

Wood vegetation in Atlantic rain forest remnants in Sorocaba (São Paulo, Brazil)

Alessandra Rocha Kortz^{1,3*}, Samuel Coelho¹, Ana Carolina Devides Castello¹, Láine Silveira Corrêa¹, Eliana Cardoso Leite² and Ingrid Koch¹

1 Universidade Federal de São Carlos (UFSCar), Campus Sorocaba, Departamento de Biologia, Rodovia João Leme dos Santos, km 110, SP 264, CEP 18052-780, Sorocaba, SP, Brazil.

2 Universidade Federal de São Carlos (UFSCar), campus Sorocaba, Departamento de Ciências Ambientais, Rodovia João Leme dos Santos, km 110, SP 264, CEP 18052-780, Sorocaba, SP, Brazil

3 Current address: University of St Andrews, Centre for Biological Diversity, St Andrews, Fife, KY16 9TF, United Kingdom

* Corresponding author. E-mail: ark4@st-andrews.ac.uk

ABSTRACT: The Atlantic rain forest is in a very fragmented condition due to the high deforestation in recent decades, thus even remnants of secondary vegetation may be considered important for maintaining the ecological and microclimatic functions on a regional scale. This represents the first plant composition study conducted in the area, located in Sorocaba (São Paulo, Brazil), a region relatively unknown in terms of vegetation. Our aims were to survey the vegetation, verify the vegetation formation in which the sampled species occur and identify endangered species. Periodic samples of woody plants were conducted between September 2007 and December 2009. We found 166 species, belonging to 47 families and 102 genera; ten of these species are under threat of extinction. Our data substantially increase our knowledge of the diversity of the regional flora and will play a crucial role in developing conservation policy.

INTRODUCTION

The Atlantic rain forest - one of the most diverse ecosystems on the planet (Mittermeier *et al.* 1999) - is mainly located on the coast of Brazil. Today only 16% of its original area remains (Ribeiro *et al.* 2009), which places it among the 25 most endangered high diversity biomes in the world (Mittermeier *et al.* 1999). Moreover, the majority of its remnants are small, isolated from each other, and composed of secondary (re-grown) forests in early to intermediate successional stages (Metzger 2000; Metzger *et al.* 2009).

Human intervention has intensively fragmented Atlantic rain forest formations, particularly in southern Brazil (São Paulo state) (Zipparro *et al.* 2005), and has resulted in loss of biodiversity (Laurance 2001; Tabarelli *et al.* 2004). Crucially, the remaining fragments of vegetation have not yet been systematically investigated, leading to a gap in knowledge about the regional flora (Giulietti *et al.* 2005; Cielo-Filho *et al.* 2009). As a consequence, there is a pressing need for vegetation composition studies, to provide information about the geographic distribution patterns of species. These studies will play a crucial role in identifying areas of high endemism, finding the location of endangered species, and determining priority areas for conservation (Myers *et al.* 2000).

The second highest percentage of cover of natural vegetation in São Paulo state (after the littoral region) is located in the administrative region of Sorocaba, which contains the Sorocaba Médio-Tietê watershed (Kronka *et al.* 2005). This region is mostly composed of seasonal semideciduous forest (SSF) and *Cerrado*, and has 13.6% of vegetation cover (Instituto de Pesquisas Tecnológicas 2006), including reforestation areas (Rodrigues *et al.* 2008). In this study, we aim to (1) survey the plant species occurring in remaining vegetation in Sorocaba;

(2) to classify its vegetation formation and (3) identify the presence of endangered species. We expect that these data will be valuable in understanding the regional flora and be used in its conservation.

MATERIALS AND METHODS

Study site

The study was conducted in the Universidade Federal de São Carlos (UFSCar), *campus* Sorocaba, located in a rural area, under the coordinates 47°31'28" W and 23°34'53" S (Figure 1). The total size of the seven remaining patches is 10.46 ha (linear remaining: 1.3 ha, R1: 2 ha, R2: 2 ha, R3: 1.5 ha, R4: 2 ha, R5: 0.5 ha, R6: 1.2 ha), which are mostly located in permanent protection areas, including headwaters of the Ipaneminha stream - a tributary of the Sorocaba river.

The climate of the area is a transition from Cwb (tropical altitude with moderately warm summer) to Cwa (tropical altitude with hot summer) (Köppen 1948), with average annual temperature of 22°C. The relief comprises a transition between the Atlantic Plateau and Peripheral Depression Paulista, under an altitude between 625 to 670 m (Ross and Moroz 1997). The soil is characterized as an association of Dystrophic Red Latosol, with moderate horizon and heavy clay (Rossi and Oliveira 2000).

Data collection

Woody plants were periodically sampled between September 2007 and December 2009. The specimens were collected mainly during the plant's reproductive phase and from individuals with ≥ 1.5 m of height. The collected material was pressed and dried in accordance with the methodology for this type of study (Fidalgo and Bononi 1989), and the specimens were donated to the herbarium CCTS (Thiers 2013) after identification. The specimens

were identified using identification keys, specialized literature, comparisons with specimens identified by specialists listed in the Herbarium of State University of Campinas (UEC) collection, and help from taxonomist experts.

The results are presented in accordance with APG III (2009). The spelling of species names was checked using relevant literature and/or the tropical plants databases from Missouri Botanical Garden (Tropicos 2013) and List of Species of the Brazilian Flora (2013). When databases were in conflict, we also used reviews of genus. The spelling and abbreviation of authors' names were standardized following The International Plant Names Index (IPNI 2013).

The species were classified with respect to the environment in which they occur according to *Secretaria do meio ambiente do estado de São Paulo* (São Paulo 2008), and the List of Species of the Brazilian Flora (2013). All the species were checked against the Official List of Endangered Species of São Paulo state (São Paulo 2004), the Official List of Endangered Brazilian Flora Species (Brasil 2008), the List of Endangered Brazilian Flora Species (Biodiversitas 2008) and the Red List of Endangered Species of the International Union for the Conservation of Nature (IUCN 2013).

RESULTS

We sampled 166 species, from 102 genera and 47 families. The families with the highest number of species were Myrtaceae (24 spp.) and Fabaceae (21 spp.), followed by Lauraceae (12 spp.), Melastomataceae (9

spp.), Meliaceae (7 spp.), Euphorbiaceae and Piperaceae (6 spp.), and Annonaceae and Sapindaceae (5 spp.). The most representative genus in number of species was *Myrcia* (8 spp.), followed by *Eugenia* and *Piper* (6 spp.), *Miconia* (5 spp.), *Campomanesia*, *Casearia*, *Machaerium*, *Nectandra* and *Ocotea* (4 spp.) and *Psidium* and *Trichilia* (3 spp.) (Table 1, Figures 2-5).

The majority of species are widespread and occur both in SSF and dense ombrophylous forest (DOF) (34.9%); 31.3% occur in DOF, SSF and *Cerrado*; 8.4% occur only in DOF; 6.6% occur only in *Cerrado*; 4.8% occur both in SSF and *Cerrado*; 2.4% occur both in DOF and *Cerrado*; 2.4% occur only in SSF; and just one specie (0.6%) occur in DOF, SSF and semi deciduous forest (8.4% were not classified).

Ten species were found in the extinction threat lists consulted (IUCN, Brazil, São Paulo state). The São Paulo state list of endangered species (São Paulo 2008) contains the largest number of species (nine). However, only *Protium kleinii* fell in the Vulnerable category. All the others species, *Bauhinia longifolia*, *Cecropia hololeuca*, *Copaifera langsdorffi*, *Chrysophyllum marginatum*, *Guarea guidonia*, *Guarea kunthiana*, *Guarea macrophylla* and *Machaerium villosum* were classified as "Almost Endangered". *Machaerium villosum* is listed also in the IUCN list, but as Vulnerable to extinction (World Conservation Monitoring Centre 1998). *Brosimum glaziovii*, the only species on the endangered species list for Brazil (Brasil 2008), is classified as deficient in data (i.e. whose information regarding the geographical distribution, threats/impacts and uses, among others, is still deficient). On another hand, this species is classified as "Endangered" in the IUCN list

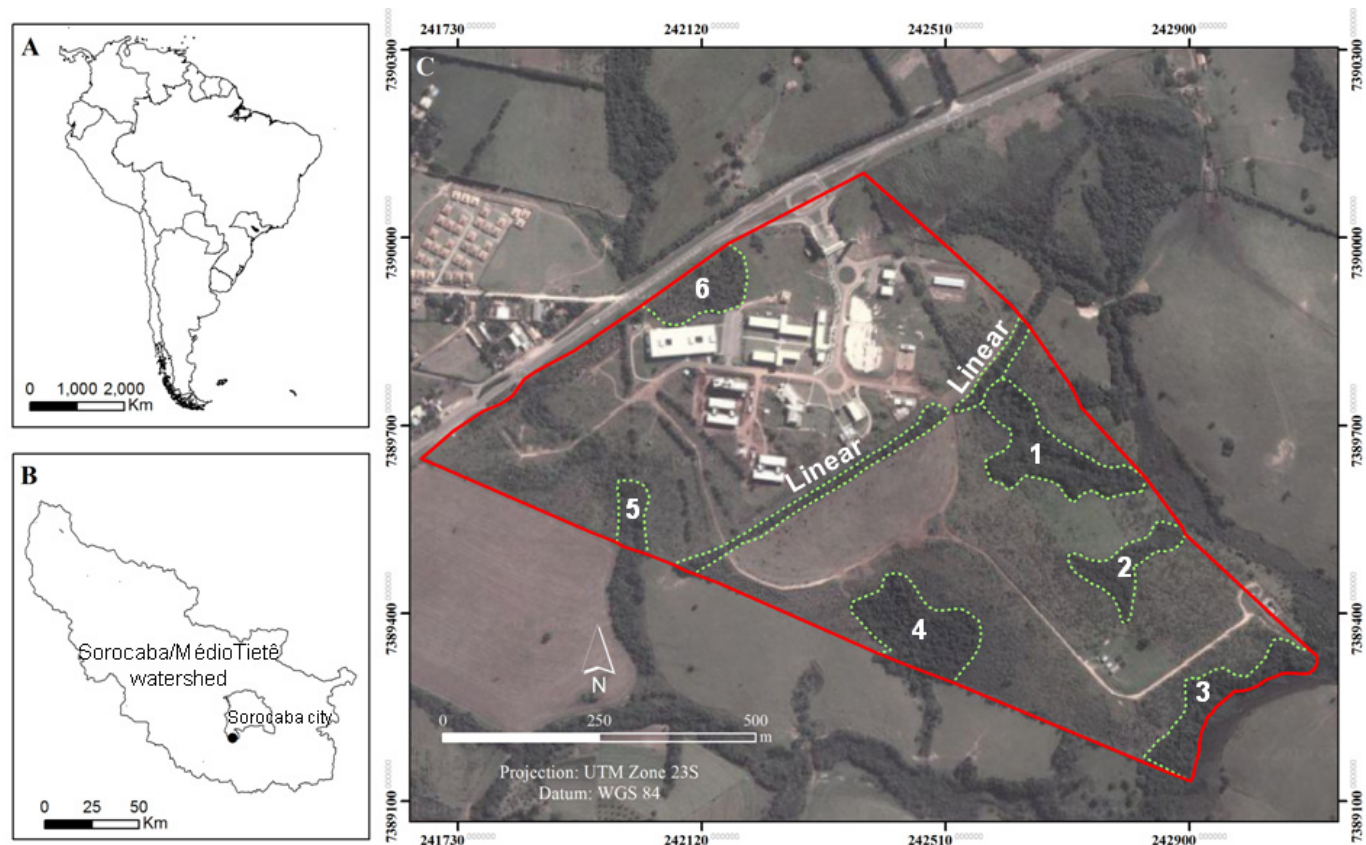


FIGURE 1. A. South America territory showing the Médio Tietê watershed (in black) located in the São Paulo state, Brazil. B. Localization of the study area (black point) in Sorocaba city and in the Médio Tietê watershed. C. Study area with the remaining vegetation fragments. The red line represents the area of Universidade Federal de São Carlos, campus Sorocaba. Linear and 1-6 represents the remaining patches of vegetation studied. Satellite image from Google Earth (2013). Organized by Ana Carolina D. Castello (2014).

(Varty 1998).

DISCUSSION

Our study identified the families with greatest floristic richness as the Fabaceae, Myrtaceae, Euphorbiaceae,

Lauraceae and Melastomataceae. These taxa are some of the most diverse families in Brazil (especially with regard to large woody species), and our findings are consistent with several studies conducted in the state of São Paulo (Assumpção *et al.* 1982; Leitão-Filho 1987; Cardoso-Leite

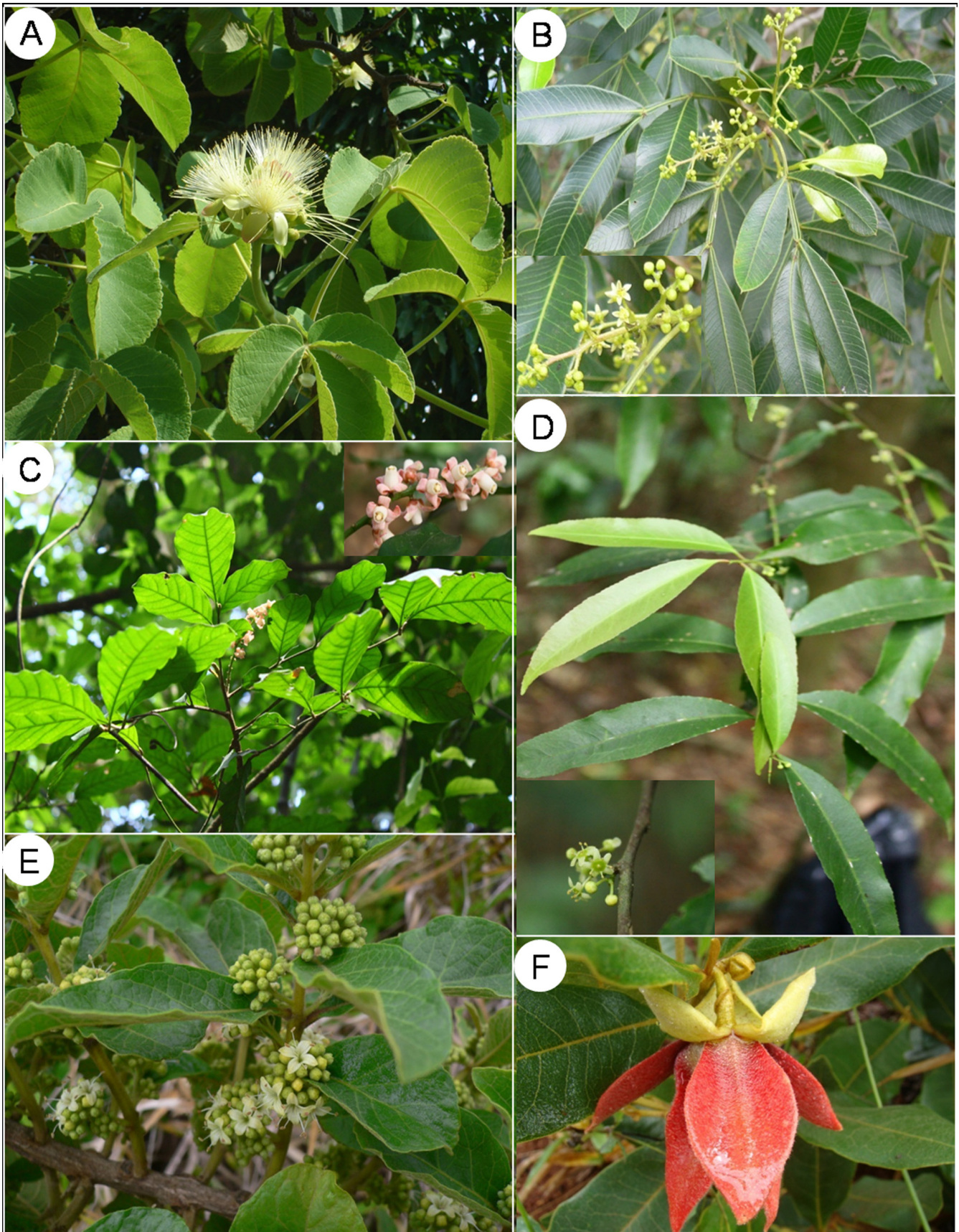


FIGURE 2. A. *Caryocar brasiliense*; B. *Lithrea molleoides*; C. *Guarea macrophylla*; D. *Maytenus gonoclada*; E. *Aegiphila vertillata*; F. *Duguetia furfuracea*. Images taken by Alessandra Kortz, Larissa Campos and Ingrid Koch.

et al. 2004; Zipparro et al. 2005; Oliveira and Godoy 2007; Pereira-Silva et al. 2007; Franco et al. 2007; Guaratini et al. 2008) and more specifically in the administrative region of Sorocaba (Ivanauskas and Rodrigues 1999; Bernacci et al. 2006; Ishara et al. 2008; Viani and Rodrigues 2009) on formations of SSF and *Cerrado*.

Tapirira guianensis is typical of forest, but has also been recorded in *Cerrado* areas (Ratter et al. 1988). *Schinus terebinthifolius*, *Lithrea molleoides*, *Copaifera langsdorffii* and *Casearia sylvestris* are recorded as

occurring in different vegetation formations. With respect to the species which occur in SSF (Table 1), *Aspidosperma olivaceum* and *Guarea kunthiana* are considered typical (Durigan et al. 2000; Silva and Soares 2002; Catharino et al. 2006; Pinheiro and Monteiro 2008; Cielo-Filho et al. 2009). Despite *Machaerium paraguariense* being found in SSF, it also occurs in the *Pantanal* (Polido and Sartori 2007). Species widely cited for the *Cerrado* in São Paulo state include *Caryocar brasiliense*, *Schefflera vinosa*, *Miconia albicans*, *Styrax ferrugineus* (Ishara et al. 2008),

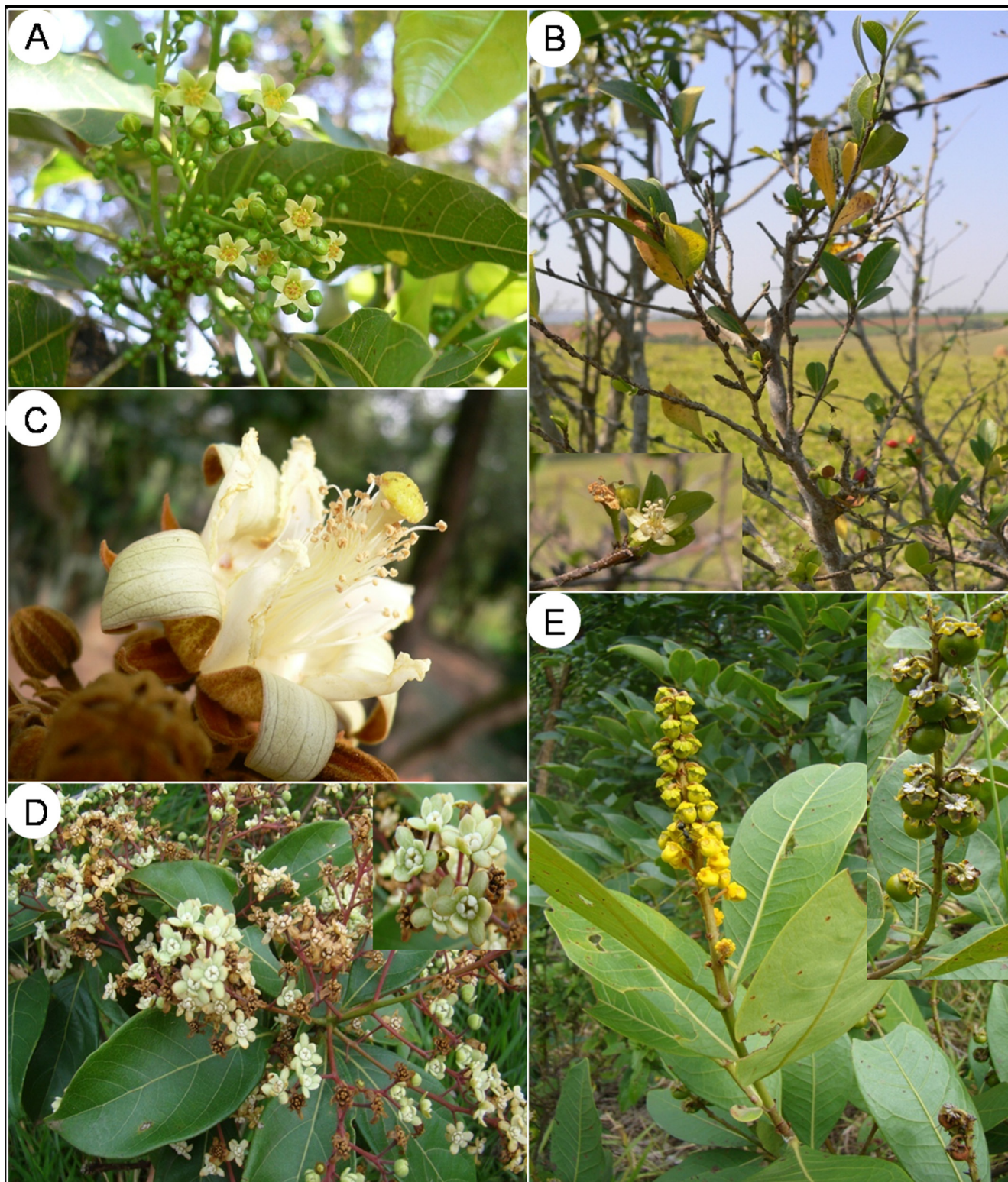


FIGURE 3. A. *Protium heptaphyllum*; B. *Erythroxylum cuneifolium*; C. *Luehea grandiflora*; D. *Nectandra grandiflora*; E. *Byrsonima intermedia*. Images taken by Alessandra Kortz, Larissa Campos and Ingrid Koch.

Leptolobium elegans, *Styrax camporum* (Leitão-Filho 1992; Bicudo 1996), *Gochnatia polymorpha*, *Lafoensia pacari*, *Platypodium elegans*, *Persea pyrifolia* (Ivanauskas and Rodrigues 1999) and *Copaifera langsdorffii* (Gandolfi et al. 1995; Albuquerque and Rodrigues 2000).

The fact that we found typical species of *Cerrado*, SSF and DOF formations in the area was expected, since the Sorocaba region comprises these formations (Kronka et al. 2005). This is also considered a transition zone between

SSF and *Cerrado* that is environmentally heterogeneous due to climate and soil conditions (Albuquerque and Rodrigues 2000).

This was the first floristic composition study conducted in the Sorocaba campus of the Universidade de São Carlos, which is located in a region highly fragmented and relatively unknown in terms of vegetation. Sorocaba city contains about 100 forest fragments smaller than 10 ha and 83% of the vegetation fragments in the watershed are

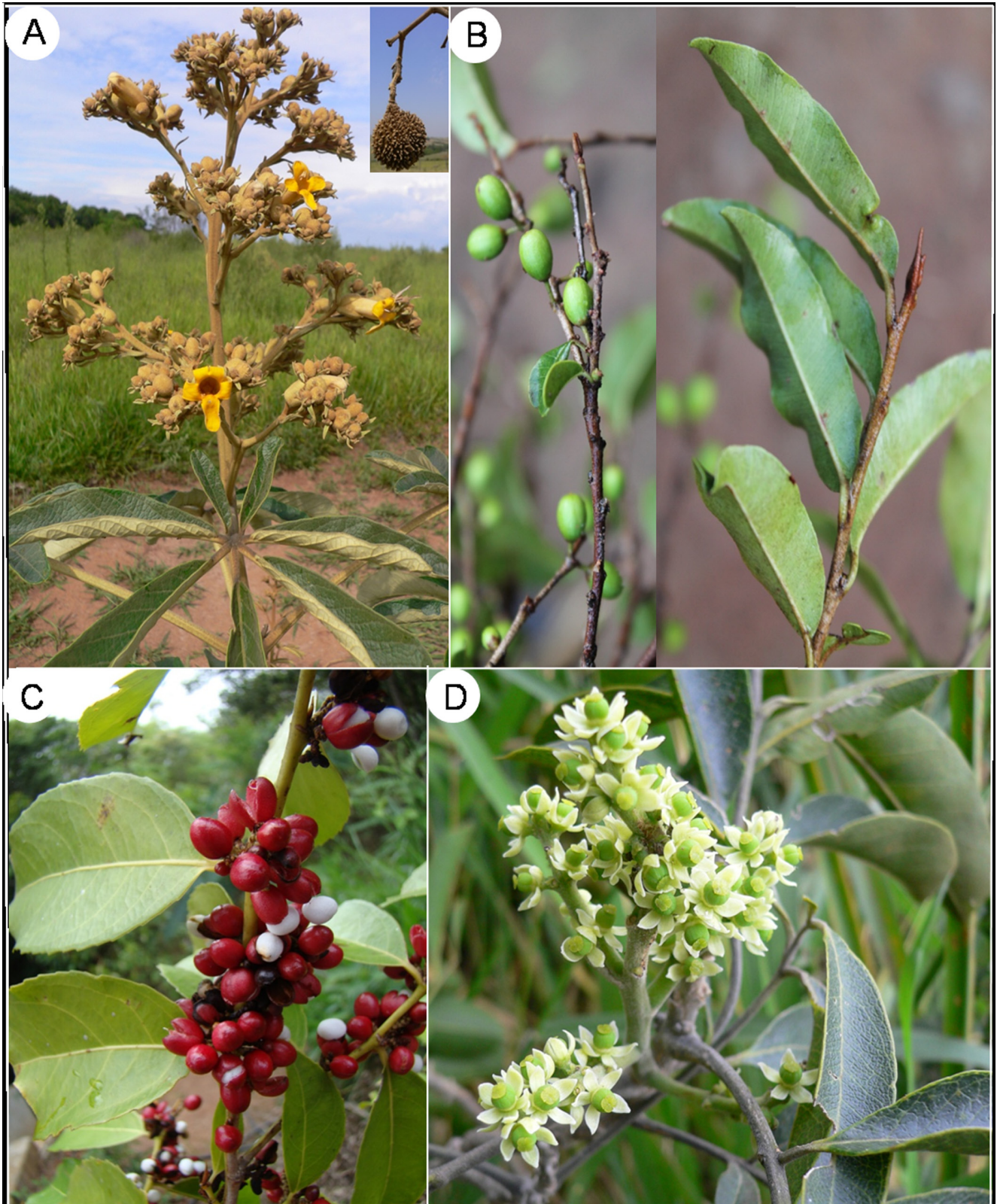


FIGURE 4. A. *Zeyheria montana*; B. *Chrysophyllum marginatum*; C. *Lacistema hasslerianum*; D. *Zanthoxylum riedelianum*. Images taken by Alessandra Kortz, Larissa Campos e Ingrid Koch.

up to 20 ha (Kronka *et al.* 2005).

Though small (approximately 10 ha), the studied fragment has high species richness and contains some endangered species. In this context, even remnants of secondary vegetation may be considered important for maintaining the ecological and microclimatic functions on a regional scale. Furthermore, the area can contribute for the conservation of endangered species, whose small

populations may be functioning as a metapopulation interconnected with larger areas and may allow the species dispersion to nearby areas (Turner and Corlett 1996). Our results have played a role in documenting the ecology and diversity of this assemblage, provide additional information on the status of the regional flora, will support conservation, and aid future investigators studying biodiversity in this floristically important area.



FIGURE 5. A. *Schinus terebinthifolia*; B. *Qualea grandiflora*; C. *Pera glabrata*; D. *Lakoensia pacari*; E. *Clethra scabra*. Images taken by Alessandra Kortz, Larissa Campos and Ingrid Koch.

TABLE 1. List of families and species of Angiosperms of the UFSCar, Sorocaba campus, São Paulo State, Brazil, with their habit, phytophysiognomy, voucher and category of threat. DOF = Dense Ombrophylous Forest; SSF = Semi-Deciduous Seasonal Forest; DSF = Deciduous Seasonal Forest; CER = Cerrado strict sensu. IUCN = International Union for Conservation of Nature; SP = List of threatened species of the state of São Paulo; VU = vulnerable; AE = almost endangered; EM = endangered. * Specimens not collected.

TAXON	FIGURE	HABIT	PHYTOPHYSIOGNOMY	VOUCHER	CATEGORY OF THREAT
ANACARDIACEAE					
<i>Lithrea molleoides</i> (Vell.) Engl.	2B	Tree	DOF, SSF, CER	248	
<i>Schinus terebinthifolius</i> Raddi	5A	Tree	DOF, SSF, CER	8	
<i>Tapirira guianensis</i> Aubl.		Tree	DOF, SSF, CER	494	
ANNONACEAE					
<i>Annona dioica</i> A.St.-Hil.		Tree	CER	1132	
<i>Annona sylvatica</i> A.St.-Hil.		Tree	DOF, SSF,	185	
<i>Duguetia furfuracea</i> (A.St.-Hil.) Saff.	2F	Tree	CER	1408	
<i>Guatteria australis</i> A.St.-Hil.		Tree	DOF, SSF, MP	208	
APOCYNACEAE					
<i>Aspidosperma olivaceum</i> Müll.Arg.		Tree	SSF		
<i>Aspidosperma cylindrocarpon</i> Müll.Arg.		Tree	DOF, SSF, MP	277	
<i>Tabernaemontana catharinensis</i> A.DC.		Tree		483	
ARALIACEAE					
<i>Dendropanax cuneatus</i> (DC.) Decne. & Planch.		Tree	DOF, SSF, CER	492	
<i>Schefflera vinosa</i> (Cham. & Schltdl.) Frodin & Fiaschi		Shrurb	CER	1343	
ARECACEAE					
<i>Attalea geraensis</i> Barb.Rodr.		Tree	CER	*	
<i>Syagrus romanzoffiana</i> (Cham.) Glassman		Tree	DOF, SSF, MC, CER	*	
ASTERACEAE					
<i>Baccharis dracunculifolia</i> DC.		Shrurb	DOF, SSF, CER	20	
<i>Gochnatia polymorpha</i> (Less.) Cabrera		Tree	DOF, CER	180	
<i>Senecio brasiliensis</i> (Spreng.) Less.		Subshrurb		1353	
<i>Vernonanthura phosporica</i> (Vell.) H.Rob.		Shrurb	DOF, SSF, CER	245	
BIGNONIACEAE					
<i>Handroanthus chrysotrichus</i> (Mart. ex DC.) Mattos		Tree	DOF, SSF	1325	
<i>Zeyheria montana</i> Mart.	4A	Tree	CER	23	
BURSERACEAE					
<i>Protium heptaphyllum</i> (Aubl.) Marchand	3A	Tree	DOF, SSF, CER	36	
<i>Protium kleinii</i> Cuatrec.		Tree	DOF	499	VU (SP)
CANNABACEAE					
<i>Celtis iguanaea</i> (Jacq.) Sarg.		Shrurb	DOF, SSF, DSF	495	
<i>Trema micrantha</i> (L.) Blume		Tree	DOF, SSF, CER	469	
CARYOCARACEAE					
<i>Caryocar brasiliense</i> Cambess.	2A	Tree	CER	232	
CELASTRACEAE					
<i>Maytenus aquifolia</i> Mart.		Tree	DOF, SSF	179	
<i>Maytenus gonoclada</i> Mart.	2D	Tree	DOF, SSF	660	
<i>Peritassa campestris</i> (Cambess.) A.C.Sm.		Shrurb		229	
CLETHRACEAE					
<i>Clethra scabra</i> Pers.	5E	Tree	DOF, SSF	190	
EBENACEAE					
<i>Diospyros inconstans</i> Jacq.		Tree	DOF, SSF	507	
ERYTHROXYLACEAE					
<i>Erythroxylum cuneifolium</i> (Mart.) O.E.Schulz	3B	Shrurb	DOF, SSF, CER	60	
<i>Erythroxylum daphnites</i> Mart.		Shrurb, Tree	CER	1388	
EUPHORBIACEAE					
<i>Actinostemon conceptionis</i> (Chodat & Hassl.) Hochr.		Tree		1357	
<i>Actinostemon concolor</i> (Spreng.) Müll.Arg.		Tree	DOF, SSF, CER	656	
<i>Croton floribundus</i> Spreng.		Tree	DOF, SSF, CER	644	
<i>Sapium glandulosum</i> (L.) Morong		Tree	DOF, SSF, CER	1356	
<i>Sebastiania brasiliensis</i> Spreng.		Tree	DOF, SSF	1355	
<i>Sebastiania commersoniana</i> (Baill.) L.B.Sm. & Downs		Tree	DOF, SSF	489	
FABACEAE					
<i>Albizia niopoides</i> (Spruce ex Benth.) Burkart		Tree	DOF, SSF	333	
<i>Andira fraxinifolia</i> Benth.		Tree	DOF, SSF	302	

TABLE 1. CONTINUED.

TAXON	FIGURE	HABIT	PHYTOPHYSIOGNOMY	VOUCHER	CATEGORY OF THREAT
<i>Bauhinia forficata</i> Link		Tree	DOF, SSF	261	
<i>Bauhinia longifolia</i> (Bong.) Steud.		Tree	SSF, CER	1344	QA (SP)
<i>Calliandra foliolosa</i> Benth.		Tree	DOF, SSF	472	
<i>Copaifera langsdorffii</i> Desf.		Tree	DOF, SSF, CER	309	QA (SP)
<i>Dalbergia brasiliensis</i> Vogel		Tree	DOF, SSF	1352	
<i>Dalbergia frutescens</i> (Vell.) Britton		Tree	DOF, SSF	1346	
<i>Enterolobium contortisiliquum</i> (Vell.) Morong		Tree	DOF, SSF	1326	
<i>Inga subnuda</i> Salzm. ex Benth.		Tree	DOF, SSF	1400	
<i>Leptolobium elegans</i> Vogel		Tree	SSF, CER	467	
<i>Leucochloron incuriale</i> (Vell.) Barneby & J.W.Grimes		Tree	DOF	275	
<i>Lonchocarpus cultratus</i> (Vell.) A.M.G.Azevedo & H.C.Lima		Tree	DOF, SSF	1327	
<i>Machaerium brasiliense</i> Vogel		Tree	DOF, SSF, CER	191	
<i>Machaerium hirtum</i> (Vell.) Stellfeld		Tree	DOF, SSF	466	
<i>Machaerium paraguariense</i> Hassl.		Tree	SSF	155	
<i>Machaerium villosum</i> Vogel		Tree	DOF, SSF, MC, CER	454	QA (SP), VU (IUCN)
<i>Piptadenia gonoacantha</i> (Mart.) J.F.Macbr.		Tree	DOF, SSF, CER	292	
<i>Platypodium elegans</i> Vogel		Tree	DOF, SSF, CER	299	
<i>Senna multijuga</i> (Rich.) H.S.Irwin & Barneby		Tree	DOF, SSF	462	
<i>Stylosanthes</i> sp.		Subshrub		18	
LACISTEMATAACEAE					
<i>Lacistema hasslerianum</i> Chodat	4C	Tree	SSF, CER	493	
LAMIACEAE					
<i>Aegiphila verticillata</i> Vell.	2E	Tree	SSF	488	
<i>Vitex polygama</i> Cham.		Tree	DOF, SSF	160	
LAURACEAE					
<i>Cryptocarya moschata</i> Nees & Mart.		Tree	DOF, SSF	195	
<i>Endlicheria paniculata</i> (Spreng.) J.F.Macbr.		Tree	DOF, SSF	272	
<i>Nectandra grandiflora</i> Nees	3D	Tree	DOF, SSF	1338	
<i>Nectandra lanceolata</i> Nees		Tree	DOF, SSF, CER	491	
<i>Nectandra megapotamica</i> (Spreng.) Mez		Tree	DOF, SSF	1345	
<i>Nectandra rigida</i> (Kunth) Nees		Tree	DOF, SSF	202	
<i>Ocotea elegans</i> Mez		Tree	DOF, SSF	1351	
<i>Ocotea minarum</i> (Nees & Mart.) Mez		Shrub, Tree	DOF, SSF	1410	
<i>Ocotea pulchella</i> (Nees & Mart.) Mez		Tree	DOF, SSF, CER	1331	
<i>Ocotea velloziana</i> (Meisn.) Mez		Tree	SSF, CER	1342	
<i>Persea venosa</i> Nees & Mart.		Tree	SSF, CER	1409	
<i>Persea willdenovii</i> Kosterm.		Tree	SSF, CER	1334	
LOGANIACEAE					
<i>Strychnos</i> sp.		Tree		1390	
LYTHRACEAE					
<i>Lafoensia pacari</i> A.St.-Hil.	5D	Tree	DOF, SSF, CER	56	
MALPIGHIACEAE					
<i>Byrsonima intermedia</i> A.Juss.	3E	Tree	DOF, SSF, CER	226	
MALVACEAE					
<i>Guazuma ulmifolia</i> Lam.		Tree	DOF, SSF, CER	1341	
<i>Luehea grandiflora</i> Mart. & Zucc.	3C	Tree	DOF, SSF, CER	471	
MELASTOMATAACEAE					
<i>Leandra aurea</i> (Cham.) Cogn.		Tree	DOF, CER	231	
<i>Miconia albicans</i> (Sw.) Triana		Tree	DOF, SSF	1336	
<i>Miconia cinnamomifolia</i> (DC.) Naudin		Tree	DOF, SSF, CER	259	
<i>Miconia discolor</i> DC.		Shrub	DOF, SSF	1349	
<i>Miconia fasciculata</i> Gardner		Tree	DOF	1348	
<i>Miconia stenostachya</i> DC.		Tree		1322	
<i>Miconia theizans</i> (Bonpl.) Cogn.		Tree	DOF, SSF	559	
<i>Tibouchina granulosa</i> (Desr.) Cogn.		Tree	DOF	22	
<i>Tibouchina stenocarpa</i> (Schränk & Mart. ex DC.) Cogn.		Tree	DOF, SSF, CER	209	
MELIACEAE					
<i>Cabralea canjerana</i> (Vell.) Mart.		Tree	DOF, SSF, CER	675	

TABLE 1. CONTINUED.

TAXON	FIGURE	HABIT	PHYTOPHYSIOGNOMY	VOUCHER	CATEGORY OF THREAT
<i>Guarea guidonia</i> (L.) Sleumer		Tree	DOF, SSF	1416	QA (SP)
<i>Guarea kunthiana</i> A.Juss.		Tree	SSF	1412	QA (SP)
<i>Guarea macrophylla</i> Vahl	2C	Tree	DOF, SSF	1320	QA (SP)
<i>Trichilia catigua</i> A.Juss.		Tree	DOF, SSF	1411	
<i>Trichilia elegans</i> A.Juss.		Tree	DOF, SSF	25	
<i>Trichilia pallida</i> Sw.		Tree	DOF, SSF, CER	1324	
MONIMIACEAE					
<i>Mollinedia clavigera</i> Tul.		Tree		1333	
<i>Mollinedia widgrenii</i> A.DC.		Tree	DOF, SSF, CER	1332	
MORACEAE					
<i>Brosimum glaziovii</i> Taub.		Shrurb	DOF, SSF	55	EM (IUCN)
<i>Ficus enormis</i> Mart. ex Miq.		Tree	DOF, SSF	1339	
<i>Maclura tinctoria</i> (L.) D.Don ex Steud.		Tree	DOF, SSF, CER	496	
MYRTACEAE					
<i>Calyptanthes grandifolia</i> O.Berg		Tree	DOF, SSF	172	
<i>Campomanesia guazumifolia</i> (Cambess.) O.Berg		Tree	DOF, SSF, CER	1329	
<i>Campomanesia pubescens</i> (DC.) O.Berg		Tree	DOF, CER	666	
<i>Campomanesia xanthocarpa</i> (Mart.) O.Berg		Tree	DOF, SSF	699	
<i>Eugenia bimarginata</i> DC.		Tree	CER	252	
<i>Eugenia cf. uniflora</i> L.		Tree	DOF,	1414	
<i>Eugenia florida</i> DC.		Tree	DOF, SSF, CER	1415	
<i>Eugenia francavilleana</i> O.Berg		Tree	DOF, SSF	674	
<i>Eugenia hiemalis</i> Cambess.		Tree	DOF, SSF	1413	
<i>Eugenia paracatuana</i> O.Berg		Tree		663	
<i>Eugenia pluriflora</i> DC.		Tree	DOF, SSF	672	
<i>Myrcia cf. selloi</i> (Spreng.) N.Silveira		Tree	DOF, SSF	1384	
<i>Myrcia cf. venulosa</i> DC.		Tree	DOF, SSF	1383	
<i>Myrcia guianensis</i> (Aubl.) DC.		Tree	DOF, SSF, CER	1347	
<i>Myrcia hebeptala</i> DC.		Tree	DOF	214	
<i>Myrcia multiflora</i> (Lam.) DC.		Tree	DOF, SSF, CER	1323	
<i>Myrcia splendens</i> (Sw.) DC.		Tree	DOF, SSF	665	
<i>Myrcia tomentosa</i> (Aubl.) DC.		Tree	DOF, SSF, CER	1385	
<i>Myrcia uberavensis</i> O.Berg		Shrurb	CER	230	
<i>Myrciaria floribunda</i> (H.West ex Willd.) O.Berg		Tree	DOF, SSF	1337	
<i>Myrciaria tenella</i> (DC.) O.Berg		Shrurb, Tree	DOF, SSF	664	
<i>Psidium grandifolium</i> Mart. ex DC.		Subshrurb		681	
<i>Psidium guajava</i> L.		Tree		215	
<i>Psidium guineense</i> Sw.		Tree	DOF, CER	662	
NYCTAGINACEAE					
<i>Guapira opposita</i> (Vell.) Reitz		Tree	DOF, SSF, CER	1391	
OCHNACEAE					
<i>Ouratea spectabilis</i> (Mart.) Engl.		Tree	SSF, CER	651	
PERACEAE					
<i>Pera glabrata</i> (Schott) Poepp. ex Baill.	5C	Tree	DOF, SSF, CER	15	
PIPERACEAE					
<i>Piper aduncum</i> L.		Subshrurb/Shrurb	DOF	1392	
<i>Piper amalago</i> L.		Subshrurb/Shrurb	DOF	1393	
<i>Piper arboreum</i> Aubl.		Subshrurb/Shrurb	DOF	1330	
<i>Piper mollicomum</i> Kunth		Subshrurb/Shrurb	DOF	652	
<i>Piper ovatum</i> Vahl		Subshrurb/Shrurb	DOF	1395	
<i>Piper umbellatum</i> L.		Subshrurb/Shrurb	DOF	1394	
PRIMULACEAE					
<i>Myrsine umbellata</i> Mart.		Tree	DOF, SSF, CER	219	
PROTEACEAE					
<i>Roupala brasiliensis</i> Klotzsch		Tree	DOF, SSF	303	
ROSACEAE					
<i>Prunus myrtifolia</i> (L.) Urb.		Tree	DOF, SSF, CER	1404	
<i>Rubus brasiliensis</i> Mart.		Subshrurb	DOF, SSF	645	

TABLE 1. CONTINUED.

TAXON	FIGURE	HABIT	PHYTOPHYSIOGNOMY	VOUCHER	CATEGORY OF THREAT
RUBIACEAE					
<i>Chomelia obtusa</i> Cham. & Schltdl.		Shrurb	DOF	647	
<i>Faramea</i> sp.				1406	
<i>Psychotria carthagenensis</i> Jacq.		Shrurb	DOF, SSF, CER	1335	
RUTACEAE					
<i>Almeidea lilacina</i> A.St.-Hil.		Tree	DOF, SSF	1403	
<i>Zanthoxylum rhoifolium</i> Lam.		Tree	DOF, SSF, CER	1402	
<i>Zanthoxylum riedelianum</i> Engl.	4D		DOF, SSF, CER	1328	
SALICACEAE					
<i>Casearia decandra</i> Jacq.		Tree	DOF, SSF, CER	300	
<i>Casearia gossypiosperma</i> Briq.		Tree	DOF, SSF, CER	646	
<i>Casearia obliqua</i> Spreng.		Tree	DOF, SSF	1401	
<i>Casearia sylvestris</i> Sw.		Tree	DOF, SSF, CER	650	
SAPINDACEAE					
<i>Allophylus edulis</i> (A. St.-Hil., A. Juss. & Cambess.) Hieron. ex Niederl.		Tree	DOF, SSF, CER	1359	
<i>Cupania tenuivalvis</i> Radlk.		Tree	DOF, SSF	1358	
<i>Cupania vernalis</i> Cambess.		Tree	DOF, SSF, CER	498	
<i>Dodonaea viscosa</i> Jacq.		Shrurb	DOF	240	
<i>Matayba elaeagnoides</i> Radlk.		Tree	DOF, SSF, CER	1317	
SAPOTACEAE					
<i>Chrysophyllum marginatum</i> (Hook. & Arn.) Radlk.	4B	Tree	DOF, SSF, CER	62	QA (SP)
SIPARUNACEAE					
<i>Siparuna brasiliensis</i> (Spreng.) A.DC.		Tree	DOF, SSF	464	
<i>Siparuna guianensis</i> Aubl.		Tree	DOF, SSF, CER	465	
SOLANACEAE					
<i>Cestrum schlechtendalii</i> G.Don		Shrurb	DOF, SSF	1399	
<i>Cestrum strigilatum</i> Ruiz & Pav.		Tree	DOF, SSF	1398	
<i>Solanum variabile</i> Mart.		Shrurb	DOF, SSF	250	
STYRACACEAE					
<i>Styrax camporum</i> Pohl		Tree	DOF, SSF, CER	474	
<i>Styrax ferrugineus</i> Nees & Mart.		Tree	SSF, CER	649	
URTICACEAE					
<i>Cecropia hololeuca</i> Miq.		Tree	DOF, SSF	1321	QA (SP)
VERBENACEAE					
<i>Aloysia virgata</i> (Ruiz & Pav.) Juss.		Shrurb	DOF, SSF, CER	1318	
<i>Lantana camara</i> L.		Shrurb		1319	
<i>Lippia corymbosa</i> Cham.		Shrurb	CER	1396	
VIOLACEAE					
<i>Hybanthus</i> sp.				1397	
VOCHYSIACEAE					
<i>Qualea grandiflora</i> Mart.	5B	Tree	CER	505	

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