals. *Corolla* pentamerous, bilabiate, yellow. *Fruits* septicide-capsula. *Seeds* elliptic to ovate.

3.1. *Mecardonia grandiflora* (Bentham 1836: 56) Pennel (1946: 87). (Fig. 2 H).

Distribution and Habitat:— Terrestrial or aquatic herb. Occurs in flooded areas from Paraná to Rio Grande do Sul. In the Park it was found in Foz do Iguaçu and Capanema.

Phenology:— In the Park it was found floweres in May and October.

Conservation:— Native. This species has been categorized as NT [Near Threatened] (CNCFlora 2021, following the IUCN criteria).

Taxonomic Notes:— Presents erect stems, leaves with serrated margin and calyx larger than 1.0 cm long. Differs from *M. procumbens* by being only slightly branched and the larger leaves and calyx.

Even though this species is listed as endemic to Brazil on the Flora do Brasil platform, many specimens were collected in Argentina.

Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, Sendero Macuco, *Vanni, R. 4621*, 12 Dec 2014 (CTES!); **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, margem do Rio Iguaçu, *Caxambu, M.G. 7104*, 30 Oct 2015 (HCF!); Foz do Iguaçu, Cataratas do Iguaçu, *Hatschbach, G. 3916*, 02 May 1957 (UPCB!); Foz do Iguaçu, Trilha da desembocadura do Rio São João no Iguaçu, *Caxambu, M.G. 6405*, 22 May 2015 (HCF!, MBM!).

3.2. *Mecardonia procumbens* subs. *flagellaris* (Miller 1768) Small (1903: 1065) (Fig. 2 I).

Distribution and Habitat:— Terrestrial or aquatic herb. In Brazil it occurs in Acre, Amazonas, Pará, Bahia, Goiás, Mato Grosso do Sul, Mato Grosso, Minas Gerais, São Paulo, Paraná, Rio Grande do Sul and Santa Catarina (Flora do Brasil 2020). In the Park it was found in Foz do Iguaçu.

Phenology:— Found flowered in November.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 13,550,089.613 km² and the estimated area of occupancy is 648.000 km² (cell width of 2 km).

Taxonomic Notes:— Crawling stems, leaves with margin entire or serrated, calyx smaller than 1.0 cm long. Differs from *M. grandiflora* by being very branched and the smaller leaves and calyx. The subspecies *Mecardonia procumbens* subs. *flagellaris* can be identified by the leaves longer than wide and margin entire to slightly dentate.

Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazu, *Vanni*, R. 2728, 07 Aug 1991 (CTES!); **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, próximo ao porto, *Duarte, A.P.* 1635, 07 May 1949 (NY); Foz do Iguaçu, Macuco, *Hatschbach, G.* 49792 (MBM!); Foz do Iguaçu, *Hatschbach, G.* 11207 (MBM!); Foz do Iguaçu, casa de hóspedes, *Cervi, A.C.* 6943, 12 Dec 1999 (UPCB); Foz do Iguaçu, Trilha do Rio São João, 25°37'37.8"S 54°28'52.6"W, *Caxambu, M.G.* 6412, 22 May 2015 (HCF!, MBM!); Foz do Iguaçu, *Siqueira, E.L.* 2841, 15 Nov 2018 (HCF!);

4. *Scoparia* Linnaeus (1753: 116).

Terrestrial. Herbs or subshrub, glabrous, rarely pubescent. *Leaves* opposite, rarely verticillate. *Leaf blade* dentate, rarely entire, linear, lanceolate or elliptic. *Flowers* axillary, solitary, pedunculated. *Calyx* tetramerous or pentamerous, equal sepals. *Corolla* pentamerous, rotaceous, white, pinkish, blue, violet or yellow. *Fruits* septicide-capsules. *Seeds* variable in form.

4.1. *Scoparia dulcis* Linnaeus (1753: 116). (Fig. 3 A-B).

Distribution and Habitat:— Herb or subshrub. It is Pantropical, occurring in all states for Brazil, usually in damaged forest areas, or in urban centers (Souza & Giuliette 2009). In the Park it was found in Foz do Iguaçu.

Phenology:— Found with flowers in March.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 17,214,497.050 km² and the estimated area of occupancy is 4,936.000 km² (cell width of 2 km).

Taxonomic Notes:— *Scoparia dulcis* can be easily recognized by the sepals-4 and white corolla (vs. sepals-5 and yellow corolla in *S. montevidensis*). It can also acquire the subshrub habit, with 3 to 4 verticillate leaves, rarely opposite (vs. only herbaceous habit and opposite leaves to 3-verticillate for *S. montevidensis*).

Specimen Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, *Hatschbach*, G. 9922, 19 March 1963 (MBM!; UPCB!).

Additional Specimens Examined:— **BRAZIL.** Paraná: Maringá, Parque do Ingá, 23°25'46.0"S 51°55'42.0"W, *Souza, M.C. 1804*, 14 Feb 2007 (HUEM);

4.2. *Scoparia montevidensis* (Sprengel 1824:42) Fries (1906: 22). (Fig. 2 C-D).

Distribution and Habitat: Occurs from México to Argentina. In Brazil it is found throughout the occident side of the country, from Amazonas to Rio Grande do Sul (Souza & Giuliette 2009). In the Park it was found in Capanema and Foz do Iguaçu.

Phenology: Found with flowers in March, May, October and November.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 3,844,605.820 km² and the estimated area of occupancy is 548.000 km² (cell width of 2 km).

Taxonomic Notes:— *Scoparia montevidensis* can be easily recognized by the sepals-5 and yellow corolla (vs. sepals-4 and white corolla in *S. dulcis*). It can presents only herbaceous habit and opposite to 3 verticillate leaves (vs. occasional subshrub habit, with 3-4 verticillate leaves, rarely opposite in *S. dulcis*).

Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, Rio Iguaçu, Ilha do Sol, 25°36'12.5"S 53°48'35.4"W, *Caxambu M. G. 7101*, 30 Oct 2015, fl. (HCF!); Foz do Iguaçu ,

Trilha da Usina, *Cervi A.C. 6957*, 12 Dec 1999 (UPCB!); Foz do Iguaçu, Trilha do Rio São João, 25°37'38.1"S 54°28'53.1"W, *Caxambu, M.G. 6422*, 22 May 2015 (UNOP!); Foz do Iguaçu, final da Trilha do Macuco, 25°39'01.0"S 54°27'22.2"W, *Caxambu, M.G. 8895*, 22 Mar 2019, fl. (HCF!);

5. *Stemodia* Linnaeus (1759: 1118).

Aquatic, rupicolous or terrestrial. Herbs, subshrubs or shrubs. *Leaves* opposite to verticillate. *Leaf blade* dentate to entire, linear, ovate, obovate, lanceolate, sessile or pedunculated. *Flowers* sessile to long pedunculated, axillary, sometimes forming a spiciform inflorescence, axillary or terminal. *Calyx* pentamerous. *Corolla* pentamerous, bilabiate, purple to lilac. *Fruit* loculiced or septicide capsules. *Seeds* variable.

5.1. *Stemodia diplohyptoides* Sosa & Dematteis (2014: 272). (Fig. 3 E).

Distribution and Habitat: Occurs in Argentina, in the north and center of Misiones province (Sosa & Dematteis 2014). Found only in the Iguazu National Park.

Phenology: Flowering from August to December (Sosa & Dematteis 2014).

Conservation: Endemic to Argentina. NE.

Taxonomic Notes:— *Stemodia diplohyptoides* can be confused with *Stemodia hyptoides* from which it differ by the barely pubescent leaves (vs. hirsute pubescent leaves in *S. hyptoides*). Both species share leaves highly dentate and dense axillary inflorescences which separates them from the other *Stemodia* species.

Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazu, Isla San Martin, *Sosa, M.M 131, 133*, 14 Feb 2004 (CTES!).

5.2. *Stemodia hyptoides* Chamisso & Schlechtendal (1828: 8). (Fig. 3 F).

Distribution and Habitat: Occurs in Argentina, Brazil (from Mato Grosso do Sul to Rio Grande do Sul), Paraguay and Uruguay. Usually found in open areas, such as “banhados”, small streams and floodable rocky soils (Souza & Giuliette 2009). In the Park it was found in Foz do Iguaçu.

Phenology: Found with flowers in December.

Conservation: Native. This species has been categorized as VU [Vulnerable] (CNCFlora 2021, following the IUCN criteria).

Taxonomic Notes:— *Stemodia hyptoides* can be distinguished from other *Stemodia* species found by it sessile leaves (vs. petiolated in *Stemodia verticillata*), long trichomes in the calyx (vs. short trichomes in *Stemodia stricta*), leaves margin with more than 20 teeth per side (vs. less than 20 teeth per side in *S. stricta*), and the hirsute pubescent leaves (vs. barely pubescent leaves in *Stemodia diplohyptoides*). Shares with *Stemodia diplohyptoides* leaves highly dentate and dense axillary inflorescences which can lead to unprecise identifications.

Even though all specimens of *Stemodia hyptoides* from the Iguazú National Park were redetermined as *Stemodia diplohyptoides* (Vanni, R. 3372, Sosa, M.M. 131, 133) we decided to display both species, since *Stemodia diplohyptoides* is not indicated for Brazil yet (Souza *et al.* 2020).

Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, porto, Duarte, A.P. 1853, 19 May 1949 (MO); Foz do Iguaçu, Trilha do Hidrante, 25°40'58.1"S 54°25'45.0"W, Caxambu, M.G. 7715, 16 December 2016, fl. (HCF!).

Additional Specimens Examined:— **ARGENTINA.** Corrientes: Carambola, Pedersen, T.M., 14 Mar 1979 (L); **BRAZIL.** Paraná: Guaíra, Sete Quedas, Hatschbach, G. 9332 (MBM).

5.3. *Stemodia stricta* Chamisso & Schlechtendal (1828: 10). (Fig. 3 G).

Distribution and Habitat: Occurs in open humid areas that are susceptible to floods in Argentina, Brazil (Mato Grosso do Sul to Rio Grande do Sul), Bolívia, Paraguay and Uruguay (Souza & Giuliette 2009). In the Park it was found in Foz do Iguaçu.

Phenology: Found with flowers in March and December.

Conservation: Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 1,704,616.222 km² and the estimated area of occupancy is 232.000 km² (cell width of 2 km).

Taxonomic Notes:— *Stemodia stricta* can be distinguished from other *Stemodia* species found in the Park by it sessile leaves (vs. petiolated in *Stemodia verticillata*), short trichomes in the calyx (vs. long trichomes in *Stemodia hyptoides*), and leaves margin with less than 20 teeth per side (vs. more than 20 teeth per side in *S. hyptoides*).

Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazu, Isla San Martín, Tressens, S.G. 4562, 15 Oct 1993 (MO); **BRAZIL.** Paraná, Parque Nacional do Iguaçu:

Foz do Iguaçu, *Duarte, A.P. 1853*, 19 May 1949 (UEC); Foz do Iguaçu, *Pereira, E. 5355*, 18 Feb 1960 (NY); Foz do Iguaçu, *Siqueria, E.L. 2477*, 08 March 2018, fl. (HCF!); trilha da Sede, 25°37'38.0"S 54°28'52.7"W, *Caxambu, M.G. 7718*, 16 December 2016 (HCF!).

Additional Specimen Examined:— **ARGENTINA.** Corrientes, *Sosa, M.M. 92*, 19 Dec 2020 (ASU, HUEFS, MO).

5.4. *Stemodia verticillata* (Miller 1768) Hassler (1909: 110). (Fig. 3 H).

Distribution and Habitat: Occurs in the Neotropics from Mexico to Argentina, is the most and West Africa, highly widespread (Souza & Giuletta 2009). In Brazil, this species occurs in all states (Souza *et al.* 2020). In the Park it was found in Céu Azul, Foz do Iguaçu and Lindoeste.

Phenology: Found with flowers in February, March and December.

Conservation: Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 13,277,497.295 km² and the estimated area of occupancy is 660.000 km² (cell width of 2 km).

Taxonomic Notes:— *Stemodia verticillata* can be distinguished from other *Stemodia* species found in the Park petiolated leaves (vs. sessile on othe species).

Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazu, borde de camino de acceso al Parque, *Sosa, M.M. 132*, 14 Feb 2004 (CTES!); **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, Trilha da Jacutinga, 25°14'05.5"S 53°49'08.9"W, 18 March 2018, *Siqueira, E.L. 2532* (HCF!); Foz do Iguaçu, *Hatschbach, G. 9366*, 14 Oct 1962 (MBM); Foz do Iguaçu, Casa da administração, 12 December 1999, *Cervi, A.C. 6942* (UPCB); Lindoeste, Cachoeira Rio Gonçalves Dias, 25°21'37.2"S 53°39'28.1"W, 13 February 2020, *Caxambu, M.G. 9110* (HCF!).

Key to the Scrophulariaceae from the Iguaçu and Iguazu National Parks

Cylindrical stem, white or cream corolla, tomentose capsules *Buddleja elegans* subsp. *elegans*

- Quadrangular stem, yellow corolla, glabrescent capsules *Buddleja stachyoides*.

6. *Buddleja* Linnaeus (1753: 112).

Terrestrial. Subshrubs, erect or scandent shrubs, rarely treelets. *Stems* cylindrical to quadrangular, glabrescent to velutine. *Leaves* opposite, sessile or rarely peciolated. *Leaf blade* elliptic, narrowly

elliptic, ovate, lanceolate, obovate, oblanceolate or oblong, apex acute, acuminate or obtuse, base attenuate, cuneate or truncate, margin dentate, crenate, crenulate, or sub-entire, adaxially glabrescent or tomentose, abaxially tomentose, sometimes glabrescent. *Cymes* apical, subapical, rarely axillary, sessile or pedunculated. *Flowers* actinomorphic, sessile or pedunculated. *Calyx* membranaceous, chartaceous or coriaceous, tetramerous, campanulate or tubular, green. *Corolla* tetramerous, tubular, rarely campanulate, yellow, white, cream colored, greenish or lilac. *Fruits* septicidal-capsules. *Seeds* numerous, sometimes winged.

6.1 *Buddleja elegans* subsp. *elegans* Chamisso & Schlechtendal (1827: 594). (Fig. 2 C-D).

Distribution and Habitat:— Terrestrial shrub. Found in Argentina, Brazil (Mato Grosso do Sul, Minas Gerais, São Paulo, Paraná, Santa Catarina e Rio Grande do Sul), Paraguay and Uruguay. In the Park it was found in Céu Azul. Common in wetlands and forests border (Coelho & Miotto 2018).

Phenology:— Flowering primarily from September to December, fruiting from October to January (Norman 2000). In the Park it was found flowered in October.

Conservation:— Native. This species has been categorized as LC [Least Concern] (Coelho & Miotto 2018, following the IUCN criteria).

Taxonomic Notes:— This species presents two subspecies and the one found in the Park is *Buddleja elegans* subsp. *elegans*, which is endemic to Brazil and occurs in Semidecidual Seasonal Forests from Paraná. This subspecies is characterized by congested cyme with sessile flowers (vs. lax cymes with pedunculated flowers in *Buddleja elegans* subsp. *angustata*). Also it differs from the other *Buddleja* species found in the Park by the coriaceous leaves (vs. membranaceous or chartaceous in *B. stachyoides*), the cylindrical stem (vs. quadrangular in *B. stachyoides*) and white flowers (vs. yellow in *B. stachyoides*).

Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, Lagoa Azul, Caxambu M.G. 7931, 25°05'22.5"S 53°40'09.1"W, altitude 701m, 05 Oct 2017 (HCF!).

Additional Specimens Examined:— **BRAZIL.** Paraná: Guaratuba, Morro dos perdidos, Santos E.P. 339, 18 September 1997 (UPCB); Tibagi, Parque Estadual do Guartelá, Snak C. 230, 02 March 2009 (UPCB); Piraquara, arredores da represa, Lannoy L.C. 1, 12 August 2015 (UPCB).

6.2 *Buddleja stachyoides* Chamisso & Schlechtendal (1827: 597). (Fig. 2 E-F).

Distribution and Habitat:— Terrestrial shrub. It is widely spread, being native from Argentina, Bolivia, Brazil (Alagoas, Bahia, Paraíba, Distrito Federal, Goiás, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Rio Grande do Sul and Santa Catarina), Paraguay and Uruguay (Coelho & Miotto 2018). In the Park it was found in Céu Azul and Foz do Iguaçu.

Phenology:— Flowers from July to September, with fruits from August to October (Lannoy *et al* 2018). In the Park it was found flowered in August and September.

Conservation:— Native. This species has been categorized as LC [Least Concern] (Coelho & Miotto 2018, following the IUCN criteria).

Taxonomic Notes:— Can be distinguished from *B. elegans* by the membranaceous or chartaceous leaves (vs. coriaceous in *B. elegans*), quadrangular stem (vs. cylindrical in *B. elegans*) and the yellow flowers (vs. white in *B. elegans*).

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, borda do Parque, 25°06'29.1"S 53°45'09.3"W, altitude 666, *Caxambu M.G. 7464*, 25 Aug 2016 (HCF!); Foz do Iguaçu, trilha da sede do ICMBio, 25°37'36.6"S 54°28'53.7"W, *Caxambu M.G. 6759*, 14 Aug 2015 (HCF!); Foz do Iguaçu, Trilha do Hidrômetro, *Rauber C.R. 165*, 15 Sep 2018 (UNOP!).

Some difficulties were found while working on the specimen *Caxambu M.G. 7931* (HCF!). Even though it was already identified as *Buddleja elegans*, we decided to further identify it in a subspecies level. That way, while analyzing the possible subspecies, we realized that most of the *Buddleja elegans* subsp. *elegans* collections (*Lannoy L.C. 1*, *Santo E.P. 339*, *Snak C. 230*) were made in higher elevations, and that *Buddleja elegans* subsp. *angustata* is really common in elevations lower than 100m, specially on the borders of Paraguay with Paraná and Mato Grosso do Sul (Coelho & Miotto 2018). However, based on the specimen morphology, we decided that the subspecies found in the Iguaçu National Park is, indeed, *Buddleja elegans* subsp. *elegans*, being a rare occurrence to the region. Also, it is worth highlighting that none of the *Buddleja* species found in the Iguaçu National Park are listed for the Argentinian Park, further indicating the lack of sampling efforts in the area.

Overall, The Iguaçu National Park presents higher species richness with 11 species total. Foz do Iguaçu, showed the highest species richness among the areas, with nine species, including two species that are not found in any other area, namely, *Scoparia dulcis* and *Stemodia hyptoides*. Four species were found in Céu Azul, *Buddleja elegans* only found in this area, a collection made near a natural lake deep in the Park, which can explain its restricted occurrence, since similar areas are not

well sampled. For the Iguazu National Park five species were documented in the CTES herbarium, and *Stemodia diplohyptoides* only occurring there. The other four species were also found in the Foz do Iguacu area, with which it shares the Forest type (Semidecidual Seasonal Forest).

Still, two species were found in Capanema, and only one for the Matelândia/Serranópolis area. The lack of documented species in some areas can be explained. While Foz do Iguacu is the most visited area, with more accessible trails to be explored, the other areas demand more to be explored (specialized ICMBIO workers to help finding the trails, as well as a boat for the collections in Capanema).

TABLE 1. Plantaginaceae and Scrophulariaceae species found in each of the study areas within the Iguazu and Iguazu National Parks.

Species	Céu Azul	Matelândia/Serranópolis	Capanema	Foz do Iguacu	Argentina
<i>Buddleja elegans</i>	X				
<i>Buddleja stachyoides</i>	X			X	
<i>Bacopa australis</i>		X			
<i>Plantago australis</i>	X			X	
<i>Mecardonia grandiflora</i>			X	X	X
<i>Mecardonia procumbens</i>				X	X
<i>Scoparia dulcis</i>				X	
<i>Scoparia montevidensis</i>			X	X	
<i>Stemodia diplohyptoides</i>					X
<i>Stemodia hyptoides</i>				X	
<i>Stemodia stricta</i>				X	X
<i>Stemodia verticillata</i>	X			X	X

Although some of these species have already been cited in some studies in the region, knowledge about them was still scarce. For example, a floristic survey carried out at the ParNa Iguacu (Trochez *et al.* 2017) listed seven Plantaginaceae species, which were displayed in this survey. However, no Scrophulariaceae species were previously cited to the Park. Also, an old management plan for the ParNa Iguacu listed no species for both families, and the most recent one does not present a species list for the flora (ICMBio 2018). Thus, the results confirm the importance of detailed floristic surveys in large forest remnants, as they are basic resources for Management Plans, and other studies,

such as ecology, environmental education, physiology, phytochemistry and genetics, all of which depend on the identification and indication of the location of the species within the park, highlighting the importance to conserve the Iguaçu and Iguazu National Parks.

Examined Materials: *Caxambu, M.G.* 6485 (2.1), 6405, 7104 (3.1), 6412 (3.2), 6422, 7101, 8895 (4.2), 7715 (5.2), 7718 (5.3), 9110 (5.4), 7931 (6.1), 6759, 7464 (6.2); *Cervi, A.C.* 6943 (3.2), 6957 (4.2), 6942 (5.4); *Duarte, A.P.* 1635 (3.2), 1853 (5.2), 1853 (5.3); *Hatschbach, G.* 3916 (3.1), 49792, 11207 (3.2), 9922 (4.1), 9332 (5.2), 9366 (5.4); *Hefler, S.M.* 34, 35 (2.1); *Hentz Júnior, E.J.* 101 (2.1); *Lannoy, L.C.* 1 (6.1); *Lindemann, J.C.* 3358 (1.1); *Pedersen, T.M.* (5.2); *Pereira, E.* 5355 (5.3); *Pott, V.J.* 1321 (1.1); *Rauber, C.R.* 56 (2.1), 165 (6.2); *Santos E.P.* 339 (6.1); *Siqueira, E.L.* 2481 (3.2), 2477 (5.3), 2532 (5.4); *Snak, C.* 230 (6.1); *Sosa, M.M.* 131, 133 (5.1), 92 (5.3), 132 (5.4); *Souza, M.C.* 1804 (4.1); *Tressens, S.G.* 4562 (5.3); *Vanni, R.* 4621 (3.1), 2728 (3.2).

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Attachments

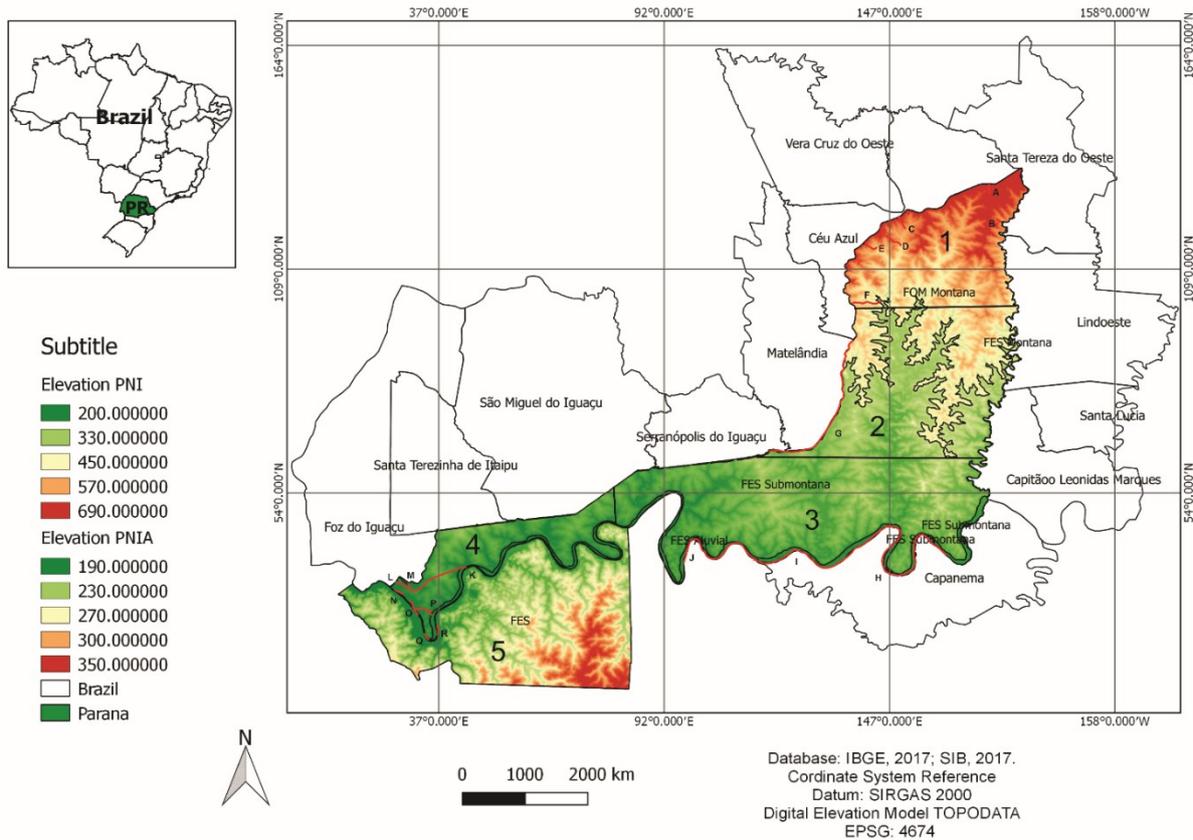


FIGURE 1. Areas of the Iguaçú and Iguazu National Parks. Area 1 – Céu Azul, trails from A-F. Area 2 – Matelândia/Serranópolis, trail G. Area 3 – Capanema, trails from H-J. Area 4 – Foz do Iguaçú, trails K-R. Area 5 – Iguazu National Park. Source: Modified from Hammes *et al.* 2021.

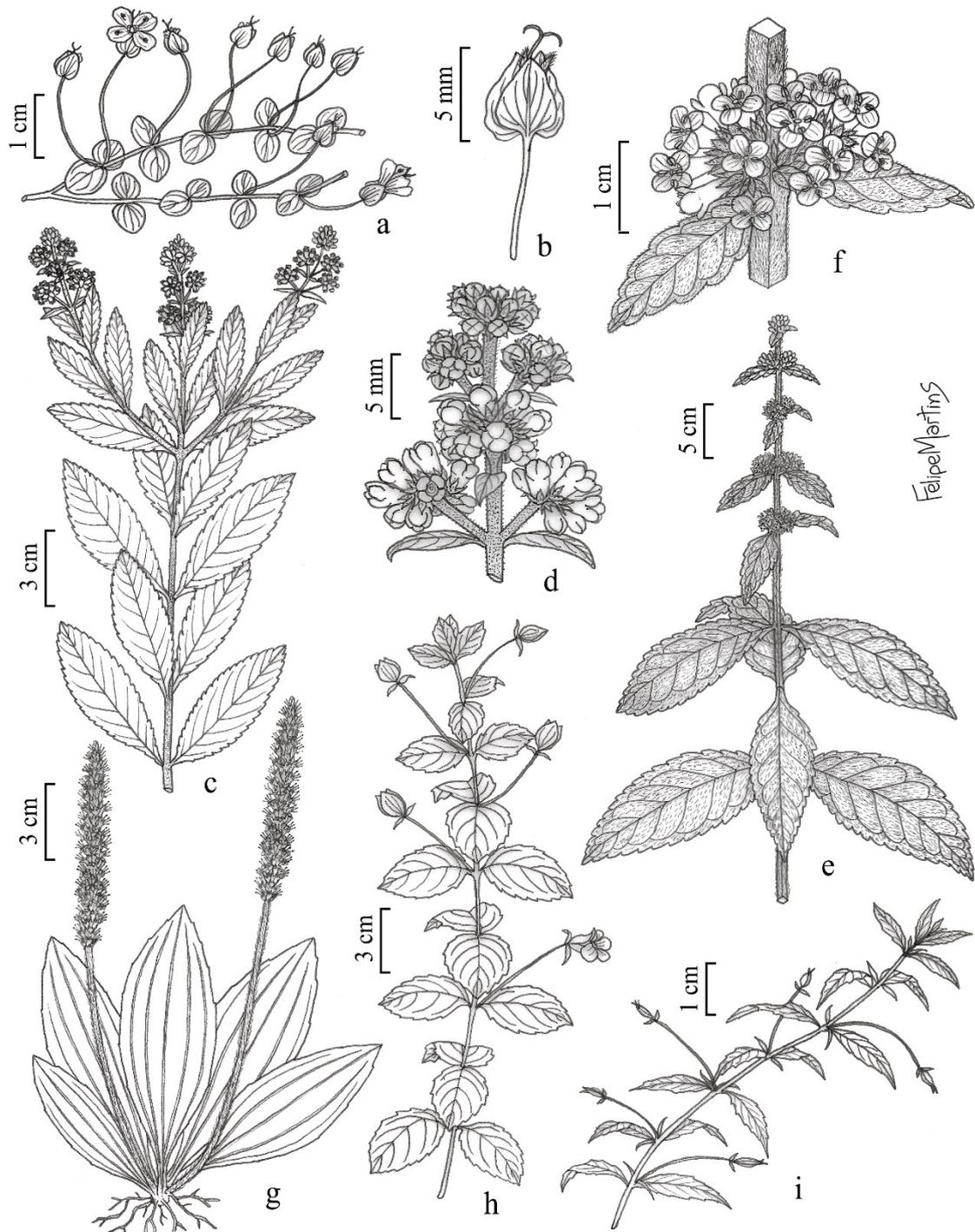


FIGURE 2. *Bacopa australis*. A. Habit. B. Flower detail. *Buddleja elegans* subs. *elegans*. C. Habit. D. Inflorescence. *Buddleja stachyoides*. E. Habit. F. Inflorescence. *Plantago australis*. G. Habit. *Mecardonia grandiflora*. H. Habit. *Mecardonia procumbens* subs. *flagellaris*. I. Habit.

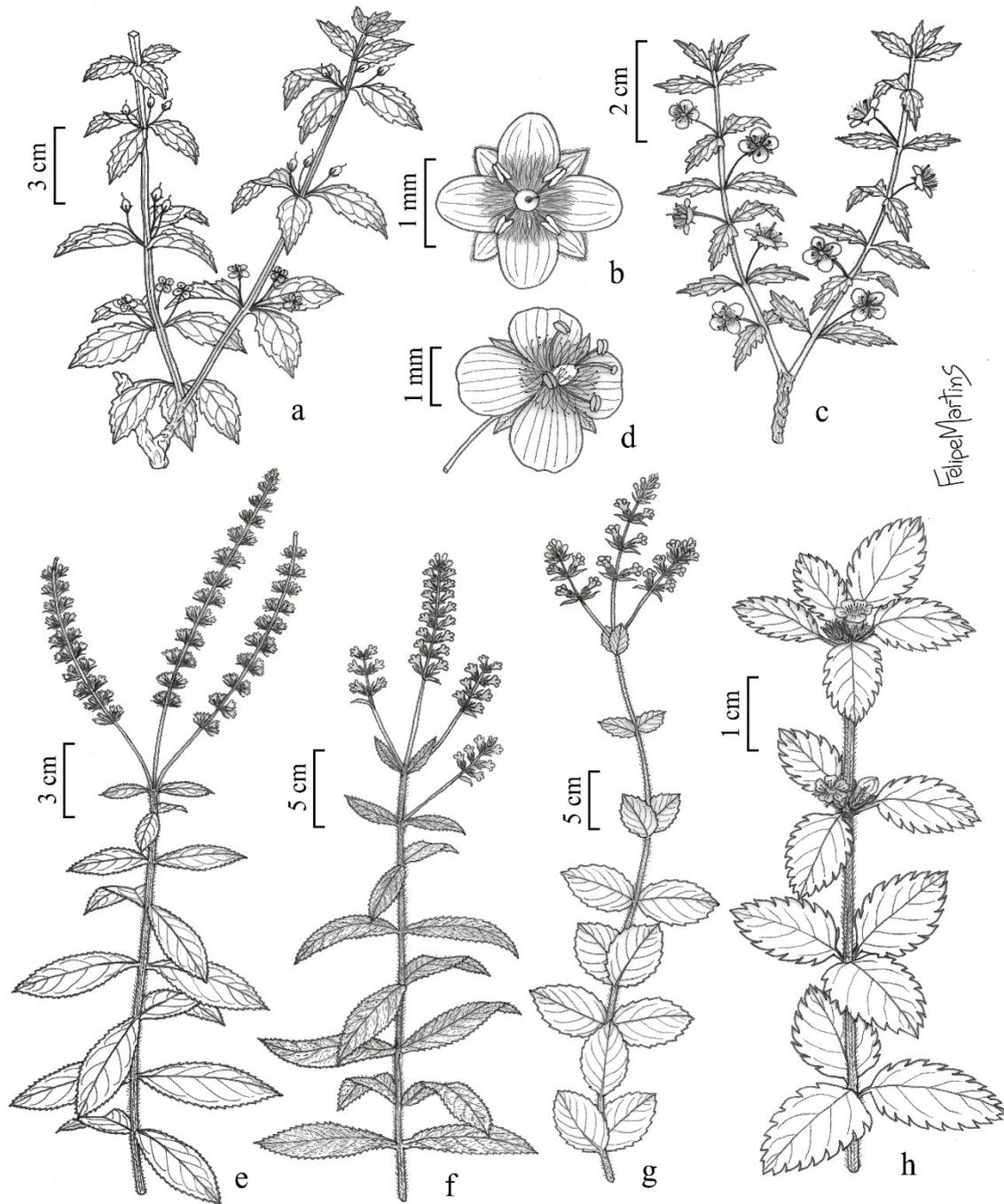


FIGURE 3. *Scoparia dulcis*. A. Habit. B. Flower detail. *Scoparia montevidensis*. C. Habit. D. Flower detail. *Stemodia diplohyptoides*. E. Habit. *Stemodia hyptoides*. F. Habit. *Stemodia stricta*. G. Habit. *Stemodia verticillata*. H. Habit.

Capítulo 2. Taxonomic Synopsis for the Bignoniaceae of the Iguazu and Iguaçu National Parks (Brazil and Argentina)

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Abstract

The Iguazu region, where the Iguaçu National Park (Brazil) and the Iguazu National Park (Argentina) are located, is an example of a region that remains poorly known botanically. Even though the Bignoniaceae is an important component of the flora of this region, few floristic treatments are available for this plant family for the Southern Cone, a region encompassing Chile, Argentina, Uruguay, Paraguay, and Southern Brazil. Here, we provide a floristic account for the Bignoniaceae from the Iguazu and Iguaçu National Parks, including identification keys, photographs, illustrations, comments on the distribution, habitat, and phenology. A total of 29 species and 13 genera of Bignoniaceae were documented. Of these, *Dolichandra* and *Fridericia* are richest genera in the region, with five species each, followed by *Adenocalymma*, *Handroanthus*, and *Jacaranda* with three species each, and *Amphilophium* and *Bignonia* with two species each. Six genera, i.e., *Mansoa*, *Podranea*, *Pyrostegia*, *Tabebuia*, *Tanaecium*, and *Tynanthus*, are represented by a single species. *Fridericia triplinervia* is here documented for the first time for the Iguazu region. Our findings expand the knowledge about the flora of the Southern Cone, contributing important information for the establishment of biodiversity management plans and conservation priorities.

Key Words: *Dolichandra*, *Fridericia*, Iguaçu Region, Neotropical Flora, Southern Cone, taxonomy.

Introduction

The Bignoniaceae is a monophyletic family that comprises lianas, trees, shrubs, and herbs (Spangler & Olmstead 1999; Olmstead *et al.* 2009). It is characterized by opposite and compound leaves, pentamerous tubular corollas, androecium with four didynamous stamens and one staminode, and capsular fruits bearing winged seeds (Fosberg *et al.* 1993; Fisher *et al.* 2004). This plant family is Pan-tropical and includes around 80 genera and 840 species (Lohmann & Ulloa Ulloa 2020), of which ca. 600 species are Neotropical (Gentry 1980). In Argentina, around 57 species and 21 genera occur (Arbo 1999), while 391 species and 32 genera are known from Brazil (Lohmann 2010). In total, 119 species and 28 genera have been documented for the Southern Cone region (Arbo & Lohmann 2008).

Six monophyletic tribes, namely, Bignonieae Dumortier (1829), Catalpeae De Candolle ex Meisner in Meisner (1837: 300), Jacarandae Seemann (1862: 31), Oroxyleae Gentry ex Reveal & Lohmann (2012: 218), Tecomeae Endlicher (1839: 711), and Tourrettieae Don (1837: 215), and two informally named clades (Tabebuia alliance and Paleotropical clade) are currently recognized in the family (Olmstead *et al.* 2009), four of which are Neotropical (Bignonieae, Jacarandae, Tecomeae, and Tabebuia alliance). The tribe Bignonieae comprises ca. 400 species and 20 genera of lianas and shrubs (Lohmann & Taylor 2014; Fonseca & Lohmann 2019) representing the largest Bignoniaceae clade. The tribe is centered in Brazil, consisting on the largest clade of lianas in Brazilian forests and one of the most important clades of lianas in South America (Gentry 1980; Silva & Queiroz 2003). The Tabebuia alliance is restricted to the Neotropics and includes 14 genera and 147 species, representing the second largest clade in the family. It includes large trees such as *Handroanthus* Mattos (1970: 1) and *Tabebuia* Gomes ex De Candolle in De Candolle (1838: 130) (Olmstead *et al.* 2009). Tribe Jacarandae includes *Jacaranda* Jussieu (1789: 138), with 52 species (Ragsac 2019), 38 of which occur in Brazil (Lohmann 2010).

Even though the Bignoniaceae is an important component of Neotropical forests and centered in Brazil (Gentry 1980), few floristic inventories and taxonomic treatments are available for the Southern Cone. The state of Paraná includes 5,891 species (Giulietti *et al.* 2005; BFG 2015, 2018; S.I.B 2020) while the province of Misiones includes 3,418 species (Zanotti *et al.* 2020), contributing to the species diversity of the Southern Cone region. Even though the Iguazu and Iguazu National Parks are among the most species rich areas within the Southern Cone, these National Parks remain poorly studied botanically. Focused surveys have tackled the following plant families: Rubiaceae (Toderke 2015), Orchidaceae (Boff 2016), Acanthaceae (Hammes *et al.* in press), Verbenaceae

(Hammes 2017), Cyperaceae and Poaceae (Jesus 2017), and Leguminosae (Rauber *et al.*, in press). A floristic survey encompassing all angiosperms has also been conducted (Trochez 2017).

Here, we present a floristic account for the Bignoniaceae from the Iguaçu and Iguazu National Parks, including identification keys, photographs, and illustrations of the species collected, as well as comments on the distribution, habitat, and phenology.

Material and Methods

The Iguaçu and Iguazu National Parks are located within the Atlantic Rainforest, within the Upper Paraná Forest which includes 471,204 km² and extends from the Serra do Mar in Brazil to the eastern portions of Paraguay and the Province of Misiones in Argentina (Di Bitetti *et al.* 2003). Despite the high fragmentation levels of this region, this area includes the highest number of protected forest remnants within the Iguazu region. The Iguazu climate is categorized as Cfa (wet subtropical climate) under the Köppen classification (Peel *et al.* 2007), a transition between tropical and temperate climates, with hot summers, lack of dry seasons, and a few frosts (Alvares *et al.* 2013).

The Iguaçu National Park (ParNa Iguaçu) is a conservation unit (25°05'–25°41'S, 53°40'–54°38'W) located within the state of Paraná, Brazil. The Park has 185,262.5 hectares in length and a perimeter of 420km, of which 300km include pristine vegetation. The ParNa Iguaçu includes Seasonal Semideciduous Forest and Mixed Ombrophilous Forest with *Araucaria angustifolia* (Bertoloni 1819: 411) Kuntze (1898: 375), representing the largest remnant of Atlantic Forest in Brazil (IBAMA 1999). The Mixed Ombrophilous Forests are mostly composed of montane vegetation growing in areas above 500m. The Seasonal Semideciduous Forest is found in Submontane formations growing in areas up to 500m, representing the most common vegetation type within the Park. Montane vegetation is also found at altitudes above 500m, intermingled with Mixed Ombrophilous Forests (IBAMA 1999).

The Iguazu National Park (ParNa Iguazu), on the other hand, is located at the northern portion of the province of Misiones between 25°31'–25°43'S, 54°08'–54°32'W). This National Park was established in 1934 and includes 67,620 hectares divided into a National Reserve (in Puerto Iguazu) and the National Park itself (SIB 2020). The Park is composed of a Seasonal Semideciduous Forest vegetation, known as “Selva Paranaense” or Interior Atlantic Forest (Di Bitetti *et al.* 2003). Misiones is the most preserved province, with 40% of its original forest cover (SIB 2020).

For this study, we divided our focal study site into five main areas, as follows: (i) Céu Azul, (ii) Matelândia/Serranópolis do Iguaçu, (iii) Capanema, (iv) Foz do Iguaçu, and the (v) Iguazu National Park (Argentina) (Fig. 1). A brief description of each of these areas, including a description of the reasoning behind this division is presented below:

(i) *Céu Azul*. This area includes the cities of Céu Azul, Santa Tereza do Oeste, and Lindoeste. This area is covered by Montane Seasonal Semideciduous Forest and Montane Mixed Ombrophilous Forest. Sampling of this region was conducted throughout the Park borders along the BR—277 road and along 17 km of extension of the following Park trails: Rio Butu, Nascentes do Rio Gonçalves Dias, Araucárias, Cachoeira rio Azul, Manoel Gomes, and Cachoeira Jacutinga (Fig. 1 A—F).

(ii) *Matelândia/Serranópolis*. This area encompasses the “Trail Benjamin” located along the Park borders through the rural areas of Matelândia and Serranópolis, as well as 17,5 km of the “Colono Road.” This area is composed of Montane Seasonal Semideciduous and Submontane Seasonal Semideciduous Forests (Fig. 1 G).

(iii) *Capanema*. This area is located in the Southern portions of the Iguaçu Park and predominantly covered by Submontane Seasonal Semideciduous Forest, with altitudes ranging between 150 to 250 meters. Collections in this area were conducted through the banks of the Iguaçu River using a motorboat (Fig. 1 H—J).

(iv) *Foz do Iguaçu*. This area is characterized by Submontane Seasonal Semideciduous Forest growing between 100 and 270 m. Sampling in this area was conducted through 19 km of following forest trails: Linha Martins, Poço Preto, Represa São João, Antiga Usina, Macuco Safari, Bananeiras, and Cataratas. The forest borders surrounding the BR—469 road and the tourist trails were also explored (Fig. 1 K—R).

(v) *Iguazu National Park*. This area includes Submontane Seasonal Semideciduous Forests (Selva Paranaense). No field work was conducted in this region, but samples of the Iguazu ParNa deposited at the CTES Herbarium, Argentina, were studied instead (Fig. 1).

Monthly visits to the Iguaçu National Park were carried out between April 2018 and February 2020, during which time Bignoniaceae specimens were collected and incorporated into the UNOP and EVB herbaria following Bridson & Forman (2004). Species were identified through the study of herbarium specimens deposited at the CTES, EVB, HCF, MBM, PUC-PR, UNOP, and UPCB herbaria (Thiers B. [continuously updated]) and the following literature: Barroso *et al.* (1991), Gentry & Morawetz (1992), Batalha & Mantovani (1999), Silva & Queiroz (2003), Scudeller

(2004), Pereira & Mansano (2008), Araújo (2008), Udulutsch (2010), Rodrigues (2012), Lohmann & Taylor (2014), Zuntini *et al.* (2015), Fonseca *et al.* (2017), Fonseca & Lohmann (2019), Kaehler *et al.* (2019), Frazão & Lohmann (2019), and Reiche *et al.* (2020).

Species phenology was determined by the collection dates of fertile specimens deposited at herbaria and images of specimens deposited at the SpeciesLink. Species phenology was categorized using three main phenological types proposed by Gentry (1974): (i) Cornucopia (Type 3), whenever individuals produce a large number of flowers during a few weeks; (ii) Big Bang (Type 4), whenever individuals bloom for a few days during the dry season; and, (iii) Multiple Bang (Type 5), whenever individuals produced flowers throughout the year. Conservation status was assessed using distribution data and the GeoCAT Tool (Bachman *et al.* 2011). Extent of occurrence (EOO) was used to categorize species. Species diagnostic features, an identification key, photos, illustrations, and a list of materials examined are also provided.

Results

The Bignoniaceae is represented by 29 species in the Iguaçu and Iguazu National Parks. Of these, 27 species are native and two are exotic [*Jacaranda mimosifolia* Don in Ker Gawler (1822: 631) and *Podranea ricasoliana* (Tanfani 1887: 17) Sprague in Dyer (1904: 449)]. These species are distributed among 13 genera: *Adenocalymma* Martius ex Meisner (1840: 300) emend Lohmann in Lohmann & Taylor (2014: 382) (4), *Amphilophium* (Kunth 1818: 451) emend Lohmann in Lohmann & Taylor (2014: 399) (2), *Bignonia* Linnaeus (1753: 622) (2), *Dolichandra* Chamisso (1832: 657) emend Lohmann in Lohmann & Taylor (2014: 428) (5), *Fridericia* (Martius 1827: 7) emend Lohmann in Lohmann & Taylor (2014: 431) (4), *Handroanthus* Mattos (1970: 2) (3), *Jacaranda* Jussieu (1789: 138) (3), *Mansoa* De Candolle (1838: 128) (1), *Podranea* Sprague in Dyer (1904: 449) (1), *Pyrostegia* Presl (1845: 523) (1), *Tabebuia* Gomes ex de Candolle (1838: 130) (1), *Tanaecium* Swart (1788: 91) emend Lohmann in Lohmann & Taylor (2014: 463) (2), and *Tynanthus* Miers (1863: 193) (1).

Key to the species of Bignoniaceae Juss. from the Iguazu and Iguaçu National Parks

1. Lianas ... 2
- Trees (Tribe Jacarandae and Tabebuia Alliance) ... 23

2. Leaves bi-trifoliolate, with terminal leaflet modified into a tendril (Tribe Bignonieae) ... 3
 - Leaves imparipinnate, without tendrils (Tribe Tecomeae) ... *Podranea ricasoliana**
3. Tendrils simple ... 4
 - Tendrils bifid or trifid ... 14
4. Petiole and petiolules articulated; corolla yellow; calyx with cupular glands ... 5
 - Petiole and petiolules not articulated; corolla lilac, white, magenta, pink, purple, or red; calyx without cupular glands ... 7
5. Dry leaflets dark bronze abaxially, with hyalin margins; corolla 6 cm or larger ... *Adenocalymma marginatum*
 - Dry leaflets green abaxially, without hyalin margins; corolla smaller than 6 cm ... 6
6. Stem densely lenticellated; prophylls of the axillary buds triangular; calyx with glands arranged in lines; filaments inserted ... *Adenocalymma bracteatum*
 - Stem not densely lenticellated; prophylls of the axillary buds curved; calyx with glands arranged sparsely; filaments sub-exserted ... *Adenocalymma paulistarum*
7. Corolla lilac; nectar disk lacking or poorly developed ... 8
 - Corolla white, pink or red; nectar disk well-developed ... 9
8. Stems cylindrical, not winged, with interpetiolar ridge; inflorescences racemose; fruit with spines smaller than 0,6 cm ... *Bignonia binata*
 - Stems quadrangular, winged, without interpetiolar ridge; inflorescences thyrsoid; fruit with spines larger than 1 cm ... *Bignonia sciuripabulum*
9. Corolla white ... *Fridericia florida*
 - Corolla pink, purple, or red ... 10
10. Corolla pink, shorter than 3 cm ... 11
 - Corolla purple or red, 3 cm or larger ... 12
11. Leaflets reddish when dry ... *Fridericia chica*
 - Leaflets green when dry ... 13
12. Domatia on the vein axils side of leaflets abaxially; calyx tubular; corolla puberulous ...
Fridericia triplinervia

- Domatia absent; calyx campanulate; corolla glabrous, lobes velutine ... *Fridericia samydoides*

13. Stems without interpetiolar glandular fields; leaflets elliptic ... *Tanaecium selloi*

- Stems with interpetiolar glandular fields (sometimes lacking on young branches); leaflets ovate ...
Fridericia mutabilis

14. Tendrils uncinata ... 15

- Tendrils not uncinata ... 19

15. Prophylls of the axillary buds ovate; calyx campanulate ... *Dolichandra unguis-cati*

- Prophylls of the axillary buds lanceolate; calyx not campanulate ... 16

16. Leaflets with margins serrate ... *Dolichandra dentata*

- Leaflets with margins smooth ... 17

17. Corolla orange or red; anthers and stigma exserted ... *Dolichandra cynanchooides*

- Corolla yellow; anthers and stigma inserted ... 18

18. Stems glabrous to puberulous; fruit oblong, 4-parted ... *Dolichandra quadrivalvis*

- Stems hispid; fruit linear, 2-parted ... *Dolichandra hispida*

19. - Corolla lilac, white or yellow; anthers and stigma inserted ... 20

- Corolla orange; anthers and stigma exserted ... *Pyrostegia venusta*

20. Calyx and corolla coriaceous ... 21

- Calyx and corolla membranaceous ... 22

21. Leaflets with base cordate, obtuse or truncate; corolla white or yellow, curved, open at anthesis; fruit echinate ... *Amphilophium crucigerum*

- Leaflets with base acute; corolla lilac, not curved, curved at anthesis; fruit surface smooth ...
Amphilophium paniculatum

22. Corolla lilac ... *Mansoa difficilis*

- Corolla white ... *Tynanthus micranthus*

23. Leaves bi-pinnate; staminode glandular, larger than stamens (Tribe Jacarandae) ... 24

- Leaves digitate or tri-foliolate; staminode glabrous, shorter than the stamens (Tabebuia Alliance) ...

24. Leaves with 12 pinna or more ... *Jacaranda mimosifolia**
 - Leaves with less than 12 pinna ...
25. Leaves with 7 to 9 pinna, leaflet margins entire or wavy ... *Jacaranda micranta*
 - Leaves with 4 to 6 pinna, leaflet margins serrate ... *Jacaranda puberula*
26. Corolla pinkish-white ... *Tabebuia roseoalba*
 - Corolla lilac or yellow ... 27
27. Leaflet margins entire; corolla lilac ... *Handroanthus impetiginosus*
 - Leaflet margins serrate; corolla yellow ... 28
28. Leaflets discolorous, whitish abaxially ... *Handroanthus albus*
 - Leaflets concolorous ... *Handroanthus chrysotrichus*

1. *Adenocalymma* Martius ex Meisner (1840: 300) emend Lohmann in Lohmann & Taylor (2014: 382).

1.1. *Adenocalymma bracteatum* (Chamisso 1832: 692) de Candolle (1845: 200) (Fig. 2 A—B).

Distribution and Habitat:— It occurs in Bolivia (Santa Cruz), Brazil (Bahia, Espírito Santo, Rio de Janeiro, Mato Grosso do Sul, Minas Gerais, Paraná, and São Paulo), Paraguay, and Peru, especially in Ombrophilous and Semideciduous Atlantic Forest (Lohmann 2010; Lohmann & Taylor 2014; Fonseca & Lohmann 2019). It is found occasionally in riparian forests (Scudeller 2004). Within the study area, it was collected in Foz do Iguaçu and Céu Azul.

Phenology:— Multiple Bang (Type 5). Flowers were collected in August and September.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 7,158,275.944 km² and the estimated area of occupancy is 492.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Adenocalymma bracteatum* can be identified by the densely lenticellated stems, pubescent leaves, and calyx with cupular trichomes arranged in lines. It differs from *A. marginatum* by the smooth leaflet margins (vs. coriaceous margins). It can be distinguished from *A.*

paulistarum by the inserted filaments (vs. sub-exserted) and prophylls of the axillary buds straight (vs. prophylls curved).

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, Trilha do Poço Preto, 03 September 2015, *Siqueira, E.L. 1603* (HCF!); Capanema, Rio Floriano, 04 August 2007, *Temponi, L.G. 467* (UNOP!); Céu Azul, Beira do Rio Floriano, 08 September 1998, *Ziller, S.R. 1679* (MBM!, UCS!).

1.2. *Adenocalymma marginatum* (Chamisso 1832: 695) de Candolle (1845: 200). (Fig. 4 A—B).

Distribution and Habitat:— It occurs in Argentina (Corrientes, Entre Rios, and Misiones), Brazil (Bahia, Espírito Santo, Minas Gerais, Paraná, Rio Grande do Sul, Rio de Janeiro, Santa Catarina, and São Paulo), Paraguay, and Uruguay (Lohmann 2010; Lohmann & Taylor 2014). Within the study area, it was found in Céu Azul, Matelândia/Serranópolis, Capanema, Foz do Iguaçu, and the Iguazu National Park.

Phenology:— Multiple Bang (Type 5). Flowers were collected throughout the year (January, February, March, May, June, August, October, November, and December).

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 2,305,321.993 km² and the estimated area of occupancy is 1,024.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Adenocalymma marginatum* can be identified by the chartaceous leaflets with coriaceous margins, turning olive when dried, by the congested racemes, with reduced bracts. It differs from *A. bracteatum* and *A. paulistarum* by the ovate and straight prophylls of the axillary buds (vs. triangular and curved prophylls, respectively).

Selected Specimens Examined:— **ARGENTINA.** Misiones: Puerto Iguazú, camino a garganta del diablo, 25°42'11''S, 54°26'31''W, 10 March 2009, *González, A.M. 219* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, margem da BR-469, 25°40'46.7"S, 54°26'18.4"W, 22 May 2015, *Caxambu, M.G. 6451* (HCF!); Capanema, margens do Rio Iguaçu, 22 February 2016, *Hammes, J.K. 87* (UNOP!); Céu Azul, próximo à Trilha da Jacutinga, 25°14'27.8"S, 53°51'27.9"W, 24 May 2018, *Hentz Júnior, E.J. 30* (UNOP!).

1.3. *Adenocalymma paulistarum* Bureau ex Schumann in Engler (1894: 214). (Figs. 2 C, 4 F).

Distribution and Habitat: It occurs in Argentina (Misiones), Brazil (Minas Gerais, São Paulo, Paraná, and Santa Catarina), and Paraguay (Lohmann 2010; Fonseca & Lohmann 2019). Within the study area, it was found in Foz do Iguaçu and Céu Azul.

Phenology:— Multiple Bang (Type 5). Flowers were collected in June and October.

Conservation:— Native. This species has been categorized as LC [Least Concern] CNCFlora (2020).

Taxonomic Notes:— *Adenocalymma paulistarum* can be identified by the curved prophylls (vs. straight prophylls in *A. bracteatum* and *A. marginatum*), filaments and stigma exerted or sub-exserted (vs. inserted).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, Camping Nandu, 20 September 1995, *Herrera, J & Malmierca, L. 82* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, Trilha do Poço Preto, 07 October 2007, *Temponi, L.G. 494* (UNOP!); Matelândia, borda do Parque, 25°21'42.7"S 53°52'24.7"W, 339m, 13 October 2016, *Caxambu, M.G. 7594* (HCF!; UEC).

2. *Amphilophium* (Kunth 1818: 451) emend Lohmann in Lohmann & Taylor (2014: 399).

2.1. *Amphilophium crucigerum* (Linnaeus 1753: 624) Lohmann in Hokche *et al.* (2008: 270) (Figs. 2 D—E, 4 D—E).

Distribution and Habitat:— It occurs from Mexico to western South America (Peru, Bolivia, and northern Argentina), and eastern South America (throughout Brazil, Argentina, and Uruguay), where it grows between 0–1900m elevation. In Brazil it occurs in Acre, Amazonas, Bahia, Ceará, Espírito Santo, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Piauí, Rio de Janeiro, São Paulo, and Rio Grande do Sul (Pool 2007; Lohmann 2010; Lohmann & Taylor, 2014). Within the study area, it was found in Foz do Iguaçu and Céu Azul.

Phenology:— Multiple Bang (Type 5). Flowers were collected in November and fruits in May.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of

occurrence is 17,891,959.508 km² and the estimated area of occupancy is 1,108.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Amphilophium crucigerum* can be recognized by the smooth calyx (vs. undulated in *A. paniculatum*), and the strongly curved corolla (vs. straight in *A. paniculatum*).

Selected Specimens Examined:— **ARGENTINA. Misiones:** Puerto Iguazú, sendero Macuco, 25 November 2003, *Cocucci, A.A. et al.* 3224 (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguazu: Céu Azul, próximo à Trilha da Jacutinga, 25°14'27.8"S, 53°51'27.9"W, 24 May 2018, *Hentz Junior, E.J.* 28 (UNOP!); Foz do Iguazu, ponto de ônibus Macuco Safari, 16 January 2019, *Hentz Júnior, E.J.* 67 (UNOP!).

2.2. *Amphilophium paniculatum* (Linnaeus 1753: 623) Kunth in Von Humboldt *et al.* (1819: 148). (Fig. 2 F—G, 4 F).

Distribution and Habitat: Widely distributed from Mexico to Central and South America. It occurs in all Brazilian states (Lohmann 2010). Within the study area, it was found growing in Atlantic Forest formation in Céu Azul.

Phenology:— Multiple Bang (Type 5). Flowers were collected in December.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 16,025,302.466 km² and the estimated area of occupancy is 1,136.000 km² (cell width of 2 km). Population data is not available for this taxon.

Taxonomic Notes:— *Amphilophium paniculatum* can be differentiated by the undulated calyx (vs. smooth in *A. crucigerum*), and the white or yellow corollas (vs. lilac corollas in *A. crucigerum*).

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguazu: Céu Azul, borda do Parque, 25°11'00.3"S, 53°52'19.4"W, 10 December 2015, Caxambu, M.G. 7112 (HCF!); Matelândia, borda do Parque, 12 December 2019, *Hentz Júnior, E.J.* 168 (EVB).

3. *Bignonia* Linnaeus (1753: 622).

3.1. *Bignonia binata* Thunberg (1821: 35) (Figs. 3 A, 4 G).

Distribution and Habitat:— It occurs from Mexico to Central and South America. In Argentina it occurs in the provinces of Chacho, Corrientes, Misiones, and Salta. In Brazil it occurs in Amapá, Amazonas, Bahia, Ceará, Espírito Santo, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondônia, Roraima, Santa Catarina, and São Paulo (Lohmann 2010; Lohmann & Taylor 2014; Zuntini *et al.* 2015). Within the study area, it was found in Céu Azul.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in February, October, November, and December.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 11,980,987.270 km² and the estimated area of occupancy is 356.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Bignonia binata* can be differentiated by the cylindrical and smooth stems (vs. tetragonal and winged in *B. sciuripabulum*).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, islãs del paseo superior, 29 February 1996, *Vanni, R. et al.* 3535 (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, margem do Rio Iguaçú, 08 December 1966, *Lindeman, J.C.* 3481 (US, SPF); Céu Azul, trilha de Educação Ambiental, 07 November 2019, *Ribeiro, H.* 06 (EVB!); Foz do Iguaçu, Trilha do Poço Preto, 03 October 2006, *Labiak, P.H.* 3837 (SPF, MBM, UPCB!).

3.2. *Bignonia sciuripabulum* (Schumann 1894: 224) Lohmann in Hokche *et al.* (2008: 272) (Figs. 3 B, 4 H).

Distribution and Habitat:— It occurs in Argentina (Misiones), Brazil (Amazonas, Pará, Tocantins, Alagoas, Bahia, Maranhão, Piauí, Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul), Bolivia, Colombia, Ecuador, Guyana, Paraguay, Peru, and Venezuela (Lohmann 2010; Lohmann & Taylor 2014; Zuntini *et al.* 2015). Within the study area, it was collected in all areas.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in January, February, April, August, September, October, and November,

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 11,898,571.680 km² and the estimated area of occupancy is 620.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Bignonia sciuripabulum* can be differentiated by the tetragonal and winged stems (vs. cylindrical and not winged in *B. binata*).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, Sendero Yacaratia, 30 October 1995, *Herrera, J. 100* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, 25°37'18.3"S, 54°26'45.9"W, 11 October 2009, *Temponi, L.G. 672* (UNOP!); Céu Azul, estrada entre Céu Azul e Matelândia, 25°12'21.0"S, 53°51'57.8"W, 21 August 2015, *Caxambu, M. 6821* (HCF!, MBM!); Capanema, margens do Rio Iguaçu, 23 February 2016, *Hammes, J.K. 98* (UNOP!).

4. *Dolichandra* Chamisso (1832: 657) emend Lohmann in Lohmann & Taylor (2014: 428).

4.1. *Dolichandra cynanchoides* (Chamisso 1832: 658). (Fig. 3 C).

Distribution and Habitat:— It occurs in Argentina, Brazil (Paraná, Santa Catarina, and Rio Grande do Sul), Bolivia, Paraguay, and Uruguay. Cultivated worldwide (Lohmann 2010; Lohmann & Taylor 2014; Fonseca *et al.* 2017). Within the study area, it was found in Foz do Iguaçu, Lindoeste, and Capanema.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in December and February.

Conservation:— Native. This species has been categorized as LC [Least Concern] (Fonseca *et al.* 2017, following the IUCN criteria).

Taxonomic Notes:— *Dolichandra cynanchoides* is easily recognized by the reflexed corolla lobes, the large anthers (4,3–5,4 mm), and stipitate ovary.

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, al este de Garganta del Diablo, 25°42'11,"S, 54°25'34''W, 19 May 2009, *Keller H.A. & Gatti F.E. 7083* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, 08 December 1966, *Lindeman, J.C. et al. 3476* (MBM!, U); Capanema, 08 December 1966, *Lindeman, J.C. 3478* (MO, US); Lindoeste, cachoeirra, 13 February 2020, 25°21'33.8"S, 53°39'26.4"W, *Caxambu, M. 9114* (HCF).

4.2. *Dolichandra dentata* (Schumann 1894: 227) L.G. Lohmann in Lohmann & Taylor (2014: 430) (Figs. 3 D—E).

Distribution and Habitat:— It occurs in Argentina (Corrientes, Misiones, and Santa Fé), Brazil (Paraná, Santa Catarina, and Rio Grande do Sul), Paraguay, and Uruguay (Lohmann 2010; Lohmann & Taylor 2014; Fonseca *et al.* 2017). Within the study area, it was found in Capanema.

Phenology:— Not enough data to establish the phenological type. Flowers were collected in October.

Conservation:— Native. This species has been categorized as LC [Least Concern] (Fonseca *et al.* 2017, following the IUCN criteria).

Taxonomic Notes:— *Dolichandra dentata* can be distinguished by the serrated leaflet margins (vs. entire margin in other *Dolichandra* species).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 19 December 1980, *Cusato L. 461* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguazú: Capanema, 25°32'24.1"S, 53°47'59.0"W, 30 October 2015, *Caxambu, M.G. 7091* (HCF!).

4.3. *Dolichandra hispida* (Candolle 1845: 205) Fonseca & Lohmann (2015: 35) (Fig. 3 F—G).

Distribution and Habitat:— It occurs in Argentina (Misiones and Santa Fé), Brazil (Mato Grosso do Sul, Mato Grosso, Minas Gerais, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul) and Paraguay (Fonseca *et al.* 2017). Within the study area, it was found in Céu Azul and Capanema.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in August, September, and October.

Conservation:— Native. This species has been categorized as LC [Least Concern] (Fonseca *et al.* 2017, following the IUCN criteria).

Taxonomic Notes:— *Dolichandra hispida* can be easily recognized by the purple ovary (vs. green in other *Dolichandra* species) and the calyx with curved apices (vs. not curved in *D. quadrivalvis*).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, Ruta Nacional 101, 5 March 1995, *Zuloaga, F.O. et al. 5296* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguazú: Céu Azul, Trilha Cachoeira do Rio Azul, 14 September 2015, *Hammes,*

J.K. 65 (UNOP!). Serranópolis do Iguaçu, Área de Capanema, 25°34'08.7"S, 53°56'38.4"W, 29 October 2015, *Caxambu, M. 7042* (HCF!, SPF).

4.4. *Dolichandra quadrivalvis* (Jacquin 1809: 37) Lohmann (2008: 273) (Fig. 5 A—B).

Distribution and Habitat:— It occurs from México to Uruguay, and throughout Brazil (Lohmann 2010; Lohmann & Taylor 2014; Fonseca *et al.* 2017). Within the study area, it was found in Céu Azul and Capanema.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in May and August.

Conservation:— Native. This species has been categorized as LC [Least Concern] (Fonseca *et al.* 2017, following the IUCN criteria).

Taxonomic Notes:— *Dolichandra quadrivalvis* can be differentiated by the oblong fruit (vs. linear in all other *Dolichandra*).

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, margem do Rio Iguaçu, 25°34'25.9"S, 54°03'29.9"W, 03 March 2019, *Rauber, C.R. 375* (UNOP!); Céu Azul, borda do Parque, 25°12'26.1"S, 53°51'57.7"W, 21 August 2015, *Caxambu, M.G. 6813* (HCF!, MBM!, DVPR).

4.5. *Dolichandra unguis-cati* (Linneaus 1753: 623) Lohmann (2008: 273) (Fig. 5 C—D).

Distribution and Habitat:— It occurs from México to Uruguay between sea level to 2100 m alt., usually in dry forests. In Brazil it occurs in all states (Lohmann 2010; Lohmann & Taylor 2014; Fonseca *et al.* 2017). Within the study area, it was found in Foz do Iguaçu and Céu Azul.

Phenology:— Type 5 (Multiple Bang). Flowers were collected throughout the year (January, February, March, August, September, October, and November).

Conservation:— Native. This species has been categorized as LC [Least Concern] (Fonseca *et al.* 2017, following the IUCN criteria).

Taxonomic Notes:— *Dolichandra unguis-cati* is characterized by the ovate prophylls of the axillary buds and calyx campanulate.

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 23 February 1996, *Herrera J. 150* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu:

Céu Azul, borda do Parque, 25°12'23.0"S, 53°51'57.6"W, 21 August 2015, *Caxambu, M.G. 6812* (UNOP!, MBM!, HCF); Foz do Iguaçu, Trilha da Represa, 25°40'58.0"S, 54°26'09.0"W, 16 January 2019, *Hentz Júnior, E.J. 68* (UNOP!); Matelândia, borda do Parque, 13 November 2015, *Siqueira, E.L. 1838* (HCF!).

5. *Fridericia* (Martius 1827: 7) emend Lohmann in Lohmann & Taylor (2014: 431). (2014: 431).

5.1. *Fridericia chica* (Bonpland 1808: 107) Lohmann in Lohmann & Taylor (2014: 434) (Fig. 6 A).

Distribution and Habitat:— It is broadly distributed throughout Central and South America. In Brazil it occurs in all states (Lohmann 2010; Lohmann & Taylor 2014). Within the study area, it was found in Foz do Iguaçu and Céu Azul.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in January, February, March, October, and November.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 13,601,622.311 km² and the estimated area of occupancy is 1,424.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Fridericia chica* can be easily recognized by the reddish dry leaflets (vs. green dry leaflets in other *Fridericia* species).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 24 February 2001, *Vanni, B. et al. 4536* (CTES!); Puerto Iguazú, 10 March 2009, *González, A.M. 217* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, cercanias da BR-277, 25°09'28.9"S, 53°51'02.8"W, 12 November 2015, *Siqueira, E.L. 1781* (DVPR, HCF!); Foz do Iguaçu, borda BR-469, 26 October 2018, *Hentz Junior, E.J. 58* (UNOP!); Serranópolis do Iguaçu, 13 October 2016, *Caxambu, M.G. 7620* (EVB!, HCF!, UEC).

5.2. *Fridericia florida* (de Candolle 1845: 184) Lohmann in Lohmann & Taylor (2014: 438) (Fig. 6 B—C).

Distribution and Habitat:— It occurs throughout Latin America. In Brazil it occurs in Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins, Bahia, Maranhão, Piauí, Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso, Espírito Santo, Minas Gerais, São Paulo, and Paraná

(Lohmann 2010; Lohmann & Taylor 2014). Within the study area, it was found in Céu Azul, Matelândia/Serranópolis, Capanema, Foz do Iguaçu, and the Iguazu National Park.

Phenology:— Type 5 (Multiple Bang). Flowers were collected throughout the year (January, February, April, June, September, and October).

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 12,070,809.774 km² and the estimated area of occupancy is 1,420.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Fridericia florida* can be recognized by the white corolla (vs. pink corolla in *F. chica*, *F. mutabilis*, and *T. selloi*; red in *F. samydoides*; purple in *F. triplinervia*).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 4 February 1996, *Herrera, J. et al. 141* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, margens do Rio Iguaçu, 22 February 2016, *Hammes, J.K. 88* (UNOP!); Céu Azul, estrada de chão entre Céu Azul – Serranópolis, 25°12'33.3"S, 53°52'14.0"W, 01 October 2015, *Caxambu, M.G 6909* (MBM!); Foz do Iguaçu, 25°38'33.0"S, 54°26'26.6"W, 04 June 2005, *Caxambu, M.G 6490* (DVPR, HCF!, MBM!).

5.3. *Fridericia mutabilis* (Bureau & Schumann 1896: 38) Frazão & Lohmann (2020: 296) (Fig. 6 C).

Distribution and Habitat:— It occurs in Argentina (Corrientes, Misiones, and Salta), Bolivia, Brazil (Minas Gerais, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul), and Paraguay (Lohmann 2010; Lohmann & Taylor 2014). Within the study area, it was found in Céu Azul and Foz do Iguaçu.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in February, April, September, and October.

Conservation:— Native. This species conservation status was not evaluated (NE).

Taxonomic Notes:— *Fridericia mutabilis* shares pink corollas with *Fridericia chica*, but can be differentiated by the membranaceous calyces (vs. chartaceous in *F. chica*) and leaflets drying green (vs. leaflets drying red).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 14 December 2010, *González, A.M. et al.* 424 (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, Trilha Manoel Gomes, 01 October 2015, *Hammes, J.K.* 69 (UNOP!); Foz do Iguaçu, Trilha Poço Preto, 25°37'18.3"S, 54°26'45.9"W, 11 October 2009, *Temponi, L.G.* 646 (UNOP!). Serranópolis do Iguaçu, 21 September 2017, *Siqueira, E.L.* 2320 (HCF!).

5.4. *Fridericia samydoides* (Chamisso 1832: 669) Lohmann in Lohmann & Taylor (2014: 444) (Fig. 6 E).

Distribution and Habitat:— It occurs in Argentina (Misiones), Brazil (Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, and Paraná), and Paraguay (Lohmann 2010; Lohmann & Taylor 2014). Within the study area, it was found in Céu Azul.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in January, November, and December.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 969,824.736 km² and the estimated area of occupancy is 396.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Fridericia samydoides* can be easily recognized by the red corolla (vs. pink and purple in other *Fridericia* species).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 29 February 1996, *Vanni, R. et al.* 3538 (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, 25°03'40.8"S, 53°38'51.8"W, 11 December 2015, *Caxambu, M.G.* 7136 (HCF!, MBM!); Santa Tereza do Oeste, 25°03'25.7"S, 53°38'28.4"W, 30 January 2019, *Rauber, C.R.* 308 (UNOP!).

5.5. *Fridericia triplinervia* (Martius & de Candolle 1845:153) Lohmann in Lohmann & Taylor (2014: 446). (Fig. 5 E—F, 6 F).

Distribution and Habitat:— It occurs in Argentina (Misiones), Bolivia, Brazil (all states), and Paraguay (Lohmann 2010; Lohmann & Taylor 2014). Within the study area, it was found in Céu Azul.

Phenology:— Not sufficient data to classify this species within a phenological type. Flowers were collected in February.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 6,147,031.564 km² and the estimated area of occupancy is 532.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Fridericia triplinervia* can be recognized by the marsupiform domatia on the abaxial side of leaflets adaxially, and by the tubular calyx (vs. campanulate in *F. florida*, *F. mutabilis*, and *F. samydoides*; cupular in *F. chica*).

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 29 September 2008, *Keller, H.A & Gatti, F.E. 6127* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Matelândia, borda do Parque, 20 February 2020, *Hentz Júnior, E.J. 190* (EVB!).

6. *Handroanthus* Mattos (1970: 2).

6.1. *Handroanthus albus* (Chamisso 1832: 655) Mattos (1970: 1) (Figs. 7 A—B, 8 A).

Distribution and Habitat:— It occurs in Argentina (Misiones), and Brazil (Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul (Gentry 1992; Lohmann 2010). In the study area, it was found in Céu Azul and Foz do Iguaçu.

Phenology:— Type 3 (Cornucopia). Flowers were collected in August, September, and December.

Conservation:— Native. This species has been categorized as LC [Least Concern] CNCFlora (2020).

Taxonomic Notes:— *Handroanthus albus* can be recognized by the leaflets serrated margins and the strongly discolored abaxially.

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, borda BR-277, 25°04'28.2"S, 53°40'45.5"W, 25 August 2016, *Caxambu, M.G. 7470* (HCF!,UFMT,UNOP!); Foz do Iguaçu, entrada do Parque, 25°36'55.9"S, 54°28'43.0"W, 14 September 2018, *Hentz Junior, E. J. 38* (UNOP!).

6.2. *Handroanthus chrysotrichus* (Martius ex De Candolle 1845: 216) Mattos (1970: 1) (Figs. 7 C, 8 B—C).

Distribution and Habitat:— Occurs in Argentina (Misiones) and Brazil (Bahia, Paraíba, Pernambuco, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul (Gentry 1992; Lohmann 2010). Within the study area, it was found in Céu Azul and Foz do Iguazu.

Phenology:— Type 3 (Cornucopia). Flowers were collected in September and October.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 9,539,976.113 km² and the estimated area of occupancy is 664.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Handroanthus chrysotrichus* can be recognized by the hirsute calyces and fruits.

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguazu: Foz do Iguazu, em frente ao Hotel, 15 September 2018, *Hentz Junior, E. J.* 48 (UNOP!); Céu Azul, PIC, 25°09'18.4"S, 53°50'51.6"W, 12 October 2016, *Caxambu, M.G.* 7579 (HCF!).

6.3 *Handroanthus impetiginosus* (Martius ex De Candolle 1845: 218) Mattos (1970: 1) (Fig. 8 D).

Distribution and Habitat: It occurs from Mexico to Argentina and Brazil (Acre, Pará, Rondônia, Tocantins, Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe, Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso, Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo) (Gentry 1992; Lohmann 2010). Within the study area, it was found in Foz do Iguazu.

Phenology:— No sufficient data to classify this species within a phenological type. Flowers were collected in June.

Conservation:— Native. This species has been categorized as NT [Near Threatened] (CNCFLora 2020).

Taxonomic Notes:— *Handroanthus impetiginosus* can be recognized by the tree habit and lilac corollas. Can be confused with *H. heptaphyllus*, but differs by the larger leaflet with margins entire (vs. serrated in *H. heptaphyllus*) (Lozano & Zapater 2008).

Selected Specimens Examined BRAZIL. Paraná: Foz do Iguaçu, sede ICMBio, 25°37'36.2"S, 54°28'43.9"W, 06 June 2018, *Caxambu, M.G. 8419* (EVB!, HCF!).

7. *Jacaranda* Jussieu (1789: 138).

7.1. *Jacaranda micrantha* Chamisso (1832: 554) (Fig. 8 E—F).

Distribution and Habitat:— It occurs in Argentina (Corrientes), Paraguay (Alto Paraná), and Brazil (Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul) (Gentry & Morawetz 1992; Lohmann 2010). Within the study area, it was found in Céu Azul.

Phenology:— Type 3 (Cornucopia). Flowers were collected in September and October.

Conservation:— Native. Endemic to Brazil. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 1,409,924.533 km² and the estimated area of occupancy is 452.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Jacaranda micrantha* can be recognized by the leaves with 7 to 9 pinna and leaflets with margins entire to wavy.

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 29 November 1995, *Herrera, J. et al. 115* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, 22 September 2010, *Pilatti, D.M. 2* (UNOP!).

7.2. *Jacaranda mimosifolia* Don in Ker Gawler (1822: 631) (Fig. 10 C).

Distribution and Habitat:— It occurs in Bolivia and Argentina (Gentry & Morawetz 1992). Widely cultivated around the world. Within the study area, it was found in Céu Azul.

Phenology:— Not sufficient data to classify this species within a phenological type.

Conservation:— Exotic. This species conservation status was not evaluated (NE).

Taxonomic Notes:— *Jacaranda mimosifolia* can be recognized by the presence of more than 12 pinna.

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, 22 September 2017, *Siqueira, E.L. 2336* (ASE, HCF!, UEC).

7.3. *Jacaranda puberula* Chamisso (1832: 550) (Fig. 10 A—B).

Distribution and Habitat:— It is known to occur in Argentina (Misiones) and Brazil (Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo) (Gentry & Morawetz 1992; Lohmann 2010). Cultivated in other states. Within the study area, it was found in Céu Azul.

Phenology:— Type 3 (Cornucopia). Flowers were collected in October and November.

Conservation:— Native. Endemic to Brazil. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence estimated is 2,211,606.412 km² and the estimated area of occupancy is 1,088.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Jacaranda puberula* can be recognized by the leaves with 4 to 6 pinna, and leaflets with serrated margins. It can be differentiated by other *Jacaranda* species by the shorter stature, ca. 4–10 m (vs. 15–30 m in *J. micrantha*).

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, beira BR-277, 01 October 2015, *Hammes, J.K. 73* (UNOP!).

8. *Mansoa* De Candolle (1838: 128).

8.1. *Mansoa difficilis* (Chamisso 1832: 714) Bureau & Schumann in Von Martius & Eichler (1896: 201) (Fig. 10 D—E).

Distribution and Habitat:— It occurs in Bolivia, Paraguay, and Brazil (Amazonas, Pará, Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe, Mato Grosso do Sul, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul) and Argentina (Corrientes, Misiones) (Lohmann 2010; Lohmann & Taylor 2014). Within the study area, it was found in Céu Azul, Matelândia/Serranópolis, Capanema, Foz do Iguaçu, and the Iguazu National Park.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in February, June, September, October, and November.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 5,859,162.289 km² and the estimated area of occupancy is 900.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Mansoa difficilis* can be distinguished by the striated bark, extrafloral nectaries on the leaflet veins abaxially.

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 3 December 1993, *Vanni, R. et al.* 3203 (CTES!); Puerto Iguazú, 10 December 2009, *González, A.M.* 228 (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, 29 November 1966, *Lindeman, J.C.* 3439 (MBM!, NYBG, UB, US); Foz do Iguaçu, Trilha do Poço Preto, 02 October 2006, *Labiak, P.H.* 3766 (MBM!); Serranópolis do Iguaçu, 25°27'24.2"S, 54°04'58.4"W, 21 September 2017, *E.L. Siqueira* 2327 (HCF!).

9. *Podranea* Sprague in Dyer (1904: 449).

9.1 *Podranea ricasoliana* (Tanfani 1887: 17) Sprague in Dyer (1904: 449) (Fig. 7 D).

Distribution and Habitat:— Native from South Africa, cultivated in Central and South America (Hurrell *et al.* 2012).

Phenology:— Data not sufficient to classify this species within a phenological type.

Conservation:— Exotic. This species conservation status was not evaluated (NE).

Taxonomic Notes:— Recognized by the imparipinnate leaves, and pink corollas with dark stripes.

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, próximo ao Hotel Cataratas, 16 January 2019, *Hentz Junior* 69 (UNOP).

10. *Pyrostegia* Presl (1845: 523).

10.1. *Pyrostegia venusta* (Ker Gawler 1818: 249) Miers (1863: 188) (Fig. 7 E—F).

Distribution and Habitat:— It occurs throughout Latin America (Lohmann & Taylor 2014). In Brazil, it occurs in all states (Lohmann 2010). Within the study area, it was found in Céu Azul, Matelândia/Serranópolis, Capanema (E.J.H.J. pers. obs.), Foz do Iguaçu, and the Iguazu National Park.

Phenology:— Type 3 (Cornucopia). Flowers were collected in May, June, July, August, and September.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 13,044,275.134 km² and the estimated area of occupancy is 2,724.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Pyrostegia venusta* can be recognized by the bright orange corollas, stamens and stigmas exerted.

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 9 August 1991, *Vanni, R. et al. 2849* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Céu Azul, próximo a trilha Jacutinga, 25°14'27.8"S, 53°51'27.9"W, 24 May 2018, *Hentz Junior, E.J. 29* (UNOP!); Foz do Iguaçu, 25°37'52.3"S, 54°27'33.9"W, 02 July 2015, *Caxambu, M.G. 6630* (HCF!, FUEL); Serranópolis do Iguaçu, 21 September 2017, *Siqueira E.L. 2315* (HCF!).

11. *Tabebuia* Gomes ex de Candolle (1838: 130).

11.1. *Tabebuia roseoalba* (Ridley 1890: 52) Sandwith (1955: 597) (Fig. 9 A—B).

Distribution and Habitat:— It occurs Brazil (Pará, Tocantins, Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe, Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso, Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo), Bolívia, Paraguay, and Peru (Gentry & Morawetz 1992; Lohmann 2010). Within the study area, it was found in Foz do Iguaçu, where it was introduced.

Phenology:— Type 4 (Big Bang). Flowers were collected in July and August.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of

occurrence is 10,566,390.394 km² and the estimated area of occupancy is 836.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Tabebuia roseoalba* can be easily recognized by the flaky calyx and the pinkish white corolla.

Selected Specimens Examined:— **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Foz do Iguaçu, 15 September 2018, *Hentz Junior, E.J. 43* (EVB!, UNOP!).

12. *Tanaecium* Swart (1788: 91) emend Lohmann in Lohmann & Taylor (2014: 463).

12.1. *Tanaecium selloi* (Sprengel 1825: 831) Lohmann in Lohmann & Taylor (2014: 466) (Fig. 9 C).

Distribution and Habitat:— It occurs in Colombia, Venezuela, Peru, Bolivia, Paraguay, Brazil (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe, Distrito Federal, Goiás, Mato Grosso do Sul, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul) and Argentina (Chaco, Corrientes, Jujuy, Misiones, and Salta) (Lohmann 2010; Lohmann & Taylor 2014; Frazão and Lohmann 2019). Within the study area, it was found in Foz do Iguaçu and Capanema.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in February, March, and December.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 6,078,916.978 km² and the estimated area of occupancy is 872.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Tanaecium selloi* can be confused with some *Fridericia* species, however this species can be differentiated from other *Fridericia* by the lack of interpetiolar glands and the bilabilated calyx apices.

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 10 March 2009, *González, A.M. 218* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, margens do Rio Iguaçu, 23 February 2016, *Hammes, J.K. 96* (UNOP!); Foz do Iguaçu, 28 February 2010, *Fonseca, L.H.M. 112* (SPF).

13. *Tynanthus* Miers (1863: 193).

13.1. *Tynanthus micranthus* Correia de Mello ex Schumann in Engler (1894: 221) (Figs. 9 D, 10 F—H).

Distribution and Habitat:— It occurs in Paraguay, Brazil (Mato Grosso do Sul, São Paulo, and Paraná), and Argentina (Misiones) (Lohmann 2010; Lohmann & Taylor 2014; Medeiros & Lohmann 2015). Within the study area it was found in Céu Azul and Foz do Iguaçu, representing a new record for the state of Paraná.

Phenology:— Type 5 (Multiple Bang). Flowers were collected in September, October, November, and December.

Conservation:— Native. This species is categorized as Least Concern [LC] following the IUCN criteria (IUCN 2012, IUCN Standards and Petitions Subcommittee 2016). The estimated extent of occurrence is 443,037.390 km² and the estimated area of occupancy is 200.000 km² (cell width of 2 km). Population level data is not available for this taxon.

Taxonomic Notes:— *Tynanthus micranthus* can be differentiated by the smell of clove on vegetative portions and the bilabiate white corolla.

Selected Specimens Examined:— **ARGENTINA.** Misiones, Parque Nacional Iguazú: Puerto Iguazú, 11 August 1995, *Vanni, R. et al. 3487* (CTES!). **BRAZIL.** Paraná, Parque Nacional do Iguaçu: Capanema, 23 November 1966, *Lindeman, J.C. 3354* (MO, US); Céu Azul, Trilha Cachoeira do Rio Azul, 14 September 2015, *Hammes, J.K. 66* (UNOP!); Foz do Iguaçu, 24 November 1966, *Lindeman, J.C. 3409* (MBM!, MO, NYBG, P, US); Serranópolis do Iguaçu, 13 October 2016, *Caxambu, M.G. 7614* (HCF!).

Discussion

In this study we documented 29 species of Bignoniaceae for the Iguaçu and Iguazu National Parks, two of which are endemic to Brazil (*Jacaranda micrantha* and *Jacaranda puberula*). Of these, 21 are lianas (tribe Bignoniaceae), while eight are trees from the Tabebuia Alliance (4 spp.), tribe Jacarandae (3 spp.), and tribe Tecomeae (1 sp.). Only two species are exotic, i.e., *Jacaranda mimosifolia* and *Podranea ricasoliana*.

The low endemism might be associated with the liana habit given that lianas are generally broadly distributed through multiple vegetation types (Kim 1986). Despite that, three species show restricted distribution patterns, i.e., *Dolichandra cynanchoides*, *Dolichandra dentata*, and *Jacaranda micrantha* all of which are restricted to the southeastern portions of Brazil. Five species are cultivated

in the region, *Handroanthus impetiginosus*, *Jacaranda mimosifolia*, *Jacaranda puberula*, *Tabebuia roseoalba*, and *Podranea ricasoliana*.

Overall, Céu Azul and Foz do Iguaçú, with twenty species each, showed the highest species richness. The Foz do Iguaçú area includes three species that are not found in any other area (i.e., *Handroanthus impetiginosus*, *Tabebuia roseoalba*, and *Podranea ricasolina*), while the Céu Azul area includes four species that are not found in any other area (i.e., *Fridericia samyroides*, *Jacaranda micrantha*, *J. puberula*, and *J. mimosifolia*). Nineteen species were documented in the the Iguazu National Park, none of which were restricted to this area (Table 1). In turn, 13 species were found in Capanema, while 10 species were found in Matelândia/Serranópolis do Iguaçú.

Other floristics surveys carried out at ParNa Iguaçú (Sozzo 2016; Trochez *et al.* 2017) list 18 and 13 species of Bignoniaceae respectively, 15 of which were included in this work. There are taxa documented in the earlier studies, i.e., *Adenocalymma dusenii* Kraenzlin (1921: 115), *Fridericia platyphylla* (Chamisso 1832: 679) Lohmann in Lohmann & Taylor (2014: 442) and *Handroanthus heptaphyllus* (Vellozo 1825: 251) Mattos (1970: 1), that turned out to be misidentified and actually represent *Adenocalymma marginatum*, *Fridericia florida*, and *Handroanthus impetiginosus*, respectively. Specimens misidentified as *Amphilophium dusenianum* (Kraenzlin 1921:118) Lohmann in Lohmann & Taylor (2014: 403) and *Cuspidaria convoluta* (Vellozo 1825: 248) Gentry (1975: 343) were found in some herbaria, but these turned out to correspond to *Amphilophium paniculatum* and *Tynanthus micranthus* instead. Finally, the specimen *Hatschbach 9378* (MO) identified as *Dolichandra uncata* (Andrews 1808: table 530) Lohmann in Hotchke *et al.* (2008: 273) has a dubious identification that would require reproductive material to be confirmed.

Eighteen species documented in this study bloomed for short periods throughout the year matching the phenology type 5, Multiple Bang. Five species produced a large number of flowers for a few weeks during the winter, matching the phenology type Cornucopia, the second most comment in the region. *Tabebuia roseoalba*, was the only species that flowered for a few days during dry seasons, corresponding to the phenology type 4 (Big Bang). Five species did not have enough data to allow their classification within phenological types.

Out of the 29 species documented here, the conservation status of eleven had already been evaluated elsewhere (Fonseca & Lohmann 2019; CNCFLora 2020). We used the GeoCAT Tool to estimate the conservation status of the remaining 18 species, all of which were classified as Least Concern (LC) following the IUCN criteria (2012). Out of the 29 species documented for the Iguaçú and Iguazu National Parks, 25 are classified as LC (Least Concern) and one as NE (Near Endangered).

Three species did not have enough data to allow them to be classified according to their Conservation Status.

During this study, *Dolichandra cynanchoides*, an important ornamental from Argentina (Garcia 1992), was collected for the first time since 1966 in the Brazilian side of the Park (Caxambu, MG 911); this species was collected in the Céu Azul area (municipality Lindoeste). Likewise, *Fridericia triplinervia*, another species collected in the Céu Azul area was registered for the first time in the Brazilian side of the Park, representing a new record for the ParNa Iguaçu (Hentz Junior, EJ 190). These new records demonstrate the importance of detailed floristic surveys in large forest remnants, highlighting the importance of the Iguaçu and Iguazu National Parks for conservation.

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Examined Materials: *Buttura, E.* 976 (11.1); *Caxambu, M.G.* 6451, 7068 (1.2), 7594 (1.3), 7112, 7672 (2.2), 6821, 7048 (3.2), 9114 (4.1), 7091 (4.2), 6813, 7042 (4.3), 6812, 7026 (4.5), 6946, 7620 (5.1), 6490 (5.2), 7136 (5.4), 7470 (6.1), 7579 (6.2), 8419 (6.3), 7961 (7.1), 6945 (7.3), 7616 (8.1), 6544, 6630 (10.1), 6909, 7606 (5.3), 6997, 9117 (12.1), 6891, 7614 (13.1); *Cocucci, A.A. et al.* 3224 (2.1); *Conceição, L.S.H.M.* 190 (7.3); *Cusato, L.* 461 (4.2); *Durigon, J.* 632 (4.5), 631 (5.1), 633 (12.1); *Ferrucci, S.* 506 (1.3); *Fonseca, L.H.M.* 114 (4.5), 113 (8.1), 112 (12.1); *González, A.M.* 219 (1.2), 217 (5.1), 228 (8.1), 424 (5.3), 218 (12.1); *Hammes, J.K.* 87 (1.2), 98 (3.2), 65 (4.3), 88 (5.2), 73 (7.3), 58 (10.1), 69 (5.3), 96 (12.1), 66 (13.1); *Hatschbach, G.* 49578 (1.2); *Hentz Júnior, E.J.* 30, 60 (1.2), 28 (2.1), 168 (2.2), 59, 167 (3.1), 57, 163, 166 (3.2), 68 (4.5), 58 (5.1), 165 (5.3), 172 (5.4), 190 (5.5), 38 (6.1), 48 (6.2), 69 (9.1), 29, (10.1), 43 (11.1), 164 (13.1); *Herrera, J.* 82 (1.3), 100 (3.2), 150 (4.5), 141 (5.2), 115 (7.1); *Keller, H.A.* 6127 (5.5); *Lima, L.C.P.* 808 (1.2), 762, 1005 (1.2), 788 (3.2), 872 (4.5), 884 (5.1), 797 (6.1); *Labiak, P.* 3327, 3343 (1.2), 3847 (1.3), 3766, 3837 (3.1); *Lindeman, J.C.* 3476, 3478 (4.1), 3439 (8.1), 3460 (12.1), 3354, 3409 (13.1); *Machado-Silva, T.* 212 (1.2); *Mano, G.B.* 03 (10.1); *Pilatti, D.M.* 2 (7.1); *Rauber, C.R.* 206, 376, 377 (3.2), 375 (4.4), 307 (5.1), 388 (5.2), 308 (5.4); *Ribas, O.S.* 7443 (4.5); *Ribeiro, H.* 04 (2.1), 06 (3.1), 03 (3.2), 07 (5.1), 02 (7.1), 01 (13.1); *Rodolfo, A.M.* 40 (3.2); *Siqueira, E.L.* 1603 (1.1), 1892 (1.3), 1837, 2861, 2518 (1.2), 1776, 1826 (2.1), 1616, 1623, 2862 (3.2), 1597, 1628, 1838, 2864 (4.5), 1781, 1819, 1821, 2107, 3318 (5.1), 1627, 1898 (5.2), 2336 (7.2), 2327 (8.1), 2315

(10.1), 1611, 1627, 2320 (5.3), 1822, 2324 (13.1); **Temponi, L.G.** 467 (1.1), 494 (1.3), 493, 633, 672 (3.2), 646 (5.3), 621 (13.1); **Toderke, M.L.** 59 (5.2), 20 (5.3); **Vanni, R.** 3120 (1.2), 3535 (3.1), 4536 (5.1), 3538 (5.4), 3203 (8.1), 2849 (10.1), 3487 (13.1); **Ziller, S.R.** 1679 (1.1); **Zuloaga, F.O.** 5296 (4.3).

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Attachments

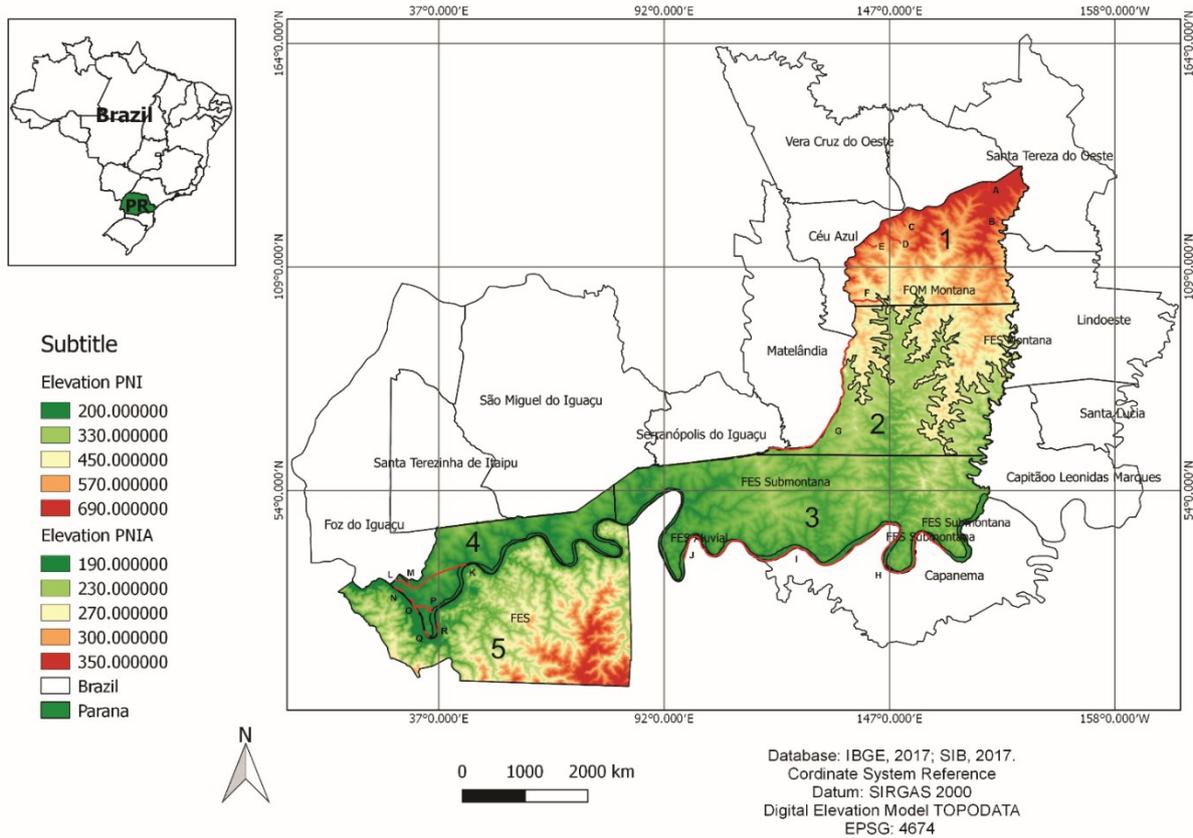


FIGURE 1. Areas of the Iguacu and Iguazu National Parks. Area 1 – Céu Azul, trails from A-F. Area 2 – Matelândia/Serranópolis, trail G. Area 3 – Capanema, trails from H-J. Area 4 – Foz do Iguacu, trails K-R. Area 5 – Iguazu National Park. Source: Modified from Hammes *et al.* 2021.

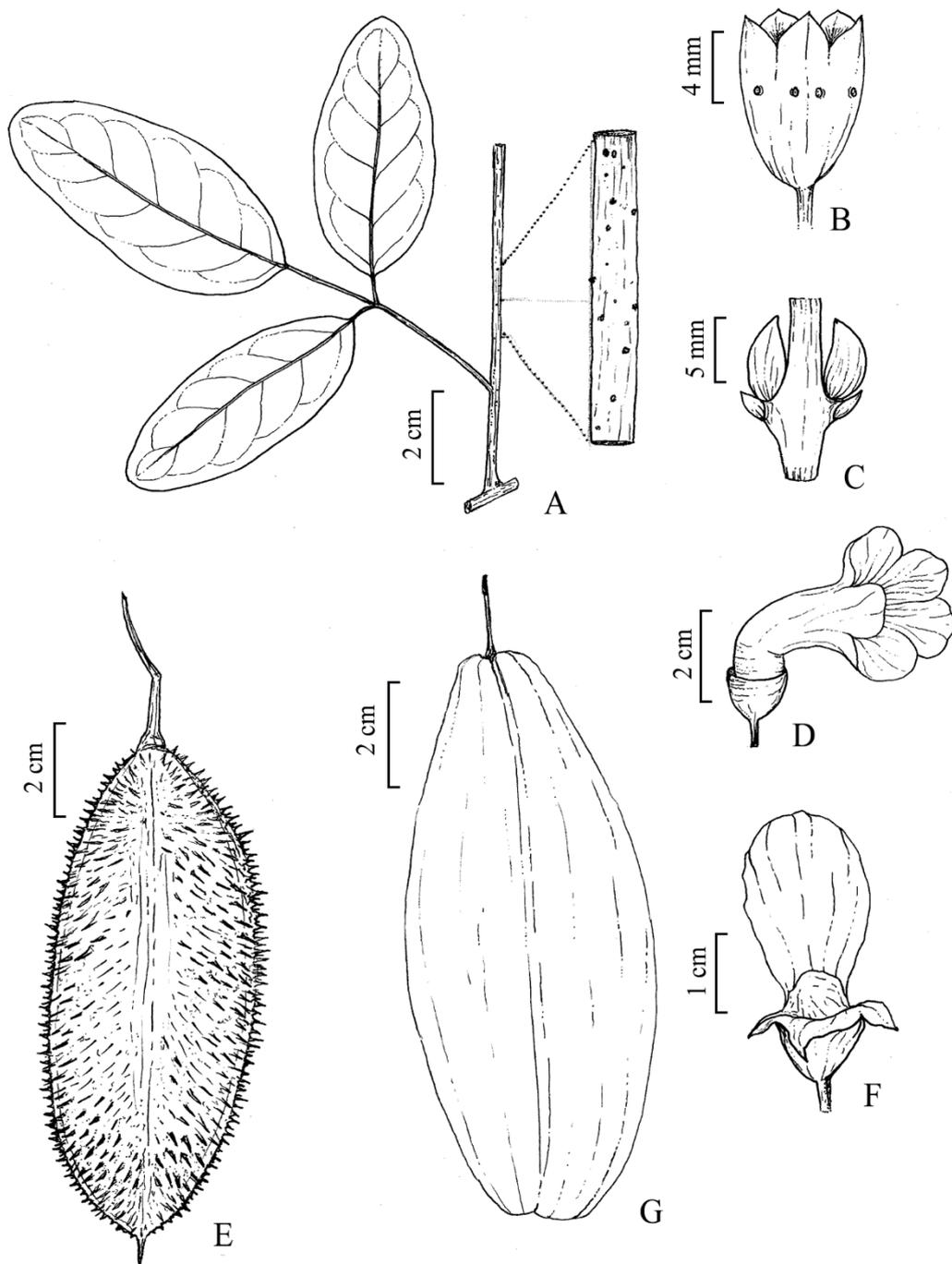
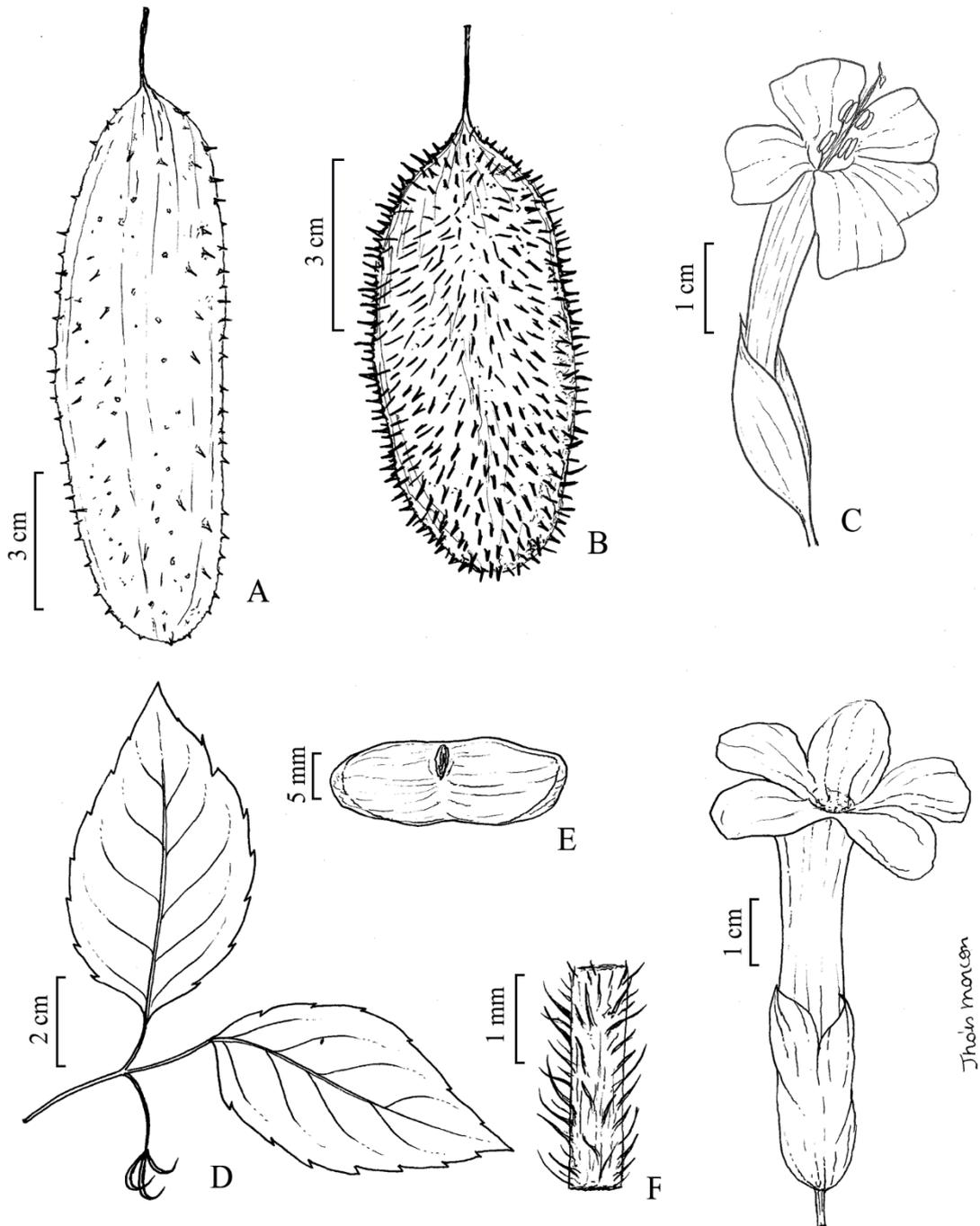


FIGURE 2. *Adenocalymma bracteatum*. A. Branch showing lenticels. B. Calyx with linear cupular and glandular trichomes. *Adenocalymma paulistarum*. C. Curved prophylls of the axillary buds. *Amphilophium crucigerum*. D. Corolla strongly curved. E. Fruit. *Amphilophium paniculatum*. F. Flower showing the undulated calyx and bilabiate corolla. G. Fruit.



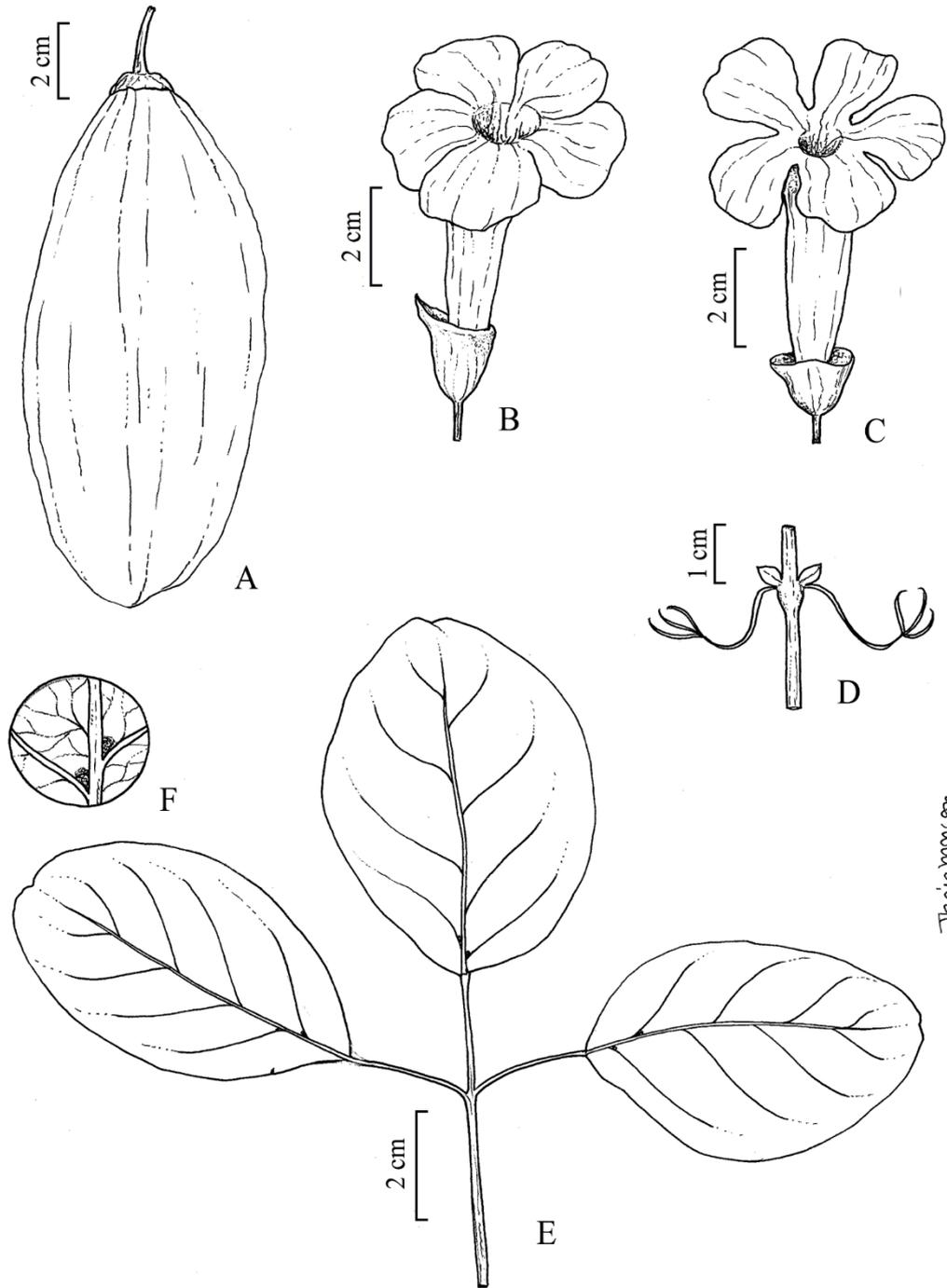
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FIGURE 3. *Bignonia binata* A. Fruit. *Bignonia sciuripabulum*. B. Fruit. *Dolichandra cyananchoides*. C. Corolla. *Dolichandra dentata*. D. Leaflets with serrated margin. E. Seeds. *Dolichandra hispida*. F. Branch with hispid trichomes. G. Flower showing bilabiate calyx.



FIGURE 4. *Adenocalymma marginatum*. A. Habit and leaflet with coriaceous margins. B. Inflorescence. *Adenocalymma paulistarum*. C. Filaments and stigma sub-exserted. *Amphilophium crucigerum*. D. Flower. E. Curved corolla on the inflorescence branch. *Amphilophium paniculatum*.

F. Bilabiate flower and undulated calyx. *Bignonia binata*. G. Habit. *Bignonia sciuripabulum*. H. Inflorescence.



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FIGURE 5. *Dolichandra quadrivalvis*. A. Fruit. B. Flower showing apiculated calyx. *Dolichandra unguis-cati*. C. Flower showing campanulate calyx. D. Ovate prophyll of the axillary buds and tendrils. *Fridericia triplinervia*. E. Leaf. F. Detail of the domatia.

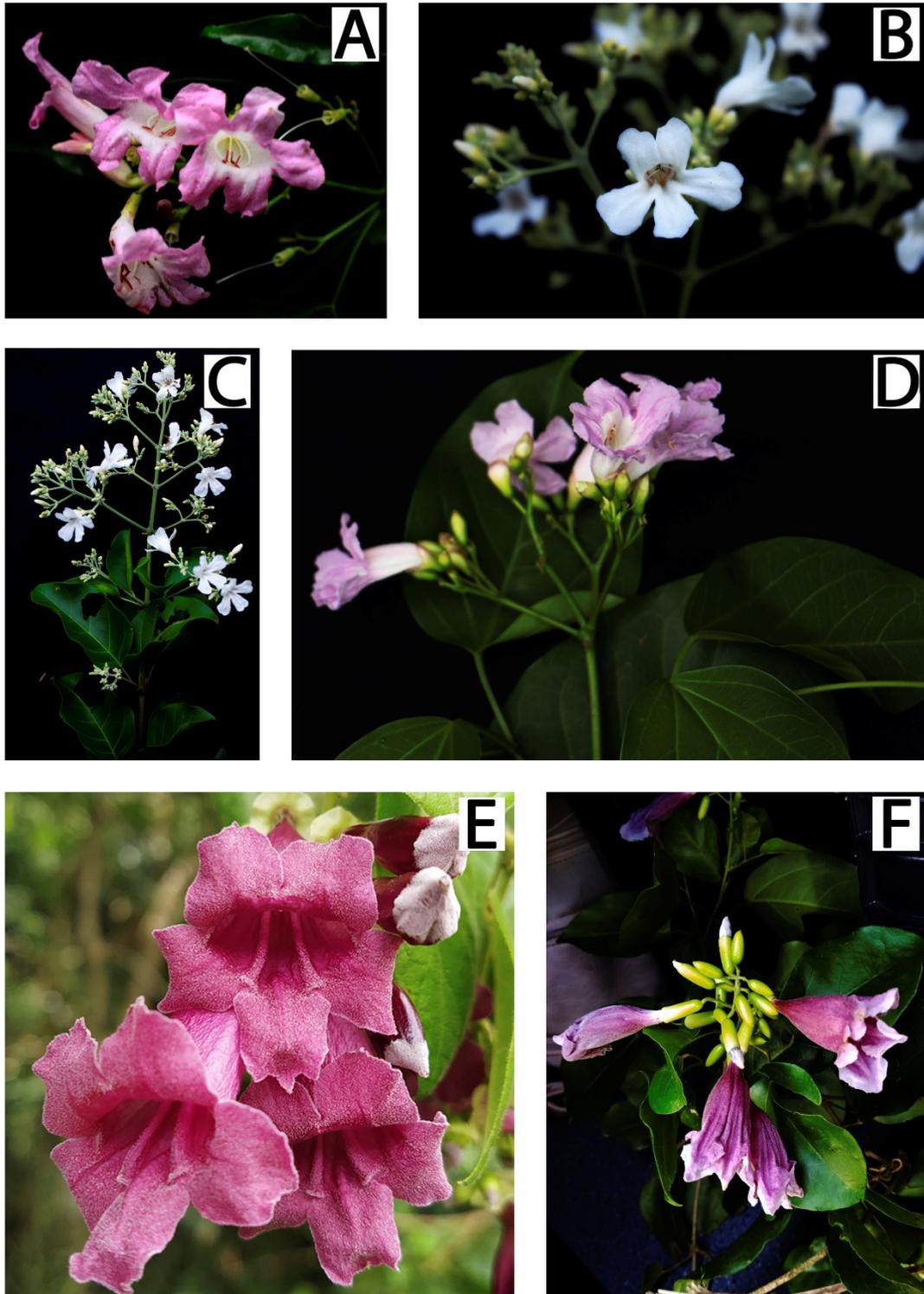


FIGURE 6. *Fridericia chica*. A. Inflorescence. *Fridericia florida*. B. Flower detail. C. Inflorescence. *Fridericia mutabilis*. D. Inflorescence. *Fridericia samydoides*. E. Flower detail. *Fridericia triplinervia*. F. Inflorescence.

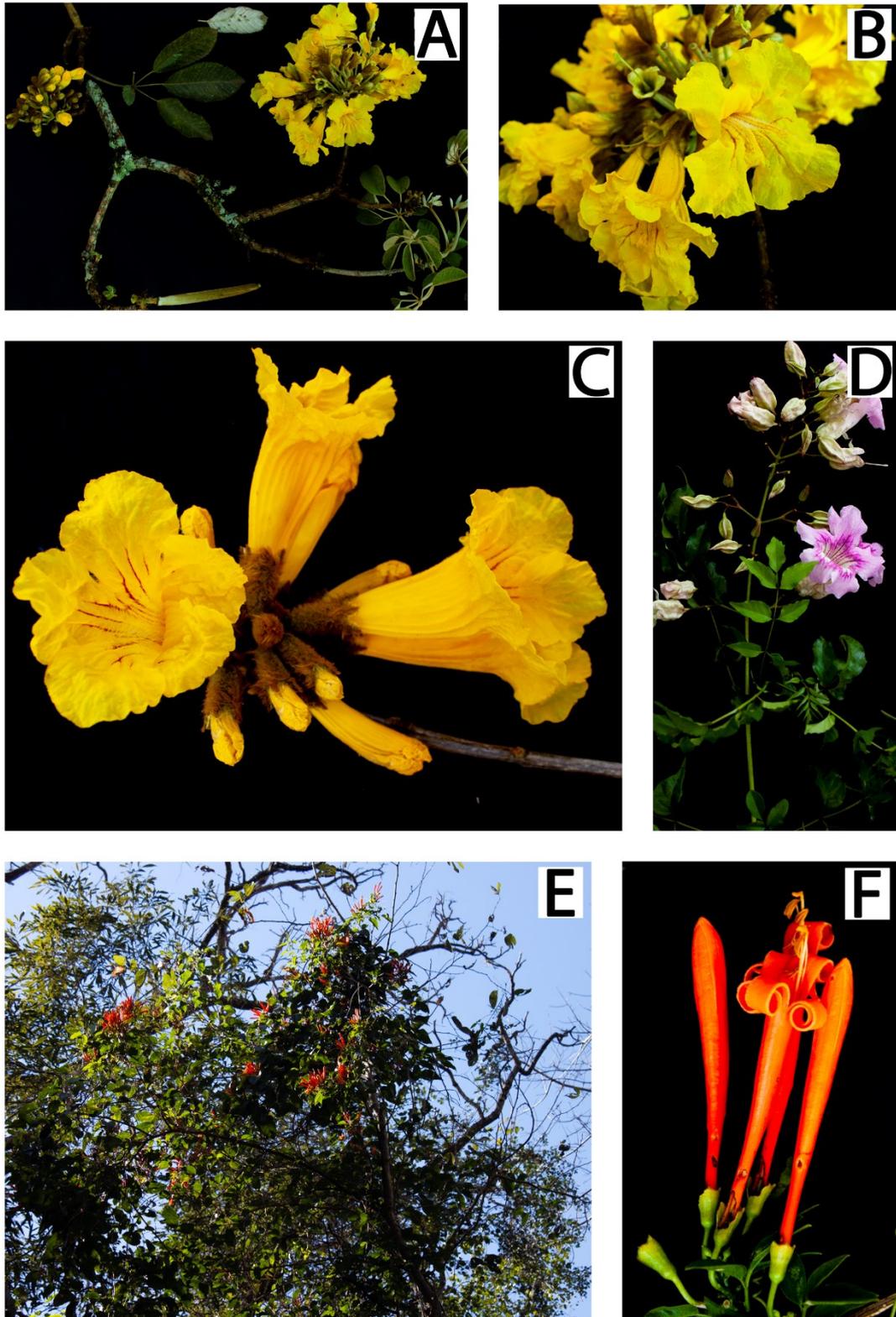


FIGURE 7. *Handroanthus albus*. A. Branch showing the discoloured leaflets. B. Inflorescence. *Handroanthus chrysotrichus*. C. Inflorescence. *Podranea ricasoliana*. D. Flowering branch. *Pyrostegia venusta*. E. Lianescent habit. F. Flower.

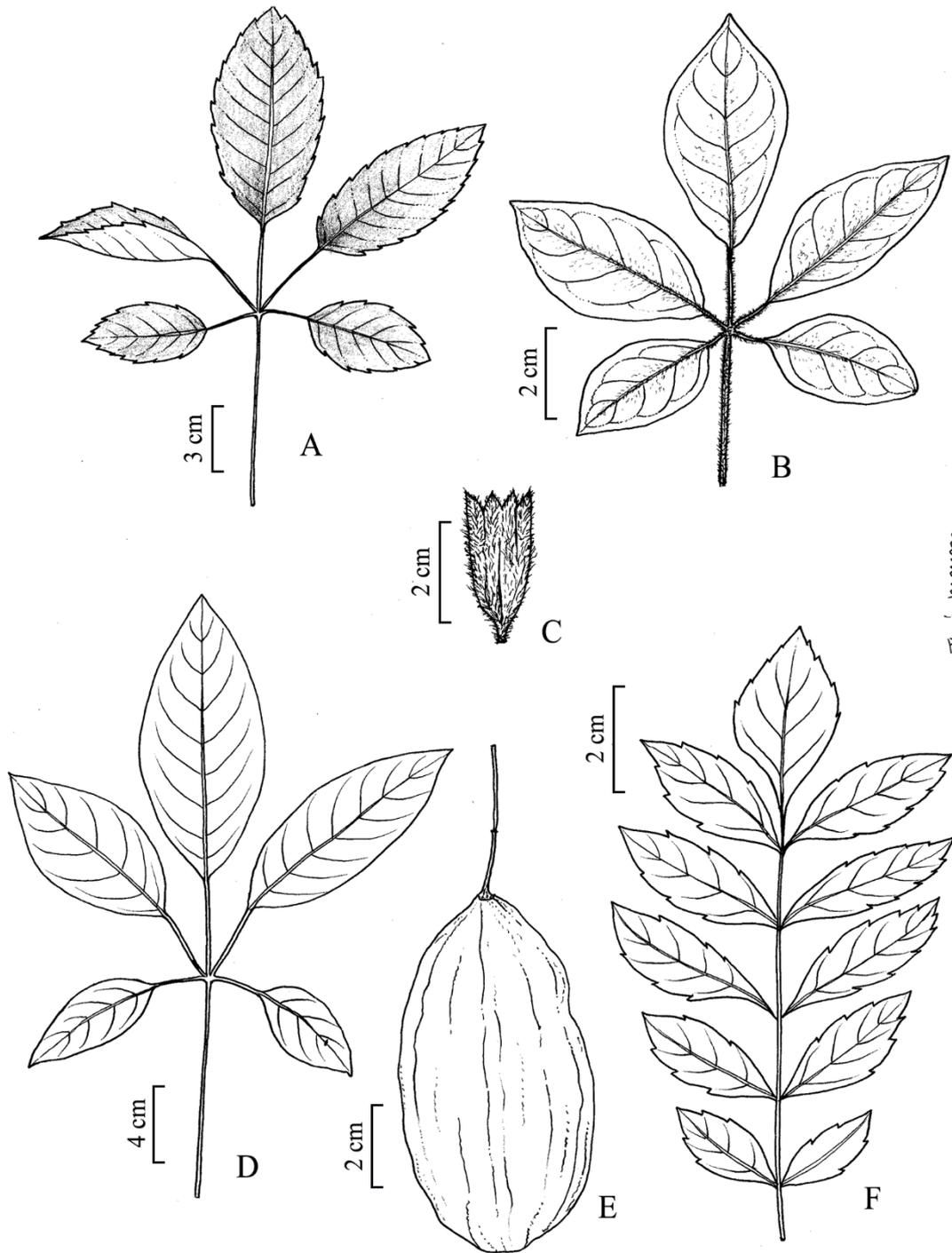


FIGURE 8. *Handroanthus albus*. A. Leaflets with serrated margins. *Handroanthus chrysotrichus*. B. Leaf with trichomes. C. Hirsute calyx. *Handroanthus impetiginosus*. D. Leaf. *Jacaranda micrantha*. E. Fruit. F. Leaf.

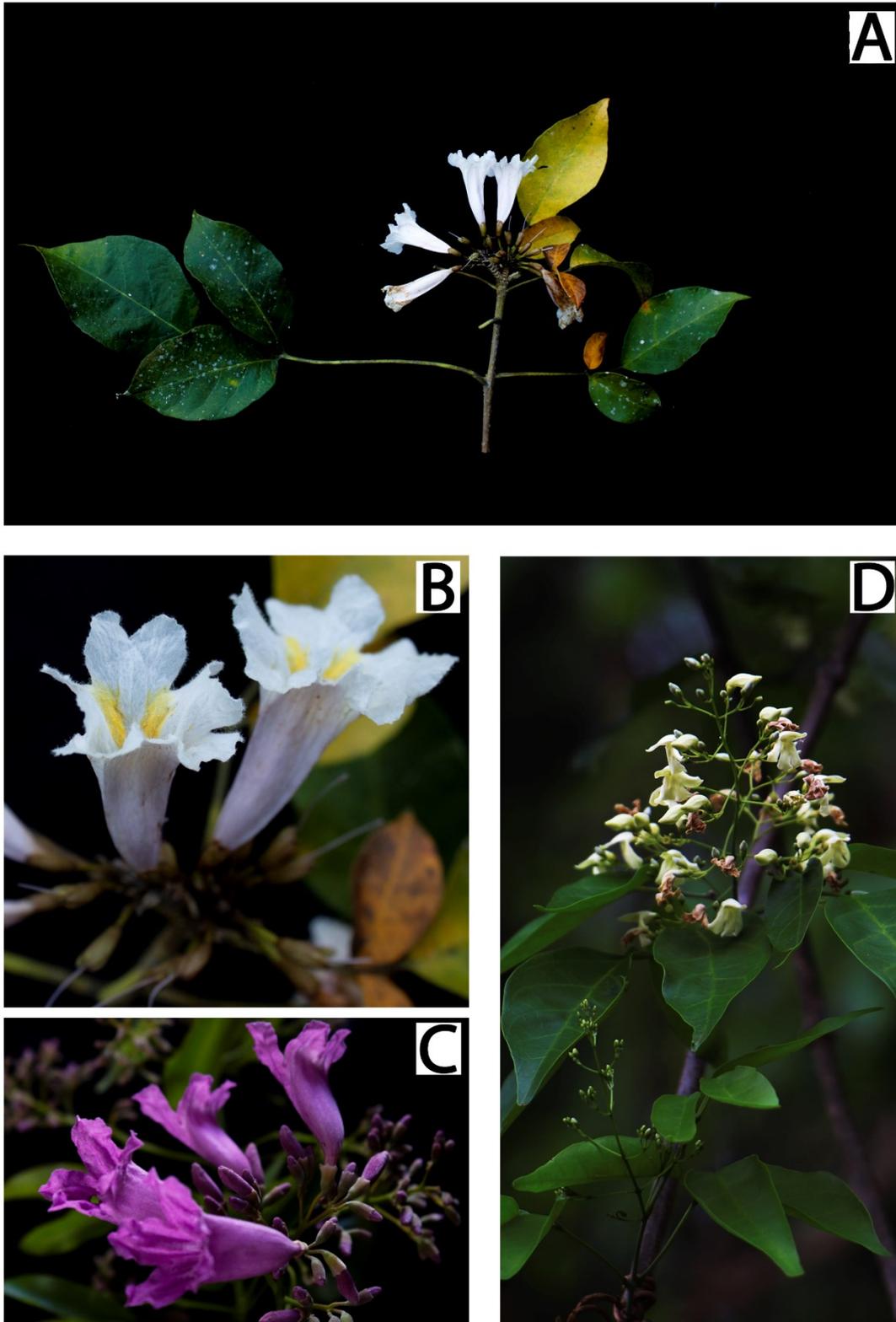


FIGURE 9. *Tabebuia roseoalba*. A. Flowering branch. B. Flower detail. *Tanaecium selloi*. C. Inflorescence. *Tynanthus micranthus*. D. Flowering branch.

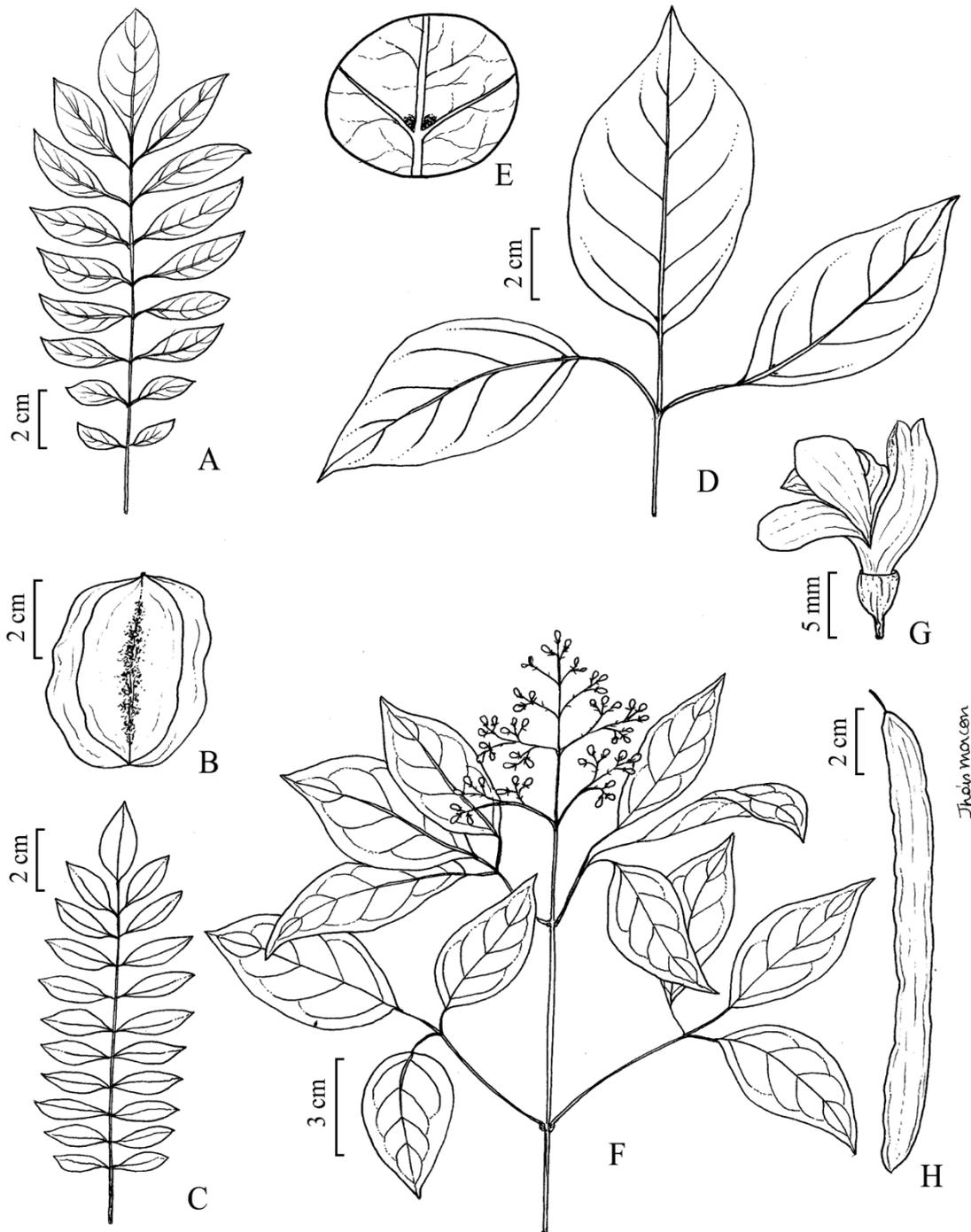


FIGURE 10. *Jacaranda puberula*. A. Leaflet. B. Fruit. *Jacaranda mimosifolia*. C. Leaf. *Mansoa difficilis*. D. Leaf. E. Detail of the extrafloral nectaries. *Tynanthus micranthus*. F. Flowering branch. G. Corolla. H. Fruit.

TABLE 1. Bignoniaceae species found in each of the study areas within the Iguazu and Iguazu National Parks (* indicate exotic species).

Species	Céu Azul	Matelândia/Serranópolis	Capanema	Foz do Iguazu	Argentina
<i>Adenocalymma bracteatum</i>	X		X	X	
<i>Adenocalymma marginatum</i>	X		X	X	X
<i>Adenocalymma paulistarum</i>		X		X	X
<i>Amphilophium crucigerum</i>	X	X		X	X
<i>Amphilophium paniculatum</i>	X	X			
<i>Bignonia binata</i>	X		X	X	X
<i>Bignonia sciuripabulum</i>	X		X	X	X
<i>Dolichandra cynanchoides</i>			X	X	X
<i>Dolichandra dentata</i>			X		X
<i>Dolichandra hispida</i>	X		X		X
<i>Dolichandra quadrivalvis</i>	X		X		
<i>Dolichandra unguis-cati</i>	X	X		X	X
<i>Fridericia chica</i>	X	X		X	X
<i>Fridericia florida</i>	X		X	X	X
<i>Fridericia mutabilis</i>	X	X		X	X
<i>Fridericia samydoides</i>	X				X
<i>Fridericia triplinervia</i>		X			X
<i>Handroanthus albus</i>	X			X	
<i>Handroanthus chrysotrichus</i>	X			X	
<i>Handroanthus impetiginosus</i>				X	
<i>Jacaranda micrantha</i>	X				X
<i>Jacaranda puberula</i>	X				
<i>Jacaranda mimosifolia*</i>	X				
<i>Mansoa difficilis</i>		X	X	X	X
<i>Podranea ricasolina*</i>				X	
<i>Pyrostegia venusta</i>	X	X	X	X	X
<i>Tabebuia roseoalba</i>				X	
<i>Tanaecium selloi</i>			X	X	X
<i>Tynanthus micranthus</i>	X	X	X	X	X