Rodriguésia 74: e00932022. 2023
http://rodriguesia.jbrj.gov.br
DOI: http://dx.doi.org/10.1590/2175-7860202374026

Original Paper

Floristic inventory of Myrtaceae of Parque Nacional do Iguaçu, Paraná, Brazil

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Abstract

Myrtaceae is a diverse family in Brazil and the sixth most representative family in the Atlantic Forest. In Paraná, the Parque Nacional do Iguaçu (ParNa Iguaçu) is a large National Park and also one of the largest remnants of this phytogeographic domain. The objective of the present study was to carry out a floristic inventory of the Myrtaceae of the ParNa Iguaçu, presenting an identification key to the species, illustrations, conservation status evaluation, and comments on geographic distribution and phenology. The collections were carried out between May 2019 and March 2020 in two areas composed of Seasonal Semideciduous Forest and a transitional area to Mixed Ombrophilous Forest. In addition to the samples collected by us, material from other herbaria were also examined. Twenty-five native species and one exotic species of Myrtaceae were found, distributed in seven genera. *Eugenia* was the most representative genus with 11 species. Of the 26 species, seven are new occurrences for ParNa Iguaçu. From the samples collected in this research and other records in the northwest and west regions of the state of Paraná, the presence of *Psidium striatulum* in Seasonal Semideciduous Forest is confirmed. *Eugenia myrciariifolia* was the only species on Brazil's endangered species list, the IUCN conservation status of which is Endangered (EN). The other species were considered as Least Concern (LC), but some of these species are restricted to certain areas or types of vegetation. Therefore, we conclude that ParNa Iguaçu contributes to the maintenance of these species in their natural environment.

Key words: Atlantic Forest, diversity, *Eugenia*, *Myrcia*, southern Brazil.

Resumo

Myrtaceae é uma família diversa no Brasil e a sexta família mais representativa da Mata Atlântica. No Paraná o Parque Nacional do Iguaçu (ParNa Iguaçu) é um dos maiores remanescentes desse domínio fitogeográfico. O objetivo do presente estudo foi realizar um inventário florístico das Myrtaceae do Parque Nacional do Iguaçu, apresentando para as espécies encontradas uma chave de identificação, ilustrações, seus status de conservação e comentários sobre distribuição geográfica e fenologia. As coletas foram realizadas entre maio de 2019 a março de 2020 em duas áreas compostas por Floresta Estacional Semidecidual e uma área de transição dessa formação com Floresta Ombrófila Mista. Além das amostras coletadas, foram examinados também materiais de outros herbários. Foram encontradas 25 espécies nativas e uma espécie exótica de Myrtaceae, distribuídas em sete gêneros. *Eugenia* foi o gênero mais representativo com 11 espécies. Das 26 espécies, sete são novas ocorrências para o ParNa Iguaçu. A partir das amostras coletadas nessa pesquisa e de outros registros nas regiões noroeste e oeste do estado do Paraná confirma-se a presença de *Psidium striatulum* para Floresta Estacional Semidecidual. *Eugenia myrciariifolia* é a única espécie presente na Lista brasileira de espécies ameaçadas,

See supplementary material at <https://doi.org/10.6084/m9.figshare.22564264.v1>

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apresentando status de conservação da IUCN como Em Perigo (EN). As demais espécies são consideradas como Pouco Preocupantes (LC), porém algumas dessas espécies apresentam-se restritas a algumas áreas ou formações vegetacionais. Desta forma, o ParNa Iguaçu é uma Unidade de Conservação que contribui para a manutenção dessas espécies em seu ambiente natural.

Palavras-chave: Mata Atlântica, diversidade, *Eugenia*, *Myrcia*, sul do Brazil.

Introduction

Myrtaceae is a family with approximately 130 genera and 6,000 species (Stevens 2017) and is recognized mainly for its arboreal and shrubby habit, often smooth, exfoliating bark, leaves opposite to alternate, simple, entire, often with conspicuous oil glands; bisexual flowers with an inferior, 1–5(–18)-carpelate ovary, the presence of a hypanthium, numerous stamens and dry or fleshy fruits. Distributed predominantly in the Southern hemisphere, with a higher representation in Australia and South America, it also occurs in Africa, Southeast Asia, India, New Caledonia, and the Pacific Islands (Wilson 2011; Thornhill *et al.* 2015).

Through a phylogenetic analysis based on genetic sequencing data, Wilson *et al.* (2005) proposed a new internal classification of the family, dividing Myrtaceae into two subfamilies, Psiloxyloideae, represented by two tribes, and Myrtoideae, with 18 tribes (Wilson *et al.* 2022). Myrteae is the largest tribe in the subfamily Myrtoideae, with about 50 genera and 2,700 species, covering all South American native species (Stevens 2017), except *Metrosideros stipularis* (Hook. & Arn.) Hook.f. This tribe is characterized by the opposite leaves, free perianth, calyx lobes free or fused, tearing irregularly or forming a calyptra, numerous stamens, inferior ovary, indehiscent fleshy fruits, and one to numerous seeds with highly variable embryos (Wilson *et al.* 2005; Lucas *et al*. 2019).

In Brazil, there are 22 genera and 1.049 native species distributed across all states. Paraná, where our study was carried out, is the sixth most species-rich state (253 spp.; BFG 2015; Proença *et al.* 2022a). Myrtaceae are found in all phytogeographic domains, and are a significant component of the Atlantic Forest, as they provide food for fauna throughout the year (Staggemeier *et al.* 2017). However, this phytogeographic domain is one of the most reduced in extension (Campanili & Prochnow 2006), and in Paraná only 13.1% of its original extension remains (Fundação SOS Mata Atlântica & INPE 2019).

There are few studies specifically related to the Myrtaceae in the state of Paraná, i.e: floristic studies by Soares-Silva (2000) in the Tibagi river basin, which encompasses Cerrado, Dense Ombrophilous Forest, and Mixed Ombrophilous Forest; Romagnolo & Souza (2004, 2006), for the floodplain of the upper Paraná River, with Semideciduous Seasonal Forest formation influenced by the tributaries of the upper Paraná River; Lima *et al.* (2015) for Ilha do Mel, formed by Dense Ombrophilous Forest, *restingas* (sandy costal forests) and mangroves; Rocha (2018) for Parque Estadual de Vila Velha, composed of Cerrado and Mixed Ombrophilous Forest. Three other studies are restricted to specific genera, such as Lima *et al.* (2011) of *Campomanesia*, Sobral (2011) of *Eugenia*, and Lannoy *et al.* (2021) of *Myrcia*. However, for the western region of the state formed predominantly by Semideciduous Seasonal Forest, such as the Parque Nacional do Iguaçu (ParNa Iguaçu), there are no floristic studies of this family.

Given the data herein presented, and the scarcity of research related to the Myrtaceae family for the study area, the objective of the present research was to provide a floristic study of the Myrtaceae in the ParNa Iguaçu. An identification key to the species is provided, as well as illustrations, conservation status, geographic distribution, phenology, and diagnostic characteristics. This research provides contributions to the knowledge of the flora of Paraná and neighboring countries (Argentina and Paraguay) as well as associated useful data for the conservation and management of this important National Park.

Material and Methods

Study area

The ParNa Iguaçu is a conservation unit with the highest level of protection in the Brazilian conservation system (*Proteção Integral*; ICMBio 2018) and covers an area of 185,262.5 hectares. It is located between coordinates 25º05' to 25º41' S and 53º40' to 54º38' W (ICMBio 2018). ParNa Iguaçu encompasses two vegetational formations of

the Atlantic Forest: Seasonal Semideciduous Forest (SSF), with a large extension and presenting three sub-formations (Montane, Submontane, and some Alluvial regions); Mixed Ombrophilous Forest (MOF), with a smaller extension and presenting the same three sub-formations (Montane, Submontane, and some Alluvial regions) (ITCG 2009; IBGE 2012). The Köppen climate classification for the region is Cfa, characterized as a subtropical climate, with hot summers and average annual air temperatures between 20.1º C and 22ºC, with an annual rainfall ranging between 1.600 and 2.000 mm (Nitsche *et al.* 2019).

For this study, the park was divided into three large areas, as established by Hammes *et al.* (2021) (Fig. 1), and 19 trails were followed for the collection of specimens (Fig. 2): area 1, located in the northern part, a transition zone of MOF and SSF, which encompasses the administrative headquarters of ParNa Iguaçu team in Céu Azul (Fig. 2c,d); area 2, in the southern part of the park, composed exclusively of SSF, encompasses the administrative headquarters of ParNa Iguaçu team in Capanema (Fig. 2b); area 3, located in the southwest part of the park, also represented solely by SSF, where the administrative headquarters of ParNa Iguaçu team in Foz do Iguaçu is located (Fig. 2a,e).

Data collection and analysis

Between May 2019 and March 2020, 17 collecting field expeditions were carried out. At least three branches of fertile individuals were collected, which were described, photographed in the field, and herborized according to Bridson & Forman (2010). The samples were incorporated into the UNOP herbarium, and the duplicates were sent to the EVB, HCF, HUFSJ, MBM, and UB herbaria (acronyms according to Thiers, continuously updated). In addition to these, specimens from the BHCB, CGMS, EVB, FUEL, FURB, HCF, HUCS, HUEFS, HUEM, MBM, NY, SP, U, UB, UPCB, and UNOP herbaria.

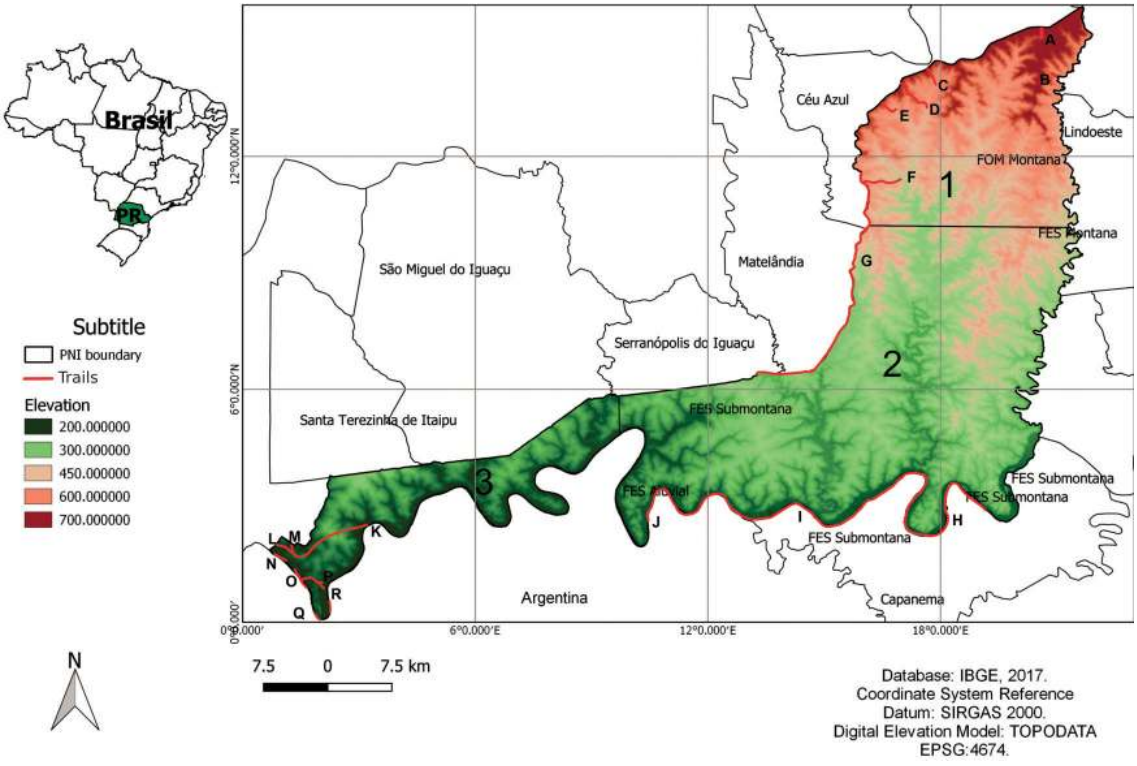


Figure 1 – Map of Parque Nacional do Iguaçu with its respective trails (red lines) – Three areas: Céu Azul (Area 1) – A. Fazenda Rio Butu; B. Nascentes do Jumelo; C. Araucárias; D. Cachoeira Rio Azul; E. Manoel Gomes; F. Jacutinga. Capanema (Area 2) – G. Matelândia; H. Banks of Iguaçu river on the Brazilian side; I. Cachoeira Rio Silva-Jardim; J. Ilha do Sol. Foz do Iguaçu (Area 3) – K. Poço Preto; L. Represa São João; M. Antiga Usina; N. Escola Parque; O. Macuco Safari; P. Bananeiras; Q. Cataratas; R. Hidrante (Based on Hammes *et al.* 2021).

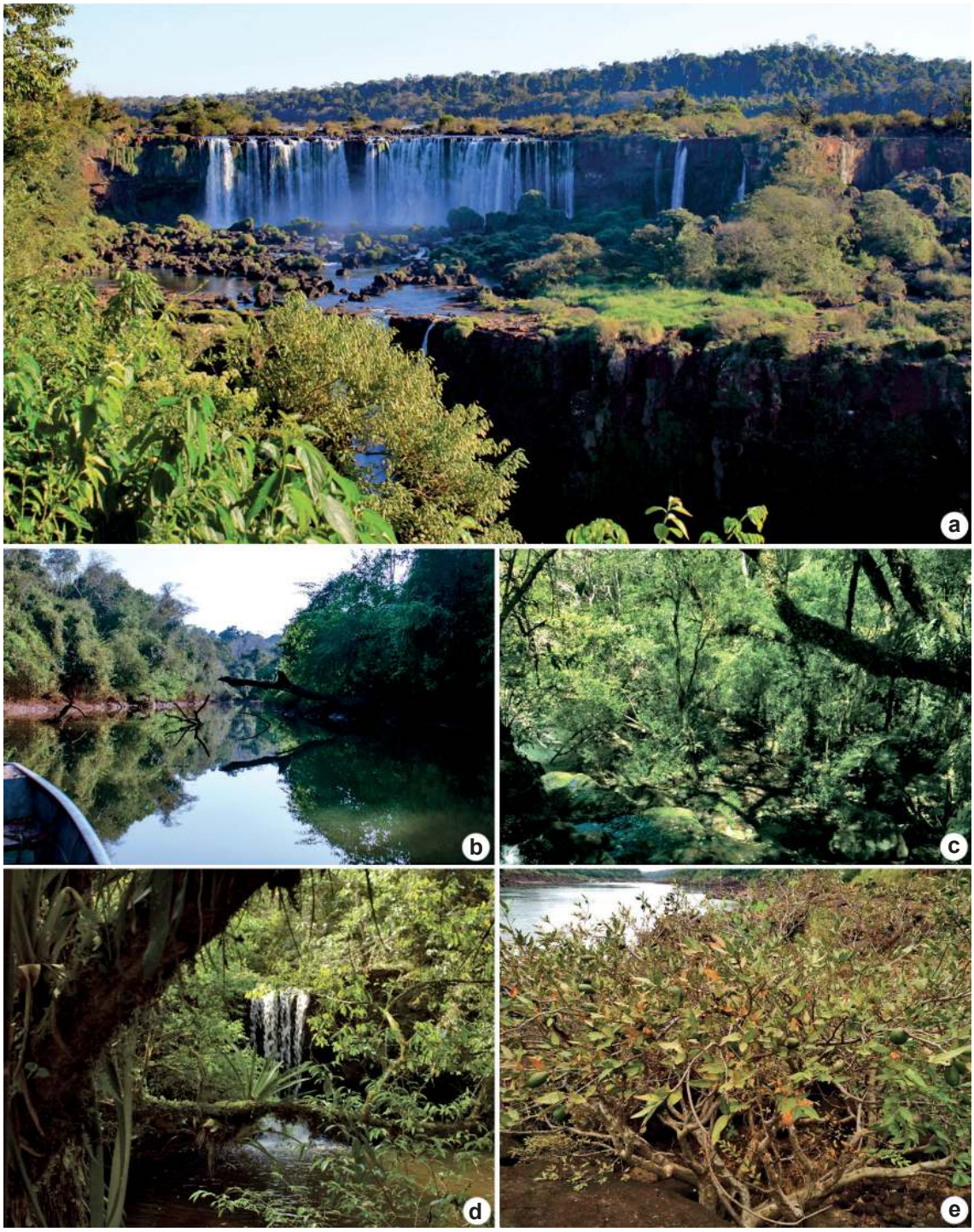


Figure 2 – ParNa Iguaçu trails – a. view of the Iguaçu Falls while walking in the Cataratas trail; b. banks of Iguaçu river, Brazilian side; c. Cachoeira do Rio Azul trail; d. Manoel Gomes trail; e. end of Macuco Safari trail, banks of Iguaçu river with *Psidium striatulum* growing among the rocks.

The samples were analyzed with the aid of a stereoscope, and precise identification reached consulting specific literature (Landrum 1981; Lannoy *et al.* 2021; Lima *et al.* 2011; Proença *et al*. 2022b; Sobral 2003, 2011). The correct spelling of scientific names and the species authors were checked against the International Plant Names Index (IPNI 2021) and Proença *et al.* (2022a). For this study, the samples were treated at the species level, disregarding varieties and for each area a single voucher was selected; other vouchers are listed in Appendix S1, available on supplementary material <https://doi.org/10.6084/m9.figshare.22564264.v1>.

The botanical illustrations were based on selected characteristics of the identification key that were considered important for species recognition. They were illustrated in pen and ink from the observation of exsiccatae or photos of the plants in the field. Morphological terms follow Radford *et al.* (1974), Stearn (1992), and Sobral (2003). For each species complementary literature is cited; the criteria used to select this literature was that it must include a morphological description of the species.

Information on geographic distribution and the phytogeographic domains the species inhabit were obtained from the Flora e Funga do Brasil platform (Proença *et al.* 2022a) and Plants of the World Online (POWO 2022). Data on phenology, elevation, and areas of occurrence in ParNa Iguaçu were based on the samples collected and on the information on the labels of analyzed material.

The species conservation status was verified by consulting the IUCN Red List of Threatened Species (IUCN 2021) and the National Flora Conservation Center (CNCFlora 2012). For the non-evaluated species, a preliminary assessment was made using the GeoCAT tool created by Bachman *et al.* (2011), which follows the IUCN Red List Criteria Application Guidelines for Regional and National Levels (IUCN 2012). The data used in this analysis was taken from the speciesLink database, filtering only the records from Brazil, with original coordinates, and removing duplicate records.

Results and Discussion

Twenty-six species of Myrtaceae were recorded for the ParNa Iguaçu, distributed in seven genera (Figs. 3-6). All species found belong to subfamily Myrtoideae and tribe Myrteae (Wilson *et al.* 2005). *Eugenia* was the most representative genus with 11 species, followed by *Myrcia* with five species, *Campomanesia* and *Psidium* with three species each, *Myrceugenia* with two species, and *Blepharocalyx* and *Plinia* with one species each.

Key to the Myrtaceae from the Parque Nacional do Iguaçu, Paraná, Brazil

1. Calyx lobes fused to the apex in floral buds (buds completely closed) 2
1'. Calyx lobes free in floral buds - buds with 4 or 5 visible calyx lobes (*e.g.*, Fig. 5g) 7
    2. Flowers with a calyptra (*e.g.*, Fig. 6e) ..... 18. *Myrcia glomerata*
    2'. Flowers without a calyptra, calyx lobes tearing regularly or irregularly 3
        3. Calyx lobes tearing regularly (Fig. 3f) ..... 14. *Eugenia subterminalis*
        3'. Calyx lobes tearing irregularly 4
            4. Ovary with 10–14 locules; seeds glandular-verrucose, one per locule, up to 14 seeds (Fig. 5f) ..... 3. *Campomanesia guazumifolia*
            4'. Ovary with 3–6 locules; seeds bony, several to many per locule (*e.g.*, Fig. 6k) 5
                5. Leaves with an acute apex and cuneate base ..... 26. *Psidium striatulum*
                5'. Leaves with a rounded apex and obtuse base 6
                    6. Leaves with 12–17 pairs of secondary veins and sparse, adpressed trichomes on the abaxial face (Fig. 6i) ..... 24. *Psidium guajava*
                    6'. Leaves with 7–10 pairs of secondary veins with abundant erect trichomes on the abaxial face (Fig. 6j) ..... 25. *Psidium guineense*
                        7. Calyx lobes 4, deciduous in post anthesis, ultimately leaving a square scar at the fruit apex (Fig. 5a) ..... 1. *Blepharocalyx salicifolius*
                        7'. Calyx lobes 4 or 5, persistent in the fruit 8
                            8. Inflorescence a simple (3-flowered) or compound dichasium, or a panicle 9
                            8'. Inflorescence a raceme, botryoid, fascicle or solitary flowers 13

9. Inflorescence a simple (3-flowered) or compound dichasium (rarely solitary flowers); flowers tetramerous; locules of the ovary pilose internally ..... 12. *Eugenia pyriformis*
9’. Inflorescence a panicle (*e.g.*, Fig. 6g); flowers pentamerous locules of the ovary glabrous internally 10
10. Leaves with rounded apex..... 11
10’. Leaves with acute to acuminate apex..... 12
11. Leaves with revolute margins ..... 19. *Myrcia hartwegiana*
11’. Leaves with plan margins.....21. *Myrcia palustris*
12. Calyx lobes reflexed in flowers.....22. *Myrcia selloi*
12’. Calyx lobes not reflexed in flowers..... 20. *Myrcia oblongata*
13. Inflorescence a fascicle, leaves with a yellow thickening in the margin, up to 0.3 mm wide.....7. *Eugenia hiemalis*
13’. Inflorescence a raceme, botryoid or solitary flowers, leaves without a yellow thickening in the margin.....14
14. Inflorescence raceme or botryoid 15
14’. Solitary flowers 18
15. Inflorescence botryoid (Fig. 6a) ..... 11. *Eugenia paracatuana*
15’. Inflorescence raceme (*e.g.*, Fig. 5j) 16
16. Racemes up to 15 mm long, 1–4 flowers per axis (Fig. 6b)..... .....13. *Eugenia repanda*
16’. Racemes longer than 15 mm, more than 4 flowers per axis.....17
17. Rounded calyx lobes, leaves with the first pair of secondary veins not confluent with the marginal veins (Fig. 5i)..... .....6. *Eugenia florida*
17’. Acute calyx lobes, leaves without this characteristic ....23. *Plinia rivularis*
18. Flowers pentamerous (4, 5 or 6 in *Eugenia myrcianthes*) 19
18’. Flowers tetramerous 21
19. Leaves without domatia on the abaxial face..... .....9. *Eugenia myrcianthes*
19’. Leaves with domatia formed by tufts of trichomes in the axils of the secondary veins on the abaxial surface (Fig. 5b) 20
20. Calyx lobes longer than wide (Fig. 5g) ....4. *Campomanesia xanthocarpa*
20’. Calyx lobes wider than long (Fig. 5c) ....2. *Campomanesia guaviroba*
21. Flowers usually in pairs in the leaf axils with pedicels aligned in the same plane as the petiole and branch (Fig. 6d).....22
21’. Flowers usually solitary in the leaf axils, when in pairs pedicels not aligned in the same plane as the petiole and branch... 23
22. Pubescent leaves, 26–38 mm long... .....16. *Myrceugenia euosma*
22’. Glabrous to pubescent leaves, 43–73 mm long..... .....17. *Myrceugenia glaucescens*

23. Ovary externally covered by trichomes 24
23'. Ovary externally glabrous 25
24. Leaves 73–90 × 23–29(–33) mm, marginal veins 3–5 mm from the leaf margin, flowers usually sessile or with pedicel up to 1 mm long (Fig. 5h) ..... 5. *Eugenia burkartiana*
24'. Leaves 20–39 × 8–16 mm, marginal veins 0.6–0.8 mm from the leaf margin (Fig. 5l), flowers with pedicels up to 0.8–1 mm long ..... 10. *Eugenia myrciariifolia*
25. Ovary costate, with eight longitudinal ridges, bracteoles deciduous around anthesis ..... 15. *Eugenia uniflora*
25'. Ovary smooth, bracteoles persistent in the fruit ..... 8. *Eugenia involucrata*

1. *Blepharocalyx salicifolius* (Kunth) O.Berg, Linnaea 27(4): 413. 1856 Fig. 5a

Blepharocalyx salicifolius is recognized by the small fruits (5 × 5 mm) and the square-shaped scar at the apex of the fruit, in addition to dichasium-type inflorescences and pubescent branches, leaves, inflorescence axis and pedicels.

Selected material: Área 2, estrada Jardinópolis - Capanema, 23.XI.1966, fl., *J.C. Lindeman & J.H. de Hass 3368* (MBM!, U!, UB); Área 3, trilha da antiga Fazenda Salinet, 194 m, 25°35'09.3"S, 54°22'56.8"W, 24.I.2019, fr., *E.L. Siqueira et al. 2863* (HCF!).

Blepharocalyx salicifolius occurs in Ecuador, Peru, Bolivia, Brazil, and Argentina (POWO 2022). In Brazil this species is distributed in the Northeast, Central-West, Southeast and South regions (Vasconcelos & Proença 2022). In the ParNa Iguaçu it is registered in areas 2 and 3, in SSF Submontane formation. It was collected with flowers in November and fruits in January. The species is evaluated as Least Concern - LC (CNCFlora 2012).

The popular names of the species are: murta, murteira.

Complementary bibliography: Landrum (1986); Santos & Sano (2012); Lima *et al.* (2015); Stadnik *et al.* (2018).

2. *Campomanesia guaviroba* (DC) Bertoni, Bull. Soc. Natl. Acclim. 4(4): 443. 1887. Fig. 5b-c

Campomanesia guaviroba is easily recognized by the calyx lobes wider than long and small pedicels (around 7 mm long) when compared to *C. xanthocarpa*.

Selected material: Área 1, estrada de chão Céu Azul - Serranópolis do Iguaçu, 627 m, 25°11'42"S, 53°52'21"W, 12.XI.2015, fr., *E.L. Siqueira 1789* (HCF); Área 3, Parque Nacional do Iguaçu, 9.XI.1963, fl., *G. Hatschbach 10413* (CGMS, U!, UPCB).

Campomanesia guaviroba occurs in Bolivia, Brazil and Argentina (POWO 2022). In Brazil this species is distributed in all regions (Oliveira *et al.* 2022). In the ParNa Iguaçu it was registered in areas 1 and 3 in SSF Montane and Submontane formations. It was collected with flowers and fruits in November. It is suggested that this species should be rated as Least Concern - LC, due to the EOO higher than 20,000 km² (5,989,732.280 km²).

The popular names of the species are: guabiroba, guabirobão, gabiroba.

Complementary bibliography: Lima *et al.* (2011); Lima *et al.* (2015); Silva & Mazine (2016); Stadnik *et al.* (2018).

3. *Campomanesia guazumifolia* (Cambess.) O.Berg, Linnaea 27(4): 434. 1856. Fig. 5d-f

This species distinguishes from the other *Campomanesia* in the ParNa Iguaçu by the totally closed calyx, which is deciduous during fruiting, and by the fruit covered by trichomes. In addition, its leaves also present abundant trichomes, especially on the abaxial surface, and well-developed secondary and tertiary veins.

Selected material: Área 1, trilha da Cachoeira do Rio, 497 m, 25º9'18"S, 53º47'44"W, 28.I.2020, fr., *L.H.S.M. Conceição et al. 239* (UNOP!); Área 2, estrada de chão Céu Azul - Serranópolis do Iguaçu, 327 m, 25°21'21.7"S, 53°52'31.8"W, 13.X.2016, fl., *M.G. Caxambu et al. 7593* (FUEL, HCF!); Área 3, Parque Nacional do Iguaçu, 19.II.1963, fl., *G. Hatschbach 9739* (MBM!).

Campomanesia guazumifolia occurs in Brazil and Paraguay (POWO 2022). In Brazil this species is distributed in the Northeast, Central-West, Southeast and South regions (Oliveira *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane and MOF Montane, Submontane and Alluvial formations. It was collected with flowers in February and October and fruits in January. *Campomanesia guazumifolia* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: sete-capotes, capoteira.

Complementary bibliography: Lima *et al.* (2011); Silva & Mazine (2016).

4. *Campomanesia xanthocarpa* (Mart.) O.Berg, *Fl. bras.* 14(1): 451-452. 1857-1859. Figs. 3a; 5g

This species, when compared to *C. guaviroba* usually presents longer pedicels (up to 20 mm long), and calyx lobes longer than wide.
Selected material: Área 1, cercanias da BR-277, 682 m, 25°07'49"S, 53°49'26"W, 20.VIII.2015, fl., *M.G. Caxambu et al.* 6786 (HCF); Área 2, borda do Parque Nacional do Iguaçu, 25º19'50''S, 53º52'38''W, 14.X.2019, fl., *L.H.S.M. Conceição et al.* 172 (UNOP!); Área 3, Rodovia das Cataratas, próximo a polícia militar, 25º37'25''S, 54º28'37''W, 7.X.2019, fl., *L.H.S.M. Conceição et al. 147* (UNOP!).

Campomanesia xanthocarpa occurs in Brazil and Argentina (POWO 2022). In Brazil this species is distributed in the Southeast and South regions (Oliveira *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane, SSF Montane and MOF Montane formations. It was collected with flowers in August and October and fruits in November. The species is evaluated as Least Concern - LC (CNCFlora 2012).

The popular name of the species is: gabiroba.

Complementary bibliography: Sobral (2003); Lima *et al.* (2011).

5. *Eugenia burkartiana* (D.Legrand) D.Legrand, Sellowia 13: 321. 1961. Fig. 5h

Eugenia burkartiana is recognized by the sessile to short-pedicellate flowers and by the marginal vein 3 to 5 mm from the leaf margin.
Selected material: Área 1, Rio Floriano, 19.III.2004, fl., *O.S. Ribas et al. 6077* (MBM!); Área 2, trilha da antiga estrada do Colono, 233 m, 25º28'29''S, 54º1'25''W, 27.II.2020, fl., *L.H.S.M. Conceição et al. 279* (UNOP!); Área 3, trilha de Represa, 181 m, 25°37'14"S, 54°28'12"W, 27.VII.2017, fr., *M.G. Caxambu et al.* 7862 (HCF!, MBM!).

Eugenia burkartiana occurs in Brazil, Argentina and Paraguay (POWO 2022; Sobral 2011). In Brazil this species is distributed in the Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane and MOF Montane and Alluvial formations. It was collected with flowers in February, March and April and fruits in July. The species is evaluated as Least Concern - LC (CNCFlora 2012).

The popular name of the species is: guamirim.

Complementary bibliography: Sobral (2003, 2011).

6. *Eugenia florida* DC., Prodr. 3: 283. 1828. Fig. 5i-j

Eugenia florida is recognized by the racemose inflorescences and leaves with the first pair of secondary veins not confluent with the marginal veins formed by the other veins.
Selected material: Área 1, estrada de chão Céu Azul-Serranópolis do Iguaçu, 628 m, 25°11'57"S, 53°52'18"W, 26.VIII.2016, fl., *M.G. Caxambu et al.* 7475 (HCF!, MBM!); Área 3, Foz do Iguaçu, 195 m, 25º41'17''S, 54º26'21''W, 24.IX.2019, fl., *L.H.S.M. Conceição & J.G. Wink* 146 (UNOP!).

Eugenia florida occurs from Nicaragua to Argentina (POWO 2022; Sobral 2011). In Brazil it is distributed in the North, Northeast, Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in areas 1 and 3, in SSF Submontane, Montane and Alluvial formations. It was collected with flowers in August and September and fruits in October and November. The species is evaluated as Least Concern - LC (CNCFlora 2012; IUCN 2021).

The popular names of the species are: guamirim-cereja, cafezinho-da-mata, copal.

Complementary bibliography: Sobral (2011); Silva & Mazine (2016).

7. *Eugenia hiemalis* Cambess., Fl. Bras. Merid. 2: 360. 1829. Fig. 5k

This species is easily recognized by the fasciculate inflorescences, by the yellowish thickening at the margin of its leaves and its oblong fruits.
Selected material: Área 1, Rio Gonçalves Dias, 568 m, 25°07'33"S, 53°39'33"W,10.XI.2016, fr., *M.G. Caxambu et al.* 7666 (HCF, MBM); Área 2, margem de um riacho, 351 m, 25°19'49"S, 53°52'35"W, 22.VII.2022, fl. and fr., *L.H.S.M. Conceição et al.* 314 (UNOP!); Área 3, trilha das Bananeiras, 25º39'22''S, 54º25'51''W, 18.III.2017, fl., *L.C.P. Lima et al.* 926 (EVB!).

Eugenia hiemalis occurs from Bolivia to Brazil and Argentina (POWO 2022; Sobral 2011). In Brazil it is distributed in the Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane, SSF Alluvial and MOF Alluvial formations. It was collected with flowers in March and April and fruits in October and November. *Eugenia hiemalis* is evaluated as Least Concern - LC (CNCFlora 2012).

The popular name of the species is: guamirim-do-inverno.

Complementary bibliography: Kawasaki (1989); Sobral (2003, 2011).

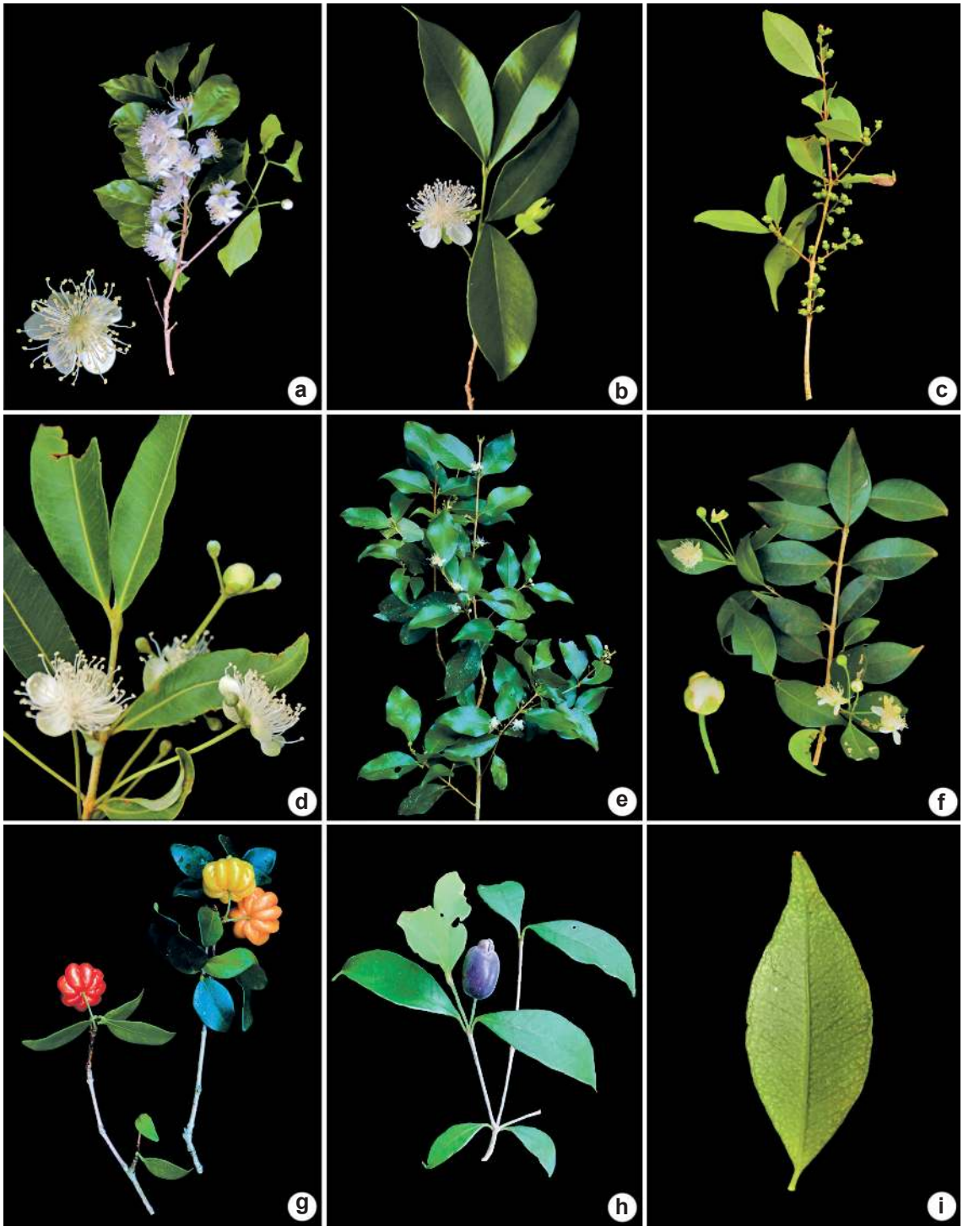


Figure 3 – a. *Campomanesia xanthocarpa* – branch with an enlarged flower. b. *Eugenia involucrata* – branch with a flower. c. *Eugenia paracatuana* – branch with immature fruits. d. *Eugenia pyriformis* – dichasium inflorescence. e. *Eugenia repanda* – branch with blades showing undulate margins. f. *Eugenia subterminalis* – branch with an enlarged flower bud. g. *Eugenia uniflora* – fruits. h-i. *Myrceugenia glaucescens* – h. branch with a mature fruit; i. abaxial surface of leaf blade showing the marbled pattern.

8. *Eugenia involucrata* DC., Prodr. 3: 264. 1828. Fig. 3b

This species is easily recognized by the cordate bracteoles and well-developed calyx lobes (around 10 mm), persistent until fruiting.

Selected material: Área 1, Posto de Informação e Controle Céu Azul, 653 m, 25°09'17"S, 53°50'46"W, 12.X.2016, fr., *M.G. Caxambu et al.* 7578 (FUEL, HCF!); Área 2, borda do Parque, 25º21'22''S, 53º52'31''W, 14.X.2019, fr., *L.H.S.M. Conceição et al.* 174 (UNOP!); Área 3, próximo ao heliponto nas Cataratas, 25º41'2''S, 54º26'23''W, 24.IX.2019, fl., *L.H.S.M. Conceição et al.* 145 (UNOP!).

Eugenia involucrata occurs from Bolivia to Brazil and Argentina (POWO 2022). In Brazil it is distributed in the Northeast, Central-West, Southeast and South regions (Bünger 2015; Bünger *et al.* 2016; Mazine *et al.* 2022). In the ParNa Iguaçu it is registered in all areas, in SSF Submontane, SSF Alluvial, MOF Montane and MOF Alluvial formations. It was collected with flowers in September and October and fruits in October. *Eugenia involucrata* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: cereja-do-mato, cereja-do-rio-grande.

Complementary bibliography: Sobral (2003, 2011).

9. *Eugenia myrcianthes* Nied., Nat. Pflanzenfam. 3(7): 81. 1893.

Eugenia myrcianthes is the only species of the genus *Eugenia* in ParNa Iguaçu that is pentamerous, while all the others are tetramerous. Young branches and leaves are pubescent, secondary and tertiary veins are quite conspicuous.

Selected material: Área 1, trilha de Educação Ambiental, 9.X.2009, fr., *L.G. Temponi et al. 586* (UNOP!); Área 2, estrada de Céu Azul - Serranópolis do Iguaçu, 331 m, 25°20'7"S, 53°52'35"W, 13.X.2015, fl. and fr., *E.L. Siqueira et al. 1824* (HCF); Área 3, trilha do Poço Preto, 25°36'49"S, 54°25'54"W, 1.XI.2019, fl., *E.L. Siqueira et al. 3363* (HCF).

Eugenia myrcianthes occurs in Bolivia, Brazil and Argentina (POWO 2022; Sobral 2011). In Brazil it is distributed in the Northeast, Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane and MOF Montane formations. It was collected with flowers in August and October and fruits in October. *Eugenia myrcianthes* is evaluated as Least Concern - LC (IUCN 2021).

The popular name of the species is: pessegueiro-do-mato.

Complementary bibliography: Sobral (2003, 2011).

10. *Eugenia myrciariifolia* Soares-Silva & Sobral, 14(2): 236. 2004. Fig. 5l

Eugenia myrciariifolia is recognized by the small leaves (20–39 × 8–16 mm), densely clustered in the branches, cataphylls in the branches and flowers with short pedicels (0,8–1 mm).

Selected material: Área 1, Rio Floriano, 19.III.2004, fl., *O. Ribas et al. 6079* (MBM!); Área 2, 100 km W of Rio Floriano, ca. 3 km from the mouth, 1.XII.1966, fl., *J.C. Lindeman & J.H. de Haas 3544* (MBM!).

This species in endemic to Paraná (Mazine *et al.* 2022; POWO 2022; Sobral 2011). In the ParNa Iguaçu it was registered in areas 1 and 2, in SSF Submontane formation. It was collected with flowers in March and December. *Eugenia myrciariifolia* is evaluated as Endangered - EN and is endemic to SSF in Paraná (CNCFlora 2012).

The popular names of the species are: cambuí, pitangão.

Complementary bibliography: Soares-Silva & Sobral (2004); Sobral (2011).

11. *Eugenia paracatuana* O.Berg, *Fl. bras*. 14(1): 588. 1857-1859. Figs. 3c; 6a

This species is recognized by the botryoid inflorescence, the main feature to distinguish it from *E. florida* (Silva & Mazine 2016).

Selected material: Área 2, 7.IX.1998, fl., *S.R. Ziller 1684* (MBM!, SP!); Área 3, Foz do Iguaçu, 190 m, 25º37'34''S, 54º28'48''W, 24.IX.2019, fl., *L.H.S.M. Conceição et al. 139* (UNOP!).

Eugenia paracatuana occurs in Brazil and Paraguay (POWO 2022; Sobral 2011). In Brazil it is distributed in the Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in areas 2 and 3, in SSF Submontane and SSF Alluvial formations. It was collected with flowers in August, September and October and fruits in September and December. It is suggested that this species should be rated as Least Concern - LC due to the EOO higher than 20,000 km² (1,037,659.626 km²).

The popular name of the species is: cambuí.

Complementary bibliography: Sobral (2011); Silva & Mazine (2016).

12. *Eugenia pyriformis* Cambess., Fl. Bras. Merid. 2: 336. 1829. Fig. 3d

Eugenia pyriformis is the only species in the genera *Eugenia* found in the ParNa Iguaçu with

dichasial inflorescence. The locules of the ovary are pilose internally and the fruit color ranges from yellow to orange.

Selected material: Área 1, borda do Parque, 719 m, 25º5'13''S, 53º43'9''W, 14.X.2019, fl., *L.H.S.M. Conceição et al. 163* (UNOP!); Área 2, borda do Parque - Rio Iguaçu, 220 m, 25º34'22''S, 54º0'10''W, 3.IV.2019, fr., *C.R. Rauber et al. 392* (UNOP!); Área 3, trilha do Hidrante, 25º40'57''S, 54º25'46''W, 25.XI.2019, fl., *E.J. Hentz-Júnior & A. Panizza 155* (EVB!).

This species occurs in Bolivia, Brazil and Argentina (POWO 2022; Sobral 2011). In Brazil it is distributed in the Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane, SSF Alluvial and MOF Montane formations. It was collected with flowers in October, November and December and fruits in April, October and November. *Eugenia pyriformis* is evaluated as Least Concern - LC (IUCN 2021).

The popular name of the species is: uvaia.

Complementary bibliography: Sobral (2003, 2011); Silva & Mazine (2016).

13. *Eugenia repanda* O.Berg, *in* Mart. *Fl. bras*. 14(1): 304. 1857-1859. Figs. 3e; 6b

It is recognized by its blades with undulate margins, its short racemes with up to four flowers and by the sepals and bracteoles with revolute margin, giving the false impression that they are acuminate.

Selected material: Área 3, trilha das Cataratas, 150 m, 25º41'S, 54º26'00''W, 9.I.2016, fl., *C.E.B. Proença & S.A. Harris 5221* (UB!).

Eugenia repanda occurs in Bolivia, Brazil and Argentina (POWO 2022; Sobral 2011). In Brazil it is distributed in the Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in area 3, in the SSF Submontane and SSF Alluvial formations. It was collected with flowers in January, July and December, and fruits in January and February. *Eugenia repanda* is evaluated as Least Concern - LC (IUCN 2021).

The popular name of the species is: pitanguinha.

Complementary bibliography: Sobral (2003, 2011).

14. *Eugenia subterminalis* DC., Prodr. 3: 263. 1828. Fig. 3f

This species is recognized by the leaves with acuminate apex, rounded base, calyx lobes tearing up regularly into four lobes, and generally solitary flowers, but in rare cases it may have a simple dichasium inflorescence.

Selected material: Área 2, borda do Parque - Rio Iguaçu, 222 m, 25º35'00''S, 53º59'19''W, 3.IV.2019, fr., *C.R. Rauber et al. 356* (UNOP!); Área 3, mirante das Cataratas (espaço Naipi), 181 m, 25º41'27''S, 54º26'12''W, 25.I.2020, fl., *L.H.S.M. Conceição et al. 236* (UNOP!).

Eugenia subterminalis occurs in Argentina, Paraguay and Brazil (Giaretta *et al.* 2021). In Brazil it is distributed in the Northeast, Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in areas 2 and 3, in SSF Submontane and SSF Alluvial formations. It was collected with flowers in January and October and fruits in March, April and December. *Eugenia subterminalis* is evaluated as Least Concern - LC (CNCFlora 2012).

The popular name of the species is: cara-de-leão.

Complementary bibliography: Sobral (2011).

15. *Eugenia uniflora* L., Sp. Pl. 1: 470-471. 1753. Fig. 3g

Eugenia uniflora is recognized by being the only species in the study area by presenting the ovary with eight visible longitudinal ridges in the flowers that persist in the fruits.

Selected material: Área 1, trilha da educação ambiental, 650 m, 25º9'15''S, 53º50'44''W, 26.VI.2019, fl., *L.H.S.M. Conceição et al. 109* (UNOP!); Área 3, entrada do Parque Nacional do Iguaçu, 205 m, 25º36'56''S, 54º28'41''W, 20.II.2019, fr., *L.H.S.M. Conceição et al. 67* (UNOP!).

This species is native to South America but widely cultivated worldwide, especially in Africa, Southeast Asia and Australasia (POWO 2022; Sobral 2011). In Brazil it is distributed in the Northeast, Central-West, Southeast and South regions (Mazine *et al.* 2022). In the ParNa Iguaçu it was registered in areas 1 and 3, in SSF Submontane and MOF Montane formations. It was collected with flowers in June and fruits in February. *Eugenia uniflora* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: pitanga, pitangueira.

Complementary bibliography: Sobral (2003, 2011); Lima *et al.* (2015); Silva & Mazine (2016).

16. *Myrceugenia euosma* (O. Berg) D.Legrand, Anales Mus. Nac. Montevideo 4(11): 40-42. 1936. Fig. 6c

Myrceugenia euosma is recognized by the short pedicels (5–7 mm long) when compared to

Myrceugenia glaucescens, and it presents leaves with abundant dibrachiate trichomes.
Selected material: Área 1, Rio Gonçalves Dias, 569 m, 25°07'51"S, 53°39'30"W, 7.II.2019, fl. and fr., *M.G. Caxambu*, *et al. 8883* (UNOP!; HCF!).

Myrceugenia euosma occurs in Brazil and Argentina (POWO 2022). In Brazil it is distributed in the Southeast and South regions (Vieira & Meireles 2022). In the ParNa Iguaçu it was registered only in area 1, in MOF Alluvial formation. It was collected with flowers and fruits in February. It is suggested that this species should be rated as Least Concern - LC due to the EOO higher than 20,000 km² (374,580.443 km²).

The popular names of the species are: cambuizinho, guamirim-branca.

Complementary bibliography: Landrum (1981); Sobral (2003).

17. *Myrceugenia glaucescens* (Cambess.) D.Legrand & Kausel, Comun. Bot. Mus. Hist. Nat. Montevideo 1(7): 7. 1943. Figs. 3h-i; 6d

This species differs from *Myrceugenia euosma* by the longer pedicels (10–19 mm long), glabrous to moderately covered by dibrachiate trichomes, and by the presence of a marbled pattern on the abaxial leaf surface of some of the specimens.
Selected material: Área 1, Céu Azul, 637 m, 25º9'15''S, 53º50'34''W, 2.XII.2019, fr., *L.H.S.M. Conceição et al. 192* (UNOP!); Área 3, Ilha da Taquara, 181 m, 25°36'06"S, 54°21'34"W, 16.X.2015, fl., *M.G. Caxambu et al. 7016* (HCF!).

Myrceugenia glaucescens occurs in Paraguay, Argentina, Uruguay and Brazil (POWO 2022). In Brazil it is distributed in the Southeast and South regions (Vieira & Meireles 2022). In the ParNa Iguaçu it was registered in areas 1 and 3, in SSF Submontane, SSF Alluvial and MOF Montane formations. It was collected with flowers in October and fruits in May and December. *Myrceugenia glaucescens* is evaluated as Least Concern - LC (CNCFlora 2012).

The popular names of the species are: cambuí, guamirim, cambuizinho.

Complementary bibliography: Landrum (1981); Sobral (2003).

18. *Myrcia glomerata* (Cambess.) G. Burton & E.Lucas, *in* Lourenço *et al*., Phytotaxa 460(1): 26. 2020. Figs. 4a; 6e

This is the only species of the Myrtaceae in ParNa Iguaçu with flowers opening through a calyptra; additionally, branches usually present conspicuous dichotomous ramifications.
Selected material: Área 1, trilha do Rio Butu próximo à lagoa, 739 m, 25º5'22''S, 53º40'8''W, 13.XII.2019, fl., *L.H.S.M. Conceição et al. 228* (UNOP!); Área 3, Ilha da Taquara, 185 m, 25°36'16"S, 54°21'24"W, 16.X.2015, fl., *M.G. Caxambu et al. 7019* (HCF!).

Myrcia glomerata occurs from Ecuador, Bolivia and Brazil to Argentina (POWO 2022). In Brazil it is distributed in the Southeast and South regions (Santos *et al.* 2022). In the ParNa Iguaçu it was registered in areas 1 and 3, in SSF Alluvial and MOF Montane formations. It was collected with flowers in October, November and December and fruits in September. *Myrcia glomerata* is evaluated as Least Concern - LC (CNCFlora 2012; IUCN 2021).

The popular name of the species is: guamirim.

Complementary bibliography: Lourenço *et al.* (2020); Lannoy *et al.* (2021).

19. *Myrcia hartwegiana* (O.Berg) Kiaersk., Enum. Myrt. Bras. 39: 109. 1893. Fig. 4b

Myrcia hartwegiana is recognized by the leaves with revolute margins and angulation of the secondary veins in relation to the midvein of approximately 60°. According to Lannoy *et al*. (2021) there are no consistent diagnostic features that clearly distinguish *M. palustris* from *M. hartwegiana* specimens from Paraná, and further studies are needed to better distinguish these species.
Selected material: Área 1, trilha do Rio Butu próximo à lagoa, 739 m, 25º5'22''S, 53º40'9''W, 13.XII.2019, fl., *L.H.S.M. Conceição et al. 226* (UNOP!).

This species in endemic to Brazil and is distributed in the Southeast and South regions (Santos *et al.* 2022; POWO 2022). In the ParNa Iguaçu it was registered only in area 1, in SSF Montane and MOF Montane formations. It was collected with flowers in December and fruits in October. It is suggested that this species should be rated as Least Concern - LC due to the EOO higher than 20,000 km² (743,903.782 km²).

The popular name of the species is: guamirim.

Complementary bibliography: Sobral (2003); Lannoy *et al.* (2021).

20. *Myrcia oblongata* DC., Prodr. 3: 251. 1828. Figs. 4d; 6f

This species is recognized by the moderately to strongly discolored leaves, flowers ranging from tetramerous to pentamerous in the same individual, and unequal-sized calyx lobes.
Selected material: Área 2, borda do Parque Nacional do Iguaçu, 311 m, 25º24'54''S, 53º54'2''W, 12.XII.2019, fl., *L.H.S.M. Conceição et al. 222* (UNOP!).

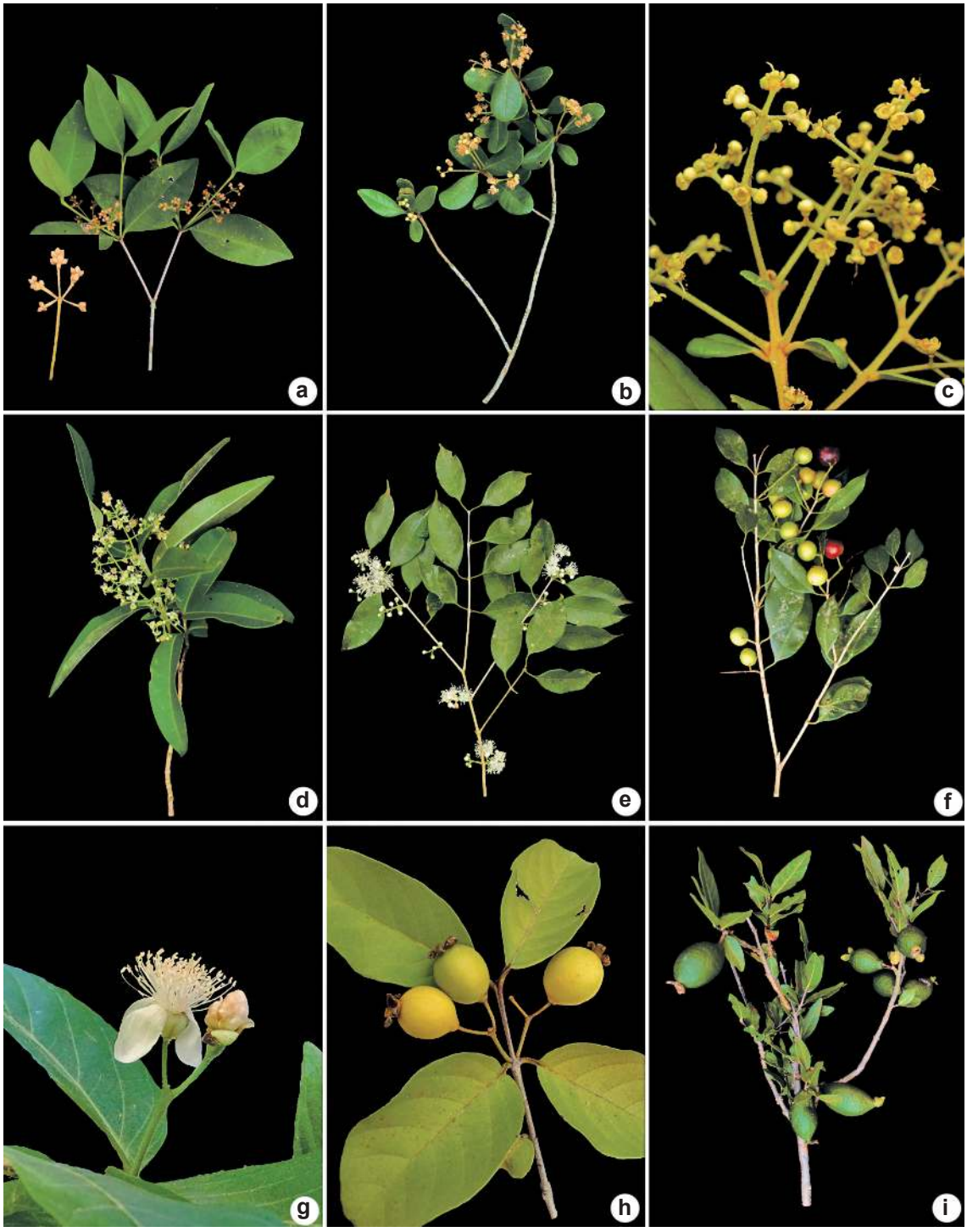


Figure 4 – a. *Myrcia glomerata* – branch with an enlarged inflorescence. b. *Myrcia hartwegiana* – branch with flowers. c. *Myrcia palustris* – enlarged inflorescence. d. *Myrcia oblongata* – branch with flowers. e-f. *Plinia rivularis* – e. branch with flowers; f. branch with fruits. g-h. *Psidium guineense* – g. flower; h. branch with fruits. i. *Psidium striatulum* – branch with fruits.

Myrcia oblongata occurs in Brazil and Argentina (POWO 2022). In Brazil it is distributed in the Southeast and South regions (Santos *et al.* 2022). In the ParNa Iguaçu it was registered only in area 2, in SSF Submontane formation. It was collected with flowers in December and fruits in November. *Myrcia oblongata* is evaluated as Least Concern - LC (CNCFlora 2012).

The popular name of the species is: guamirim.

Complementary bibliography: Fernandes *et al.* (2020); Lannoy *et al.* (2021).

21. *Myrcia palustris* DC., Prodr. 3: 246. 1828. Fig. 4c

Myrcia palustris is recognized by the leaves with flat margins and angulation of the secondary veins in relation to the central one of approximately 45–50º. However, this species is very close to *M. hartwegiana* (see comments under that species).

Selected material: Área 1, trilha do Rio Butu, 25º5'22''S, 53º40'9''W, 12.XII.2018, fl., *C.R. Rauber et al. 252* (HUFSJ!, UNOP!); Área 2, 2,5 km W of road Jardinópolis - Capanema near N limit of park, 23.XI.1966, fl., *J.C. Lindeman & J.H. de Haas* 3360 (MBM!, U!).

Myrcia palustris occurs in Argentina and Brazil (POWO 2022). In Brazil it is distributed in Northeast, Central-West, Southeast and South regions (Santos *et al.* 2022). In the ParNa Iguaçu it was registered in areas 1 and 2, in SSF Submontane and MOF Montane. It was collected with flowers in November and December. *Myrcia palustris* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: cambuizinho, pitangueira-do-mato.

Complementary bibliography: Lima *et al.* (2015); Lannoy *et al.* (2021).

22. *Myrcia selloi* (Spreng.) N.Silveira in Mattos et al. Loefgrenia 89: 5. 1986. Fig. 6g-h

Myrcia selloi presents uniform, reflexed calyx lobes, and the hypanthium is usually constricted above the ovary.

Selected material: Área 1, Céu Azul, VIII.1997, fl., *M. Sobral & J.A. Jarenkow 8578* (MBM!, UPCB!, HUCS); Área 2, borda do Parque, 302 m, 25º25'17''S, 53º54'17''W, 14.X.2019, fl., *L.H.S.M. Conceição et al. 176* (UNOP!); Área 3, trilha Macuco Safari próximo ao cachoeirismo, 156 m, 25º38'49''S, 54º27'22''W, 15.II.2020, fl., *L.H.S.M. Conceição et al. 250* (UNOP!).

This species occurs in Argentina, Bolivia, Brazil, Paraguay and Uruguay (POWO 2022). In Brazil it is distributed in all regions (Santos *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane, SSF Montane and MOF Montane formations. It was collected with flowers in February, August and October and fruits in December. *Myrcia selloi* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: cambuí, cambuizinho-vermelho.

Complementary bibliography: Lannoy *et al.* (2021).

23. *Plinia rivularis* (Cambess.) Rotman, Bol. Soc. Argent. Bot. 24: 195. 1985. Fig. 4e-f

This species is recognized by the leaves with acuminate to long acuminate apex, tetramerous flowers, calyx lobes triangular and racemose inflorescences.

Selected material: Área 1, trilha da Educação Ambiental, 667 m, 25º9'15''S, 53º50'43''W, 26.VI.2019, fl., *L.H.S.M. Conceição et al. 108* (UNOP!); Área 2, borda do Parque, 523 m, 25º14'54''S, 53º51'28''W, 14.X.2019, fr., *L.H.S.M. Conceição et al. 170* (UNOP!); Área 3, trilha da Represa, 204 m, 25º37'29''S, 54º28'00''W, 14.IX.2018, fl., *L.H.S.M. Conceição et al. 65* (UNOP!).

Plinia rivularis occurs from Trinidad and Tobago to Argentina (POWO 2022). In Brazil it is distributed in all regions (Stadnik *et al.* 2022). In the ParNa Iguaçu it was registered in all areas, in SSF Submontane, SSF Montane and MOF Montane formations. It was collected with flowers in August and September and fruits in October and November. *Plinia rivularis* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: guaburiti, guapuriti.

Complementary bibliography: Sobral (2003); Romagnolo & Souza (2004).

24. *Psidium guajava* L., Sp. Pl. 1: 470. 1753. Fig. 6i

This species is recognized by the leaves with 12–17 pairs of veins and abundant translucent dots, easily seen against the light under a stereoscopic microscope. Its ripe fruits have a green to yellow-green external color and the pulp is whitish to pink. In Area 1 a sterile individual was registered on the Manoel Gomes trail.

Selected material: Área 2, Rio Iguaçu, 215 m, 25°36'12"S, 53°48'35"W, 30.X.2015, fr., *M.G. Caxambu et al. 7108* (HCF); Área 3, Cânion Iguaçu próximo ao Rio Iguaçu, 135 m, 25º41'5"S, 54º26'26"W, 24.IX.2019, fl., *L.H.S.M. Conceição & E.J. Hentz Junior 141* (UNOP!).

Psidium guajava is widely distributed worldwide, occurring in Africa, Southeast Asia, Australasia, Tropical and Subtropical America

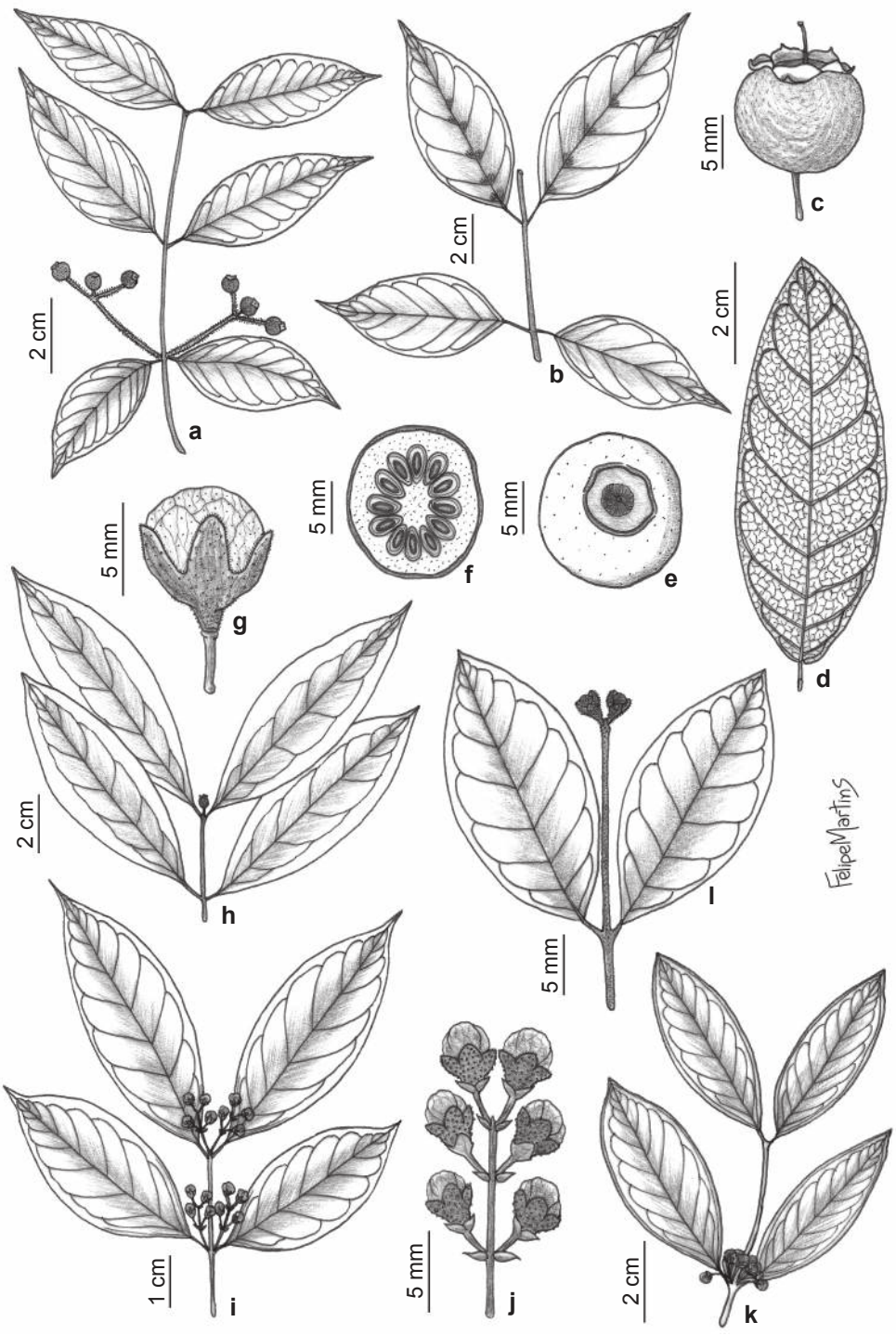


Figure 5 – a. *Blepharocalyx salicifolius* – branch with dichasium inflorescence. b-c. *Campomanesia guaviroba* – b. vegetative branch; c. fruit with calyx lobes wider than long. d-f. *Campomanesia guazumifolia* – d. leaf abaxial surface; e. fruit with deciduous calyx; f. fruit, cross section. g. *Campomanesia xanthocarpa* – floral bud with calyx lobes longer than wide. h. *Eugenia burkartiana* – branch. i-j. *Eugenia florida* – i. branch; j. racemose inflorescence. k. *Eugenia hiemalis* – branch with fasciculate inflorescence. l. *Eugenia myrciariifolia* – branch. (a. *Siqueira 2863* HCF 27042; b-c. *Siqueira 1789* HCF 18362; d-f. *Conceição 239* UNOP 10545; g. *Conceição 147* UNOP 10433; h. *Biral 1648* UNOP 10715; i-j. *Conceição 146* UNOP 10404; k. *Caxambu 8066* EVB 3369; l. *Lindeman 3544* MBM 8455).



Figure 6 – a. *Eugenia paracatuana* – branch with botryoid inflorescence. b. *Eugenia repanda* – short raceme. c. *Myrceugenia euosma* – branch with the detail of the dibrachiated trichomes. d. *Myrceugenia glaucescens* – branch. e. *Myrcia glomerata* – flower with caliptra and floral buds. f. *Myrcia oblongata* – flower. g-h. *Myrcia selloi* – g. branch with paniculate inflorescence; h. flower. i. *Psidium guajava* – branch with the detail of the adpressed trichomes. j. *Psidium guineense* – leaf abaxial surface with the detail of the trichomes. k. *Psidium striatulum* – ovary, cross section with peltate placentation. (a. *Rauber 152* UNOP 10230; b. *Conceição 204* UNOP 10491; c. *Caxambu 8883* UNOP 10577; d. *Conceição 192* UNOP 10746; e. *Conceição 228* UNOP 10742; f. *Conceição 222* UNOP 10532; g-h. *Siqueira 3320* HCF 29608; i. *Conceição 141* UNOP 10431; j. *Conceição 254* UNOP 10470; k. *Caxambu 7803* HCF 22841).

(POWO 2022). In Brazil it is distributed in all regions (Proença *et al.* 2022b). In the ParNa Iguaçu it was registered in all areas in SSF Submontane, SSF Alluvial and MOF Montane formations. It was collected with flowers in September and October and fruits in April and October. *Psidium guajava* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: goiaba, goiabeira.

Complementary bibliography: Lima *et al.* (2015); Landrum (2017); Tuler *et al.* (2017); Stadnik *et al.* (2018).

25. *Psidium guineense* Sw., Prodr. 77. 1788. Figs. 4g-h; 6j

This species is recognized by the pubescent leaves with 7–10 pairs of lateral veins and inconspicuous translucent dots, only seen against light. The ripe fruits have yellowish skin and pulp.
Selected material: Área 3, costão rochoso próximo ao Rio Iguaçu, 110 m, 25º38'50''S, 54º27'30''W, 15.II.2020, fr., *L.H.S.M. Conceição et al. 254* (UNOP!).

Psidium guineense occurs from Mexico to Argentina (POWO 2022). In Brazil it is distributed in all regions (Proença *et al*. 2022b). In the ParNa Iguaçu it was registered only in area 3, in SSF Submontane and Alluvial formation. It was collected with flowers in February and April and fruits in February and June. *Psidium guineense* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: goiabinha, araçá.

Complementary bibliography: Silva & Mazine (2016); Landrum (2017); Tuler *et al*. (2017); Stadnik *et al.* (2018).

26. *Psidium striatulum* Mart. *ex* DC., Prodr. 3: 233. 1828. Figs. 4i; 6k

This species is recognized by the elliptical dark green fruits when ripe, leaves narrowly elliptical to lanceolate (47 × 17 mm), glabrous with conspicuous brown punctuations.
Selected material: Área 3, costão rochoso próximo ao Rio Iguaçu, 118 m, 25º38'50''S, 54º27'30''W, fr., 15.II.2020, *L.H.S.M. Conceição et al. 255* (UNOP!).

Psidium striatulum occurs from North America to Bolivia and Brazil. In Brazil it is distributed in all regions, and Paraná is the southern limit of its distribution (POWO 2022; Proença *et al.* 2022b). In the ParNa Iguaçu it was registered only in area 3, in SSF Alluvial formation. It was collected with flowers in May and fruits in February. *Psidium striatulum* is evaluated as Least Concern - LC (IUCN 2021).

The popular names of the species are: guajava-mirim, goiaba de folha estreita.

Complementary bibliography: Landrum (2017).

For ParNa Iguaçu, seven new records of Myrtaceae are presented: *Eugenia myrcianthes*, *Myrceugenia euosma*, *Myrcia glomerata*, *Myrcia oblongata*, *Myrcia palustris*, *Psidium guineense* and *Psidium striatulum*. The samples of *P. striatulum* collected in this study, plus six more records in the Northwest and West regions of the state of Paraná (Ponciano 655 in EVB; Romagnolo 426, 472, 488 in HUEM; Kita 766 in HUEM; Lindeman & Haas 5487 in UB), are new records of this species in the SSF formation. These data will contribute to the Flora of Brazil, as this species had been recorded only in the vegetational formations of caatinga (*stricto sensu*), cerrado (*lato sensu*), and lowland forest (Proença *et al.* 2022b).

Out of the 26 species found in the study area, 25 are native to Brazil, and only *P. guajava* is exotic, currently considered naturalized (Proença *et al.* 2022a). However, despite being considered naturalized, this species appears in the park as a casual exotic (Richardson *et al.* 2000; Pysek *et al.* 2004; Moro *et al.* 2012), since it was in a reproductive form, but with few individuals, not enough to be considered a viable population. This species was recorded in a few trails in the park, which is positive in terms of conservation, since *P. guajava* has allelopathic potential over other species (Chapla & Campos 2010; Kawawa *et al.* 2016), which can negatively affect natural ecosystems.

Before this study, 28 species were recorded for the park, in the management plan (IBAMA, 1999), phytosociological studies (Gris & Temponi 2017; Gris *et al.* 2014; Souza *et al.* 2019), and in a checklist for ParNa Iguaçu (Trochez *et al.* 2017) (Tab. 1), of which nine were not re-collected during our study. For *Eugenia ramboi* D.Legrand, *Myrceugenia ovata* (Hook. & Arn.) O.Berg, and *Myrciaria floribunda* (H.West ex Willd.) O.Berg, misidentifications were found and these species are now respectively identified as *Eugenia subterminalis*, *Myrceugenia glaucescens var. latior* (Burret) Landrum and *Eugenia repanda*. Other previous records: *Eucalyptus* sp., *Eugenia cereja* D.Legrand, *Eugenia chlorophylla* O.Berg, *Myrcia rostrata* DC., *Pimenta pseudocaryophyllus* (Gomes) Landrum and *Psidium cattleyanum* Sabine, were disregarded as we were unable to

Table 1 – Myrtaceae species cited in the management plans of Parque Nacional do Iguaçu (Brazil) and in the literature. (IBAMA 1999; Gris *et al.* 2014; Gris & Temponi 2017; Souza *et al.* 2017, 2019; Trochez *et al.* 2017). Confirmed indicates that species were either recollected or identifications on herbarium specimens were confirmed.

Species cited in previous works	Confirmed in ParNa Iguaçu
Blepharocalyx salicifolius (Kunth) O.Berg	X
Campomanesia guaviroba (DC.) Bertoni	X
Campomanesia guazumifolia (Cambess.) O.Berg	X
Campomanesia xanthocarpa (Mart.) O.Berg	X
Eucalyptus sp.	
Eugenia burkartiana (D.Legrand) D.Legrand	X
Eugenia chlorophylla O.Berg	
Eugenia cereja D.Legrand	
Eugenia florida DC.	X
Eugenia hiemalis Cambess.	X
Eugenia involucrata DC.	X
Eugenia myrciariifolia Soares-Silva & Sobral	X
Eugenia paracatuana O.Berg	X
Eugenia pyriformis Cambess.	X
Eugenia ramboi D.Legrand	
Eugenia repanda O.Berg	X
Eugenia subterminalis DC.	X
Eugenia uniflora L.	X
Myrceugenia glaucescens (Cambess.) D.Legrand & Kausel	X
Myrceugenia ovata (Hook. & Arn.) O.Berg	
Myrcia hartwegiana (O.Berg) Kiaersk.	X
Myrcia selloi (Spreng.) N.Silveira	X
Myrcia rostrata DC.	
Myrciaria floribunda (H.West *ex* Willd.) O.Berg	
Pimenta pseudocaryophyllus (Gomes) Landrum	
Plinia rivularis (Cambess.) Rotman	X
Psidium cattleyanum Sabine	
Psidium guajava L.	X
Total species	**19**

find vouchers in herbaria and their presence was not confirmed during field expeditions.

Regarding species richness per area, area 3 stands out for presenting 21 species, among which three occur only in this area (*E. repanda*, *P. guineense* and *P. striatulum*). In area 1, 19 species were recorded, with only *Myrceugenia euosma* and *Myrcia hartwegiana* occurring exclusively in this region, and finally, in area 2 there are 16 species, with only *Myrcia oblongata* occurring exclusively in this area (Tab. 2). Of the 26 species recorded, 10 are widely distributed across the three areas of ParNa Iguaçu, eight species occur only in SSF and two species only in MOF (Tab. 2).

The differences in species richness between the ParNa Iguaçu areas may be explained by

Table 2 – Distribution of Myrtaceae species in the ParNa Iguaçu, Paraná, Brazil and near areas (5–10 km). (* = endemic species to Brazil according to Proença *et al.* (2022a) and POWO (2022); ▲ = exotic species to Brazil).

Species	Area 1 SSF/MOF	Area 2 SSF	Area 3 SSF	Outside the CU limits
Blepharocalyx salicifolius (Kunth) O.Berg		X	X	
Campomanesia guaviroba (DC.) Bertoni	X		X	
Campomanesia guazumifolia (Cambess.) O.Berg	X	X	X	
Campomanesia xanthocarpa (Mart.) O.Berg	X	X	X	
Eugenia burkartiana (D.Legrand) D.Legrand	X	X	X	
Eugenia florida DC.	X		X	
Eugenia hiemalis Cambess.	X	X	X	
Eugenia involucrata DC.	X	X	X	
Eugenia myrcianthes Nied.	X	X	X	
Eugenia myrciariifolia Soares-Silva & Sobral *	X	X		
Eugenia paracatuana O.Berg		X	X	
Eugenia pyriformis Cambess.	X	X	X	
Eugenia repanda O.Berg			X	
Eugenia subterminalis DC.		X	X	
Eugenia uniflora L.	X		X	
Myrceugenia euosma (O.Berg) D. Legrand	X			
Myrceugenia glaucescens (Cambess.) D.Legrand & Kausel	X		X	
Myrcia glomerata (Cambess.) G.P.Burton & E.Lucas	X		X	
Myrcia hartwegiana (O.Berg) Kiaersk. *	X			
Myrcia oblongata DC.		X		
Myrcia palustris DC.	X	X		
Myrcia selloi (Spreng.) N.Silveira	X	X	X	
Myrcianthes pungens (O.Berg) D.Legrand				X
Myrciaria cuspidata O.Berg				X
Plinia rivularis (Cambess.) Rotman	X	X	X	
Psidium guajava L. ▲	X	X	X	
Psidium guineense Sw.			X	
Psidium striatulum Mart. *ex* DC.			X	
Total species	**19**	**16**	**21**	**2**

the ease of collection in the Foz do Iguaçu area, in which the maintenance of the trails is much more frequent due to intense tourism, which also facilitates access by scientists. The other two areas present difficulties in accessing the trails for fieldwork, which generally require help from the ICMBio team to accompany the collecting expeditions or even the use of a boat in area 2, along the banks of the Iguaçu River.

In addition to the 26 species found within the geographical limit established for the CU, two other species were recorded in the ParNa surroundings (5-10 km from the borders): *Myrcianthes pungens* (O.Berg) D.Legrand, which is recognized by its leaves with a mucronate apex up to 2 mm, tetramerous flowers solitary or arranged in a dichasium or raceme, and by the fruits with a persistent calyx; and *Myrciaria cuspidata* O.Berg,

which also has a mucronate apex but smaller (up to 1 mm), tetramerous flowers arranged in fascicles and fruits with a circular scar originating from the abscission of the prolonged hypanthial tube (Tab. 2).

These results were compared with the management plan of the Parque Nacional Iguazu, a contiguous conservation unit in Argentina (Ministerio de Ambiente y Desarrollo Sustentable 2017), which listed 17 species of Myrtaceae (Tab. 3) most of which were also recorded in our study. Six of them were not found in the ParNa Iguaçu (Brazil): *Myrciaria tenella* (DC.) O.Berg, that has a wide distribution in South America; *Eugenia pitanga* (O.Berg) Nied., and *Myrcianthes pungens* (O.Berg) D.Legrand that are distributed from Bolivia to Argentina; *Eugenia mansoi* O.Berg, and *Eugenia uruguayen*sis Cambess., that have a more restricted distribution, extending from Brazil to Argentina (POWO 2022). These species may occur in ParNa Iguaçu, particularly *M. pungens* that was collected 5 km from the park border (see paragraph above) but the confirmation of these identifications was not possible because the management plan of the Parque Nacional Iguazu also does not include herbarium vouchers for the listed species.

The conservation status of the four non-evaluated species was assessed using GeoCAT, and all of them were classified as Least Concern (LC) according to the IUCN criteria (2012). Twenty species had already been evaluated by CNCFlora (2012) and IUCN (2021), and were also categorized as Least Concern (LC) due to their wide distribution across phytogeographic domains, Brazilian vegetation formations, and conservation units or for having large populations in most cases. However, we highlight the species *E. myrciariifolia*, considered Endangered (EN) that occurs in ParNa Iguaçu in areas 1 and 2. This species is endemic to Paraná and found only in SSF (Mazine *et al.* 2022). The Forest has suffered a significant reduction in its natural area, which may have reduced their population into subpopulations, and only one of these occurs in conservation units such as the ParNa Iguaçu (CNCFlora 2012). In addition, this species was not collected during our expeditions and the

Table 3 – Total Myrtaceae species presented in the management plan for the Parque Nacional Iguazu, Argentina (Ministerio de Ambiente y Desarrollo Sustentable 2017) and in the second column the species also found in the ParNa Iguaçu, Brazil.

Species of Parque Nacional Iguazu (Argentina)	**ParNa Iguaçu (Brazil)**
Campomanesia guazumifolia (Cambess.) O.Berg	X
Campomanesia xanthocarpa (Mart.) O.Berg	X
Eugenia burkartiana (D.Legrand) D.Legrand	X
Eugenia florida DC.	X
Eugenia hiemalis Cambess.	X
Eugenia involucrata DC.	X
Eugenia mansoi O.Berg	
Eugenia pitanga (O.Berg) Nied.	
Eugenia pyriformis Cambess.	X
Eugenia uniflora L.	X
Eugenia uruguayensis Cambess.	
Myrcia glomerata (Cambess.) G.P.Burton & E.Lucas	X
Myrcia palustris DC.	X
Myrcia selloi (Spreng.) N.Silveira	X
Myrcianthes pungens (O.Berg) D.Legrand	
Myrciaria tenella (DC.) O.Berg	
Plinia rivularis (Cambess.) Rotman	X
Total species	**12**

last collection took place in 2004 (*O. Ribas et al. 6079* in MBM).

Our research brings important contributions to the distribution of the flora of Paraná, especially for the western region of the state, where there were no specific studies for this family, and will also be useful for the neighboring countries Argentina and Paraguay. In addition, the importance of conserving the ParNa Iguaçu is highlighted for the protection of populations of these species.

Acknowledgments

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001 (scholarship to the first author). We would also like to thank: ICMBio and Parque Nacional do Iguaçu teams, for the collections authorizations and help with field expeditions; the specialists Duane Lima, Carolyn Proença, Amélia Tuler, and Fábio Speck Vieira, for their help in identifying some of the species; Duane Lima, Jair Faria, Carolyn Proença and two anonymous reviewers, for valuables suggestions for the improvement of this paper; Elmar Hentz Junior and Carolyn Proença, for translation and proofreading; and also Felipe Martins Guedes, for the illustrations. This work is part of the first author's dissertation (M. Sc. in Conservation and Management of Natural Resources, Universidade Estadual do Oeste do Paraná, Brazil).

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Area Editor: Dr. Marcelo Trovó

Received on August 31, 2022. Accepted on October 31, 2022.

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