FLORISTICS OF FLOWERING PLANTS FROM THE UNDERSTORY OF ATLANTIC REMNANTS IN BAHIA, BRAZIL

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ABSTRACT

The Atlantic Rainforest has high species diversity and endemism and is one of the most threatened ecosystems in the world. However, the rainforest understory stratum is regarded as the least studied and understood with regards to biodiversity. The aim of our study was to develop an up-to-date checklist of flowering plants collected in 10 Atlantic Rainforest remnants in Southern Bahia, Brazil. The floristic inventory recorded 49 families, 103 genera, and 170 species. The richest families were Rubiaceae (34 spp.), Melastomataceae (16), Bromeliaceae, Poaceae (8 spp.), Cyperaceae, Erythroxylaceae, Marantaceae, Myrtaceae, and Piperaceae (7). We record 10 new state records for Bahia and one new taxonomic novelty (*Bertolonia* sp. nov.) was discovered. The species composition is very exclusive with 85% of species occurring in only one of the studied areas and 27% being endemic to this biome region.

RESUMO

A floresta Atlântica é um dos domínios mais ameaçados no mundo, apresentando grande diversidade e endemismo. Entretanto, a biodiversidade do subosque é pouco estudada. Desta maneira, o objetivo deste estudo foi elaborar um checklist das angiospermas coletadas em dez áreas de floresta Atlântica no sul da Bahia, Brasil. O inventário florístico registrou 49 famílias, 103 gêneros e 170 espécies. As famílias mais ricas são Rubiaceae (34 spp.), Melastomataceae (16), Bromeliaceae, Poaceae (8), Cyperaceae, Erthroxylaceae, Marantaceae, Myrtaceae e Piperaceae (7). Entre as espécies coletadas, dez são novas ocorrências para a Bahia e uma é uma novidade taxonômica (*Bertolonia* sp. nov.). A composição florística da área é muito exclusiva (85% das espécies ocorrem em uma única área de estudo e 27% são endêmicas para este bioma).

INTRODUCTION

The Atlantic Rainforest (AF) is considered one of the biodiversity hotspots of great conservation concern (Myers et al. 2000), and although it has been reduced to about 8% of its original extent (Ribeiro et al. 2009), this ecosystem holds around 5.2% of all vascular plants in the world, of which 57% are restricted to this area (Stehmann et al. 2009). The AF domain displays a considerable longitudinal (4°N to 32°S) and topographic range (Rizzini 1979), and comprises a great variety of phytophysiognomies (rainforest, semi-deciduous forest, restinga, and altitudinal grassland) which are a reflection of different soil types, temperature ranges, and rainfall regimes (Morellato & Haddad 2000; Oliveira Filho & Fontes 2000; Scarano 2002).

The AF in Bahia, also known as "Hiléia Baiana," occurs along the coastline, predominantly in the southern part of the state, and has a high number of ecologically and economically important taxa. This area is considered one of the centers of high endemism in the country (Thomas et al. 1998; Giulietti et al. 2006; Amorim et al. 2009). Studies of the AF in Bahia have traditionally focused on trees (Rocha & Amorim 2012; Rigueira et al. 2013; Lima & Mariano-Neto 2013) or epiphytes (Leitman et al. 2014), while the understory stratum lacks basic floristic inventories and phytosociological and phenological studies (Gentry & Emmons 1987; Liuth et al. 2013).

The AF understory comprises an environment of reduced light, but has a high number of localized taxa of young trees, shrubs, and herbs (Gentry & Emmons 1987). Studies have shown that the understory responds

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and adapts differently than the canopy stratum to environmental factors such as light, rainfall, and soil fertility (Hilty 1980; Gentry 1992). The understory adaptation to these environmental factors is reflected in species diversity as well as exhibiting different flowering and fruiting regimes (Gentry & Emons 1987; Williams-Linera 2003).

In an effort to increase our floristic knowledge of AF's understory, we present a checklist of flowering plants in 10 AF remnants in Bahia, Brazil.

MATERIALS AND METHODS

Ten AF remnants ranging from intermediate to advanced successional stages, from Central and Southern Bahia (11°48'–18°49'S / 21°24'–40°08'W) were sampled. The remnants were identified for study by using "Atlas de Remanescentes Florestais" (see www.sosma.org.br and www.inpe.org.br) and are located in the municipalities of Camamu, Iguaí, Ilhéus, Itamaraju, Jaguaripe, Nilo Peçanha, Presidente Tancredo Neves, Ubaíra, Valença, and Wenceslau Guimarães (Figs. 1–2.). The areas are classified as montane to sub-montane forests, showing a humid and warm climate, annual rainfall greater than 2000 mm, and average temperatures from 24–27°C (Peel et al. 2007). All Atlantic Forest remnants sampled in this study have elevation ranges between 60–892 m and canopy heights from 8–13 m (Rigueira et al. 2013).

Collecting field trips were conducted from January 2011 to April 2012 with one trip per forest remnant for eight days each. We surveyed a set of 80 hexagonal transects (8 per forest remnant) covering approximately 13 hectares of area. Flowering and/or fruiting specimens were collected in the understory stratum. Identifications were done with a variety of available local and regional floras and monographs. We also examined specimens in herbaria, specimens online, and consulted with family or generic specialists. Data on distribution and endemism were based on *List of Species of Brazilian Flora* (BFG 2015) and Stehmann et al. (2009). Vouchers for all collected specimens were deposited at ALCB (Thiers 2017).

Data provided by *Specieslink* (splink.cria.org.br) were not included because this inventory refers only to these specific fragments. None of the rainforest fragments sampled in this study had been previously inventoried.

RESULTS

For the 10 AF understory remnants, we recorded a total of 171 species, 103 genera, and 49 families of flowering plants (Appendix 1, Fig. 3.). Families with the highest diversity were Rubiaceae (34 spp.), Melastomataceae (16 spp.), Bromeliaceae, Poaceae (8 spp. each), Cyperaceae, Erythroxylaceae, Marantaceae, Myrtaceae, Piperaceae (7 spp. each), and Acanthaceae (6 spp.). About 63% (107 spp.) of the flora were restricted to 10 families, while 37% (63 spp.) were distributed over 39 additional families (Fig. 4). The most diverse genera were *Psychotria* (16 spp.); *Erythroxylum*, *Miconia*, and *Piper* (7 spp. each); *Calathea* and *Dichorisandra* (5 spp. each); and *Eugenia* (4 spp.). Relatively few species were recorded in more than one of the 10 remnant areas studied with the majority (136 spp.) of the taxa restricted to a single remnant area (Appendix 1).

About 26% (45 spp.) were endemic to the Atlantic Rainforest Domain. *Triphora amazonica* Schtlr. is a new record to the AF (Stehmann et al. 2009; Vieira et al. 2017). Five species [*Bertolonia marmorata* (Naudin) Naudin, *Erythroxylum nobile* O.E. Schulz, *Faramea coerulea* (Nees & Mart.) DC., *Geonoma pauciflora* Mart., *Lymania smithii* R.W. Read], were restricted to the Brazilian Northeastern Rainforests. Seven species [*Clavija caloneura* Mart., *Dichorisandra penduliflora* Kunth, *Justicia symphyantha* (Nesse ex Mart.) Lindau, *Leandra rhamnifolia* (Naudin) Cogn., *Psychotria jambosioides* Schltdl., *Psychotria phyllocalymmoides* Mull.Arg. and *Ruellia affinis* (Schrad.) Lindau] were limited to the AF of Bahia and Espírito Santo states. At least nine species [*Aechmea miniata* Beer ex Baker, *Araecocus nigropurpureus* Leme & J.A. Siqueira, *Bernadia scabra* Mull.Arg., *Erythroxylum compressum* Peyr., *Erythroxylum martii* Peyr., *Erythroxylum mattos silvae* Plowman, *Hohenbergia belemii* L.B. Sm. & Read, *Mikania salzmanniifolia* DC. and *Myrcia blanchetiana* (O. Berg) Mattos] were considered endemic to Bahia state.

We discovered 10 species as new Bahia state records [*Aphelandra hirta* (Klotzsch) Wassh., *Bertolonia wur-*

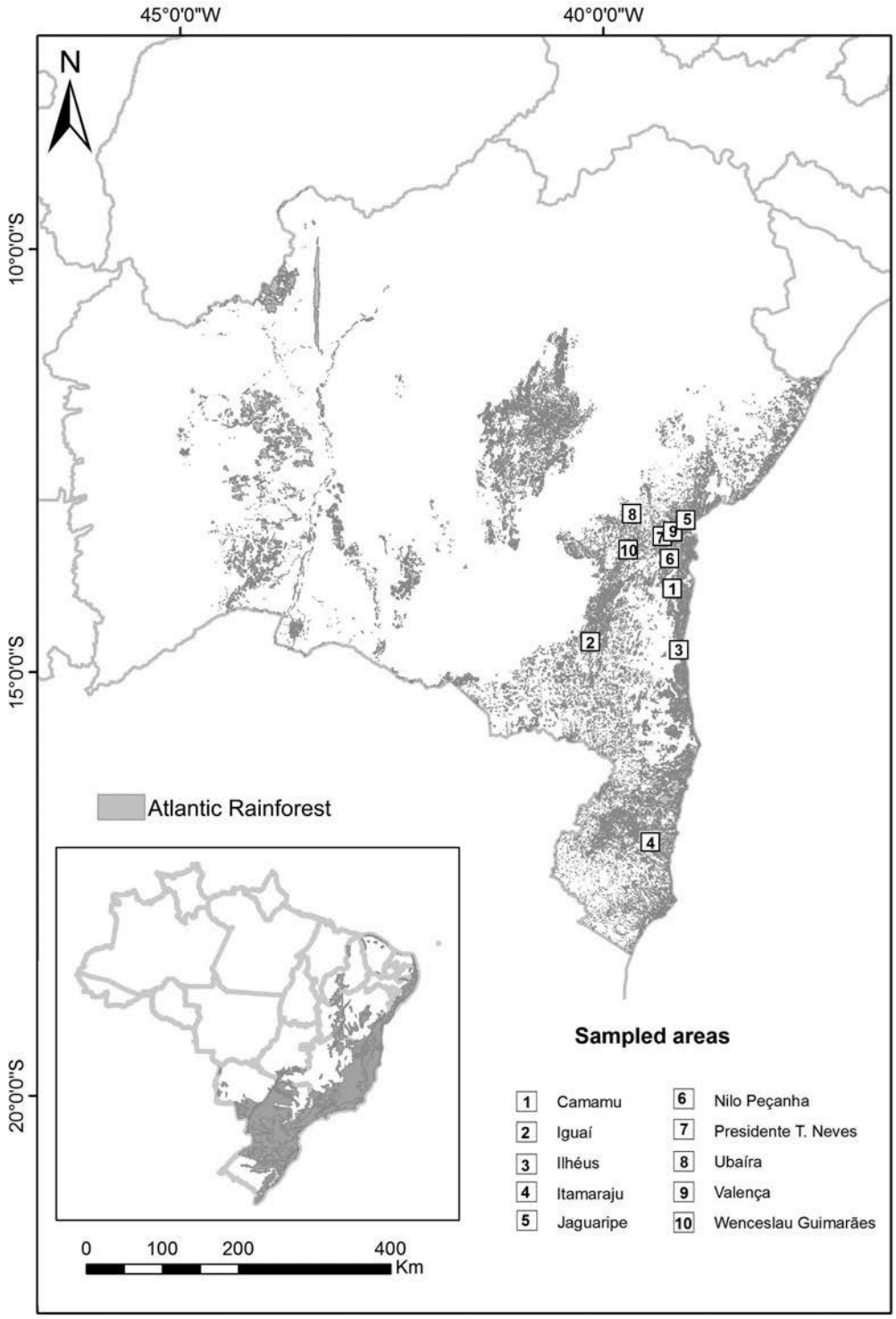

Fig. 1. Map showing the location of sampled Atlantic Rainforest remnant areas in municipalities, Bahia, Brazil (Modified from SOS Mata Atlântica).

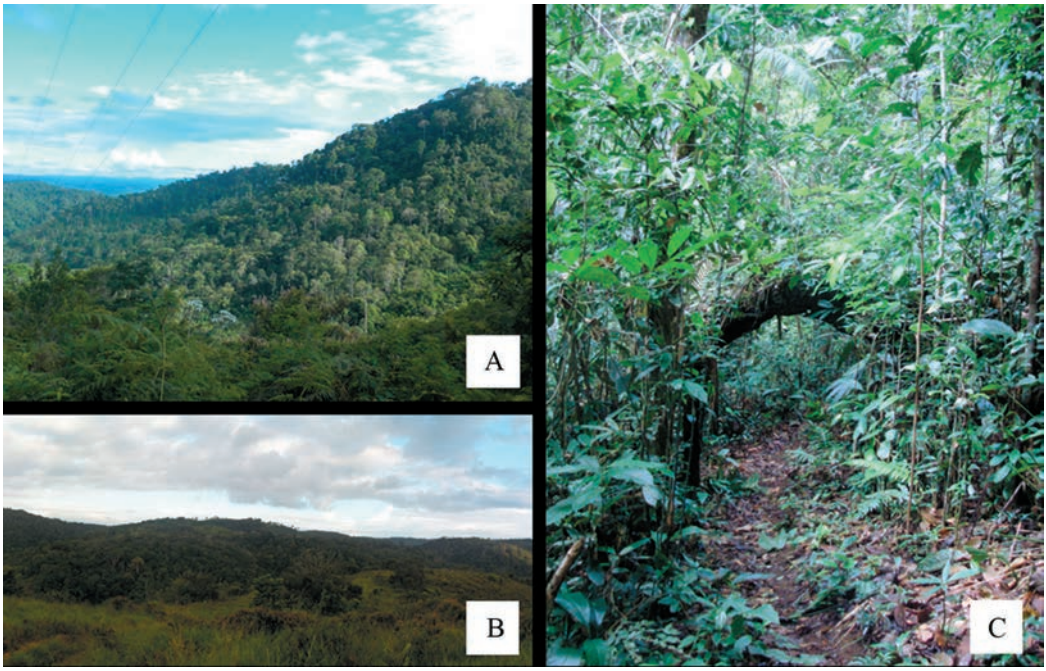

Fig. 2. Atlantic Forest fragments found in the studied areas. A. Montane canopy in Wenceslau Guimarães. B. Rainforest fragment within cattle farm in Itamaraju. C. Understory in Jaguaripe (Photos by P.A. Ferreira).

dackiana Baumgratz, *Erythroxylum macrophyllum* Cav., *Guatteria villosissima* A. St.-Hil., *Miconia rufescens* (Aubl.) DC., *Mollinedia sphaerantha* Perkins, *Myrciaria glomerata* O. Berg, *Stenandrium tenellum* Nees, *Triphora amazonica* Schtlr. and *Vriesea heterostachys* (Baker) L.B. Sm.] and one taxonomic novelty was discovered [*Bertolonia* sp. nov.] (J. Coelho pers. comm.).

DISCUSSION

The AF in Bahia is known for its taxonomic diversity and high endemism (Mori et al. 1983; Thomas et al. 1998; Giulietti et al. 2006). The flora in this area has been documented mostly through floristic studies in Southern Bahia (Amorim et al. 2005, 2008, 2009; Coelho & Amorim 2014; Leitman et al. 2014) and in few forest remnants in South-central (Sobrinho & Queiroz 2005), North coast, and "Recôncavo Baiano" (Gomes & Guedes 2014; Alves et al. 2015).

Usually, AF inventories have focused on trees with little emphasis on understory shrubs and herbs (Kozera et al. 2009). The understory stratum displays a highly differentiated species composition (Gentry & Emmons 1987; Gentry 1988), and in general, it is comprised of shrubs and herbs, but also young trees and vines/climbers appear later in the canopy (Guedes-Bruni et al. 1994; Andreata et al. 1997).

From the most diverse families in our study area, six [Rubiaceae, Melastomataceae, Bromeliaceae, Myrtaceae, Poaceae, and Piperaceae] were also the richest for other AF remnants in Bahia (Amorim et al. 2009; Coelho & Amorim 2014). When generic diversity is taken into account, *Psychotria*, *Erythroxylum*, *Miconia*, *Piper*, *Calathea*, *Dichorisandra*, and *Eugenia* are among the most cited for the Atlantic Rainforest Domain (Oliveira Filho & Fontes 2000; Amorim 2005, 2009; Kozera et al. 2009; Rocha & Amorim 2012). Furthermore, these genera are also referred to as the most representative taxa in the understory stratum (Guedes-Bruni et al. 1994; Andreata et al. 1997; Oliveira-Filho & Fontes 2000; Tonhasca 2005). Rubiaceae and Melastomataceae,

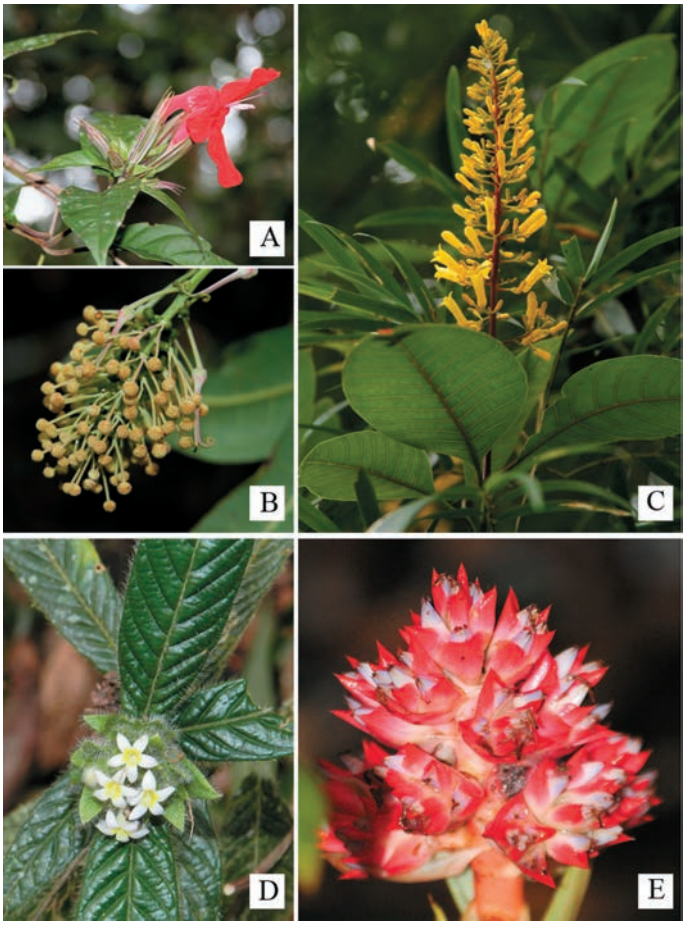

Fig. 3. **Species found in the sampled areas, Bahia, Brazil. A.** *Ruellia affinis*. **B.** *Mabea piriri*. **C.** *Palicourea blanchetiana*. **D.** *Psychotria purpurascens*. **E.** *Hohenbergia belemii.* **(Photos A–C. Dary Rigueira; D–E. Patricia Ferreira.)**

the first and the second families respectively with the greatest species diversity, are of great taxonomic interest and ecological importance within rainforests (Guedes-Bruni et al. 1994; Andreata et al. 1997; Tabarelli et al. 1999; Tonhasca 2005).

With 16 species, *Psychotria* was the most diverse genus in our study; this was also true for other floristic inventories in montane forests from Southern Bahia (Lombardi & Gonçalves 2000; Amorim et al. 2009; Rocha & Amorim 2012). Oliveira-Filho and Fontes (2000) documented *Psychotria* as one of 10 most diverse genera in rainforests, but less diversified in seasonally dry forests (Amorim et al. 2005; Cardoso & Queiroz 2008).

Species composition in the AF is represented by a majority of typical rainforest's taxa, such as *Byrsonima sericea* DC , *Miconia chartacea* Triana, *M. cinnamomifolia* (DC.) Naudin, *Psychotria carthagenensis* Jacq., *Justicia symphyantha* (Nees ex Mart.) Lindau, *Leandra rhamnifolia* (Naudin) Cogn., and *Psychotria phyllocalymmoides* Mull.Arg. (Oliveira-Filho & Fontes 2000; Amorim et al. 2005, 2008, 2009; Coelho & Amorim 2014). *Clavija caloneura* Mart., frequently recorded in seasonal or transitional forests or semi-deciduous forests (Amorim et al. 2005), is here documented in the AF rainforest.

Erythroxylum macrophyllum Cav. (Erythroxylaceae), *Miconia rufescens* (Aubl.) DC. (Melastomataceae), *Myrciaria glomerata* O. Berg (Myrtaceae), *Protium aracouchini* (Aubl.) Marchand (Burseraceae), and *Triphora*

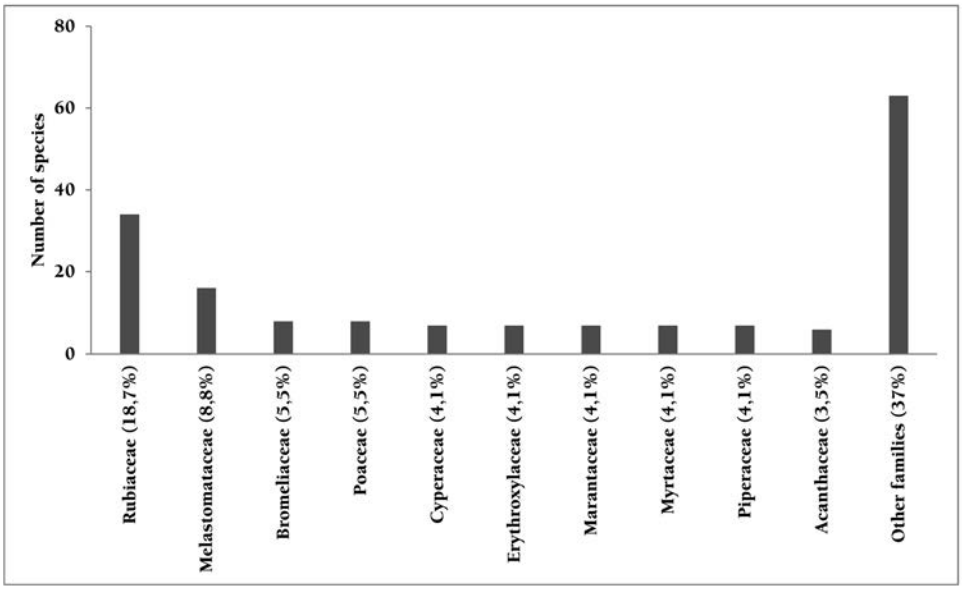

Fig. 4. Richest families of flowering plants in this study. From the 49 families recorded, 10 represent 62% of all richness found.

amazonica Schtlr. (Orchidaceae) show a disjunct distribution between the Amazon and Atlantic Rainforest (BFG 2015), with the latter as a new record for Bahia state.

Bertolonia sp. nov. (J. Coelho pers. comm.) was discovered and identified as new to science. This, along with the high number of new floristic records in these remnant areas, reinforces the dearth of floristic and systematic knowledge for the entire Atlantic Rainforest Domain (Lombardi & Gonçalves 2000; Ziparro et al. 2005; Amorim et al. 2008, 2009; Coelho & Amorim 2014). This study corroborates the high heterogeneity in the Atlantic remnants due to the high specificity of floristic elements in each area as discussed by Tabarelli et al. (1999) and Amorim et al. (2009).

Despite the large number of studies for the Atlantic Rainforest, those that focus on the understory are still sparse (Gentry & Emmons 1997; Kozera et al. 2009). In our floristic study there was a remarkable diversity in species composition, in which most species were restricted or endemic to these 10 understory remnants. These data also reinforce the need for more research and exploration of understory habitats to better understand the Atlantic Rainforest. Knowing and understanding more about AF Rainforest understory flora will help support conservation initiatives for the whole Atlantic Rainforest.

APPENDIX 1

Annotated checklist. List of species found within the ten sampled forest remnants. **CM** = Camamu; **IG** = Iguaí; **IL** = Ilhéus; **IT** = Itamaraju; **JG** = Jaguaripe; **NP** = Nilo Peçanha; **PTN** = Presidente Tancredo Neves; **UB** = Ubaíra; **VL** = Valença; **WG** = Wenceslau Guimarães. * = Atlantic Rainforest endemics (based on Stehmann et al. 2009).

Acanthaceae
Aphelandra hirta (Klotzch) Wassh.*—**IG;** 114268
Aphelandra nitida Nees & Mart.*—**NP;** 114270
Justicia symphyantha (Nees ex. Mart.) Lindau*—**JG;** 114272
Justicia sp.—**IG;** 114267
Ruellia affinis (Schrad.) Lindau*—**IT, NP;** 114273
Stenandrium tenellum Nees*—**WG;** 114271

Amaranthaceae
Celosia grandifolia Moq.—**IG;** 114271

Annonaceae
Guatteria macropus Mart.*—**WG;** 114807
Guatteria villosisssima A.St - Hil.—**UB;** 114806
Hornschuchia bryotrophe Nees*—**IL;** 115743

Apocynaceae
Rauvolfia grandiflora Mart. ex A.DC.*—**CM;** 114274
Tabernaemontana solanifolia A.DC.—**IT, UB;** 114275, 114276, 114277

Araceae
Anthurium bellum Schott*—**CM;** 114279
Philodendron sp.—**IG;** 117376

Arecaceae
Geonoma pauciflora Mart.*—**WG,UB;** 115758, 115738, 114266
Geonoma pohliana Mart.*—**JG;** 114803

Asteraceae
Austroeupatorium inulaefolium (Kunth) R.M.King & H.Rob.—**IG;** 115958
Baccharis calvescens DC.—**IG;** 115956
Chaptalia nutans (L.) Pol.—**IG;** 114737
Cyrtocymura mattos-silvae (H.Rob.) H.Rob.—**IG;** 115957
Mikania salzmanniifolia DC.—**VL;** 115727

Boraginaceae
Cordia nodosa Lam.—**JP, VL;** 114805, 115946
Cordia superba Cham.—**IL;** 114282

Bromeliaceae
Aechmea miniata Beer ex. Baker*—**CM;** 114777
Araeococcus nigropurpureus Leme & J.A.Siqueira.*—**NP;** 114780
Hohenbergia belemii L.B.Sm. & Read*—**NP;** 114779
Lymania smithii R.W.Read*—**WG;** 114778
Portea silveirae Mez*—**WG;** 115955
Tillandsia globosa Wawra—**IT;** 114781
Vriesea heterostachys (Baker) L.B.Sm.*—**IG;** 115787
Vriesea sp.—**JP;** 114782

Burseraceae
Protium aracouchini (Aubl.) Marchand—**IT;** 115718

Celastraceae
Cheiloclinium cognatum (Miers) A.C. Sm.—**IG;** 114810

Clusiaceae
Tovomita mangle G. Mariz—**IT;** 99176

Commelinaceae
Dichorisandra aff. *acaulis* Cogn*—**IT;** 114799
Dichorisandra hirtella (Nees & Mart.) Mart. ex Schult. f.*—**VL;** 117375
Dichorisandra leucophtalmos Hook.*—**IT;** 114377
Dichorisandra penduliflora Kunth—**JP;** 114798

Connaraceae
Rourea chrysomalla Glaz. ex. Schellenb.—**IT;** 115938
Rourea gardneriana Planch.—**JP;** 117373

Costaceae
Costus spiralis (Jacq.) Roscoe—**IG;** 114281

Curcubitaceae
Gurania acuminata Cogn.—**IG, IT;** 114808, 115736

Cyclanthaceae
Evodianthus funifer (Poit.) Lindm.—**UB;** 114797

Cyperaceae
Hypolytrum bullatum C.B.Clarke*—**IL;** 114794
Hypolytrum jardimii M.Alves & W.W.Thomas*—**CM;** 114792, 115762
Hypolytrum verticillatum T. Koyama—**NP;** 114793
Hypolytrum sp.—**CM;** 114791
Scleria bracteata Cav.—**PTN;** 114775
Scleria latifolia Sw.—**IG, PTN, WG;** 114795, 114796, 115771
Rynchospora splendens Lindm.—**VL;** 114776

Erythroxylaceae
Erythroxylum citrifolium A.St.-Hil.—**VL;** 115717
Erythroxylum compressum Peyr.*—**IT;** 115788
Erythroxylum macrophyllum Cav.—**IG;** 115721
Erythroxylum martii Peyr.*—**UB;** 114786
Erythroxylum mattos-silvae Plowman*—**VL;** 114790
Erythroxylum nobile O.E.Schulz*—**VL;** 115789
Erythroxylum passerinum Mart.*—**VL;** 115791

Euphorbiaceae
Actinostemon concolor (Spreng.) Mull.Arg.—**IT;** 114789
Aparisthmium cordatum (A.Juss.) Baill.—**UB;** 114774
Bernardia scabra Mull.Arg.*—**VL;** 114790
Mabea piriri Aubl.—**NP;** 114788

Fabaceae
Desmodium axillare (Sw.) DC.—**IT;** 113374
Senna affinis (Benth.) H.S.Irwin & Barneby—**IT;** 114278

Heliconiaceae
Heliconia angusta Vell.—**UB;** 114773
Heliconia richardiana Miq.—**IL;** 115761

Loganiaceae
Spigelia tetraptera Taub. ex L.B.Sm.—**WG;** 114783, 115754

Malpighiaceae
Byrsonima sericea DC.—**CM;** 114280

Marantaceae
Calathea sp.—**IL;** 114283
Calathea sp.1—**IT;** 115725
Calathea sp.2—**WG;** 115770
Calathea sp.3—**IT;** 115773
Maranta protracta Miq.—**UB, WG;** 114809, 115747
Monotagma plurispicatum (Korn.) K.Schum.—**IG, IL;** 114726, 114800
Stromanthe porteana Gris—**IT;** 115792

Melastomataceae
Bertolonia marmorata (Naudin) Naudin*—**VL;** 115731
Bertolonia wurdackiana Baumgratz*—**WG;** 114739
Bertolonia sp. nov.—**UB;** 118734
Clidemia capilliflora (Naudin) Cogn.*—**WG;** 114771
Clidemia capitellata (Bonpl.) D.Don—**JP, PTN;** 115722, 115734
Clidemia hirta (L.) D.Don—**NP;** 115723
Henriettea succosa (Aubl.) DC.—**VL;** 115726
Leandra rhamnifolia (Naudin) Cogn.*—**NP, PTN;** 114741
Miconia albicans (Sw.) Triana—**PTN;** 115724, 115772
Miconia chartacea Triana—**JP ;** 115769
Miconia ciliata (Rich.) DC.—**PTN;** 115720, 115728
Miconia cinnamomifolia (DC.) Naudin*—**VL;** 115768
Miconia nervosa (Sm.) Triana—**IT;** 115733
Miconia prasina (Sw.) DC.—**JP, WG;** 115737, 115766
Miconia rufescens (Aubl.) DC.—**JP, IT;** 114772
Ossaea quadrisulca (Naudin) Wurdack—**IG ;** 115943

Meliaceae
Trichilia sp.—**IT;** 117370

Menispermaceae
Odontocarya vitis (Vell.) J.M.A. Braga*—**IT;** 114711

Monimiaceae
Mollinedia sphaerantha Perkins—**NP;** 115954

Moraceae
Sorocea hilarii Gaudich.—**PTN, VL;** 114718, 115765

Myrtaceae
Eugenia sp.—**WG;** 115949
Eugenia sp.1—**IT;** 115752
Eugenia sp.2—**IT;** 115753
Marlierea sp.—**IT;** 99217
Myrcia blanchetiana (O.Berg) Mattos—**JP;** 99182
Myrcia splendens (Sw.) DC.—**PTN;** 114719
Myrciaria glomerata O.Berg—**WG;** 114294

Nyctaginaceae
Guapira opposita (Vell.) Reitz—**IT, UB, VL, WG;** 114298, 114707, 115729, 114293, 114712
Guapira sp.—**UB;** 114703
Guapira sp.1—**VL;** 99202

Ochnaceae
Ouratea cearensis (Tiegh.) Sastre—**CM;** 115744

Orchidaceae
Epidendrum secundum Jacq.—**CM;** 114286
Huntleya meleagris Lindl.*—**CM;** 114274
Triphora amazonica Schtlr.—**VL;** 114288

Piperaceae
Piper anisum (Spreng.) Angely—**IL;** 114784
Piper arboreum Aubl.—**IL, IT;** 114284
Piper ceernum Vell.—**UB;** 114785
Piper hayneanum DC.—**IT;** 114708
Piper sp. 1—**IL;** 115942
Piper sp. 2—**WG;** 115951
Piper sp. 3—**JP;** 115952

Poaceae
Ichnanthus nemoralis (Schrad. ex Schult.) Hitchc. & Chase—**JP;** 115959, 117372
Ichnanthus pallens (Sw.) Munro ex. Benth.—**NP;** 114701
Lasiacis ligulata Hitchc. & Chase—**IL;** 114716
Merostachys sp.—**UB;** 114705
Olyra latifolia L.—**PTN;** 114717
Panicum condensatum Bertol.—**JP;** 114715
Parodiolyra micrantha (Kunth) Davidse & Zuloaga—**IL, UB;** 114704, 114714
Parodiolyra ramosissima (Trin.) Soderstr. & Zuloaga*—**CM, JP;** 114291

Polygalaceae
Caamembeca spectabilis (DC.) J.F.B. Pastore—**IL, IT;** 115730, 115751

Primulaceae
Clavija caloneura Mart.*—**IT;** 115948

Rapateaceae
Rapatea paludosa Aubl.—**JP;** 114720

Rubiaceae
Amaioua sp.—**PTN;** 99206
Chomelia pedunculosa Benth.—**NP;** 118736
Coccocypselum aureum (Spreng.) Cham. & Schtdl.—**NP, PTN;** 114300
Coccocypselum cordifolium Nees & Mart.—**IT, WG;** 115748
Coccocypselum hasslerianum Chodat—**IG;** 114291
Cordiera sp.—**VL;** 99197
Coussarea contracta (Walp.) Mull.Arg,—**IT;** 99215
*Coussarea graciliflora (*Mart.) Mull.Arg.*—**CM, IL;** 114730, 115716
Faramea coerulea (Nees & Mart.) DC.*—**VL;** 99198
Ixora sp.—**IT;** 99219
Malanea martiana Mull.Arg.—**JP, PTN;** 99177
Margaritopsis cephalantha (Mull.Arg.) C.M.Taylor—**WG, IT;** 115713
Margaritopsis chaenotricha (DC.) C.M.Taylor—**WG, VL, IT, IL, JP;** 114802, 99187, 99211
Palicourea blanchetiana Schltdl.—**IG, IL, IT, UB;** 114702, 114738, 115714
Palicourea sp.—**IG;** 114290
Posoqueria latifolia (Rudge) Schult.—**IT;** 118743
Psychotria bahiensis DC.—**WG;** 114292
Psychotria bracteocardia (DC.) Mull.Arg.—**CM, IL;** 114732
Psychotria carthagenensis Jacq.—**IT;** 114731
Psychotria deflexa DC.—**VL, WG;** 99174
Psychotria hoffmannseggiana (Willd. ex Schult.) Mull.Arg.—**PTN;** 99207
Psychotria jambosioides Schltdl.*—**IL, JP;** 114736, 115716
Psychotria leiocarpa Cham. & Schltdl.—**WG;** 114297, 114728
Psychotria lupulina Benth.—**IG;** 115947
Psychotria myriantha Mull.Arg.—**WG;** 118739
Psychotria phyllocalymmoides Mull.Arg.*—**CM, JP;** 114722, 115715
Psychotria platypoda DC.—**IL;** 114706, 114723, 115719
Psychotria purpurascens Mull.Arg.*—**UB, WG;** 114287, 114295, 115755
Psychotria schlechtendaliana (Mull.Arg.) Mull.Arg.—**NP, UB, VL, WG;** 114733, 114734, 114735
Psychotria stachyoides Benth.—**WG;** 115764
Psychotria sp.—**IT;** 99210
Psychotria sp.1—**IT;** 99165
Randia sp.—**IT;** 128379
Ronabea latifolia Aubl.—**VL, JP;** 114729, 99186

Rutaceae
Rauia nodosa (Engl.) Kallunki*—**NP;** 115786

Salicaceae
Casearia commersoniana Cambess.—**VL;** 115735

Santalaceae
Phoradendron crassifolium (Pohl ex DC.) Eichler—**JP;** 115745

Smilacaceae
Smilax rufescens Griseb.—**IG;** 114285

Stemonuraceae
Discophora guianensis Miers—**JP;** 114721

Solanaceae
Cestrum salzmanni Dunal—**VL;** 115940
Solanum campaniforme Roem. & Schult.—**IG, IT;** 115939, 117369

Urticaceae
Urera baccifera (L.) Gaudich. ex Wedd.—**IG;** 114725

Violaceae
Payparola blanchetiana Tul.*—**IL;** 114787

Zingiberaceae
Renealmia petasites Gagnep.*—**UB;** 115757

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