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Inventory

The vascular flora of Porto Ferreira State Park: an ecotonal area in São Paulo State, southeastern Brazil

Gabriel Pavan Sabino[1]*, Vitor de Andrade Kamimura[1,2], Renan Borgiani[1], Rafael Konopczyk[1], Ernesto Pedro Dickfeldt[3], José Eduardo de Arruda Bertoni[4], Sonia Aparecida de Souza Evangelista[3] & Gabriel Mendes Marcusso[1]

[1]Universidade Estadual Paulista "Júlio de Mesquita Filho", Instituto de Biociências, Departamento de Botânica, Av. 24, 13506-000, Rio Claro, SP, Brasil.
[2]Universidade Federal de Minas Gerais Departamento de Botânica, Instituto de Ciências Biológicas, Av. Antônio Carlos, 31270-901, Belo Horizonte, MG, Brasil.
[3]Instituto Florestal, Rua do Horto, 02377-000, São Paulo, SP, Brasil.
[4]Instituto Agronômico de Campinas, Divisão de horticultura, Seção de Floricultura e Plantas Ornamentais, Rua Barão de Itapura, 13020-902, Campinas, SP, Brasil.
**Corresponding author: gpsabino@gmail.com*

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Abstract: The Porto Ferreira State Park (PFSP) is located in the State of São Paulo southeastern Brazil, in an intriguing transitional area between the Atlantic Forest and *Cerrado* – both hotspots of biodiversity – represented mainly by the *cerradão* (CER), and the seasonal semideciduous forest (SSF), with its alluvial variation vegetation type (riparian forest – RP). Ecotonal areas play an important role in providing ecological and phytogeographic knowledge regarding the flora and vegetation of this region. Despite various studies on the PFSP, knowledge of this region remains fragmented. In this study, we aim to conduct an updated checklist of the PFSP vascular flora, including a compilation of all the studies conducted in this protected area, plus field work carried out by the authors from 2014 to 2017. In addition, given its ecotonal characteristics, we completed a floristic similarity analysis between the PFSP and other floristic surveys that examined the same vegetation types present in this study, to gain a better understanding of their phytogeographic relationships. Overall, 684 species, belonging to 387 genera and 107 families, were recorded. The SSF presented the richest vegetation type (478 species), followed by the CER (418) and the RP (231). The most diverse families were Fabaceae (64 species), Myrtaceae (41), Orchidaceae (39), Rubiaceae (37), Asteraceae (35), Bignoniaceae (26) and Malvaceae (20). Moreover, eight threatened species, at regional and national levels, were found. To date, 412 species have been added to the floristic list produced for the PFSP. The life forms with the highest number of species were trees (286 species), herbs (176) plus shrubs and subshrubs (123). Our research findings indicate floristic patterns with higher levels of similarity among species in geographical proximity, including those in ecotonal areas encompassing different vegetation types. These results rank the PFSP among some of the most species-rich conservation units with seasonal climates, and therefore is of great importance for plant conservation in the southeast of Brazil.
Keywords: *Atlantic Forest; Cerrado; floristic; protected area; seasonal semideciduous forest.*

Flora vascular do Parque Estadual de Porto Ferreira: uma área ecotonal no estado de São Paulo, sudeste do Brasil

Resumo: O Parque Estadual de Porto Ferreira (PEPF) está localizado no estado de São Paulo, sudeste do Brasil, em uma intrigante área de contato entre a Mata Atlântica e o Cerrado – ambos hotspots de biodiversidade –, representada principalmente pelo cerradão (CER), a floresta estacional semidecidual (FES) e pela variação dessa última, com influência aluvial (FESA). As áreas ecotonais desempenham um papel importante no conhecimento ecológico e fitogeográfico da flora e da vegetação. Mesmo com muitos estudos realizados no PEPF, as informações encontram-se dispersas. Dessa forma, produzimos um checklist atualizado da flora vascular, resultante da compilação de vouchers, estudos realizados no PEPF e de esforços de coleta realizados pelos autores entre os anos de 2014 e 2017. Além disso, para entender suas relações fitogeográficas, realizamos uma análise de similaridade florística entre o PEPF e outros levantamentos realizadas nas mesmas fitofisionomias da área estudada. Registramos 684 espécies pertencentes a 387 gêneros e 107 famílias. A FES foi a fitofisionomia mais rica (478 espécies), seguida pelo CER (418) e a FESA (231).

As famílias mais ricas foram Fabaceae (64 espécies), Myrtaceae (41), Orchidaceae (39), Rubiaceae (37), Asteraceae (35), Bignoniaceae (26) e Malvaceae (20). Oito espécies ameaçadas em âmbito regional e nacional foram encontradas. Desde a última lista florística produzida para o PEPF, 412 espécies foram adicionadas. As formas de vida com maiores números de espécies foram: árvores (286 espécies), ervas (176) e arbustos mais subarbustos (123). A análise de similaridade corroborou o padrão de que áreas mais próximas geograficamente são mais similares entre si, e esse padrão foi encontrado, também, para áreas ecotonais envolvendo diferentes fitofisionomias. Os resultados encontrados colocam o PEPF entre as unidades de conservação com maior número de espécies vegetais sob o domínio de clima sazonal, possuindo, portanto, grande importância para a conservação de espécies de plantas no Sudeste do Brasil.

Palavras-chave: *Mata Atlântica; Cerrado; florística; unidade de conservação; floresta estacional semidecidual.*

Introduction

Brazil is home to one of the richest plant diversities in the world, with more than 34,000 species of vascular plants (BFG, 2021). This great diversity is mainly due to Brazil's vast geographical area, its heterogeneous topography, as well as its climate, and biogeographical features (Fiaschi & Pirani, 2009). Traditionally, it has been divided into major landscapes and macroecological ecoregions (Ab'Sáber, 1970, 2003). Among the biogeographical units recognized in Brazil, the *Cerrado* and the Atlantic Forest are classified as biodiversity hotspots for global conservation, hosting an overwhelming number of endemic species threatened by anthropic actions (Myers et al., 2000; Mittermeier et al., 2004).

The biogeographic province, known as the *Cerrado,* mainly spans over central Brazil, with its southern limits reaching the northern part of the State of Paraná, the northern region of Argentina, and eastern Bolivia (Morrone, 2017; Velazco et al., 2018). It comprises a set of vegetation types, ranging from grasslands with herbaceous plants dominating the landscape (*campo limpo*), to savannas (*campo sujo* and *cerrado sensu stricto*) and forests (*e.g. cerradão* and gallery forests) (Coutinho, 2006; Batalha, 2011). The *Cerrado* is the second largest phytogeographical unit of Brazil, spanning 2 million km² or 23.9% of the national territory (IBGE, 2004). The main threats to the *Cerrado* vegetation are the expansion of intensive agriculture activity, and raising livestock (Ratter et al., 2006; Klink & Moreira, 2002). Nevertheless, the *Cerrado* is considered one of the world's richest savanna vegetation (Klink & Machado, 2005; Simon et al. 2009), containing more than 12,000 species of vascular plants (BFG, 2015; Flora do Brasil, 2020). In the State of São Paulo the *Cerrado* occurs mainly in the central region, but extends to eastern portions of the State as well, with enclaves in the Atlantic Forest matrix (Baitello et al., 2013).

The Atlantic Forest covers nearly 1.1 million km² (IBGE, 2004), distributed over a broad latitudinal, ranging from the State of Piauí to Rio Grande do Sul (SOS Mata Atlântica, 2016), and reaching inland to northern Argentina and eastern Paraguay (Spichiger et al., 2006; Fiaschi & Pirani, 2009). Brazil's Atlantic Forest hosts an overwhelming species richness of vascular plants (BFG 2015; *Flora do Brasil*, 2020), being one of the world's top five species-rich areas (Barthlott et al., 2005). Traditionally, the Atlantic Forest has been considered a single biogeographical unit with subdivisions (*e.g.* Morellato & Haddad, 2000). However, more than distinct vegetation types, singular biogeographical histories of the biota have been suggested for different parts of the Atlantic Forest (Vieira et al., 2015; Morrone 2014, 2017; Eisenlohr & Oliveira-Filho, 2015) justifying its division in three provinces (Morrone 2014, 2017). Among these biogeographical provinces, the inland and seasonal vegetation type is represented by the Paraná Forest province (Morrone, 2017; Zanotti et al., 2020), and it is the one most threatened by the reduction of the original area (Ribeiro et al., 2009). The floristic richness of the seasonal forest is considerably high (Souza et al., 2019a) and holds regional and typical species (Eisenlohr & Oliveira-Filho, 2015; Vieira et al., 2015; Morrone 2014, 2017).

In the State of São Paulo, the *Cerrado* and Atlantic Forest mix in a complex and transitional area, in scattered patches of each or at ecotones (Durigan et al., 2012). The *Cerrado* forest formation is very common there, with a great richness of tree species, mainly influenced by contact with Atlantic Forest taxa (Françoso et al., 2016). On the other hand, the innermost vegetation type of the Atlantic Forest is characterized by a well-marked dry season, and a characteristic composition, despite sharing several species with the rainy coastal forest and the *cerradão* (Eisenlohr & Oliveira-Filho, 2015). Ecotones represent a transition between ecological communities, with a mixture of the floristic and faunistic characteristics of two different and relatively homogenous ecological community types (Allen & Starr, 1982). Studies indicate that richness and abundance tend to peak at ecotonal areas (Kark & van Rensburg, 2006) and contribute to São Paulo's high level of plant richness, having one of Brazil's greatest numbers of species (BFG, 2015; Flora do Brasil, 2020).

Studies on the biodiversity of plant communities are considered fundamental, and one of the first steps toward the establishment of models for the preservation and conservation of ecosystems (Morellato & Leitão-Filho, 1992; Ferreira Júnior et al., 2008). Given these characteristics, the PFSP, floristically, has drawn great attention. From 1984 to present, 12 studies regarding its flora have been carried out, as well as aleatory collections deposited in herbaria. These studies include climbing plants (Vargas et al., 2018), ferns (Colli et al., 2003), non-arboreal plants (Oliveira, 2012; Osaco, 2012), trees (Bertoni, 1984; Bertoni & Martins, 1987; Bertoni et al., 2001; Sabino, 2013; Konopczyk, 2014) and vascular epiphytes (Marcusso et al., 2016). However, this data is fragmented, and remains to be systematically organized. The Management Plan (São Paulo, 2003) represents the last overall floristic list presented for this protected area.

Thus, we compiled the checklist of the vascular flora of the PFSP, based on fieldwork, studies conducted in the area, and herbarium collections, aiming to extend and systematize the scattered floristic information on the region. This data can support restoration and conservation projects in the central region of the State of São Paulo, given that several private lands of the region present a deficit in native vegetation and must be restored in accordance with the Native Vegetation Protection Law (Tavares et al., 2019).

Our work also provides a foundation on which to update the Management Plan of this important vegetation-protected area. In addition, we explored and discussed the floristic identity concerning the ecotonal condition of the PFSP, comparing our data with other floristic surveys carried out on the same vegetation types.

Material and Methods

The Porto Ferreira State Park (PFSP), known locally as "Mata do Procópio", is located in the municipality of Porto Ferreira, of the State of São Paulo, in the southeastern region of Brazil (Figure 1). The PFSP is one of more than 50 integral protected areas in São Paulo (*Instituto Florestal/Fundação Florestal*, 2008, Colli-Silva et al., 2016), founded in 1962, initially categorized as a State Reserve, and later (1987) becoming a State Park (São Paulo, 2003). Under the central geographical coordinates 21°51'S and 47°25'W, the park is bordered by the Mogi Guaçu river to the south, and by the SP-215 highway to the north, occupying an area of 611.55 hectares (São Paulo, 2003). The PFSP is part of the region of the Peripheral Depression of São Paulo (Depression of Mogi Guaçu) belonging to the Paraná Basin (Rossi et al., 2005).

According to Köeppen-Geiger classification, the climate of the region is classified as Cwa, dry winter mesothermal (Alvares et al., 2013). The annual mean temperature is 22ºC, and the annual mean precipitation is 1470 mm (INMET 2019).

The vegetation of the Mogi Guaçu basin is mainly composed of Atlantic Forest, with seasonal semideciduous forest (SSF) being the most common vegetation type (Bertoni 1984; Veloso & Góes Filho, 1982). However, PFSP is composed of different vegetation types, presenting the forested savanna in the north (CER, with altitudes between 605-575 m), and to the south, SSF (with altitudes between 575-535 m) (Rossi et al., 2005). Parallel to the Mogi Guaçu river, riparian forest is found (RP, with an average altitude of 530 m) (Bertoni & Martins, 1987; Konopczyk, 2014) (Figure 2). These vegetation types can be distinguished mainly by their structures, of which the CER presents a small average height and high density, while the SSF presents a greater average height and lower density (Vargas et al. 2018), and finally, the RP having the lowest density and diversity (Konopczyk, 2014). In addition, there are ecotonal areas among them (Sabino, 2013), as well as riverine variations (Konopczyk, 2014).

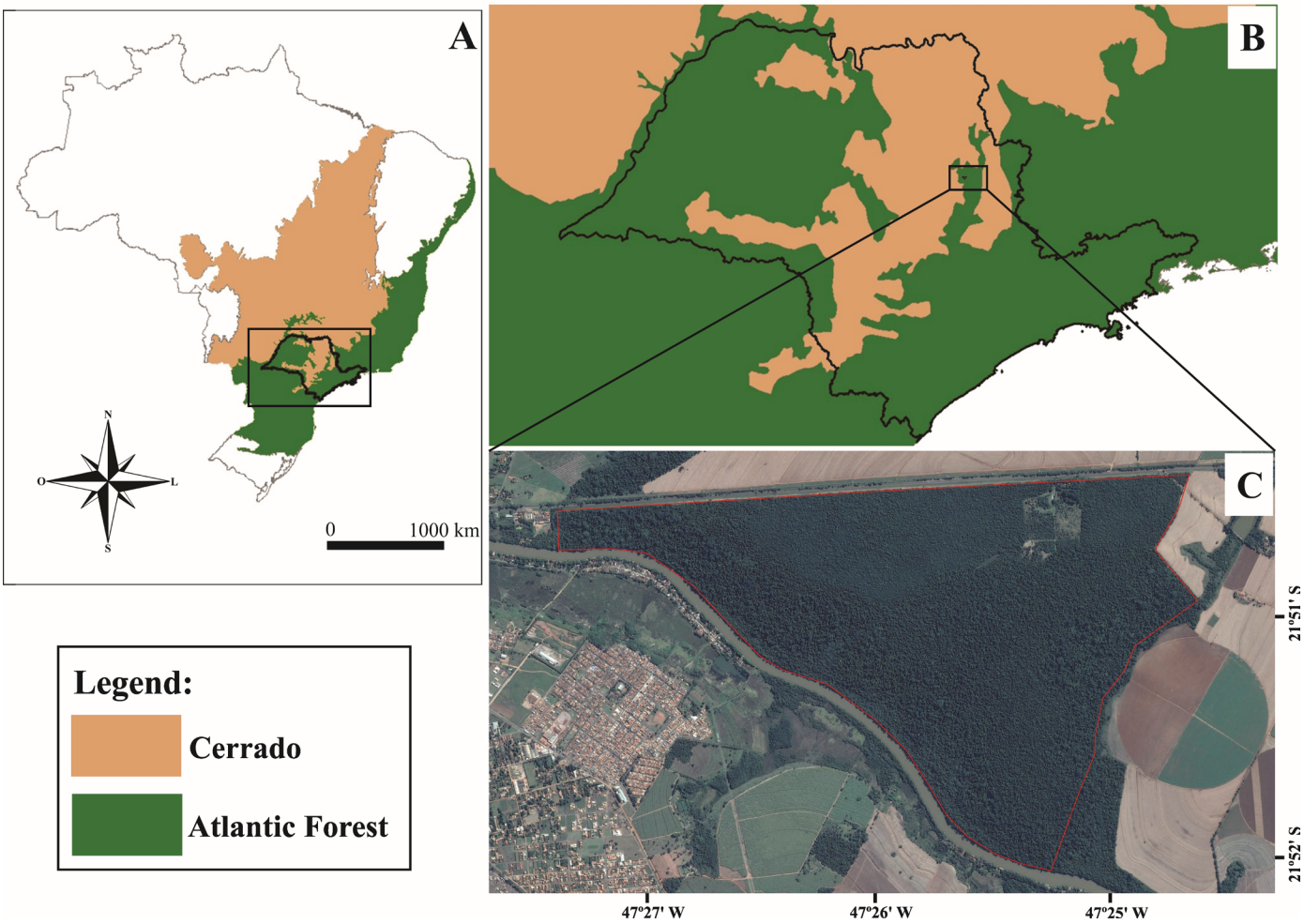

Figure 1. Location of Porto Ferreira State Park (PFSP), Porto Ferreira, São Paulo State. A. Atlantic Forest and the *Cerrado* in Brazil and the location of São Paulo State; B. Location of PFSP; C. PFSP satellite view, adapted from Google Earth.

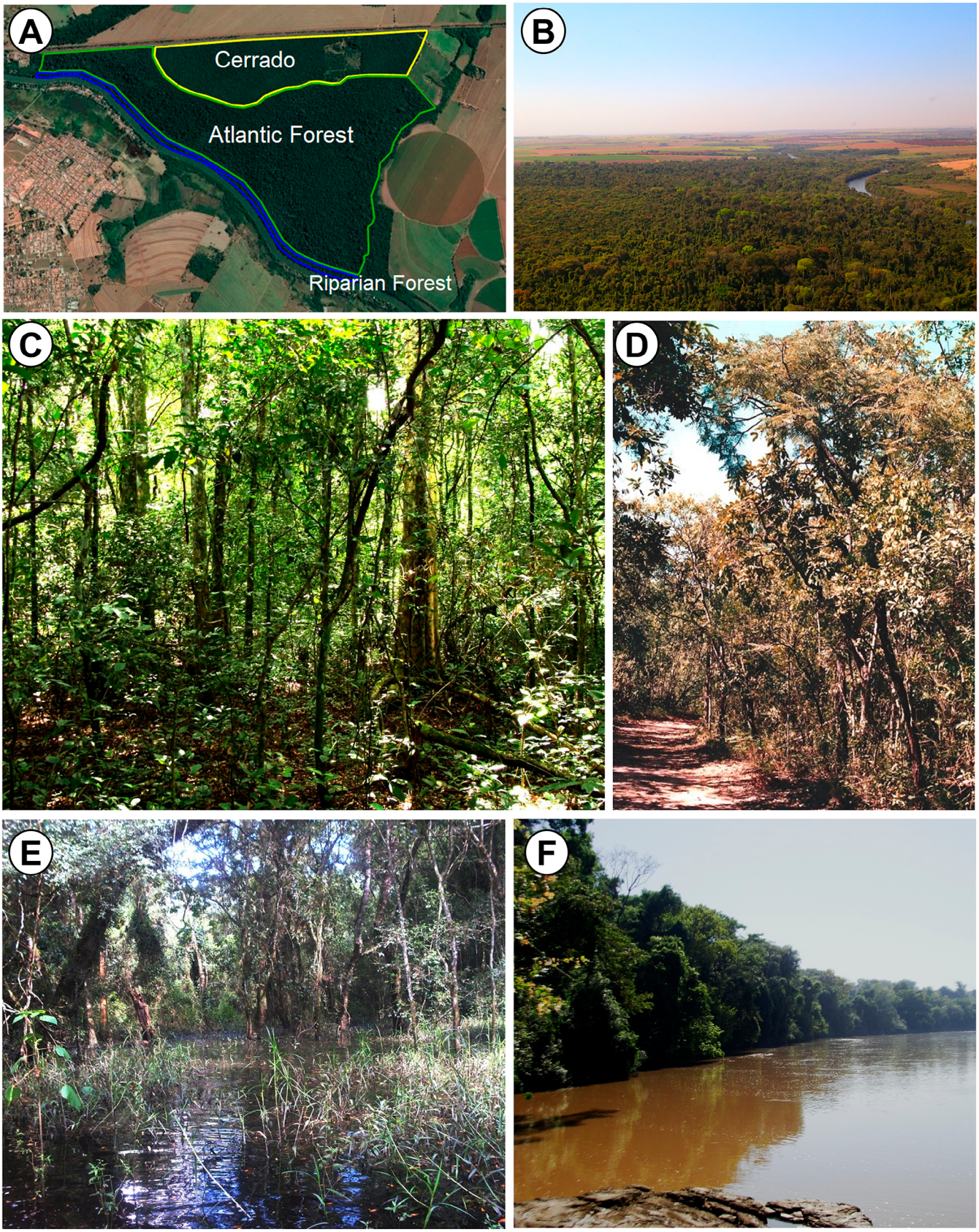

Figure 2. Vegetation types of Porto Ferreira State Park (PFSP), Porto Ferreira, São Paulo State. A: map indicating the vegetation types; B: aerial view of PFSP; C: seasonal semideciduous forest; D: cerradão; E: riparian forest; F: Mogi Guaçu river (A. Adapted from Google Earth; B. PFSP photo collection; C./F. Gabriel Mendes Marcusso; D. PFSP photo collection; E. Rafael Konopczyk).

The PFSP represents one of the few protected areas in São Paulo which comprises the contact between the *Cerrado* and Altantic Forest, becoming an important biotic pool of both, in a single and relatively small area. It also holds one of the largest and tallest populations of *Cariniana legalis* (Mart.) Kuntze and *Cariniana estrellensis* (Raddi) Kuntze (Lecythidaceae), with several individuals reaching up to 50 m. These trees are iconic elements of the PFSP.

The PFSP vascular flora checklist was created from the following: specimens collected by the authors from 2014 to 2017, using the walking research method (Filgueiras et al., 1994); the systematization of all other lists found in surveys carried out in PFSP (Bertoni, 1984; Bertoni & Martins, 1987; Bertoni et al., 2001; São Paulo, 2003; Colli et al., 2003; Oliveira, 2012; Osaco, 2012; Dickfeldt et al., 2013; Sabino, 2013; Konopczyk, 2014; Marcusso et al., 2016; Vargas et al., 2018); and the compilation of vouchers present in the Specieslink database (CRIA, 2019). We considered only native taxa identified at the taxonomic level of species and excluded those with dubious identification, at the genera-level and exotic species (cited in a separate table – Appendix 1). For angiosperms, the taxa classification followed the APG IV system (2016), and for ferns or lycophytes, the PPG I system (2016). The nomenclature and synonymizations were updated according to the *Flora do Brasil* (2020). When the data from *Flora do Brasil* (2020) were outdated or not available, we used the *Tropicos* (2019) database.

The life forms of the species were obtained through field observations, assessing the herbarium specimen labels information and, when this was not possible, we consulted the *Flora do Brasil* (2020) data. Shrubs and subshrubs were unified in a single category. To assess the number of exclusive and common species among the vegetation types in the study area, we built Venn diagrams for all the species together, and for each life form. The threatened species were classified according to The Red Book of Brazilian Flora (Martinelli & Moraes, 2013) and the list of threatened flora of São Paulo (SMA-SP, 2016).

The similarity in species composition was estimated by the Jaccard Index (Mueller-Dombois & Ellenberg, 1974), as well as this study and 14 others carried out in *Cerrado sensu lato*, SSF and RP vegetation types. Only vascular or phanerogamic floristic surveys were compared, which included studies performed in the South and Southeast regions of Brazil. Only native taxa identified at the taxonomic level of species were considered. Studies that sampled more than one vegetation type were subdivided into independent lists (*e.g.* Durigan et al., 1999), resulting in 22 lists (Table 1). We used a binary matrix with presence (1) and absence (0) to conduct an agglomerative hierarchical clustering analysis (Legendre & Legendre, 2012), by employing UPGMA (average linkage), and Jaccard dissimilarity in the vegan package (Oksanen et al. 2013) in R (R Core Team 2020).

Table 1. Studies of flora compared with this study.

CODE FOR THE STUDIES	STUDY SITE	VEGETATION TYPE	NSa / N	REFERENCE
A	Porto Ferreira - SP	Ssf	478 / 478	Present study
B	Porto Ferreira - SP	Cer	418 / 418	Present study
C	Porto Ferreira - SP	Rp	231 / 231	Present study
D	Piracicaba - SP	Ssf	269 / 289	Corrêa et al. 2018
E	Jundiaí, Itupeva, Cabreúva, Pirapora do Bom Jesus and Cajamar - SP	Ssf	835 / 976	Lombardi et al. 2012
F	Campinas - SP	Ssf	187 / 201	Guaratini et al. 2008
G	Descoberto - MG	Ssf	648 / 708	Forzza et al. 2014
H	São João Nepomuceno - MG	Ssf	174 / 204	Pifano et al. 2013
I	Caratinga - MG	Ssf	826 / 1048	Lombardi & Gonçalves 2000
J	Londrina - PR	Ssf	468 / 508	Rossetto & Vieira 2013
K	Avaré - SP	Rp+Ssf	90 / 93	Cielo-Filho et al. 2015
L	Avaré - SP	Cer	153 / 181	Cielo-Filho et al. 2015
M	Avaré - SP	Ec	33 / 33	Cielo-Filho et al. 2015
N	Santa Rita do Passa Quatro - SP	Cer	145 / 148	Batalha & Mantovani 2001
O	Santa Rita do Passa Quatro - SP	Css	336 / 339	Batalha & Mantovani 2001
P	Assis - SP	Cer	214 / 242	Durigan et al. 1999
Q	Assis - SP	Rp	120 / 134	Durigan et al. 1999
R	Assis - SP	Css	222 / 298	Durigan et al. 1999
S	Pirassununga - SP	Csl	339 / 358	Batalha et al. 1997
T	Pratânia - SP	Css	113 / 120	Carvalho et al. 2010
U	Bauru - SP	Csl	360 / 371	Cavassan & Weiser 2015
V	Botucatu - SP	Css	170 / 177	

Ssf: seasonal semideciduous forest; Rp: riparian forest; Cer: cerradão; Csl: cerrado *sensu lato*; Css: cerrado *sensu stricto*; Cc: campo cerrado; Ec: ecotone Ssf-Cer; NSa: number of taxons used in similarity analysis; N: total number of taxons.

Results

A total of 684 species distributed in 107 families and 387 genera were recorded (640 angiosperms and 44 ferns or lycophytes) (Table 2). The richest families were Fabaceae, with 64 species, followed by Myrtaceae (41), Orchidaceae (39), Rubiaceae (37), Asteraceae (35), Bignoniaceae (26), Malvaceae (20), Euphorbiaceae (19), Malpighiaceae and Sapindaceae (17 each) (Figure 3). These families account for 46% of the surveyed species, and 35 families (32.7%) had one single species. The richest genera were *Eugenia* (19 species), *Miconia* (14), *Myrcia* (11), *Solanum* (nine), *Peperomia* and *Serjania* (eight each). A separate list shows 152 excluded species and the reason for the exclusion (Appendix 1). The richest vegetation type was SSF, with 478 species, followed by the CER (418) and the RP (231).

From the registered species, 581 were listed in previous surveys, and 527 of them we found in herbaria vouchers. Added to the last floristic list prepared for the management plan, were 412 species, 70 of which were drawn from aleatory collections (not cited in previous surveys), and 33 from collections carried out by the authors of this study. Eight species recorded here are on the threatened list at the national level (Martinelli & Moraes, 2013) two of which - *Anemopaegma arvense* (Vell.) Stellfeld ex de Souza and *Cariniana legalis* (Mart.) Kuntze - are endangered, and six species [*Euterpe edulis* Mart., *Zeyheria tuberculosa* (Vell.) Bureau ex Verl., *Croton leptobotryus* Müll.Arg., *Cedrela fissilis* Vell., *Cattleya walkeriana* Gardner and *Isabelia virginalis* Barb.Rodr.] are listed as vulnerable. The list of threatened São Paulo State flora (SMA 2016) follows the same species and threat category as on the national list, except for *Cariniana legalis* (Mart.) Kuntze, classified as vulnerable.

Table 2. List of vascular flora species from Porto Ferreira State Park, municipality of Porto Ferreira, São Paulo State, southeastern Brazil.

Family/Species	Life form	Voucher	Source	Veg. type
ACANTHACEAE				
Justicia lythroides (Nees) V.A.W.Graham	Herb	HRCB, 52297	IV, XIII	cer, ssf
Mendoncia puberula Mart.	Climbing	HRCB, 52653; UEC, 173877	IV, IX, XIII	ssf
Ruellia brevifolia (Pohl) C.Ezcurra	Shrub	HRCB, 52389; MBML, 43930	IV, XIII	cer, ssf
Ruellia jussieuoides Schltdl. & Cham.	Shrub	HRCB, 52299	IV, XIII	cer, ssf
AMARANTHACEAE				
Alternanthera brasiliana (L.) Kuntze	Shrub	HRCB, 52458	IV, XIII	ssf
Chamissoa acuminata Mart.	Shrub	HRCB, 52323; HRCB, 68052	IV, IX, XIII	ssf
Pfaffia tuberosa (Spreng.) Hicken	Herb	HRCB, 54948; FUEL, 53509	IV, XIII	rp
AMARYLLIDACEAE				
Hippeastrum puniceum (Lam.) Kuntze	Herb	HRCB, 71787	XIII	rp
ANACARDIACEAE				
Astronium graveolens Jacq.	Tree		II, V, VI, VII, X	cer, ssf, rp
Astronium urundeuva (M. Allemão) Engl.	Tree		VI, X	cer, ssf
Lithraea molleoides (Vell.) Engl.	Tree	SPSF, 24691; UEC, 44048	III, XIII, X	cer
Schinus terebinthifolia Raddi	Tree		III, X	cer, ssf
Tapirira guianensis Aubl.	Tree	SPSF, 24702; UB, 147873	I, II, III, V, VI, VIII, X, XIII	cer, ssf, rp
Tapirira obtusa (Benth.) J.D.Mitch.	Tree		II, VI, X	cer, ssf, rp
ANEMIACEAE				
Anemia phyllitidis (L.) Sw.	Herb	BHCB, 141939	IV, XI, XIII	cer, ssf
Anemia tomentosa var. anthriscifolia (Schrad.) Mickel	Herb	BHCB, 153399	IV	cer, ssf
Anemia villosa Humb. & Bonpl. ex Willd.	Herb		XI	cer, ssf
ANNONACEAE				
Annona coriacea Mart.	Tree, Shrub	SPSF, 27349	III, X, XIII	cer
Annona crassiflora Mart.	Tree		III, X	cer
Annona dioica A.St.-Hil.	Shrub	UEC, 30475	III, X, XIII	cer
Annona sylvatica A.St.-Hil.	Tree		III, VI, X	cer
Duguetia furfuracea (A.St.-Hil.) Saff.	Tree		III, X	cer
Duguetia lanceolata A.St.-Hil.	Tree	HRCB, 62083	III, VI, X, XIII	cer, ssf, rp
Guatteria australis A.St.-Hil.	Tree	SPSF, 25925	III, X, XIII	cer, ssf, rp
Xylopia aromatica (Lam.) Mart.	Tree	MBM, 287171; SPSF, 27379	III, VI, X, XIII	cer
Xylopia brasiliensis Spreng.	Tree		III, V, VI, X	cer, ssf, rp
Xylopia sericea A.St.-Hil.	Tree		VI	cer

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Family/Species	Life form	Voucher	Source	Veg. type
APOCYNACEAE				
Aspidosperma cylindrocarpon Müll.Arg.	Tree		I, II, VII, X	ssf, rp
Aspidosperma polyneuron Müll.Arg.	Tree		II, X	ssf, rp
Aspidosperma ramiflorum Müll.Arg.	Tree	HRCB, 71805	I, X, XIII	ssf
Aspidosperma tomentosum Mart.	Tree		III, X	cer
Forsteronia australis Müll.Arg.	Climbing	HRCB, 67992	IX	cer
Forsteronia glabrescens Müll.Arg.	Climbing	HRCB, 52508	IV, XIII	cer, ssf
Forsteronia pubescens A.DC.	Climbing	HRCB, 67993	IX	cer, ssf
Gonolobus rostratus (Vahl) R.Br. ex Shult.	Climbing	HRCB, 52643	IV, XIII	cer
Mandevilla pohliana (Stadelm.) A.H.Gentry	Shrub	UEC, 37775	XIII	cer
Odontadenia lutea (Vell.) Markgr.	Shrub	HRCB, 68001	IX	cer
Oxypetalum appendiculatum Mart.	Climbing	HRCB, 67994	IX	cer
Prestonia coalita (Vell.) Woodson	Climbing	HRCB, 52381; HRCB, 67995	IV, IX, XIII	cer, ssf
Secondatia densiflora A.DC.	Climbing	HRCB, 67996	IX	cer, ssf
Temnadenia violacea (Vell.) Miers	Climbing	HRCB, 52464; HRCB, 71791	IV, IX, XIII	cer, ssf
AQUIFOLIACEAE				
Ilex cerasifolia Reissek	Tree	SPSF, 27381; MBM, 288153	III, X, XIII	cer
ARACEAE				
Philodendron propinquum Schott	Herb	HRCB, 62017	VIII, XIII	cer, ssf, rp
Thaumatophyllum bipinnatifidum (Schott ex Endl.) Sakur., Calazans & Mayo	Herb	HRCB, 62030	VIII, XIII	ssf
ARALIACEAE				
Dendropanax cuneatus (DC.) Decne. & Planch.	Tree	SPSF, 25481	I, V, VI, X, XIII	cer, ssf, rp
Didymopanax morototoni (Aubl.) Decne. & Planch.	Herb	HRCB, 71801	I, III, VI, X, XII, XIII	ssf
Didymopanax vinosus (Cham. & Schltdl.) Marchal	Tree	HRCB, 52466	IV, X, XIII	cer, ssf, rp
Hydrocotyle leucocephala Cham. & Schltdl.	Shrub	HRCB, 52290	IV, XIII	cer
ARECACEAE				
Acrocomia aculeata (Jacq.) Lodd. ex Mart.	Herb		III, VI, X	cer, rp
Allagoptera campestris (Mart.) Kuntze	Herb		III, X	cer
Euterpe edulis Mart.*	Herb		I, V, VI, X	cer, ssf, rp
Geonoma brevispatha Barb.Rodr.	Herb		III, X	cer, rp
Syagrus loefgrenii Glassman	Herb	SPSF, 20831	XIII	cer
Syagrus oleracea (Mart.) Becc.	Herb		I, X	ssf, rp
Syagrus romanzoffiana (Cham.) Glassman	Herb		I, II, III, VI, X	cer, ssf, rp
ARISTOLOCHIACEAE				
Aristolochia labiata Willd.	Climbing	HRCB, 52506; HRCB, 67998	IV, IX, XIII	cer, ssf
ASPARAGACEAE				
Herreria latifolia Woodson	Climbing	SPSF, 26298	XIII	cer, ssf
ASPLENIACEAE				
Asplenium auriculatum Sw.	Herb	UEC, 62342	XIII	ssf
Asplenium claussenii Hieron.	Herb	APO, 100	IV, XI	ssf, rp
Asplenium formosum Willd.	Herb	UEC, 62341	XI, XIII	ssf
Asplenium inaequilaterale Willd.	Herb		XI	ssf
Asplenium otites Link	Herb		XI	ssf

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Family/Species	Life form	Voucher	Source	Veg. type
ASTERACEAE				
Acanthospermum australe (Loefl.) Kuntze	Herb	HRCB, 52523	IV, XIII	cer, ssf
Baccharis dracunculifolia DC.	Shrub	HRCB, 59922	III, X, XIII	cer
Baccharis retusa DC.	Shrub	SPSF, 20788	XIII	cer
Bidens gardneri Baker	Herb	HRCB, 52402	IV, XIII	cer, ssf
Bidens segetum Mart. ex Colla	Climbing	HRCB, 52447	IV, IX, XIII	cer
Centratherum punctatum Cass.	Shrub	SPSF, 25939	XIII	cer
Chaptalia nutans (L.) Pol.	Herb	HRCB, 52662	IV, XIII	cer
Chromolaena laevigata (Lam.) R.M.King & H.Rob.	Shrub	HRCB, 52428	IV, XIII	cer, ssf
Chromolaena pedunculosa (Hook. & Arn.) R.M.King & H.Rob.	Shrub	HRCB, 52407	IV, XIII	cer, ssf
Chrysolaena obovata (Less.) Dematt.	Shrub	UEC, 25226	XIII	cer
Cyrtocymura scorpioides (Lam.) H.Rob.	Shrub	HRCB, 55870	IV, IX, XIII	ssf
Dasyphyllum brasiliense (Spreng.) Cabrera	Shrub	HRCB, 68000	IX	ssf
Elephantopus mollis Kunth	Herb	HRCB, 52314	IV, XIII	cer, ssf
Emilia fosbergii Nicolson	Herb	HRCB, 52524	IV, XIII	cer, ssf
Exostigma notobellidiastrum (Griseb.) G.Sancho	Herb	HRCB, 52646	IV, XIII	ssf
Melampodium divaricatum (Rich. ex Pers.) DC.	Shrub	HRCB, 52274; SP, 454549	XIII	ssf
Melampodium paniculatum Gardner	Shrub	HRCB, 52647	IV, XIII	ssf
Mikania cordifolia (L.f.) Willd.	Climbing	HRCB, 52453	IV, IX, XIII	cer
Mikania laevigata Sch.Bip. ex Baker	Climbing	HRCB, 53129	IV, IX, XIII	cer
Mikania triangularis Baker	Climbing	HRCB, 53122	IV, XIII	ssf
Moquiniastrum barrosoae (Cabrera) G. Sancho	Shrub	SPSF, 11351; HRCB, 55875	XIII	cer
Moquiniastrum paniculatum (Less.) G. Sancho	Shrub	UEC, 178504	IV, XIII	cer
Moquiniastrum polymorphum (Less.) G. Sancho	Tree		V	cer, ssf
Moquiniastrum pulchrum (Cabrera) G.Sancho	Shrub	UEC, 160575; SPSF, 20787	XIII	cer
Orthopappus angustifolius (Sw.) Gleason	Herb	HRCB, 52510	IV, XIII	cer, ssf
Piptocarpha macropoda (DC.) Baker	Tree	IPA, 89165; UEC, 44055	III, VI, X, XIII	cer, ssf
Piptocarpha rotundifolia (Less.) Baker	Tree	SPSF, 24695	III, X, XIII	cer
Porophyllum ruderale (Jacq.) Cass.	Herb	HRCB, 52480	IV, XIII	cer, ssf
Smallanthus connatus (Spreng.) H.Rob.	Herb	UEC, 181664	IV, XIII	ssf
Synedrella nodiflora (L.) Gaertn.	Shrub	HRCB, 52528	IV, XIII	cer, ssf
Trichogonia attenuata G.M.Barroso	Shrub	INPA, 172202; UEC, 45236	XIII	cer
Trichogoniopsis adenantha (DC.) R.M.King & H.Rob.	Shrub	HRCB, 52416	IV, XIII	cer, ssf
Vernonanthura divaricata (Spreng.) H.Rob.	Tree	SPSF, 25983; UEC, 166595	III, X, XIII	cer, ssf
Vernonanthura polyanthes (Sprengel) Vega & Dematteis	Shrub	SPSF, 25988; MBM, 276431	III, X, XIII	cer, ssf
Vernonia rubriramea Mart. ex DC.	Herb	HRCB, 52468; IAC, 55612	IV, XIII	cer, ssf
ATHYRIACEAE				
Diplazium cristatum (Desr.) Alston	Herb	UEC, 173868; HUEFS, 201975	IV, XI, XIII	ssf
BIGNONIACEAE				
Adenocalymma axillare (K.Schum.) L.G.Lohmann	Climbing	HUEFS, 179649	XIII	cer
Adenocalymma bracteatum (Cham.) DC.	Climbing	HRCB, 52384; HRCB, 52516	IV, IX, XIII	cer, ssf
Adenocalymma marginatum (Cham.) DC.	Climbing	HRCB, 52438	IV, IX, XIII	cer, ssf
Amphilophium crucigerum (L.) L.G.Lohmann	Climbing	HRCB, 68002	IX	cer, ssf
Amphilophium elongatum (Vahl) L.G.Lohmann	Climbing	HRCB, 52437; HRCB, 68003	IV, IX, XIII	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
Anemopaegma arvense (Vell.) Stellfeld ex de Souza *	Shrub	UEC, 544	XIII	cer
Anemopaegma chamberlaynii (Sims) Bureau & K.Schum.	Climbing	HRCB, 52521	IV, XIII	cer, ssf
Bignonia campanulata Cham.	Climbing	HRCB, 52382; HRCB, 68006	IV, IX, XIII	cer, ssf
Cuspidaria convoluta (Vell.) A.H.Gentry	Climbing	HRCB, 68007	IX	cer, ssf
Cuspidaria pulchella (Cham.) K.Schum.	Climbing	UEC, 602	XIII	cer
Cuspidaria pulchra (Cham.) L.G.Lohmann	Shrub	HRCB, 52475	IV, IX, XIII	cer, ssf
Dolichandra unguis-cati (L.) L.G.Lohmann	Climbing	HRCB, 68009	IX	ssf
Fridericia craterophora (DC.) L.G.Lohmann	Shrub	HRCB, 68005	IX	cer
Fridericia florida (DC.) L.G.Lohmann	Climbing	HRCB, 68004	IX	cer
Fridericia formosa (Bureau) L.G.Lohmann	Climbing	HRCB,52533; HRCB, 68010	IV, IX, XIII	cer, ssf
Fridericia platyphylla (Cham.) L.G.Lohmann	Shrub, Climbing	SPSF, 20825	III, X, XIII	cer
Fridericia speciosa Mart.	Shrub	HRCB, 68061	IX	cer, ssf
Handroanthus ochraceus (Cham.) Mattos	Tree		III, VI, X	cer, ssf
Handroanthus vellosoi (Toledo) Mattos	Tree		I, II, VI, X	cer, ssf, rp
Jacaranda caroba (Vell.) DC.	Shrub		III, X	cer, ssf
Lundia obliqua Sond.	Climbing	HRCB, 52519	IV, IX, XIII	cer, ssf
Pyrostegia venusta (Ker Gawl.) Miers	Climbing	HRCB, 68060	IV, IX, XIII	cer, ssf
Stizophyllum perforatum (Cham.) Miers	Climbing	HRCB, 68012; MBML, 43933	IV, IX, XIII	cer, ssf
Tanaecium selloi (Spreng.) L.G.Lohmann	Climbing	HRCB, 52497	IV, IX, XIII	cer, ssf
Zeyheria montana Mart.	Tree		III, X	cer, ssf
Zeyheria tuberculosa (Vell.) Bureau ex Verl.*	Tree		I, X	ssf
BIXACEAE				
Cochlospermum regium (Mart. ex Schrank) Pilg.	Shrub		III, X	cer
BLECHNACEAE				
Blechnum lanceola Sw.	Herb		XI	ssf, rp
BORAGINACEAE				
Cordia americana (L.) Gottschling & J.S.Mill.	Tree		I, X	ssf, rp
Cordia sellowiana Cham.	Tree	UEC, 44043	III, V, X, XIII	cer, ssf, rp
Cordia tarodae M.Stapf	Tree	UEC, 45624	XIII	ssf
Cordia trichotoma (Vell.) Arráb. ex Steud.	Tree		X	cer, ssf
Myriopus rubicundus (Salzm. ex DC.) Luebert	Climbing	HRCB, 68013	IX	cer
Varronia urticifolia (Cham.) J.S.Mill.	Shrub	HRCB, 68014	IX	cer
BROMELIACEAE				
Acanthostachys strobilacea (Schult. & Schult.f.) Klotzsch	Herb	HRCB, 62025	VIII, XIII	ssf, rp
Aechmea bromeliifolia (Rudge) Baker	Herb	HRCB, 53966	IV, VIII, XIII	cer, rp
Billbergia distachia (Vell.) Mez	Herb	HRCB, 64216	VIII, XIII	rp
Tillandsia loliacea Mart. ex Schult. & Schult.f.	Herb	HRCB, 62042	IV, VIII, XIII	cer, ssf, rp
Tillandsia pohliana Mez	Herb	HRCB, 55873	IV, VIII, XIII	cer, ssf
Tillandsia recurvata (L.) L.	Herb	HRCB, 53494	IV, VIII, XIII	cer, ssf, rp
Tillandsia tenuifolia L.	Herb	HRCB, 62029	VIII, XIII	ssf
Tillandsia tricholepis Baker	Herb	HRCB, 62381; MBML, 43977	IV, VIII, XIII	cer, ssf, rp
BURSERACEAE				
Protium heptaphyllum (Aubl.) Marchand	Tree	SPSF, 25408; UEC, 49396	I, II, III, V, VI, X, XIII	cer, ssf, rp

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Family/Species	Life form	Voucher	Source	Veg. type
CACTACEAE				
Epiphyllum phyllanthus (L.) Haw.	Herb	HRCB, 54943	IV, VIII, XIII	cer, ssf, rp
Lepismium warmingianum (K.Schum.) Barthlott	Herb	HRCB, 54942	IV, VIII, XIII	rp
Pereskia aculeata Mill.	Climbing	HRCB, 54944; FUEL, 53546	IV, IX, XIII	ssf
Rhipsalis baccifera (J.M.Muell.) Stearn	Herb	HRCB, 54010	IV, VIII, XIII	cer, ssf, rp
Rhipsalis cereuscula Haw.	Herb	HRCB, 62020	VIII	cer, ssf
Rhipsalis floccosa Salm-Dyck ex Pfeiff.	Herb	HRCB, 62558	VIII	rp
Rhipsalis teres (Vell.) Steud.	Herb	HRCB, 54009	IV, VIII, XIII	cer, ssf, rp
CALOPHYLLACEAE				
Calophyllum brasiliense Cambess.	Tree	HRCB, 71782	VI, VII, XIII	cer, ssf, rp
Kielmeyera variabilis Mart. & Zucc.	Shrub		III, X	cer
CANNABACEAE				
Celtis iguanaea (Jacq.) Sarg.	Shrub	HRCB, 55490; SPSF, 25994	III, IV, IX, X, XIII	cer, ssf
Trema micrantha (L.) Blume	Shrub	HRCB, 74507	I, X, XIII	ssf, rp
CANNACEAE				
Canna paniculata Ruiz & Pav.	Herb	HRCB, 52268	IV, XIII	ssf
CARICACEAE				
Jacaratia spinosa (Aubl.) A.DC.	Tree		X	ssf
CARYOCARACEAE				
Caryocar brasiliense Cambess.	Tree	UEC, 1285; HRCB, 74505	III, X, XIII	cer
CELASTRACEAE				
Monteverdia communis (Reissek) Biral	Tree, Shrub		II, X	ssf, rp
Monteverdia gonoclada (Mart.) Biral	Tree, Shrub	SPSF, 25970	XIII	ssf, rp
Semialarium paniculatum (Mart. ex Schult.) N.Hallé	Climbing	HRCB, 55492	IV, IX, XIII	ssf
CHRYSOBALANACEAE				
Hirtella hebeclada Moric. ex DC.	Tree		II, X	ssf, rp
CLETHRACEAE				
Clethra scabra Pers.	Tree	UEC, 44047	III, VI, X, XIII	cer, ssf, rp
CLUSIACEAE				
Garcinia gardneriana (Planch. & Triana) Zappi	Tree	SPSF, 25936; HRCB, 71785	X, XIII	ssf, rp
COMBRETACEAE				
Terminalia argentea Mart.	Tree, Shrub	SPSF, 17398; HRCB, 58786	III, VI, X, XIII	cer, ssf
Terminalia glabrescens Mart.	Tree	SPSF, 17396	I, II, III, V, VI, X, XIII	cer, ssf, rp
Terminalia triflora (Griseb.) Lillo	Tree, Shrub	MBM, 169207	XIII	rp
COMMELINACEAE				
Commelina obliqua Vahl	Herb	HRCB, 52456	XIII	cer
Dichorisandra hexandra (Aubl.) C.B.Clarke	Climbing	HRCB, 52280; CEN, 85755	IV, IX	ssf
Gibasis geniculata (Jacq.) Rohweder	Herb	HRCB, 52652; HURB, 3225	IV, XIII	ssf
Tradescantia zanonia (L.) Sw.	Herb	HRCB, 62046	IV, VIII, XIII	cer, ssf
Tripogandra diuretica (Mart.) Handlos	Herb	HRCB, 52279; UEC, 173873	IV, XIII	ssf
CONNARACEAE				
Connarus suberosus Planch.	Tree, Shrub	SPSF, 24704	III, X	cer
Rourea induta Planch.	Shrub	SPSF, 27336; HURB, 3592	XIII	cer
CONVOLVULACEAE				
Camonea umbellata (L.) A.R. Simões & Staples	Climbing	HRCB, 52517; CEN, 85754	XIII	cer, ssf
Distimake macrocalyx (Ruiz & Pav.) A.R. Simões & Staples	Climbing	HRCB, 52656; SPSF, 27346	IV, IX, XIII	cer, ssf
Ipomoea chondrosepala Hallier f.	Climbing	HRCB, 52518	IV, IX, XIII	cer, ssf
Ipomoea saopaulista O'Donell	Climbing	HRCB, 52504	IV, IX, XIII	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
CUCURBITACEAE				
Psiguria ternata (M.Roem.) C.Jeffrey	Climbing	HRCB, 68016	IX	cer
Wilbrandia hibiscoides Silva Manso	Climbing	UEC, 43383	XIII	ssf
CUNONIACEAE				
Lamanonia ternata Vell.	Tree	UEC, 75747	III, X, XIII	cer, ssf
CYATHEACEAE				
Cyathea delgadii Sternb.	Herb		XI	rp
CYPERACEAE				
Cyperus laxus Lam.	Herb	HRCB, 52433	IV, XIII	cer, ssf
Cyperus luzulae (L.) Retz.	Herb	HRCB, 54933	IV, XIII	rp
Cyperus simplex Kunth	Herb	HRCB, 52459	IV, XIII	cer
Rhynchospora exaltata Kunth	Herb	HRCB, 52423; UEC, 16576	IV, XIII	cer, ssf
Scleria gaertneri Raddi	Herb	HRCB, 52434	IV, XIII	cer, ssf
Scleria latifolia Sw.	Herb	HRCB, 71789	IX, XIII	ssf, rp
DILLENIACEAE				
Davilla elliptica A.St.-Hil.	Shrub, Climbing	HRCB, 52451	III, IV, IX, X, XIII	cer, ssf
Davilla rugosa Poir.	Climbing	HRCB, 52663	IV, IX, XIII	cer, ssf
Doliocarpus dentatus (Aubl.) Standl.	Shrub, Climbing	HRCB, 52500	IV, IX, XIII	cer, ssf
DIOSCOREACEAE				
Dioscorea dodecaneura Vell.	Climbing	JAL, 7736	IV, IX	cer, ssf
Dioscorea olfersiana Klotzsch ex Griseb.	Climbing	HRCB, 52395	IV, IX, XIII	cer, ssf
DRYOPTERIDACEAE				
Bolbitis serratifolia Schott	Herb		XI	ssf
Ctenitis eriocaulis (Fée) Alston	Herb	BHCB, 60861	XI, XIII	rp
Ctenitis submarginalis (Langsd. & Fisch.) Ching	Herb	JAL, 7772	IV, XI	cer, ssf
Lastreopsis effusa (Sw.) Tindale	Herb		XI	ssf
Polystichum platyphyllum (Willd.) C.Presl	Herb		XI	ssf
ELAEOCARPACEAE				
Sloanea hirsuta (Schott) Planch. ex Benth.	Tree	HRCB, 4966; UEC, 25465	XIII	ssf
ERYTHROXYLACEAE				
Erythroxylum buxus Peyr.	Shrub	UEC, 44051	XIII	rp
Erythroxylum cuneifolium (Mart.) O.E.Schulz	Shrub	FUEL, 39773	III, X, XIII	cer
Erythroxylum deciduum A.St.-Hil.	Tree, Shrub	BOTU, 20419	V, XIII	cer, ssf
Erythroxylum pelleterianum A.St.-Hil.	Shrub	TEPB, 25904	III, V, X, XIII	cer, ssf
Erythroxylum suberosum A.St.-Hil.	Tree, Shrub	SPSF, 25273	III, X, XIII	cer
Erythroxylum subracemosum Turcz.	Tree, Shrub		III, X	cer
Erythroxylum tortuosum Mart.	Tree, Shrub		III, X	cer
EUPHORBIACEAE				
Actinostemon concepcionis (Chodat & Hassl.) Hochr.	Shrub	HRCB, 62085; SPSF, 49093	III, V,VII, X, XIII	cer, ssf, rp
Actinostemon klotzschii (Didr.) Pax	Tree, Shrub	INPA, 78113	I, II, III, X, XIII	cer, rp
Alchornea glandulosa Poepp. & Endl.	Tree	SPSF,25976	III, VI, X, XIII	cer, ssf, rp
Aparisthmium cordatum (A.Juss.) Baill.	Tree		V	ssf
Cnidoscolus urens (L.) Arthur	Shrub	SPSF, 19516; SPSF, 20820	XIII	ssf
Croton floribundus Spreng.	Tree	HRCB, 74503	I, II, III, V, VI, X, XIII	cer, ssf, rp
Croton leptobotryus Müll.Arg. *	Shrub	HRCB, 71804	XIII	cer

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Family/Species	Life form	Voucher	Source	Veg. type
Croton lundianus (Didr.) Müll.Arg.	Shrub	HRCB, 52414	IV, XIII	cer, ssf
Croton salutaris Casar.	Tree		I, X	ssf, rp
Croton urucurana Baill.	Tree	HRCB, 62052	I, II, VII, X, XIII	rp
Dalechampia pentaphylla Lam.	Climbing	HRCB, 52431	IV, IX, XIII	cer, ssf
Dalechampia stipulacea Müll.Arg.	Climbing	HRCB, 52318	IV, IX, XIII	ssf
Dalechampia triphylla Lam.	Climbing	HRCB, 68019	IX	ssf
Euphorbia sciadophila Boiss.	Herb	HRCB, 52272	IV, XIII	ssf
Gymnanthes klotzschiana Müll.Arg.	Tree, Shrub	HRCB, 62050; SPSF, 49075	I, II, VII, X, XIII	ssf, rp
Mabea fistulifera Mart.	Tree, Shrub	IAC, 54530; SPSF, 20783	III, X, XIII	cer
Maprounea guianensis Aubl.	Tree	SPSF, 25905	III, V, VI, XIII	cer, ssf
Pachystroma longifolium (Nees) I.M.Johnst.	Tree		X	ssf
Sapium glandulosum (L.) Morong	Tree	SPSF, 25151	III, X, XIII	cer, ssf, rp
FABACEAE				
Aeschynomene racemosa Vogel	Shrub		III, X	cer
Albizia niopoides (Spruce ex Benth.) Burkart	Tree		VII, X	rp
Andira anthelmia (Vell.) Benth.	Tree		III, VI, X	cer, ssf, rp
Andira fraxinifolia Benth.	Tree	MBM, 207659	III, X, XIII	cer
Andira humilis Mart. ex Benth.	Tree, Shrub	CGMS, 43980	VI, XIII	cer, ssf
Andira inermis (W.Wright) DC.	Tree		I, X	ssf
Andira vermifuga (Mart.) Benth.	Tree	UEC, 44042	XIII	cer
Bauhinia holophylla (Bong.) Steud.	Shrub	SPSF, 17378	III, X, XIII	cer
Bowdichia virgilioides Kunth	Tree		III, X	cer, ssf
Camptosema spectabile (Tul.) Burkart	Climbing	SPSF, 20842	XIII	cer
Canavalia picta Mart. ex Benth.	Climbing	HRCB, 52658	IV, IX, XIII	cer
Cassia ferruginea (Schrad.) Schrad. ex DC.	Tree	UEC, 25224	I, II, X, XIII	ssf, rp
Centrolobium tomentosum Guillem. ex Benth.	Tree		I, II, V, X	cer, ssf, rp
Centrosema sagittatum (Humb. & Bonpl. ex Willd.) Brandegee	Climbing	HRCB, 68020; UEC, 170139	IX, XIII	ssf
Chamaecrista flexuosa (L.) Greene	Shrub	HRCB, 52452	III, IV, X, XIII	cer
Copaifera langsdorffii Desf.	Tree		I, II, III, V, VI, VII, X	cer, ssf, rp
Dahlstedtia muehlbergiana (Hassl.) M.J.Silva & A.M.G. Azevedo	Tree		I, X	ssf, rp
Dalbergia miscolobium Benth.	Tree		III, X	cer
Desmodium affine Schltdl.	Shrub	HRCB, 52293	IV, XIII	ssf
Desmodium distortum (Aubl.) J.F.Macbr.	Shrub	HRCB, 52507	IV, XIII	cer, ssf
Desmodium uncinatum (Jacq.) DC.	Shrub	HRCB, 52391	IV, XIII	cer, ssf
Dimorphandra mollis Benth.	Tree	HRCB, 71802	III, VI, X, XIII	cer, ssf
Dioclea violacea Mart. ex Benth.	Climbing	HRCB, 68021	IX	ssf
Enterolobium contortisiliquum (Vell.) Morong	Tree		X	ssf
Enterolobium gummiferum (Mart.) J.F.Macbr.	Tree		III, X	cer
Erythrina falcata Benth.	Tree		III, X	cer, ssf, rp
Holocalyx balansae Micheli	Tree		II, X	ssf, rp
Hymenaea courbaril L.	Tree	HUSC, 11451	I, X, XIII	ssf, rp
Hymenaea stigonocarpa Mart. ex Hayne	Tree		III, X	cer
Inga edulis Mart.	Tree		I, X	ssf
Inga laurina (Sw.) Willd.	Tree	INPA, 205844	I, II, X, XIII	ssf, rp

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Family/Species	Life form	Voucher	Source	Veg. type
Inga marginata Willd.	Tree	SPSF, 27342; UB, 128870	I, II, V, X, XIII	ssf, rp
Inga striata Benth.	Tree	UEC, 49402; UB, 128891	I, II, V, VI, X, XIII	cer, ssf, rp
Inga vera subsp. affinis (DC.) T.D.Penn.	Tree	HRCB, 62049	VII, X, XIII	rp
Leptolobium dasycarpum Vogel	Tree	SPSF, 24697	III, VI, X, XIII	cer, ssf
Leptolobium elegans Vogel	Tree	UEC, 7418; CGMS, 43984	III, X, XIII	cer
Lonchocarpus cultratus (Vell.) A.M.G.Azevedo & H.C.Lima	Tree		VII	rp
Machaerium aculeatum Raddi	Shrub, Climbing		V, VI	cer, ssf
Machaerium acutifolium Vogel	Tree		III, X	cer
Machaerium brasiliense Vogel	Tree, Shrub, Climbing		I, X	ssf, rp
Machaerium hirtum (Vell.) Stellfeld	Tree		VII	rp
Machaerium nyctitans (Vell.) Benth.	Tree	UEC, 49387; UB, 142145	II, X, XIII	ssf, rp
Machaerium stipitatum Vogel	Tree		III, X	cer, ssf
Machaerium villosum Vogel	Tree		I, II, III, VI, X	cer, ssf, rp
Myroxylon peruiferum L.f.	Tree		X, XIII	ssf, rp
Ormosia arborea (Vell.) Harms	Tree	MBM, 189660; IAC, 54532	I, X, XIII	ssf, rp
Peltophorum dubium (Spreng.) Taub.	Tree	SPSF, 49081	III, VI, VII, X, XIII	cer, ssf, rp
Plathymenia reticulata Benth.	Tree		III, X	cer
Platycyamus regnellii Benth.	Tree		I, X	ssf
Platypodium elegans Vogel	Tree	CGMS, 43971	III, VI, X	cer, ssf
Pterogyne nitens Tul.	Tree		II, X	ssf, rp
Rhynchosia melanocarpa Grear	Climbing	UEC, 170127; FUEL, 33424	XIII	cer, ssf
Rhynchosia phaseoloides (Sw.) DC.	Climbing	HRCB, 68022; SPSF, 25897	IX, XIII	cer, ssf
Senegalia lowei (L.Rico) Seigler & Ebinger	Climbing		III, X	cer
Senegalia polyphylla (DC.) Britton & Rose	Tree	SPSF, 49080; UEC, 109268	I, II, III, V, VI, VII, X, XIII	cer, ssf, rp
Senna macranthera (DC. ex Collad.) H.S.Irwin & Barneby	Tree		III, X	cer, ssf, rp
Senna multijuga (Rich.) H.S.Irwin & Barneby	Tree		X	ssf
Senna pendula (Humb.& Bonpl.ex Willd.) H.S.Irwin & Barneby	Tree, Shrub	UEC, 44044	III, X, XIII	cer, ssf
Senna rugosa (G.Don) H.S.Irwin & Barneby	Shrub	SPSF, 25935; HUEFS, 202006	III, IV, X, XIII	cer, ssf
Senna silvestris (Vell.) H.S.Irwin & Barneby	Tree, Shrub	UEC, 44054	III, X, XIII	cer, ssf
Stryphnodendron polyphyllum Mart.	Tree		III, X	cer
Stylosanthes viscosa (L.) Sw.	Shrub	IAC, 21993	XIII	cer, ssf, rp
Tachigali aurea Tul.	Tree		III, X	cer, ssf
Zornia latifolia Sm.	Shrub	APO, 33	IV	cer, ssf
GENTIANACEAE				
Voyria aphylla (Jacq.) Pers.	Herb	HRCB, 52305	IV, XIII	cer, ssf
HYMENOPHYLLACEAE				
Crepidomanes pyxidiferum (L.) Dubuisson & Ebihara	Herb	HRCB, 71765	XIII	ssf
IRIDACEAE				
Cipura paludosa Aubl.	Herb	GMM,798	XIII	cer
LACISTEMATACEAE				
Lacistema hasslerianum Chodat	Shrub	SPSF, 49083; UEC, 25118	I, III, V, VI, VII, X, XIII	cer, ssf, rp

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Family/Species	Life form	Voucher	Source	Veg. type
LAMIACEAE				
Aegiphila integrifolia (Jacq.) Moldenke	Tree	MBML, 45129	III, VI, X, XIII	cer, ssf
Aegiphila verticillata Vell.	Tree, Shrub	SPSF; 25933	III, X, XIII	cer
Cantinoa mutabilis (Rich.) Harley & J.F.B.Pastore	Shrub	CEN, 85801	IV, XIII	ssf
Hyptis campestris Harley & J.F.B. Pastore	Shrub	CEN, 85804	IV, XIII	cer, ssf
Marsypianthes chamaedrys (Vahl) Kuntze	Shrub	APO, 32	IV	cer, ssf
Ocimum carnosum (Spreng.) Link & Otto ex Benth.	Shrub	CEN, 85860; FUEL, 53549	IV, XIII	ssf
Vitex cymosa Bertero ex Spreng.	Tree		II, X	ssf, rp
Vitex megapotamica (Spreng.) Moldenke	Tree	INPA, 266948; SPSF, 49088	VII, XIII	rp
LAURACEAE				
Cryptocarya moschata Nees & Mart.	Tree		I, X	ssf
Endlicheria paniculata (Spreng.) J.F.Macbr.	Tree	SPSF, 20773	I, II, III, V, X, XIII	cer, ssf, rp
Nectandra megapotamica (Spreng.) Mez	Tree	HRCB, 62086; HUEFS, 227999	I, II, III, V, VII, X, XIII	cer, ssf, rp
Nectandra nitidula Nees	Tree	MBM, 128256; UEC, 40205	III, X, XIII	cer, ssf
Ocotea acutifolia (Nees) Mez	Tree		III, X	cer
Ocotea corymbosa (Meisn.) Mez	Tree	HRCB, 58790; UEC, 40302	III, V, VI, X, XIII	cer, ssf
Ocotea indecora (Schott) Mez	Tree		VII	rp
Ocotea nutans (Nees) Mez	Tree		VI	cer, ssf
Ocotea oppositifolia S.Yasuda	Tree		II	rp
Ocotea pulchella (Nees & Mart.) Mez	Tree	HRCB, 52511; UB, 150238	III, VI, X	cer, ssf
Ocotea velutina (Nees) Rohwer	Tree	HRCB, 71803	VI, VII, XIII	cer, ssf, rp
Persea willdenovii Kosterm.	Tree		III, X	cer
LECYTHIDACEAE				
Cariniana estrellensis (Raddi) Kuntze	Tree		I, II, X	ssf, rp
Cariniana legalis (Mart.) Kuntze *	Tree	HRCB, 74506	I, II, X, XIII	ssf, rp
LOGANIACEAE				
Spigelia beyrichiana Cham. & Schltdl.	Herb	UEC, 9311	IV, XIII	cer, ssf
Strychnos parvifolia A.DC.	Shrub		I	ssf
Strychnos pseudoquina A.St.-Hil.	Shrub	UEC, 25119	III, X, XIII	cer
LORANTHACEAE				
Tripodanthus acutifolius (Ruiz & Pav.) Tiegh.	Herb	UEC, 9390	XIII	cer
LYGODIACEAE				
Lygodium volubile Sw.	Climbing	HRCB, 68050	IV, IX, XIII	cer, ssf, rp
LYTHRACEAE				
Diplusodon virgatus Pohl	Tree, Shrub	APO, 14	III, IV, X	cer
Lafoensia pacari A.St.-Hil.	Tree	SPSF, 27378	III, X, XIII	cer
MALPIGHIACEAE				
Banisteriopsis adenopoda (A.Juss.) B.Gates	Climbing	SP, 470763	IV, IX, XIII	cer
Banisteriopsis argyrophylla (A.Juss.) B.Gates	Climbing	SP, 470760	IV, IX, XIII	cer, ssf
Banisteriopsis latifolia (A.Juss.) B.Gates	Tree	HRCB, 68025	IX	cer
Banisteriopsis malifolia var. malifolia (Nees & Mart.) B.Gates	Shrub, Climbing	HRCB, 68026	IV, IX	cer, ssf
Banisteriopsis oxyclada (A.Juss.) B.Gates	Climbing	HRCB, 68027	IX	cer, ssf
Banisteriopsis stellaris (Griseb.) B.Gates	Shrub, Climbing	HRCB, 68028	IV, IX, XIII	cer
Banisteriopsis variabilis B.Gates	Shrub, Climbing	HRCB, 68029	IV, IX, XIII	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
Byrsonima coccolobifolia Kunth	Tree, Shrub		III, X	cer
Byrsonima intermedia A.Juss.	Shrub	SP, 470813	III, IV, V, VI, X, XIII	cer, ssf
Byrsonima laxiflora Griseb.	Tree	SPSF, 17497	XIII	cer
Carolus chlorocarpus (A.Juss.) W.R.Anderson	Climbing	SP, 470892	XIII	cer, ssf
Diplopterys pubipetala (A.Juss.) W.R.Anderson & C.C.Davis	Climbing	FUEL, 53523	IV, IX, XIII	cer
Heteropterys umbellata A.Juss.	Shrub	JAL, 8089	IV, IX	cer, ssf
Mascagnia cordifolia (A.Juss.) Griseb.	Climbing	SP, 470891; UEC, 10048	IV, IX	cer
Niedenzuella lucida (A.Juss.) W.R.Anderson	Climbing	HRCB, 68034	IX	ssf
Niedenzuella multiglandulosa (A.Juss.) W.R.Anderson	Climbing	SP, 470871; HRCB, 68032	IV, IX, XIII	cer, ssf
Stigmaphyllon lalandianum A.Juss.	Climbing	HRCB, 68033	IX	ssf
MALVACEAE				
Callianthe fluviatilis (Vell.) Donnel	Shrub	UEC, 44041	XIII	ssf
Ceiba speciosa (A.St.-Hil.) Ravenna	Tree		I, X	ssf, rp
Christiana macrodon Toledo	Tree, Shrub	SPSF, 49089	I, X, XIII	ssf, rp
Eriotheca candolleana (K.Schum.) A.Robyns	Tree	SPSF, 25432	I, II, X, XIII	ssf, rp
Eriotheca gracilipes (K.Schum.) A.Robyns	Tree	SPSF, 20782	III, X, XIII	cer
Guazuma ulmifolia Lam.	Tree	HRCB, 71797	I, III, X, XIII	cer, ssf
Helicteres brevispira A.St.-Hil.	Shrub	UEC, 14815	XIII	cer, rp
Helicteres macropetala A.St.-Hil.	Tree, Shrub		III, X	cer
Heliocarpus popayanensis Kunth	Tree	UEC, 25137	XIII	ssf
Luehea divaricata Mart. & Zucc.	Tree	SPSF, 49112	I, II, VI, VII, X, XIII	cer, ssf, rp
Luehea grandiflora Mart. & Zucc.	Tree	HUEFS, 201978; UEC, 43389	III, VI, X, XIII	cer, ssf
Pavonia nemoralis A.St.-Hil.	Shrub	JAL, 8079	IV	ssf
Pavonia sepium A.St.-Hil.	Shrub	FUEL, 53518	IV, XIII	ssf
Pseudobombax grandiflorum (Cav.) A.Robyns	Tree	HRCB, 71798	I, VI, X, XIII	cer, ssf
Pseudobombax longiflorum (Mart.) A.Robyns	Tree		III, X	cer
Sida cordifolia L.	Shrub	FUEL, 53517	IV, XIII	cer, ssf
Sida linifolia Cav.	Shrub	APO, 15	IV	cer, ssf
Sida rhombifolia L.	Herb	FUEL, 53519	IV, XIII	ssf
Sida urens L.	Shrub	APO, 105	IV	ssf
Wissadula hernandioides (L.Hér.) Garcke	Shrub	FUEL, 53521	IV, XIII	cer, ssf
MARANTACEAE				
Goeppertia eichleri (Petersen) Borchs. & S.Suárez	Herb	UNOP, 3703	IV, XIII	ssf
Goeppertia flavescens (Lindl). Borchs. & S.Suárez	Herb	MBML, 48122	IV, XIII	ssf
Goeppertia sellowii (Körn.) Borchs. & S. Suárez	Herb	UEC, 168472	XIII	ssf
MELASTOMATACEAE				
Leandra aurea (Cham.) Cogn.	Shrub	SPSF, 25986; UEC, 172881	III, X, XIII	cer
Miconia affinis DC.	Tree	HUEFS, 176684; SPSF, 25907	V, VI, XIII	cer, ssf
Miconia albicans (Sw.) Triana	Tree, Shrub	SPSF, 49124; MBM, 204234	III, V, X, XIII	cer, ssf
Miconia chamissois Naudin	Shrub	SPSF, 25928	XIII	cer, ssf
Miconia collatata Wurdack	Tree, Shrub	SPSF, 49090; UEC, 50534	VII, XIII	rp
Miconia discolor DC.	Tree	UPCB, 71216; SPSF, 25930	IV, XIII	cer, ssf
Miconia eugenioides Triana	Tree, Shrub	UB, 133972	I, II, X, XIII	cer, rp
Miconia ibaguensis (Bonpl.) Triana	Tree, Shrub	SPSF, 25927; UEC, 49409	XIII	cer
Miconia jucunda (DC.) Triana	Tree, Shrub	UEC, 49404	XIII	rp
Miconia latecrenata (DC.) Naudin	Tree, Shrub	SPSF, 16626; MBM, 169217	III, X, XIII	cer, ssf
Miconia ligustroides (DC.) Naudin	Tree, Shrub	SPSF, 25274; UEC, 172872	III, VI, X, XIII	cer, ssf
Miconia nervosa (Sm.) Triana	Shrub	SPSF, 25929; FUEL;,39778	IV, XIII	cer
Miconia paucidens DC.	Tree, Shrub	SPSF, 25989; UEC, 172869	III, IV, V, X, XIII	cer, ssf
Miconia rubiginosa (Bonpl.) DC.	Tree, Shrub	SPSF, 25982; UB, 134163	III, VI, XIII	cer, ssf
Miconia stenostachya DC.	Shrub	SPSF, 20790; UEC, 40240	III, IV, X, XIII	cer
Pleroma stenocarpum (Schrank et Mart. ex DC.) Triana	Tree	SPSF; 20841	III, X, XIII	cer

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Family/Species	Life form	Voucher	Source	Veg. type
MELIACEAE				
Cabralea canjerana (Vell.) Mart.	Tree		I, X	ssf, rp
Cedrela fissilis Vell. *	Tree		V, VI, X	cer, ssf, rp
Guarea guidonia (L.) Sleumer	Tree	HRCB, 74504	I, II, X, XIII	ssf, rp
Guarea kunthiana A.Juss.	Tree	UEC, 34654	I, II, V, X, XIII	ssf, rp
Guarea macrophylla Vahl	Tree	SPSF, 25520; INPA, 266940	V, VII, XIII	ssf, rp
Trichilia casaretti C.DC.	Tree	FUEL, 5498	VI, VII, XIII	cer, ssf, rp
Trichilia catigua A.Juss.	Tree	SPSF, 49078; UEC, 49395	I, II, III, V, VII, X, XIII	cer, ssf, rp
Trichilia clausseni C.DC.	Tree	SPSF, 49111; FUEL, 45515	I, II, V, VII, X, XIII	ssf, rp
Trichilia elegans A.Juss.	Shrub	SPSF, 19729; UEC, 43388	XIII	ssf, rp
Trichilia hirta L.	Tree	SPSF, 22821	XIII	rp
Trichilia pallida Sw.	Tree	SPSF, 49128; UEC, 185068	I, III, V, VI, VII, X, XIII	cer, ssf, rp
MENISPERMACEAE				
Cissampelos pareira L.	Climbing	FUEL, 53511	IV, IX, XIII	cer
MONIMIACEAE				
Mollinedia widgrenii A.DC.	Tree	SPSF, 25977; FUEL, 39753	I, II, V, X, XIII	cer, ssf, rp
MORACEAE				
Brosimum gaudichaudii Trécul	Shrub	SPSF, 20791	III, X, XIII	cer, ssf
Dorstenia vitifolia Gardner	Herb	CEN, 85746	XIII	cer, ssf
Ficus citrifolia Mill.	Tree	SPSF, 49086	III, VII, VIII, X, XIII	cer, ssf, rp
Ficus guaranitica Chodat	Tree	HRCB, 71800	III, V, VI, X, XIII	cer, ssf, rp
Maclura tinctoria (L.) D.Don ex Steud.	Tree		VI, X	cer, ssf
Sorocea bonplandii (Baill.) W.C.Burger et al.	Tree	SPSF, 25924	V, VII, XIII	ssf, rp
MYRISTICACEAE				
Virola sebifera Aubl.	Tree	MBM, 287583; SPSF, 27382	III, V, VI, X, XIII	cer, ssf
MYRTACEAE				
Blepharocalyx salicifolius (Kunth) O.Berg	Tree, Shrub		III, X	cer, ssf, rp
Campomanesia guazumifolia (Cambess.) O.Berg	Tree	HRCB, 71784	X, XIII	ssf
Campomanesia pubescens (Mart. ex DC.) O.Berg	Tree, Shrub	UEC, 11668	III, X, XIII	cer, ssf
Eugenia astringens Cambess.	Tree		I, II, X	ssf, rp
Eugenia aurata O.Berg	Tree, Shrub		III, X	cer
Eugenia bimarginata DC.	Shrub		III, X	cer
Eugenia brasiliensis Lam.	Tree		I, X	ssf
Eugenia brevistyla D.Legrand	Tree	ESA, 118281	XIII	ssf, rp
Eugenia dodonaeifolia Cambess.	Tree	SP, 338775; UEC, 45226	XIII	rp
Eugenia florida DC.	Tree	HUEFS, 227997	III, V, VI, VII, X, XIII	cer, ssf, rp
Eugenia francavilleana O.Berg	Tree	UEC, 45225	V, XIII	ssf
Eugenia handroana D.Legrand	Tree	SPSF, 49100	VII, XIII	rp
Eugenia ligustrina (Sw.) Willd.	Tree		V	ssf
Eugenia livida O.Berg	Shrub		III, X	cer
Eugenia longipedunculata Nied.	Tree	SPSF, 49074	VII, XIII	rp
Eugenia mansoi O.Berg	Tree, Shrub	SPSF, 49077; INPA, 266945	VII, XIII	rp
Eugenia pruniformis Cambess.	Tree, Shrub		II, X	ssf, rp
Eugenia repanda O.Berg	Tree, Shrub	SPSF, 49073	I, VII, X, XIII	ssf, rp
Eugenia speciosa Cambess.	Tree		V	ssf

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Family/Species	Life form	Voucher	Source	Veg. type
Eugenia sphenophylla O.Berg	Tree, Shrub	SPSF, 25908; BHCB, 150372	XIII	rp
Eugenia subterminalis DC.	Tree		X	ssf, rp
Eugenia verticillata (Vell.) Angely	Shrub		II, X	ssf, rp
Myrcia albotomentosa DC.	Shrub	SPSF, 25964	III, X, XIII	cer
Myrcia bella Cambess.	Shrub		III, VI, X	cer, ssf
Myrcia glomerata (Cambess.) G.P.Burton & E.Lucas	Tree		V, VII, XIII	cer, ssf, rp
Myrcia guianensis (Aubl.) DC.	Tree	SPSF, 25406	III, VI, X, XIII	cer, ssf
Myrcia hebepetala DC.	Tree		II, III, X	cer, rp
Myrcia lasiantha DC.	Shrub		III, X	cer
Myrcia multiflora (Lam.) DC.	Tree, Shrub	SPSF, 10654; UEC, 40239	I, II, III, V, X, XIII	cer, ssf, rp
Myrcia neolucida A.R.Lourenço & E.Lucas	Tree		I, X	ssf, rp
Myrcia splendens (Sw.) DC.	Tree	UEC, 40165	I, III, VI, VII, X, XIII	cer, ssf, rp
Myrcia tomentosa (Aubl.) DC.	Tree	SPSF, 25844; INPA, 172201	III, VI, X, XIII	cer, ssf
Myrcia venulosa DC.	Tree	SPSF, 25984; UEC, 12123	VI, XIII	cer, ssf
Myrcianthes pungens (O.Berg) D.Legrand	Tree		VII	rp
Myrciaria floribunda (H.West ex Willd.) O.Berg	Tree	HRCB, 74505	II, X, XIII	ssf, rp
Myrciaria tenella (DC.) O.Berg	Tree	IAC, 54946	VII, XIII	rp
Plinia cauliflora (Mart.) Kausel	Tree		I, X	ssf, rp
Psidium grandifolium Mart. ex DC.	Shrub	SPSF, 25268	XIII	cer
Psidium guineense Sw.	Tree, Shrub	UEC, 12340	III, X, XIII	cer, ssf
Psidium rufum Mart. ex DC.	Tree	SPSF, 20853	III, VI, X, XIII	cer, ssf
Siphoneugena densiflora O.Berg	Tree		VII	rp
NYCTAGINACEAE				
Guapira noxia (Netto) Lundell	Tree	HRCB, 71794	III, X, XIII	cer
Guapira opposita (Vell.) Reitz	Tree		III, X	cer, ssf
Neea theifera Oerst.	Tree, Shrub		III, X	cer
OCHNACEAE				
Ouratea castaneifolia (DC.) Engl.	Tree	HRCB, 58787	III, VI, X	cer, ssf
Ouratea spectabilis (Mart.) Engl.	Tree		III, X	cer
OPILIACEAE				
Agonandra excelsa Griseb.	Tree, Shrub		V	ssf
ORCHIDACEAE				
Acianthera macuconensis (Barb.Rodr.) F.Barros	Herb	HRCB, 62376	VIII	ssf
Acianthera pubescens (Lindl.) Pridgeon & M.W.Chase	Herb	HRCB, 62034	IV, VIII	ssf, rp
Acianthera recurva (Lindl.) Pridgeon & M.W.Chase	Herb	HRCB, 62390	VIII	rp
Acianthera saundersiana (Rchb.f.) Pridgeon & M.W.Chase	Herb	HRCB, 62015	VIII	rp
Anathallis obovata (Lindl.) Pridgeon & M.W.Chase	Herb	HRCB, 62907	VIII	rp
Aspidogyne argentea (Vell.) Garay	Herb	HRCB, 62022	XIII	rp
Bulbophyllum epiphytum Barb.Rodr.	Herb	HRCB, 62378	VIII	ssf
Bulbophyllum tripetalum Lindl.	Herb	GMM, 208	VIII	rp
Campylocentrum crassirhizum Hoehne	Herb	HRCB, 62038	VIII	cer, ssf, rp
Campylocentrum grisebachii Cogn.	Herb	HRCB, 62373	VIII	rp
Campylocentrum sellowii (Rchb.f.) Rolfe	Herb		VIII	rp
Catasetum fimbriatum (C.Morren) Lindl.	Herb	HRCB, 62037	VIII	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
Cattleya cernua (Lindl.) Van den Berg	Herb	HRCB, 62909	VIII	ssf
Cattleya loddigesii Lindl.	Herb	HRCB, 63646	VIII	rp
Cattleya lundii (Rchb.f. & Warm.) Van den Berg	Herb	HRCB, 62375	VIII	ssf
Cattleya walkeriana Gardner *	Herb	HRCB, 62908	VIII	rp
Christensonella neowiedii (Rchb.f.) S.Koehler	Herb	HRCB, 62014	VIII	ssf
Corymborkis flava (Sw.) Kuntze	Herb	HRCB, 62047	XIII	rp
Cyclopogon elatus (Sw.) Schltr.	Herb	HRCB, 62013	XIII	rp
Dryadella aviceps (Rchb.f.) Luer	Herb	HRCB, 62036	VIII	ssf, rp
Encyclia patens Hook.	Herb		VIII	rp
Epidendrum latilabrum Lindl.	Herb	HUFU, 72366	VIII	rp
Epidendrum rigidum Jacq.	Herb	HUFU, 72316	VIII, XIII	rp
Eurystyles actinosophila (Barb.Rodr.) Schltr.	Herb	HRCB, 62369	VIII	rp
Ionopsis utricularioides (Sw.) Lindl.	Herb	IAC, 52898	IV, VIII, XIII	cer, ssf, rp
Isabelia virginalis Barb.Rodr. *	Herb		VIII	ssf
Isochilus linearis (Jacq.) R.Br.	Herb	HRCB, 62384	VIII	ssf, rp
Laelia gloriosa (Rchb.f.) L.O.Williams	Herb	HRCB, 63669	VIII	rp
Liparis nervosa (Thumb.) Lindl.	Herb	HRCB, 62372	XIII	rp
Maxillaria marginata (Lindl.) Fenzl	Herb	HRCB, 63317	VIII	ssf, rp
Mesadenella cuspidata (Lindl.) Garay	Herb	UEC, 160185	IV, XIII	rp
Miltonia flavescens (Lindl.) Lindl.	Herb	HUFU, 72315	VIII, XIII	ssf, rp
Notylia hemitricha Barb.Rodr.	Herb	HRCB, 62377	VIII	ssf
Octomeria warmingii Rchb.f.	Herb	GMM, 181	VIII	ssf, rp
Pelexia laxa (Poepp. & Endl.) Lindl.	Herb	HRCB, 62021	XIII	rp
Polystachya concreta (Jacq.) Garay & Sweet	Herb	HUEFS, 224143	VIII, XIII	ssf, rp
Rodriguezia decora (Lem.) Rchb.f.	Herb	HRCB, 62901	VIII	cer
Trichocentrum pumilum (Lindl.) M.W.Chase & N.H.Williams	Herb	HRCB, 62024	VIII	rp
Vanilla chamissonis Klotzsch	Herb	HRCB, 62032	VIII	rp
OXALIDACEAE				
Oxalis barrelieri L.	Herb	JAL, 8077	IV	rp
Oxalis physocalyx Zucc. ex Progel	Shrub	UEC, 45224	III, X, XIII	cer
PASSIFLORACEAE				
Passiflora alata Curtis	Climbing	UNOP, 8279	IV, IX, XIII	ssf
Passiflora miersii Mast.	Climbing	HRCB, 71788	IV, IX, XIII	cer
Passiflora pohlii Mast.	Climbing	SPSF, 20847; MO, 100510557	XIII	cer, ssf
Passiflora suberosa L.	Climbing	APO, 02	IV, IX	cer
Passiflora tenuifila Killip	Climbing	UEC, 40164; HURB, 2457	XIII	ssf
PERACEAE				
Pera glabrata (Schott) Poepp. ex Baill.	Tree	SPSF, 20846	III, V, VI, X, XIII	cer, ssf, rp
PHYLLANTACEAE				
Phyllanthus tenellus Roxb.	Herb	CEN, 85800	IV, XIII	ssf
Savia dictyocarpa Müll.Arg.	Tree		I, X	ssf, rp
PHYTOLACCACEAE				
Gallesia integrifolia (Spreng.) Harms	Tree		X	ssf
Phytolacca dioica L.	Tree	SPSF, 20851	XIII	cer
PICRAMNIACEAE				
Picramnia ramiflora Planch.	Tree	SPSF, 25996; UEC, 25467	II, X, XIII	ssf, rp
Picramnia sellowii Planch.	Tree, Shrub	SPSF, 49091; INPA, 266939	VII, XIII	rp

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Family/Species	Life form	Voucher	Source	Veg. type
PIPERACEAE				
Peperomia alata Ruiz & Pav.	Herb	HRCB, 62033; SPSF, 231353	IV, VIII	ssf
Peperomia arifolia Miq.	Herb	JAL, 7725	IV	rp
Peperomia campinasana C.DC.	Herb	HRCB, 62902	VIII	rp
Peperomia circinnata Link	Herb	HRCB, 62008	VIII	ssf, rp
Peperomia duartei Yunck.	Herb	JAL, 7680	IV	ssf
Peperomia nitida Dahlst.	Herb	HRCB, 62012	VIII	ssf
Peperomia rhombea Ruiz & Pav.	Herb	HRCB, 62019	IV, VIII	ssf, rp
Peperomia rotundifolia (L.) Kunth	Herb	HRCB, 62026	IV, VIII	ssf, rp
Piper amalago L.	Shrub	JAL, 7713	IV, V, VII	cer, ssf, rp
Piper arboreum Aubl.	Shrub	JAL, 7775	I, IV, V, X	cer, ssf
Piper corcovadensis (Miq.) C.DC.	Shrub	SPSF, 25931	XIII	ssf
Piper glabratum Kunth	Shrub	RON, 9106; FUEL, 53524	IV, XIII	cer, ssf
Piper mikanianum (Kunth) Steud. var. mikanianum	Shrub	JAL, 8081	IV	cer, ssf
Piper ovatum Vahl	Shrub	JAL, 7695	IV	cer, ssf
POACEAE				
Chloris elata Desv.	Herb	SP, 441340	IV, XIII	cer, ssf
Echinolaena inflexa (Poir.) Chase	Herb	UEC, 16836	XIII	cer
Hildaea pallens (Sw.) C.Silva & R.P.Oliveira	Herb	SP, 441351	IV, XIII	cer, ssf
Homolepis glutinosa (Sw.) Zuloaga & Soderstr.	Herb	SP, 441339	IV, XIII	cer, ssf
Homolepis villaricensis (Mez) Zuloaga & Soderstr.	Herb	JAL, 7672	IV	ssf
Lasiacis ligulata Hitchc. & Chase	Herb	HUEFS, 201968, SP, 441335	IV, XIII	cer, ssf
Olyra humilis Nees	Herb	JAL, 7703	IV	cer, ssf
Olyra latifolia L.	Herb	SP, 441346	IV, XIII	cer, ssf
Oplismenus hirtellus subsp. hirtellus (L.) P.Beauv.	Herb	HUEFS, 201967	IV, XIII	cer, ssf
Parodiolyra micrantha (Kunth) Davidse & Zuloaga	Herb	FUEL, 53525; SP, 441327	IV, XIII	cer, ssf
Paspalum conjugatum P.J.Bergius	Herb	SP, 441329	XIII	ssf
Pharus lappulaceus Aubl.	Herb	SP, 441337	IV, XIII	cer, ssf
Rugoloa pilosa (Sw.) Zuloaga	Herb	JAL, 7674	IV	ssf
Setaria scabrifolia (Nees) Kunth	Herb	UNOP, 8269; SP, 441338	IV, XIII	ssf
Setaria vulpiseta (Lam.) Roem. & Schult.	Herb	SP, 441345	IV, XIII	cer, ssf
Streptochaeta spicata Schrad. ex Nees	Herb	UEC, 173870; SP, 441336	IV, XIII	ssf
POLYGALACEAE				
Bredemeyera floribunda Willd.	Shrub, Climbing	HRCB, 68035	III, IV, IX, X, XIII	cer, ssf
*Securidaca rivinifolia var. rivini*folia A.St.-Hil. & Moq.	Shrub, Climbing	SPSF, 20780	XIII	cer
Securidaca tomentosa A.St.-Hil. & Moq.	Shrub, Climbing	HRCB, 68065	IX	cer
POLYGONACEAE				
Polygonum acuminatum Kunth	Herb	UEC, 45231	XIII	cer
POLYPODIACEAE				
Campyloneurum crispum Fée	Herb		XI	ssf, rp
Campyloneurum repens (Aubl.) C.Presl	Herb	UEC, 62329	IV, XI, XIII	ssf, rp
Microgramma lindbergii (Mett.) de la Sota	Herb	BHCB, 141935; HRCB, 62009	IV, VIII, XI, XIII	ssf, rp
Microgramma persicariifolia (Schrad.) C.Presl	Herb	HRCB, 63001	VIII, XI	ssf, rp
Microgramma squamulosa (Kaulf.) de la Sota	Herb	BHCB, 141922; HRCB, 62011	IV, VIII, XI, XIII	cer, ssf, rp
Microgramma vacciniifolia (Langsd. & Fisch.) Copel.	Herb	HRCB, 62903	VIII	rp
Pleopeltis minima (Bory) J. Prado & R.Y. Hirai	Herb	JAL, 7773	IV, VIII, XI	cer, ssf, rp
Pleopeltis pleopeltifolia (Raddi) Alston	Herb	BHCB, 141928	IV, VIII, XI, XIII	cer, ssf, rp
Serpocaulon catharinae (Langsd. & Fisch.) A.R.Sm.	Herb		VIII, XI	cer
Serpocaulon latipes (Langsd. & Fisch.) A.R.Sm.	Herb	BHCB, 141924	XI, XIII	cer
Serpocaulon vacillans (Link) A.R.Sm.	Herb	HRCB, 62040	VIII	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
PRIMULACEAE				
Geissanthus ambiguus (Mart.) G.Agostini	Shrub	UEC, 34652	I, II, V, X, XIII	ssf, rp
Myrsine coriacea (Sw.) R.Br. ex Roem. & Schult.	Tree	SPSF, 49123; UEC, 49382	I, II, III, V, VI, VII, X, XIII	cer, ssf, rp
Myrsine gardneriana A.DC.	Tree, Shrub	HRCB, 71799	VII, XIII	rp
Myrsine guianensis (Aubl.) Kuntze	Tree		I, III, X	cer, ssf
Myrsine lancifolia Mart.	Shrub		I, II, III, X	cer, ssf, rp
Myrsine loefgrenii (Mez) Imkhan.	Tree	MBM, 273802; SPSF, 25912	XIII	rp
Myrsine umbellata Mart.	Tree	SPSF, 20848; UEC, 45232	I, III, VI, X, XII	cer, ssf
Stylogyne warmingii Mez	Shrub	UEC, 49388; UEC, 49388	I, X, XIII	ssf
PROTEACEAE				
Roupala montana Aubl.	Tree, Shrub		III, VI, X	cer, ssf
PTERIDACEAE				
Adiantopsis radiata (L.) Fée	Herb	BHCB; 141921	IV, XI, XIII	cer, ssf
Adiantum diogoanum Glaz. ex Baker	Herb		XI	ssf, rp
Adiantum platyphyllum Sw.	Herb	BHCB, 153384	IV, XIII	ssf
Adiantum raddianum C.Presl	Herb		XI	ssf, rp
Doryopteris concolor (Langsd. & Fisch.) Kuhn.	Herb		XI	ssf, rp
Hemionitis tomentosa (Lam.) Raddi	Herb		XI	ssf
Pteris denticulata Sw.	Herb	BHCB, 141941	IV, XI, XIII	ssf
Pteris quadriaurita Retz.	Herb		XI	ssf
RHAMNACEAE				
Gouania virgata Reissek	Climbing	HRCB, 68037	IV, IX	cer, ssf
Rhamnidium elaeocarpum Reissek	Tree	UEC, 40210	III, X, XIII	cer, ssf
ROSACEAE				
Prunus myrtifolia (L.) Urb.	Tree	SPSF, 25900	I, III, VI, X, XII	cer, ssf, rp
Rubus brasiliensis Mart.	Shrub	SPSF, 20793	XIII	cer
RUBIACEAE				
Amaioua guianensis Aubl.	Tree, Shrub	SP, 360420	I, II, V, VI, X, XIII	cer, ssf, rp
Borreria cupularis DC.	Herb	JAL, 8078	IV	cer
Chomelia sericea Müll.Arg.	Tree, Shrub		I, X	ssf
Coccocypselum lanceolatum (Ruiz & Pav.) Pers.	Herb	JAL, 8100	IV	rp
Cordiera rigida (K.Schum.) Kuntze	Shrub	SPSF, 49096	VII, XIII	rp
Cordiera sessilis (Vell.) Kuntze	Shrub		I, III, V, VI, X	cer, ssf
Coutarea hexandra (Jacq.) K.Schum.	Tree, Shrub		II, X	ssf, rp
Emmeorhiza umbellata (Spreng.) K.Schum.	Climbing	UEC, 44040	XIII	ssf
Eumachia cephalantha (Müll. Arg.) Delprete & J.H. Kirkbr.	Shrub		V	ssf
Faramea stipulacea (Cham. & Schltdl.) DC.	Shrub	HRCB, 71795	XIII	ssf
Galianthe hispidula (A.Rich. ex DC.) E.L.Cabral & Bacigalupo	Herb	UEC, 44060	XIII	ssf
Galianthe laxa (Cham.	Herb	UNOP, 8272; RON, 9091	IV, IX, XIII	cer, ssf
Genipa americana L.	Tree		I, II, VII, X	ssf, rp
Geophila repens (L.) I.M.Johnst.	Herb	JAL, 7701	IV	cer, ssf
Guettarda viburnoides Cham. & Schltdl.	Tree, Shrub		III, X	cer, ssf
Hamelia patens Jacq.	Tree, Shrub	SPSF, 20778	XIII	rp
Ixora brevifolia Benth.	Tree, Shrub	UEC, 40281	I, VI, X, XIII	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
Ixora venulosa Benth.	Shrub	NY, 779196; UEC, 353229	III, X, XIII	cer, ssf
Manettia cordifolia Mart.	Climbing	HRCB, 68038	IV, IX, XIII	cer, ssf
Mitracarpus hirtus (L.) DC.	Herb	APO, 31	IV	cer, ssf
Palicourea croceoides Ham.	Shrub	SPSF, 27345; IAC, 45367	IV, XIII	rp
Palicourea rigida Kunth	Shrub		III, X	cer
Palicourea sessilis (Vell.) C.M. Taylor	Shrub	UEC, 34795	I, V, X	cer, ssf
Palicourea violacea (Aubl.) A.Rich.	Shrub	IAC, 45362; JAL, 7694	IV, V, XIII	cer, ssf
Psychotria carthagenensis Jacq.	Tree, Shrub	SPSF, 25926; JAL, 8092	IV, VII, XIII	rp
Psychotria deflexa DC.	Shrub	UNOP, 8271	IV, XIII	cer, ssf
Psychotria gracilenta Müll.Arg.	Shrub	FUEL, 53532; JAL, 7698	IV	cer, ssf
Psychotria hastisepala Müll.Arg.	Shrub		V	ssf
Psychotria hoffmannseggiana (Willd. ex Schult.) Müll.Arg.	Shrub	SPSF, 25846; IAC, 45365	IV, XIII	cer, ssf
Psychotria tenuifolia Sw.	Shrub	APO, 78	IV	ssf
Psychotria trichophora Müll.Arg.	Shrub	UEC, 13949	IV, XIII	cer, rp
Randia armata (Sw.) DC.	Tree		III, X	cer, ssf
Rudgea jasminoides (Cham.) Müll.Arg.	Tree, Shrub	UEC, 35267	V, VII, XIII	ssf, rp
Rudgea minor (Cham.) Standl. *subsp. minor*	Shrub		I, X	ssf
Rudgea viburnoides (Cham.) Benth.	Tree, Shrub	SPSF, 20824; UEC, 14110	III, VI, X, XIII	cer, ssf
Simira sampaioana (Standl.) Steyerm.	Tree	SPSF, 20840	X, XIII	rp
Tocoyena formosa (Cham. & Schltdl.) K.Schum.	Shrub	UEC, 40274	III, X, XIII	cer
RUTACEAE				
Conchocarpus pentandrus (A. St.-Hil.) Kallunki & Pirani	Tree, Shrub	UEC, 25135	XIII	ssf
Conchocarpus ruber (A.St.Hil.) Bruniera & Groppo	Shrub	SPSF, 20834	XIII	ssf
Esenbeckia febrifuga (A.St.-Hil.) A. Juss. ex Mart.	Tree	SPSF, 49095	I, II, VII, X, XIII	cer, ssf, rp
Esenbeckia grandiflora Mart.	Tree		I, X	ssf
Galipea jasminiflora (A.St.-Hil.) Engl.	Tree	SPSF, 49101; HUEFS, 224121	I, II, VII, X, XIII	cer, ssf, rp
Metrodorea nigra A.St.-Hil.	Tree	SPSF, 49097; INPA, 266936	I, II, V, X, XIII	ssf, rp
Pilocarpus pauciflorus A.St.-Hil.	Tree	SPSF, 27334; FUEL, 39994	XIII	ssf
Zanthoxylum acuminatum (Sw.) Sw.	Tree	UEC, 25223	I, II, III, X, XIII	cer, ssf, rp
Zanthoxylum fagara (L.) Sarg.	Tree		III, V, X	cer, ssf
Zanthoxylum monogynum A.St.-Hil.	Tree	SPSF, 29009	V, XIII	ssf
Zanthoxylum rhoifolium Lam.	Tree		III, VI, X	cer, ssf, rp
Zanthoxylum riedelianum Engl.	Tree		I, II, X	cer, ssf, rp
SALICACEAE				
Casearia decandra Jacq.	Tree, Shrub		III, V, X	cer, ssf
Casearia gossypiosperma Briq.	Tree	SPSF, 24696	I, II, III, V, VI, VII, X, XIII	cer, ssf, rp
Casearia grandiflora Cambess.	Tree, Shrub	INPA, 78026	XIII	rp
Casearia sylvestris Sw.	Tree, Shrub	IAC, 52464; SPSF, 49127	I, II, III, V, VI, VII, X, XIII	cer, ssf, rp
Prockia crucis P.Browne ex L.	Tree, Shrub	SPSF, 49084; HRCB, 71790	X, XIII	rp
SANTALACEAE				
Phoradendron crassifolium (Pohl ex DC.) Eichler	Herb	SPSF, 27335; RON, 9102	IV, XIII	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
SAPINDACEAE				
Allophylus racemosus Sw.	Shrub	HRCB, 71792	XIII	ssf
Allophylus semidentatus (Miq.) Radlk.	Tree		I, II, VI, X	cer, ssf, rp
Cardiospermum grandiflorum Sw.	Climbing	HRCB, 68039	IX	ssf
Cupania vernalis Cambess.	Tree	SPSF, 17376; UEC, 44049	III, V, VI, X, XIII	cer, ssf, rp
Diatenopteryx sorbifolia Radlk.	Tree		I, X	ssf
Matayba elaeagnoides Radlk.	Tree	SPSF, 49079; INPA, 204885	V, VII, XIII	cer, ssf, rp
Matayba guianensis Aubl.	Tree	SPSF, 17375	I, II, III, X, XIII	cer, ssf, rp
Paullinia rhomboidea Radlk.	Shrub, Climbing	RON, 9096	IV, IX, XIII	cer, ssf, rp
Serjania communis Cambess.	Climbing	FUEL, 53531; UNOP, 8275	IV, IX, XIII	cer
Serjania fuscifolia Radlk.	Climbing	HUEFS, 201964; RON, 9095	IV, IX, XIII	cer, ssf
Serjania laruotteana Cambess.	Climbing	HRCB, 68041	IX	cer
Serjania lethalis A.St.-Hil.	Climbing	RON, 9094	IV, IX, XIII	cer
Serjania meridionalis Cambess.	Climbing	UNOP, 8274; FUEL, 53543	IV, IX, XIII	ssf
Serjania paradoxa Radlk.	Climbing	RON, 9093	IV, IX, XIII	cer
Serjania pinnatifolia Radlk.	Climbing	HRCB, 68055; FUEL, 53513	IV, IX, XIII	cer, ssf
Serjania reticulata Cambess.	Climbing	APO, 48	IV, IX	cer, ssf
Urvillea laevis Radlk.	Climbing	RON, 9092; UNOP, 8273	IV, IX, XIII	cer, ssf
SAPOTACEAE				
Chrysophyllum gonocarpum (Mart. & Eichler ex Miq.) Engl.	Tree	SPSF, 49087	I, II, VII, X, XIII	ssf, rp
Chrysophyllum marginatum (Hook. & Arn.) Radlk.	Tree, Shrub	SPSF, 20833	III, V, VI, X, XIII	cer, ssf
Pouteria ramiflora (Mart.) Radlk.	Tree, Shrub		III, X	cer, ssf
SIPARUNACEAE				
Siparuna guianensis Aubl.	Tree	UEC, 35283	III, V, VI, X, XIII	cer, ssf, rp
SMILACACEAE				
Smilax elastica Griseb.	Climbing	HRCB, 68043; RON, 9099	IV, IX, XIII	cer
Smilax fluminensis Steud.	Climbing	HRCB, 68058	IV, IX	cer
SOLANACEAE				
Capsicum flexuosum Sendtn.	Shrub	SPSF; 25610	XIII	ssf
Cestrum mariquitense Kunth	Shrub	SPSF, 25845	XIII	cer
Cestrum pedicellatum Sendtn.	Shrub	UEC, 44039	III, X, XIII	cer
Solanum acerifolium Dunal	Shrub	BHCB, 141929	IV, XIII	cer, ssf
Solanum americanum Mill.	Herb	JAL, 7664	IV	ssf
Solanum campaniforme Roem. & Schult.	Shrub	UEC, 44059	XIII	ssf
Solanum granulosoleprosum Dunal	Tree	SPSF, 20786; FUEL, 31988	XIII	cer
Solanum lantana Sendtn.	Shrub	SPSF, 20827; HUEFS, 201965	IV, XIII	cer, ssf
Solanum lycocarpum A.St.-Hil.	Tree, Shrub	SPSF, 27344; BHCB, 141930	III, IV, X, XIII	cer, ssf
Solanum paniculatum L.	Shrub	SPSF, 25899	III, X, XIII	cer
Solanum swartzianum Roem. & Schult.	Tree	JAL, 7687	I, III, IV, V, X	cer, ssf
Solanum uncinellum Lindl.	Climbing	HRCB, 71796	XIII	ssf
STYRACACEAE				
Styrax acuminatus Pohl	Tree		V, VI	cer, ssf
Styrax camporum Pohl	Tree	UEC, 40658; IAC, 54616	III, VI, X, XIII	cer, ssf
Styrax ferrugineus Nees & Mart.	Tree, Shrub	FUEL, 53529; RON, 9104	VI, XIII	cer, ssf
Styrax pohlii A.DC.	Tree, Shrub		III, X	cer, ssf

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Family/Species	Life form	Voucher	Source	Veg. type
SYMPLOCACEAE				
Symplocos pubescens Klotzsch ex Benth.	Tree, Shrub	SPSF, 25271; UEC, 14966	XIII	cer
Symplocos uniflora (Pohl) Benth.	Tree, Shrub	MBM, 256486; HUFU, 43053	III, X, XIII	cer
TALINACEAE				
Talinum fruticosum (L.) Juss.	Herb	HUEFS, 201976	IV, XIII	ssf
TECTARIACEAE				
Tectaria incisa Cav.	Herb		XI	ssf
THELYPTERIDACEAE				
Christella dentata (Forssk.) Brownsey & Jermy	Herb		XI	cer, ssf
Christella grandis (A.R. Sm.) A.R. Sm.	Herb		XI	ssf
Christella hispidula (Decne.) Holttum	Herb	UEC, 62340	XI, XIII	ssf
Christella patens (Sw.) Pic.Serm.	Herb	BHCB, 60864	XI, XIII	ssf, rp
Cyclosorus interruptus (Willd.) H. Ito	Herb		XI	cer, rp
Goniopteris jamesonii (Hook.) Salino & T.E.Almeida	Herb	BHCB, 69394	XI, XIII	ssf
Goniopteris lugubris (Mett.) Brade	Herb	BHCB, 141919	IV, XI, XIII	ssf
URTICACEAE				
Cecropia glaziovii Snethl.	Tree	SPSF, 20796	XIII	cer
Cecropia pachystachya Trécul	Tree		III, VI, X	cer, ssf
Urera baccifera (L.) Gaudich. ex Wedd.	Tree, Shrub	JAL, 7747	I, IV, X	cer, ssf
Urera caracasana (Jacq.) Griseb.	Tree, Shrub	FUEL, 53512; RON, 9103	IV, XIII	rp
VERBENACEAE				
Aloysia virgata (Ruiz & Pav.) Juss.	Tree, Shrub	UEC, 44056	III, X, XIII	cer, rp
Lippia brasiliensis (Link) T.R.S.Silva	Shrub	UEC, 25494	IV, XIII	cer, ssf
Lippia origanoides Kunth	Shrub	SPSF, 20822	III, IV, X, XIII	cer, ssf
VIOLACEAE				
Pombalia atropurpurea (A.St.-Hil.) Paula-Souza	Shrub	HUEFS, 201966; HRCB, 71793	I, II, IV, X, XIII	ssf, rp
VITACEAE				
Cissus erosa Rich.	Climbing	HRCB, 68045	IV, IX, XIII	cer, ssf
Cissus tinctoria Mart.	Climbing	HRCB, 68046	IV, IX	ssf
Cissus verticillata (L.) Nicolson & C.E.Jarvis	Climbing	HRCB, 68047	IX	ssf
VOCHYSIACEAE				
Qualea cordata Spreng.	Tree	SPSF, 20829; UEC, 145446	III, VI, X, XIII	cer, ssf
Qualea dichotoma (Mart.) Warm.	Tree, Shrub	SPSF, 24703	III, VI, X, XIII	cer, ssf
Qualea grandiflora Mart.	Tree, Shrub		III, VI, X	cer, ssf
Qualea multiflora Mart.	Tree, Shrub		I, III, X	cer, ssf
Qualea parviflora Mart.	Tree, Shrub		III, X	cer
Vochysia magnifica Warm.	Tree	IAC, 54531; SPSF, 17391	XIII	ssf
Vochysia tucanorum Mart.	Tree	SPSF, 17498; FUEL, 53526	I, II, III, V, VI, X, XIII	cer, ssf, rp

JAL= collections of J.A. Lombardi; APO= collections of A.P. Oliveira; GMM= collections of G.M. Marcusso; I to XIII - species reporded by: I= Bertoni 1984; II= Bertoni & Martins 1987; III= Bertoni et al. 2001; IV= Oliveira 2012; V= Osaco 2012; VI= Sabino 2013; VII= Konopczyk 2014; VIII= Marcusso et al. 2016; IX= Vargas et al. 2018; X= São Paulo 2003; XI= Colli et al. 2003; XII= Dickfeldt et al. 2013; XIII= present study; Asterisks indicate threatened species according to the "Livro Vermelho da Flora do Brasil" by CNCFlora (Martinelli & Moraes 2013) and the list of threatened flora of São Paulo State (SMA Resolution 2016); Veg. type: vegetation types of occurrence; cer= cerradão; ssf: seasonal semideciduous forest; rp: riparian forest.

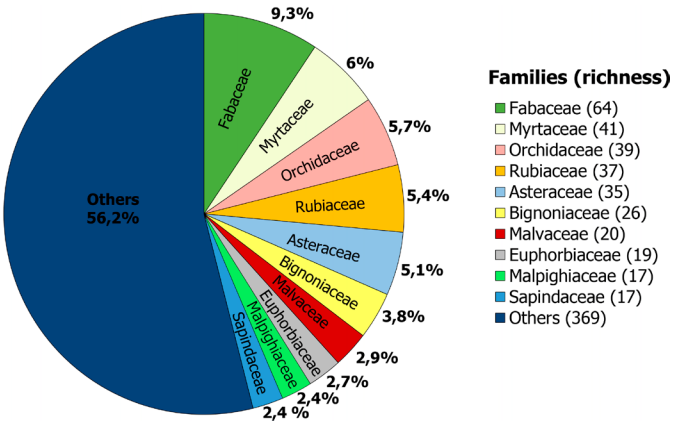

Figure 3. The most species-rich families in the Porto Ferreira State Park, Porto Ferreira, São Paulo state, southeastern Brazil.

The arboreal habit was the predominant life form in the PFSP (41.8%), followed by herbs (25.7%), shrubs/subshrubs (17.9%) and climbing plants (14.7%) (Figure 4). The results listed 84 species (12.2%) with two or more life forms. Concerning all life forms, 9.6%, 18.8% and 18.5% of the species are exclusive to RP, CER and SSF, respectively. The number of exclusive species for the CER is mainly related to the high number of trees species. However, herbs represented 40% and 50% of the exclusive species found in the SSF and RP, respectively.

The number of species compiled for the lists of the floristic similarity comparison was 2745, of which 1420 (51.7%) are exclusively from a single area (Appendix 2). Only 43 species (1.5%) occurred in 50% or more of the lists, and no species were recorded for all areas (Appendix 3). The dendrogram showed a high coefficient of cophenetic correlation of 0.82. The greater the distance was between areas, the greater the floristic dissimilarities among them. The cluster analysis showed the segregation of three major floristic groups (Figure 5). The first group (1) clustered an ecotone area and two RP (one of which belongs to the same survey as the ecotone); the second group (2) categorized the studies carried out in *Cerrado* vegetation types; and the third group (3) all vegetation types of the PFSP and areas under SSF formation.

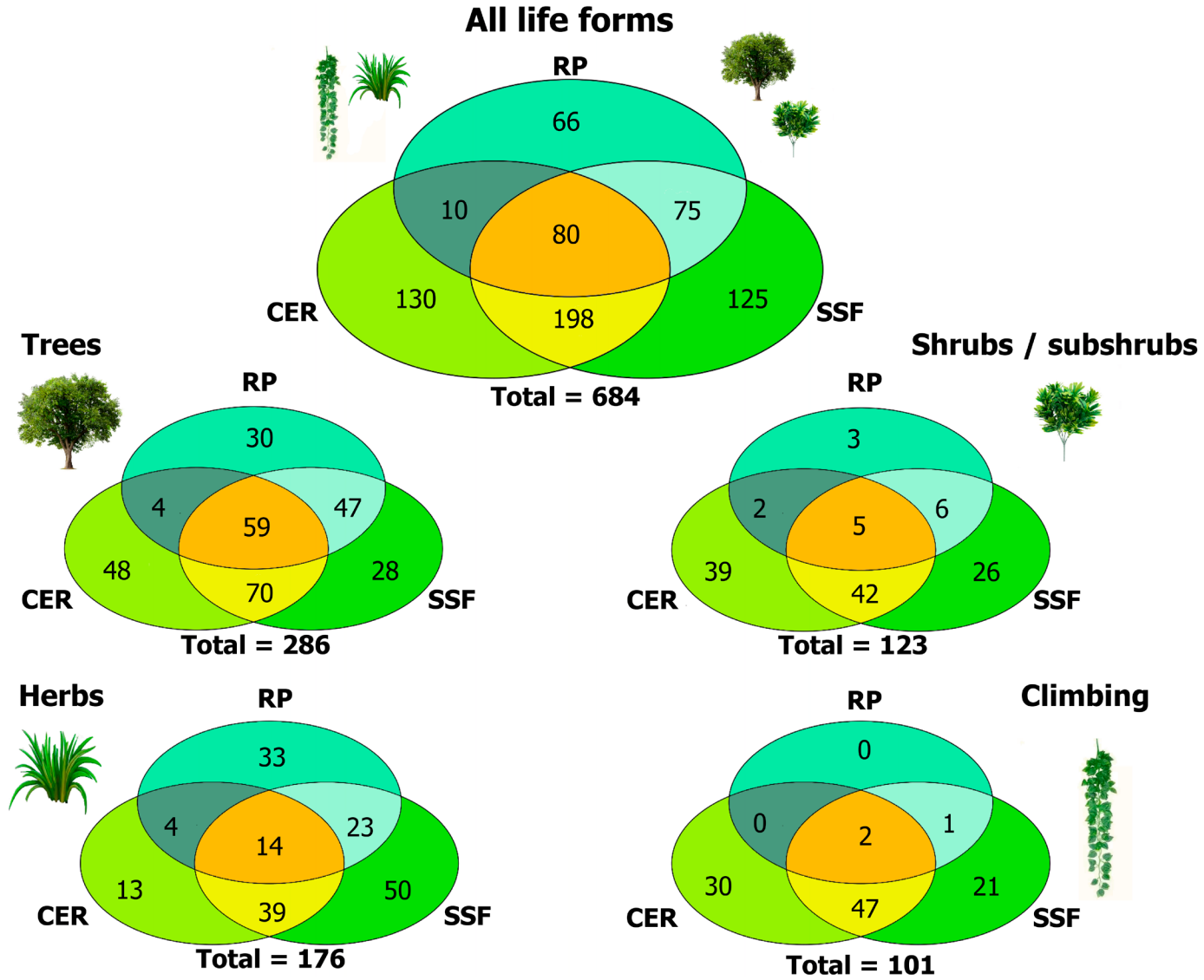

Figure 4. Venn diagrams for vascular plants recorded in Porto Ferreira State Park, Porto Ferreira, São Paulo State, southeastern Brazil. RP: riparian forest, SSF: seasonal semidecidual forest; CER: cerradão.

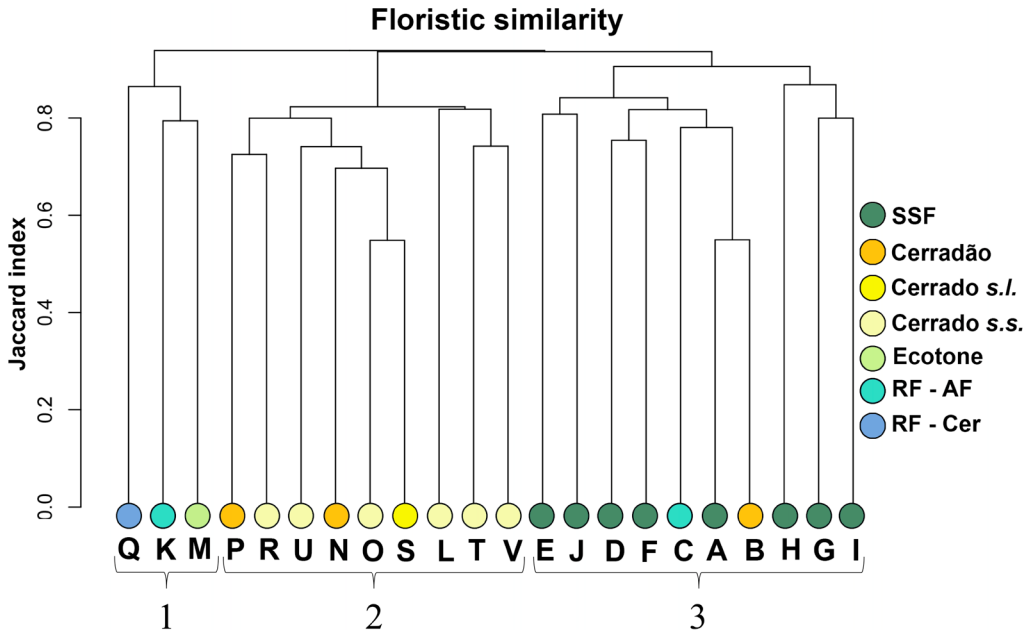

Figure 5. Cluster analysis (UPGMA) using Jaccard index among fifteen studies carried out in *Cerrado,* SSF and riparian forest vegetation. Areas (identified by letters A-V) are given in Table 1. SSF: seasonal semidecidual forest; *Cerrado s.l.*: *Cerrado sensu lato*; *Cerrado s.s.*: *Cerrado sensu stricto*; RF-AF: riparian forest under Atlantic Forest ecoregion; RF-Cer: riparian forest under *Cerrado* ecoregion.

Discussion

The comprehensive checklist of the PFSP allowed us to show that the vascular flora in this ecotonal area is composed of a mixture of elements of both the Atlantic Forest and *Cerrado* biogeographical provinces. The soil features are a possible explanation for the different vegetation types, and variations on a small scale. The overall richness is impressive, considering the small size of park; however, the number of species of each vegetation type recorded is in accordance with previous studies in these vegetation types. An Atlantic Forest similarity was found for the PFSP flora as a whole. The same relationship was found considering the CER and SSF floras independently, demonstrating the strong influence of Atlantic Forest on the area. Perhaps the geographical location of the PFSP, which reaches both biogeographical provinces in the eastern region, could be a reasonable explanation for these results.

The species richness of the PFSP was higher than that found by Cielo-Filho et al. (2015) – with 265 species –, the only vascular flora surveyed in an ecotonal site among *Cerrado* and Atlantic Forest in southeastern Brazil. The overwhelming number of species recorded for the PFSP vascular flora is ranked fourth among studies conducted under seasonal formations, behind only those of Lombardi & Gonçalves (2000), Lombardi et al. (2012) and Forzza et al. (2014). Species richness tends to peak in ecotonal areas (Kark & van Rensburg, 2006), likely because transitional areas hold species from two or more neighboring communities, and due to high spatial heterogeneity (Kark 2012). Furthermore, along with the increase in botanical collection in protected areas, there is an appeal to enhance the importance of these areas to protect threatened species (Colli-Silva et al., 2019). In this sense, we found eight threatened species at regional and national levels. Thus, the ecotonal condition of the PFSP between two biogeographical provinces may contribute to increase the species richness, also being home to important threatened species.

Studies have been emphasizing the need for the expansion of botanical collection in protected areas (Colli-Silva et al. 2016, 2019). The addition of more than 65% of the species number since the last PFSP floristic list (São Paulo, 2003) is significant, showing the importance of continuous research, and fieldwork, to update the knowledge about the flora. Since the Colli-Silva et al. study of 2016, which recorded 292 species for the PFSP, 235 vouchers have been added to the PFSP, most likely due to the digitization of the collections, later available in digital platforms (CRIA, 2019), and to the addition of our own collections. Moreover, notably there are species that we found in the field, such as *Cissus serroniana* (Glaz.) Lombardi (Vitaceae), which had never before been recorded fertile, and, therefore, were not included in the checklist. Even though the PFSP has a significant number of studies concerning its flora, we predict that further collections will increase the number of species in this protected area.

Considering each vegetation type of the PFSP, the richness we found in the SSF averages roughly with that found in other studies (Corrêa et al., 2018; Cielo-Filho et al., 2015; Forzza et al., 2014; Pifano et al., 2013; Rossetto & Vieira, 2013; Lombardi et al., 2012; Guaratini et al., 2008; Lombardi & Gonçalves, 2000). In the CER, the number of species recorded in our study is higher than other *Cerrado* surveys (Cavassan & Weiser, 2015; Cielo-Filho et al. 2015; Carvalho et al., 2010; Ishara et al., 2008; Batalha & Mantovani, 2001; Durigan et al., 1999; Batalha et al., 1997). As for the RP, there are no studies of vascular flora carried out specifically on this vegetation type, but rather inevitably included as a part of a larger work, such as those of Durigan et al. (1999) and Cielo-Filho et al. (2015), making comparison difficult.

The most species-rich families found in our study are also the richest ones for the *Cerrado* as a whole (Souza, et al. 2018), and seasonal forests of the Atlantic Forest (Souza, et al., 2019a). Orchidaceae, Fabaceae, Asteraceae and Myrtaceae are, respectively, the most diverse families in the Atlantic Forest (BFG, 2015).

Thus, Fabaceae, Asteraceae and Orchidaceae constitute the three richest families in the *Cerrado* (Mendonça et al. 2008). The richest genera found in the PFSP – *Eugenia*, *Micona* and *Myrcia* – are ranked as the genera with the highest number of tree species in the *Cerrado* and the Atlantic Forest, under semideciduous formation (Oliveira-Filho & Fontes 2000). Considering Brazilian flora as a whole, *Eugenia*, *Miconia*, *Myrcia*, *Psychotria*, *Solanum* and *Peperomia* are also classified among the 30 most diverse Angiosperm genera (BFG, 2015).

Generalist species, establishing and thriving both in the *Cerrado* and in the Atlantic Forest, generally become very abundant in transition areas between these two biogeographical provinces (Durigan et al. 2012, Morrone, 2014, 2017). All species classified as generalists by Durigan et al. (2012) were found in the PFSP flora [*e.g. Copaifera langsdorffii* Desf., *Cordia trichotoma* (Vell.) Arráb. ex Steud, *Mabea fistulifera* Mart., *Ocotea corymbosa* (Meisn.) Mez, *Platypodium elegans* Vogel, *Senegalia polyphyla* (DC.) Britton & Rose, *Terminalia glabrescens* Mart. and *Vochysia tucanorum* Mart.]. Durigan et al. (2012) also pointed out 20 typical species of SSF, of which 15 were reported in the PFSP flora (*e.g. Aspidosperma polyneuron* Müll.Arg., *Cedrela fissilis* Vell., *Metrodorea nigra* A.St.-Hil. and *Guarea kunthiana* A. Juss.). In a study encompassing most of the *Cerrado* woody vegetation, Ratter et al. (2003) found 38 species with the highest percentage of occurrence, of which 26 (68.4%) occur in PFSP CER (*e.g. Qualea grandiflora* Mart., *Qualea parviflora* Mart., *Bowdichia virgilioides* Kunth, *Dimorphandra mollis* Benth., *Lafoensia pacari* A.St.-Hil., *Connarus suberosus* Planch. and *Hymenaea stigonocarpa* Mart. ex Hayn). These results emphasize the PFSP as a species reservatory of several biogeographical entities, reinforcing its role in conservation.

The trees were the most species-rich life forms in the PFSP, following the patterns of forest vegetation types (IBGE, 2012; Forzza et al., 2014). Regarding the shared species among the vegetation types, trees perform a major contribution to the exclusive species of the CER. The different edaphic physicochemical features among the CER and SSF are the main causes of their differences, even in small scales (Gottsberger & Silberbauer-Gottsberger, 2006; Pinheiro et al. 2009). Edaphic factors, such as water availability in the soil, and soil composition, may play a role in vegetation type differentiation (Haridasan 1992). The heterogeneity of the soil, on a small-scale, can also act as a plant community ecological driver, increasing diversity and promoting structural changes (Souza et al., 2019b). In a study carried out on the PFSP soil and its relationship to the vegetation, Rossi et al. (2005) found several types of soil. The authors also found an association between CER, SSF and RP vegetation and dystrophic oxisols, eutrophic argisols and dystrophic fluvial neosols, respectively.

A substantial number of herbs species were found in the PFSP, including the epiphytic and terricolous habit. The impressive importance of the herbs in the PFSP is most likely due to the contribution of the *Cerrado* elements; usually the number recorded in the AF is lower than the one we recorded here (Vieira et al., 2015). An explanation for this may be the ecotonal feature of the PFSP, and the high number of shared species between the CER and SSF. Thus, even in the *Cerrado* forestry vegetation type, the herbaceous layers must be considered as an important synusia. On the other hand, the high number of exclusive herbaceous species in the RP must be attributed to the microclimatic conditions propitious to the epiphytes' development (Marcusso et al., 2016). The number of species of climbing plants in the present study was lower than that found by Vargas et al. (2018), because we considered only taxa identified at the taxonomic level of species and, occasionally, used the life form classification according to the *Flora do Brasil* (2020). This classification does not always reflect Vargas' et al. (2018) interpretations.

We found an outstanding heterogeneity among the floristic surveys analyzed, in which very few species occurred in 50% or more of the areas, and no species occurred in all areas. This may be due to the addition of surveys from different vegetation types belonging to the *Cerrado* and the Atlantic Forest. Floristic comparisons are usually made between vegetation types within the same biogeographical provinces (*e.g.* Carvalho et al. 2010; Ishara et al., 2008; Guaratini et al., 2008; Pifano et al., 2013). Here, including areas of both *Cerrado* and Atlantic Forest, we found that the areas with the same vegetation type are more inclined to be floristically similar. However, in ecotones, areas with different vegetation types in the same location tend to share more species with each other than areas in which the same vegetation type occurs at a distance from one another. These results have been reported for several studies (*e.g.* Oliveira-Filho & Fontes, 2000; Oliveira-Filho et al., 2015; Dryflor et al., 2016), contrary to the general biogeographic hypothesis that similar species would be shared between regions due to the restriction of their dispersion capacity (Lieberman, 2003). Therefore, the fact that the CER of the PFSP joined in the SSF group might be due to the high spatial proximity correlation between them, suggesting a strong relationship with this matrix (Pinheiro & Monteiro, 2008; Passos et al., 2018), with the SSF exerting more influence over the CER flora.

The PFSP harbours eight threatened species, and a huge number of vascular plant species. We also found a greater floristic similarity within the PFSP, and studies carried out in the Atlantic Forest. There is a lack of floristic studies that include all life forms conducted in ecotonal areas in southeastern Brazil. The reason for this, we believe, is due to the difficulty in recognizing an ecotone, and the negligence on supporting descriptive studies. This is an unprecedented floristic list recorded for the PFSP. The overwhelming diversity and the pool of species found, highlights this remnant as an important protected area. Results shown here can be used as a floristic reference for future conservation measures, and restorative actions in areas under ecotonal influences of the Atlantic Forest and the *Cerrado*.

Supplementary Material

The following online material is available for this article:

Appendix 1 - Excluded species from PFSP species list and the respective reason of exclusion.

Appendix 2 - Number of exclusive species among studies compared with this study.

Appendix 3 - Species occurring at 11 (50%) or more lists among the compared studies and PFSP.

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Author Contributions

Gabriel Pavan Sabino: elaboration of study's concept and design, data collection, analysis and preparation of manuscritpt;

Gabriel Mendes Marcusso: elaboration of study's concept and design, data collection, analysis and preparation of manuscritpt;

Vitor de Andrade Kamimura: elaboration of study's concept and design, data collection, analysis and preparation of manuscritpt;

Renan Borgiani: elaboration of study's concept, data collection and analysis;

Rafael Konopczyk: elaboration of study's concept and data collection;

Ernesto Pedro Dickfeldt: Contribution to data collection;

José Eduardo de Arruda Bertoni: Contribution to data collection;

Sonia Aparecida de Souza Evangelista: Contribution to data collection.

Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

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