

# Parque Nacional da Serra do Itajaí (southern Brazil) shrub and herbs flora

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**ABSTRACT:** This paper aim to characterize the herbaceous and shrub species diversity of Parque Nacional da Serra do Itajaí (PNSI). We identified 643 herbaceous and shrub species distributed in 110 families being the most representative family Asteraceae (62 species), Melastomataceae (49) and Rubiaceae (30), besides a two new records for Santa Catarina (*Thelypteris glaziovii* T.F. Reed and *Pseudelephantopus spiralis* Cronquist). We recorded 22 exotic species. Thus, due to the vast diversity of life and the rather large territory, PNSI is one of the most important spots for biodiversity conservation in Santa Catarina.

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## INTRODUCTION

Santa Catarina's flora is very well documented due to the memorable efforts of botanists such as Roberto Miguel Klein and Raulino Reitz, founders of Herbário Barbosa Rodrigues and Flora Ilustrada Catarinense authors. It is estimated that today 80% of the species are already published in the *Flora Ilustrada Catarinense* (Reitz 1965–1989 and Reis 1999–2011), meaning 3,784 species in 929 genera and 159 families, published in 189 fascicles and 15,008 pages (Reis 2011).

According to Flora do Brasil (2013), in Santa Catarina there are mentioned 4,434 angiosperm species (4,208 native), 420 ferns species *latu sensu* (415 native) and six gymnosperms (three native), totaling 4,860 taxa, which represents about 15% of all known plant species in Brazil and about 31% of the known species in the Atlantic rainforest (Stehmann *et al.* 2009).

Despite of being recorded, many of these species have very few samples, often quite long time ago, particularly not arboreal species, which are often excluded from forest surveys. According to Feelei and Silman (2011), the more a species are collected, the better it can be evaluated for its conservation status, as well as decide appropriate strategies for their preservation.

As pointed out by Gilliam and Roberts (2003), herbaceous synusiae is neglected because it does not represent the structure of the forest and also because it does not have commercial value, unlike the trees, which may have economic value assigned to the timber. However, native species often have useful properties, but lack studies prospects for them. The economic importance of herbs and shrubs is, for example, the major source of secondary compounds, widely studied searching for new drugs, besides providing food, fibers, industrial inputs, ornamental, essences, spices, among many other uses to humans (Mentz *et al.* 1997; Coradin *et al.* 2011).

The Itajaí Valley is located in Santa Catarina, and is covered by Atlantic Subtropical Rainforest and has humid

mesothermal climate with hot summers (Cfa) (Köppen 1948). The Itajaí-Açu watershed covers approximately 15,000 km<sup>2</sup>, and, as Leite and Klein (1990) pointed out, the vegetation of this area is known to be very rich in tree species, lianas and epiphytes, especially for tree species such as canela-preta (*Ocotea catharinensis* Mez), laranjeira-do-mato (*Sloanea guianensis* (Aubl.) Benth.), peroba (*Aspidosperma australe* Müll. Arg.) and tanheiro (*Alchornea triplinervia* (Spreng.) Müll. Arg.). Tree ferns dominates the understory like *Alsophila setosa* Kaulf., *Cyathea phalerata* Mart. and *Cyathea corcovadensis* (Raddi) Domin, besides the presence of shrubs of the genus *Psychotria* L. and *Mollinedia* Ruiz & Pavon (Sevegnani *et al.* 2013).

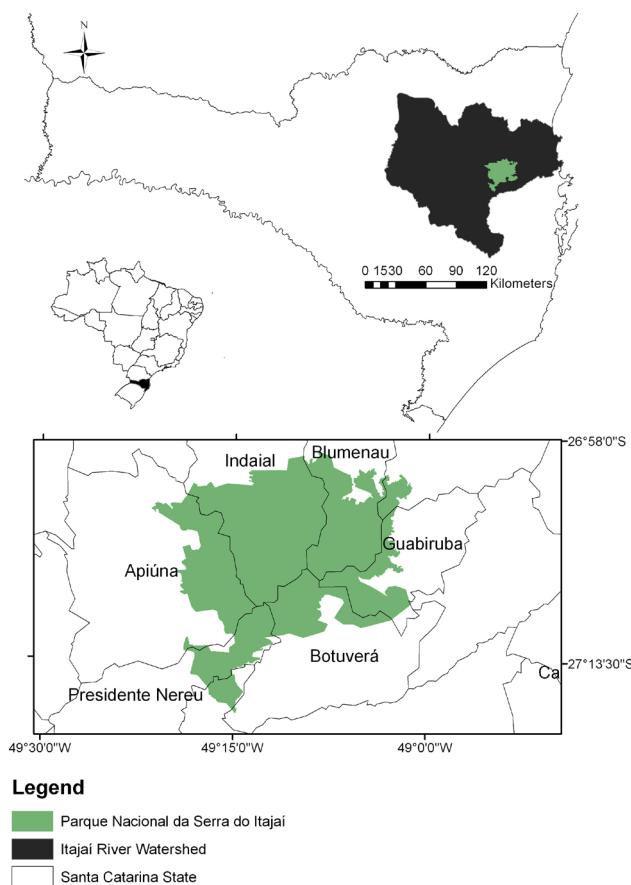
Thus, the objective of this study was to characterize the floristic diversity of herbaceous and shrub species of the largest remnants of Atlantic Subtropical Rainforest in southern Brazil, the Parque Nacional da Serra do Itajaí.

## MATERIALS AND METHODS

### Study Area

The Parque Nacional da Serra do Itajaí (PNSI) was created in June 2004 with more than 57,000 ha. It is covered by Rainforest (Oliveira-Filho 2009), distributed in sub-montane, montane and upper montane secondary and primary vegetation. The region is predominantly mountainous with altitudes ranging from about 30 to 1000 m. Part of it, which belonged to the former Parque Natural Municipal Nascentes do Garcia, is located in Blumenau city, in the Middle Itajaí Valley, between the coordinates 27°06' S and 49°10' W, in Santa Catarina (Figure 1), southern Brazil.

For logistics reasons, four locations were defined for field studies. The locations are: Parque Ecológico Spitzkopf, RPPN Buguerkopf, Morro do Sapo and Trilha da Chuva, all of them part of Parque Nacional da Serra do Itajaí. The PNSI is part of a major fragment of Atlantic Subtropical Rainforest, which has previously suffered from several human disturbances, but is now in an advanced stage of



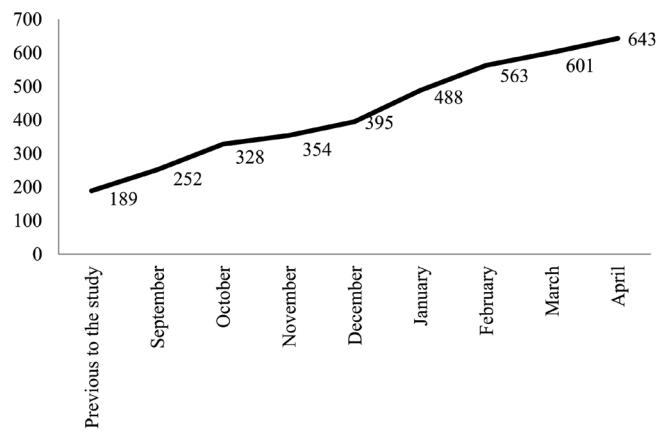
**FIGURE 1.** Location of the Parque Nacional da Serra do Itajaí, Itajaí Valley, Santa Catarina, Brazil.

regeneration. The climate is tropical humid with no dry season and thermal averages never below 15°C. Rainfall are abundant and evenly distributed throughout the year, however, there is a period of more intense rain during the summer, with less than 60 days with less than 100 mm rainfall. The relative humidity is high, ranging from 84–86% (Santa Catarina 1986).

#### Data collection

We collected fertile specimens by active search (Filgueiras *et al.* 1994), in previously mentioned locations. One to three fertile individuals of each species were collected and, after processed, deposited at the Herbarium Dr. Roberto Michael Klein (FURB). When necessary, we collected sterile samples, and these were grown in a greenhouse until flowering. We identified the material searching in the literature, discussing with taxonomists and compared it to materials with other herbaria collections. Angiosperm species were classified according to the Angiosperm Phylogeny Group III (APG 2009), ferns according to Smith *et al.* (2006) and adaptations of Rothfels *et al.* (2012), Kramer and Green (1990) for Lycophytes and Christenhusz *et al.* (2011) for Gymnosperms.

We compiled data published in *Flora Ilustrada Catarinense* (Reitz 1965), and herbariums FURB, FLOR, HBR, BHCB, CESJ, CNMT, CRI, FUEL, HEPH, HUCS, HVAT, ICN, JOI, LUSC, MBM, MFS, RB, UEC and UPCB through the CRIA database, aiming to increment the herbaceous-shrub list species already sampled at PNSI. We considered in this study all vascular plants with a height equal to or less than 3 m that were using soil or rocks as substrate. We



**FIGURE 2.** Collector curve by month of the species in the Parque Nacional da Serra do Itajaí, Itajaí Valley, Santa Catarina, Brazil. \*Species previously collected and which were not collected in this study.

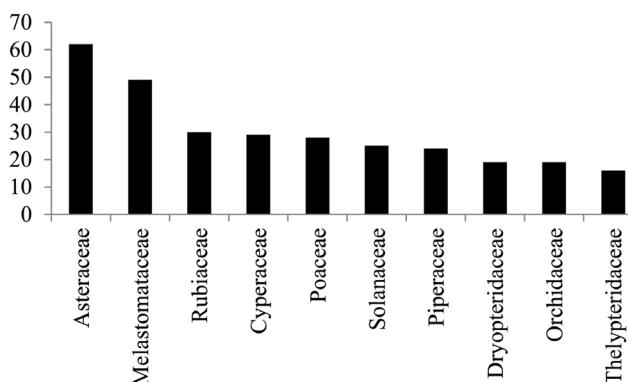
analyzed: species reported in the literature and collected species, new records for PNSI, new records for the state, exotic species, threatened species included at national and state red lists.

We classified the PNSI species by life form according to Raunkiaer (1934). A collector curve (Figure 2) was generated to determine if the species are well sampled. Field trips were made over a half year, during the warm season (September to April), to collect the specimens in reproductive stage. Plants which were not determined at species level were excluded from analysis to avoid overestimating the number of species.

#### RESULTS

We recorded 643 species from Parque Nacional da Serra do Itajaí (PNSI) (Table 1), these species were distributed in 486 (75.58%) Angiosperms with 86 families (78.18%); 145 (22.55%) fern species, with 21 families (21.81%); 11 species (1.71%) of Lycophytes into two families (1.9%) and one Gymnosperm (<1%). The ten most representative families are in Figure 3. The most abundant life forms were phanerophytes and hemicryptophytes (Figure 4). At least two species, *Thelypteris glaziovii* T.F. Reed (Thelypteridaceae) and *Pseudelephantopus spiralis* Cronquist (Asteraceae) is confirmed to be a new record for Santa Catarina state.

A total of 215 herbaceous and shrubs species (33.17%) were not collected in this study, when compared to



**FIGURE 3.** Ten most representative families in number of species in the herbaceous and shrubby of the Parque Nacional da Serra do Itajaí, Itajaí Valley, Santa Catarina, Brazil.

literature or CRIA data base. We found during the field trips 428 species, and 217 (33.74%) are new records for PNSI.

From the 643 species recorded in this study, 22 were exotic species (Table 1). We also found five threatened species and a new species of *Rhynchospora* Vahl is been described.

## DISCUSSION

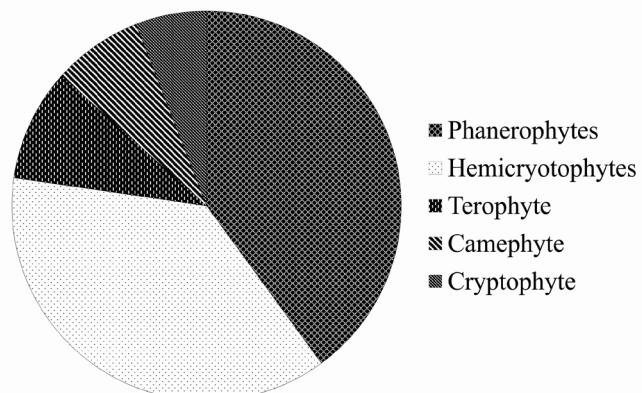
The importance of this Protected Areas for Atlantic Subtropical Rainforest (southern Brazil) biodiversity protection is proved, once again, by its richness. Adding up the tree species researched by the Management Plan of PNSI (Brasil 2009), where 340 tree and shrub species were recorded, as well as collections made by other researchers in PNSI, until now there were recorded 1,086 species of vascular.

We found epiphytes species in herbaceous stratum, growing over the leaf litter layer on top of Morro do Sapo and Spitzkopf such as *Prosthechea bulbosa* (Vell.) W.E. Higgins, *Prosthechea vespa* (Vell.) W.E. Higgins and *Coppensia flexuosa* (Lodd.) Campacci (Orchidaceae), *Vriesea erythrodactylon* (E. Morren) E. Morren ex Mez, *Vriesea rodigasiana* E. Morren and *Nidularium innocentii* Lem. (Bromeliaceae), *Pleiochiton blepharodes* (DC.) Reginato et al. (Melastomataceae) and species of *Nematanthus* Schrad. (Gesneriaceae) as has already been reported by Klein (1980).

The new record *Thelypteris glaziovii* had already been reported by Ponce (1998) in Santa Catarina and Rio Grande do Sul states, but no voucher was presented. Salino and Semir (2004) reduced its distribution only to southeastern Brazil, and more recently over a collection in Serra do Capivari, Campina Grande do Sul (Paraná), Schwartsburg and Xavier de Lima (2008) increased its distribution to Paraná state. Now we can confirm the reported made by Ponce (1998). *Pseudelphantopus spiralis* is a small ruderal herb, which a population of approximated five individuals was found in a short stretch of the Spitzkopf's trail. Is quoted by flora of Brazil with distribution in the states of Bahia, São Paulo and Acre. Possibly, as it is similar with ruderal species *Elephantopus mollis*, is poorly sampled.

The 22 exotic species in PNSI, four ferns (*Deparia petersenii* (Kunze) M. Kato, *Macrothelypteris torresiana* (Gaudich.) Ching, *Nephrolepis pectinata* (Willd.) Schott. and *Thelypteris dentata* (Forssk.) E.P. St. John, which have already been registered by Gasper and Sevegnani (2010) and 17 angiosperms: *Thunbergia alata* Bojer ex Sims, *Centella asiatica* (L.) Urb., *Bidens pilosa* L., *Galinsoga parviflora* Cav., *Tithonia diversifolia* (Emsl.) A. Gray, *Youngia japonica* (L.) DC., *Impatiens walleriana* Hook.f., *Cardamine bonariensis* Juss. ex Pers, *Drymaria cordata* (L.) Willd. ex Schult., *Stellaria media* (L.) Vill., *Tradescantia zebrina* Bosse, *Sechium edule* (Jacq.) Sw., *Psidium guajava* L., *Plantago major* L., *Eleusine indica* (L.) Gaertn., *Brugmansia suaveolens* (Humb. & Bompl. ex Willd.) Bercht. & J. Presl, *Pilea microphylla* (L.) Liebm. and *Hedychium coronarium* J.Koenig (Lista de Espécies da Flora do Brasil 2013; Schneider 2007).

Most of these exotic species were found near Spitzkopf, where in the past, some areas were used for agriculture and cattle. Likely, intense visits in the other areas studied



**FIGURE 4.** Distribution of the number of species in five forms sampled in the Parque Nacional da Serra do Itajaí, Itajaí Valley, Santa Catarina, Brazil.

may explain the fact, since many exotic species are closely related to human presence, current or past (Wright 2005). In the tracks margins we found some important invasive species such as *Impatiens walleriana* and *Hedychium coronarium* with dense populations close to watercourse.

Five species in the PNSI are threatened, that is why we should consider important the conservation of this area. Two of these were already known by previous collections for PNSI, especially xaxim-bugio (*Dicksonia sellowiana* Hook.), as quoted by Gasper and Sevegnani (2010), classified as Critically Endangered (CR) in SC state and in Brazil as Vulnerable (VU), especially due to commercial exploitation (Windisch 2002). *Heliconia farinosa* Raddi (VU) is treated as threatened on the national list of IBAMA (2008), but apparently it is a common species in PNSI, often found in lowland areas, next to watercourses. *Microlepia speluncae* (L.T. Moore) was considered probably extinct (EX) in the state list of endangered species, but we found a small population in RPPN Bugerkopf. *Piper ulei* C. DC. (VU) was also found in a location close to a watercourse in Morro do Sapo, where there were some individuals, and finally, *Vanilla dietschiana* (Edwal) Garay. (VU) was found only once, an individual with several vegetative seedlings, from which a sample was collected in RPPN Bugerkopf.

According to the samples curve, the number of species for PNSI is not stabilized, since it remained tilted, showing that the Parque Nacional da Serra do Itajaí is a extremely rich area, and 1,086 vascular plant species does not express its real richness. PNSI represents 0.6% of the state territory, yet its richness corresponds to nearly 22.6% of the total species described in Santa Catarina. Thus, we confirm the need for more research in the field in order to try to unravel the true biodiversity that this area hosts. The presence of three species categorized as threatened, and two new records for the state, besides a new species reinforces the importance of this area for the conservation of Atlantic Subtropical Rainforest remnants. On the other hand, the presence of exotic species points out this area vulnerability, especially in areas of strong human influence.

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TABLE 1. Continued.

FAMILIES/GENUS/SPECIES	FV	VOUCHER	FAMILIES/GENUS/SPECIES	FV	VOUCHER
<i>Rhynchospora</i> sp. nov.	CR	LAF 1798	<i>Linderniaceae</i> 2/3		
<i>Scleria distans</i> Poir.	H	LAF 1539	<i>Lindernia diffusa</i> (L.) Wettst.	T	LAF 1526
<i>Scleria latifolia</i> Sw.	H	LAF 911	<i>Lindernia rotundifolia</i> (L.) Alston	T	LAF 1883
<i>Scleria panicoides</i> Kunth	H	LAF 914	<i>Micranthemum umbrosum</i> (Walter ex J.F. Gmel.)	H	LAF 1882
<i>Scleria secans</i> (L.) Urb.	H	LAF 1086	<i>Loganiaceae</i> 1/2		
<i>Ericaceae</i> 2/3			<i>Spigelia pusilla</i> Mart.	CA	LAF 1018
<i>Agarista eucalyptoides</i> (Cham. & Schltdl.) G.Don	F	LS s/n	<i>Spigelia tetraptera</i> Taub.	F	LAF 1210
<i>Agarista niederleinii</i> (Sleumer) Judd	F	RMK 2313	<i>Lythraceae</i> 2/4		
<i>Gaylussacia brasiliensis</i> (Spreng.) Meisn.	F	CRG s/n	<i>Cuphea calophylla</i> Cham. & Schltdl.	CA	LAF 1503
<i>Erythroxylaceae</i> 1/2			<i>Cuphea carthagrenensis</i> (Jacq.) J.F. Macbr.	CA	LAF 1178
<i>Erythroxylum amplifolium</i> Baill.	F	LS s/n	<i>Cuphea racemosa</i> (L.f.) Spreng.	CA	LAF 995
<i>Erythroxylum vaccinifolium</i> Mart.	F	LS s/n	<i>Heimia apetala</i> (Spreng.) S.A. Graham & Gandhi	F	LAF 1490
<i>Euphorbiaceae</i> 5/5			<i>Malpighiaceae</i> 2/2		
<i>Acalypha gracilis</i> Spreng.	F	LAF 1619	<i>Bunchosia fluminensis</i> Griseb.	F	LAF 930
<i>Actinostemon concolor</i> (Spreng.) Müll. Arg.	F	ALG 2523	<i>Byrsonima ligustrifolia</i> Mart.	F	FST s/n
<i>Aparisthium cordatum</i> (A. Juss.) Baill.	F	LAF 1528	<i>Malvaceae</i> 4/7		
<i>Croton celtidifolius</i> Baill.	F	ASS 1320	<i>Byttneria australis</i> A. St.-Hil.	F	LAF 1732
<i>Sebastiania argutidens</i> Pax & K.Hoffm.	F	LS s/n	<i>Pavonia fruticosa</i> (Mill.) Fawc. & Rendle	F	LMC s/n
<i>Fabaceae</i> 5/7			<i>Pavonia nemoralis</i> A. St.-Hil.	F	LAF 1542
<i>Dahlstedtia pentaphylla</i> (Taub.) Burkart	F	LAF 1505	<i>Sida planicaulis</i> Cav.	CA	LAF 1564
<i>Dalbergia frutescens</i> (Vell.) Britton	F	ASS 1306	<i>Sida rhombifolia</i> L.	CA	LAF 1179
<i>Desmodium adscendens</i> (Sw.) DC.	H	LAF 1902	<i>Triumfetta rhomboidea</i> Jacq.	F	LAF 1848
<i>Desmodium incanum</i> DC.	H	LAF 1174	<i>Triumfetta semitriloba</i> Jacq.	F	LAF 2021
<i>Desmodium subsericum</i> Malme	CA	DBF 3955	<i>Marantaceae</i> 4/6		
<i>Erythrina speciosa</i> Andrews	F	RR8970	<i>Calathea monophylla</i> (Vell.) Körn.	CR	LAF 1231
<i>Inga marginata</i> Kunth	F	LAF 1170	<i>Ctenanthe lanceolata</i> Peterson	CR	LAF 1532
<i>Gentianaceae</i> 1/1			<i>Ctenanthe muellerii</i> Petersen	CR	LAF 1143
<i>Macrocarpaea rubra</i> Malme	T	LAF 1083	<i>Ctenanthe setosa</i> (Roscoe) Eichler	CR	LAF 1596
<i>Gesneriaceae</i> 2/3			<i>Maranta divaricata</i> Roscoe	CR	LAF 1957
<i>Nematanthus australis</i> Chautems	CA	LAF 2033	<i>Stromantha papillosa</i> Petersen	CR	LAF 1616
<i>Nematanthus fissus</i> (Vell.) L.E. Skog	CA	LAF 2027	<i>Marcgraviaceae</i> 1/1		
<i>Sinningia curtiflora</i> (Malme) Chautems	CR	LAF 1604	<i>Schwartzia brasiliensis</i> (Choisy) Bedell ex Gir.-Cañas	F	LAF 1699
<i>Gratiolaceae</i> 3/3			<i>Melastomataceae</i> 6/49		
<i>Bacopa stricta</i> (Schrad.) Wettst. ex Edwall	T	MLS 821	<i>Bertolonia acuminata</i> Gardner	CA	LAF 1541
<i>Scoparia dulcis</i> L.	T	LAF 1494	<i>Bertolonia mosenii</i> Cogn.	CA	LAF 1687
<i>Stemodia trifoliata</i> (Link) Rchb.	T	LAF 1243	<i>Leandra acutiflora</i> (Naudin) Cogn.	F	LAF 1254
<i>Stemodia verticillata</i> (Mill.) Hassl.	T	LAF 1756	<i>Leandra australis</i> (Cham.) Cogn.	F	ALG 819
<i>Griseliniaeae</i> 1/1			<i>Leandra barbinervis</i> (Cham. ex Triana) Cogn.	F	FB s/n
<i>Griselinia ruscifolia</i> (Gay) Ball	F	TJC 2587	<i>Leandra bergiana</i> Cogn.	F	LAF 1781
<i>Heliconiaceae</i> 1/1			<i>Leandra carassana</i> (DC.) Cogn.	F	LAF 1621
<i>Heliconia farinosa</i> Raddi***	CR	LAF 892	<i>Leandra dasytricha</i> (A. Gray) Cogn.	F	LAF 1200
<i>Hypoxidaceae</i> 1/1			<i>Leandra echinata</i> Cogn.	F	LAF 1092
<i>Hypoxis decumbens</i> L.	CR	LAF 1502	<i>Leandra fallax</i> (Cham.) Cogn.	F	LAF 1064
<i>Iridaceae</i> 1/2			<i>Leandra fragilis</i> Cogn.	F	ALG 973
<i>Sisyrinchium palmifolium</i> L.	H	ASS 1352	<i>Leandra glazioviana</i> Cogn.	F	LAF 1050
<i>Sisyrinchium vaginatum</i> Spreng.	H	LAF 1248	<i>Leandra hirtella</i> Cogn.	F	LAF 1214
<i>Juncaceae</i> 1/2			<i>Leandra horrida</i> Cogn.	F	RR 8972
<i>Juncus microcephalus</i> Kunth	H	LAF 1208	<i>Leandra kleinii</i> Brade	F	RR 563
<i>Juncus tenuis</i> Willd.	H	LAF 1233	<i>Leandra laevigata</i> Cogn.	F	LAF 1198
<i>Lamiaceae</i> 5/8			<i>Leandra laxa</i> Cogn.	F	MS s/n
<i>Aegiphila obducta</i> Vell.	F	LAF 2081	<i>Leandra melastomooides</i> Raddi	F	LAF 1624
<i>Hyptis fasciculata</i> Benth.	T	DRL s/n	<i>Leandra planifilamentosa</i> Brade	F	LAF 1587
<i>Hyptis heterodon</i> Epling	T	LAF 1892	<i>Leandra purpureovillosa</i> Hoehne	F	LAF 1215
<i>Hyptis inodora</i> Schrank	T	LAF 1088	<i>Leandra quinquedentata</i> Cogn.	F	RMK 2374
<i>Hyptis lacustris</i> A. St.-Hil. ex Benth.	T	LAF 1807	<i>Leandra regnellii</i> (Triana) Cogn.	F	LAF 1043
<i>Marsypianthes chamaedrys</i> (Vahl) Kuntze	T	LAF 1242	<i>Leandra reitzii</i> Wurdack	F	MS s/n
<i>Ocimum carnosum</i> (Spreng.) Link & Otto ex Benth.	CA	LAF 1197	<i>Leandra scabra</i> DC.	F	RMK 2362
<i>Peltodon radicans</i> Pohl	H	LAF 1812	<i>Leandra sublanata</i> Cogn.	F	MS 8638
<i>Lauraceae</i> 1/1			<i>Leandra tetraquetra</i> Cogn.	F	LAF 1683
<i>Endlicheria paniculata</i> (Spreng.) J.F. Macbr.	F	LAF 1886			



TABLE 1. Continued.

FAMILIES/GENUS/SPECIES	FV	VOUCHER	FAMILIES/GENUS/SPECIES	FV	VOUCHER
<i>Leandra xanthocoma</i> (Naudin) Cogn.	F	ASS 1334	<i>Habenaria parviflora</i> Lindl.	CR	LAF 1549
<i>Miconia budlejoides</i> Triana	F	AD s/n	<i>Malaxis excavata</i> (Lindl.) Kuntze	H	AK 3353
<i>Miconia chartacea</i> Triana	F	LAF 1693	<i>Microchilus arietinus</i> (Rchb. f. & Warm.) Ormerod	H	LAF 2212
<i>Miconia cubatanensis</i> Hoehne	F	DBF 3836	<i>Microchilus austrobrasiliensis</i> (Porsch) Ormerod	H	LAF 1937
<i>Miconia inconspicua</i> Miq.	F	CRG 619	<i>Prescottia densiflora</i> (Brongn.) Lindl.	H	LAF 934
<i>Miconia lymanii</i> Wurdack	F	RR 8994	<i>Prescottia stachyoides</i> (Sw.) Lindl.	H	LAF 2113
<i>Miconia sellowiana</i> Naudin	F	ALG 2461	<i>Prosthechea bulbosa</i> (Vell.) W.E. Higgins	H	LAF 1592
<i>Miconia tristis</i> Spring	F	SD 1033	<i>Prosthechea vespa</i> (Vell.) W.E. Higgins	H	LAF 1479
<i>Miconia valtheri</i> Naudin	F	LAF 1580	<i>Psilocilus dusenianus</i> Kraenzl. ex Garay & Dunst.	H	TJC 1330
<i>Ossaea amygdaloides</i> Triana	F	LAF 1213	<i>Psilocilus modestus</i> Barb. Rodr.	H	LAF 1677
<i>Ossaea confertiflora</i> (DC.) Triana	F	LAF 1685	<i>Sauvagesia nitidum</i> (Vell.) Schltr.	H	LAF 2149
<i>Ossaea meridionalis</i> D'El Rei Souza	F	LAF 1595	<i>Vanilla dietschiana</i> Edwall**	H	LAF 1707
<i>Ossaea sanguinea</i> Cogn.	F	LAF 1517	Orobanchaceae 1/1		
<i>Pleiochiton blepharodes</i> (DC.) Reginato et al.	CA	LAF 1545	<i>Velloziella westermannii</i> Dusén	F	LAF 2045
<i>Pleiochiton ebracteatum</i> Triana	CA	LAF 1863	Oxalidaceae 1/2		
<i>Tibouchina catharinensis</i> Brade	F	s/coletor	<i>Oxalis hispidula</i> Zucc.	CR	LAF 1007
<i>Tibouchina clinopodifolia</i> (DC.) Cogn.	T	LAF 1065	<i>Oxalis triangularis</i> A. St.-Hil.	CR	LAF 1780
<i>Tibouchina dusenii</i> Cogn.	F	MS s/n	Passifloraceae 1/4		
<i>Tibouchina mutabilis</i> (Vell.) Cogn.	F	LAF 1180	<i>Passiflora capsularis</i> L.	F	LAF 969
<i>Tibouchina pilosa</i> Cogn.	F	LAF 1550	<i>Passiflora haematostigma</i> Mart. ex Mast.	F	DBF 3904
<i>Tibouchina sellowiana</i> Cogn.	F	FST s/n	<i>Passiflora jilekii</i> Wawra	F	LMC s/n
<i>Tibouchina urvilleana</i> (DC.) Cogn.	F	LAF 1548	<i>Passiflora truncata</i> Regel	F	DBF 3807
<i>Tibouchina versicolor</i> Cogn.	F	DBF 3895	Phrymaceae 1/1		
Meliaceae 3/3			<i>Mazus japonicus</i> (Thunb.) Kuntze*	T	LAF 1755
<i>Cabralea canjerana</i> (Vell.) Mart.	F	CRG 572	Phyllanthaceae 1/2		
<i>Guarea macrophylla</i> Vahl	F	LAF 1028	<i>Phyllanthus caroliniensis</i> Walter	T	LAF 1002
<i>Trichilia pallens</i> C. DC.	F	ASS 1335	<i>Phyllanthus lindbergii</i> Müll. Arg.	T	LAF 1091
Monimiaceae 1/2			Phytolaccaceae 1/1		
<i>Mollinedia clavigera</i> Tul.	F	MS s/n	<i>Phytolacca thyrsiflora</i> Fenzl ex J.A. Schmidt	T	LAF 1914
<i>Mollinedia schottiana</i> (Spreng.) Perkins	F	AD s/n	Piperaceae 2/24		
Moraceae 2/2			<i>Peperomia alata</i> Ruiz & Pav.	CA	LAF 1705
<i>Dorstenia carautae</i> C.C. Berg	CA	LAF 923	<i>Peperomia glabella</i> (Sw.) A. Dietr.	H	LAF 1012
<i>Sorocea bonplandii</i> (Baill.) W.C. Burger et al.	F	JPM 31	<i>Peperomia hispidula</i> (Sw.) A. Dietr.	CA	LAF 1026
Myrtaceae 4/7			<i>Peperomia ibiramana</i> Yunck.	H	LAF 916
<i>Eugenia kleinii</i> D. Legrand	F	DBF 4831	<i>Peperomia renifolia</i> Dahlst.	H	LAF 881
<i>Eugenia sclerocalyx</i> D. Legrand	F	RR s/n	<i>Peperomia urocarpa</i> Fisch. & C.A. Mey.	H	LAF 876
<i>Eugenia uniflora</i> L.	F	LAF 1492	<i>Piper alnoides</i> Kunth	F	LAF 1044
<i>Marlieria tomentosa</i> Griseb.	F	TJC 1244	<i>Piper amplum</i> Kunth	F	LAF 1600
<i>Myrciaria alpigena</i> (DC.) Landrum	F	MS s/n	<i>Piper arboreum</i> Aubl.	F	LAF 1244
<i>Myrciaria glaucescens</i> (Cambess.) D. Legrand & Kausel	F	ASS 769	<i>Piper caldense</i> C. DC.	F	LAF 1601
<i>Psidium guajava</i> L.*	F	LAF 1496	<i>Piper cernuum</i> Vell.	F	LAF 1912
Nyctaginaceae 2/2			<i>Piper corcovadensis</i> (Miq.) C. DC.	F	AK 3345
<i>Guapira opposita</i> (Vell.) Reitz	F	CRG 566	<i>Piper crassinervium</i> Kunth	F	LAF 2022
<i>Neea pendulina</i> Heimerl	F	LAF 1039	<i>Piper dilatatum</i> Rich.	F	MS s/n
Ochnaceae 2/3			<i>Piper gaudichaudianum</i> Kunth	F	LAF 1741
<i>Ouratea parviflora</i> Engl.	F	LAF 1729	<i>Piper hispidum</i> Sw.	F	LAF 908
<i>Ouratea vaccinioides</i> Engl.	F	LS s/n	<i>Piper malacophyllum</i> (C. Presl) C. DC.	F	LAF 1737
<i>Sauvagesia vellozii</i> (Vell. ex A. St.-Hil.) Sastre	CA	LAF 1544	<i>Piper mollicomum</i> (Kunth) Steud.	F	LAF 1692
Onagraceae 2/2			<i>Piper mosenii</i> C. DC.	F	LAF 907
<i>Fuchsia regia</i> (Vand. ex Vell.) Munz	F	LAF 1062	<i>Piper piritubanum</i> Yunck.	F	ASS 1297
<i>Ludwigia longifolia</i> (DC.) H. Hara	T	DBF 3883	<i>Piper reitzii</i> Yunck.	F	ASS 1336
Orchidaceae 14/19			<i>Piper rivinoides</i> (Kunth) C. DC.	F	LAF 1959
<i>Aspidogyne decora</i> (Rchb.f.) Garay & G.A. Romero	H	LAF 991	<i>Piper ulei</i> C. DC.**	F	LAF 1820
<i>Brachystele camporum</i> (Lindl.) Schltr.	H	DBF 6202	<i>Piper viminifolium</i> Trel.	F	LAF 1801
<i>Cleistes libonii</i> (Rchb. f.) Schltr.	CR	LAF 2062	Plantaginaceae 1/2		
<i>Cleistes revoluta</i> (Barb. Rodr.) Schltr.	CR	RR9619	<i>Plantago major</i> L.*	CA	LAF 1247
<i>Coppensia flexuosa</i> (Lodd.) Campacci	H	LAF 1593	<i>Plantago tomentosa</i> Lam.	CA	LAF 1087
<i>Corymborkis flava</i> (Sw.) Kuntze	H	LAF 1944	Poaceae 14/28		
<i>Epidendrum secundum</i> Jacq.	H	LAF 1594	<i>Andropogon bicornis</i> L.	T	LAF 1698
			<i>Bromus catharticus</i> Vahl	T	RR 455





FAMILIES/GENUS/SPECIES	FV	VOUCHER
Thymelaeaceae 1/1		
<i>Daphnopsis fasciculata</i> (Meisn.) Nevling	F	ASS 1342
Thypaceae 1/1		
<i>Typha domingensis</i> Pers.	CR	LAF 1618
Urticaceae 4/10		
<i>Boehmeria caudata</i> Sw.	F	LAF 999
<i>Boehmeria cylindrica</i> (L.) Sw.	F	LAF 1877
<i>Phenax sonneratii</i> (Poir.) Wedd.	F	LAF 1497
<i>Phenax uliginosus</i> Wedd.	F	LAF 1171
<i>Pilea microphylla</i> (L.) Liebm.*	CA	LAF 1723
<i>Pilea pubescens</i> Liebm.	CA	LAF 1575
<i>Pilea rhizobola</i> Miq.	F	LAF 1016

FAMILIES/GENUS/SPECIES	FV	VOUCHER
<i>Urera baccifera</i> (L.) Gaudich.	F	LAF 1872
<i>Urera caracasana</i> (Jacq.) Gaudich. ex Griseb.	F	LAF 1823
<i>Urera nitida</i> Brack	F	LAF 1796
Vitaceae 1/1		
<i>Cissus paullinifolia</i> Vell.	F	RR 551
Winteraceae 1/2		
<i>Drimys angustifolia</i> Miers	F	LAF 2070
<i>Drimys brasiliensis</i> Miers	F	ALG 2532
Zingiberaceae 1/2		
<i>Hedychium coronarium</i> J. König*	CR	LAF 1617
<i>Renealmia petasites</i> Gagnep.	CR	LAF 1230