

Two new species of *Eugenia* sect. *Phyllocalyx* (Myrtaceae) from Brazil

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Summary. Two new endangered Brazilian species of *Eugenia* are described and illustrated, *E. magnisepala* and *E. salacifolia*. *Eugenia magnisepala*, collected in Matas de Cipó (liana forests) in the northeastern state of Bahia, is recognisable by its larger calyx lobes, membranaceous blades and costate ovary, traits not shared with the morphologically similar species *E. itacarensis*, *E. involucrata*, *E. macrobracteolata* and *E. regia*. *Eugenia salacifolia* was collected in seasonal Atlantic forests of the state of Minas Gerais and is similar to *E. macrantha*, from which it can be distinguished by its auxotelic inflorescences and larger and persistent bracteoles and calyx lobes.

Key Words. Caatinga, Cadeia do Espinhaço, endemic species.

Introduction

Myrtaceae are currently estimated to have 142 genera and c. 5,500 species worldwide (Govaerts *et al.* 2016). Among the richest genera, *Eugenia* L. comprises about 1,100 mostly Neotropical species with c. 388 species found in Brazil (Sobral *et al.* 2016) distributed throughout the country with diversity centres in the Atlantic forest Biome (Lucas & Büniger 2015) where they can make up 10 – 15% of the species of the Angiosperm flora (Mori *et al.* 1983; Oliveira-Filho & Fontes 2000).

The species of *Eugenia* were firstly classified into sections by Berg (1856) based on inflorescence morphology. Nevertheless, the Bergian concept of the genus did not include species with distinct flower morphologies segregated in distinct genera, namely *Phyllocalyx* O. Berg for species with well developed bracteoles and *Stenocalyx* O. Berg for species with mostly linear, deciduous bracteoles and inflorescences with subtending imbricate bracts. Both genera were recognised as generic sections of *Eugenia* in the later nineteenth century (Kiaerskou 1893; Niedenzu 1893) and have been widely accepted since then.

According to Mazine *et al.* (2014), *Eugenia* section *Phyllocalyx* (O. Berg) Nied. is monophyletic and can be recognised morphologically by the leafy calyx and bracts associated with the flowers. The known species of this section mostly occur along the Brazilian coastal Atlantic forest, they are rainforest and *restinga* trees or shrubs. Some species like *E. involucrata* DC. (the most widespread species of the section) and *E. espinhacensis* Büniger & Sobral

occur in the Espinhaço Range as well as in the seasonal Atlantic forests and rocky outcrops in the Minas Gerais State (Büniger *et al.* 2013, 2015). The Espinhaço Range is a major centre of plant diversity and endemism (Giulietti *et al.* 1997). The predominant vegetation type is campo rupestre (rocky outcrops/grassland/savanna, *sensu* Oliveira-Filho 2009) although the vegetation mosaic also includes seasonal and dwarf forest. The floristic composition of the range is strongly affected by the three biomes through which it crosses (Giulietti *et al.* 1997), hereafter the Southern (Atlantic forest biome), Central (Cerrado biome) and Northern Espinhaço (Caatinga Biome).

Another ecological tension zone between the humid Atlantic Forests and xeric regions is found in the state of Bahia, particularly in the municipality of Maracás. The vegetation here is also influenced by the Caatinga Biome (xeromorphic savanna-type vegetation) and is known as Mata de Cipó (liana forest) defined by a dry, deciduous to semi-deciduous forest, between about 500 and 1000 m a.s.l. (IBGE 2016). Macedo (2007) and Moro *et al.* (2016) highlight Myrtaceae as one of the most species-rich families in the region and one of the most poorly known. Recently two new Myrtaceae species were described from near Maracás (Coutinho *et al.* 2015 and Tuler *et al.* 2016) suggesting that other endemic Myrtaceae taxa might exist in the region.

During revision of herbarium collections for the taxonomic treatment of *Eugenia* sect. *Phyllocalyx* and the *Flora of Brazil* online, specimens of two new species were located that are described below.

Accepted for publication 6 June 2018. Published online 25 July 2018

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Material and Methods

The Myrtaceae collections of the following herbaria were examined: BR, BHCb, BM, ESA, G, HB, HPL, HRCb, HUFU, K, LE, M, MBM, MBML, OUPR, OX, P, R, RB, SP, SPF, UEC, UPCB [Thiers (continuously updated), 2016]. Only fully developed structures from mature plants were used for morphological analysis. Floral characters were studied in both dry and rehydrated flowers. Phenological, distributional and habitat data were obtained from the same material, both from the above cited herbaria and living plants. Morphological analysis follows the terminology of Radford *et al.* (1974). The distribution map was produced using ArcGIS version 9.3 (ESRI 2011).

Taxonomic Treatment

1. *Eugenia magnisekala* Bunger & Mazine sp. nov.
Type: Brazil, Bahia, Maracas, 1328'S, 4024'W, 15 Feb. 2004, (fl.) M. V. Moraes 600 (holotype BHCb 001912!; isotype HUEFS).

<http://www.ipni.org/urn:lsid:ipni.org:names:60476447-2>

Shrubs; young twigs glabrous. *Leaves* petiolate, petioles 3.7 – 5.8 × 0.5 – 0.82 mm, canaliculate, pubescent; blades elliptic, 42 – 45 × 15.6 – 20.6 mm, membranaceous, discoloured, pubescent on both sides, glandular dots not visible on either side, apices acute; bases attenuate; margins flat or slightly revolute; midveins sulcate adaxially, raised abaxially; lateral veins c. 15 on each side, not visible on either side; marginal vein c. 0.8 mm from the margin. *Inflorescences* axotelic, pedicels 8.3 – 13.7 mm long, pubescent; bracteoles concealing the ovary deltate, 6.9 – 16.4 × 6.2 – 13.9 mm, apices acute, pubescent, not ciliate, persistent at anthesis. Buds obpyriform 9.1 – 14 × 7.4 – 11.3 mm; calyx lobes 4, of equal size, elliptic, apices acute, 12.4 – 19.8 × 5.3 – 9.2 mm, pubescent, not ciliate; petals 4, 11 – 13.8 × 8.9 – 10.2 mm, glabrous, not ciliate; ovary 4.5 – 5.7 × 2 – 4 mm, tomentose, costate; style 9 – 12 mm long, staminal ring subquadrate. *Fruits* not seen. Fig. 1.

RECOGNITION. *Eugenia magnisekala* is recognisable by its larger calyx lobes (12.4 – 19.8 mm long), membranaceous and smaller blades (42 – 45 mm long) and costate ovary. *Eugenia itacarensis* Mattos, *E. macrobracteolata* Mattos and *E. regia* Bunger & Sobral also have larger calyx lobes (more than 12 mm long), however they have larger (more than 50 mm long) and coriaceous blades and the ovary is not costate.

DISTRIBUTION. Known only from the municipality of Maracas in Bahia (Brazil) (Map 1).

SPECIMENS EXAMINED. BRAZIL. Bahia, Maracas, 1328'S, 4024'W, 15 Feb. 2004, (fl.) M. V. Moraes 600 (holotype BHCb!; isotype HUEFS).

HABITAT. About 9000 m a.s.l. in the central-southern region of Bahia, in the municipality of Maracas. This region is semi-arid with two rainy periods during the year. Caatinga vegetation is arboreal and shrubby although other types of vegetation such as Matas de Cipo (liana forests) are found in the region (IBGE 2016). **CONSERVATION STATUS.** Recent fieldwork attempted to recollect *Eugenia magnisekala* but only non-fertile material was found. The area of occurrence of *E. magnisekala* was observed to be surrounded by *Eucalyptus* plantations; there are no officially protected areas in the region. *Eugenia magnisekala* is considered Endangered (EN) under the IUCN (2016) conservation status criteria B1ab(iii). Criterion B1 recognises an extent of occurrence of less than 5,000 km² (just one collected specimen), criterion “a”, occurrence in less than five localities (one locality) and “b(iii)”, a continuing decline in the area and quality of the habitat.

PHENOLOGY. *Eugenia magnisekala* flowers in February.

ETYMOLOGY. *Eugenia magnisekala* is so named in recognition of its large calyx lobes.

NOTES. *Eugenia magnisekala* resembles morphologically similar populations of *E. involucreata* growing in dry areas and presenting smaller leaf blades. The new species has larger calyx lobes (12.4 – 19.8 mm long vs 7 – 15 × 3.3 – 4.9 mm long). *Eugenia* sect. *Phyllocalyx* species with larger calyx lobes are *E. itacarensis*, *E. macrobracteolata* and *E. regia*, but these species have significantly larger blades (more than 50 mm long vs 15 – 20 mm long in *E. magnisekala*). Another significant morphological trait is the costate ovary of *E. magnisekala*. Among *Eugenia* sect. *Phyllocalyx* species, only *E. selloi* has a costate ovary but this species is restricted to the restingas of Rio de Janeiro State and has smaller calyx lobes (3.4 – 4.2 mm long vs 12.4 – 19.8 mm long).

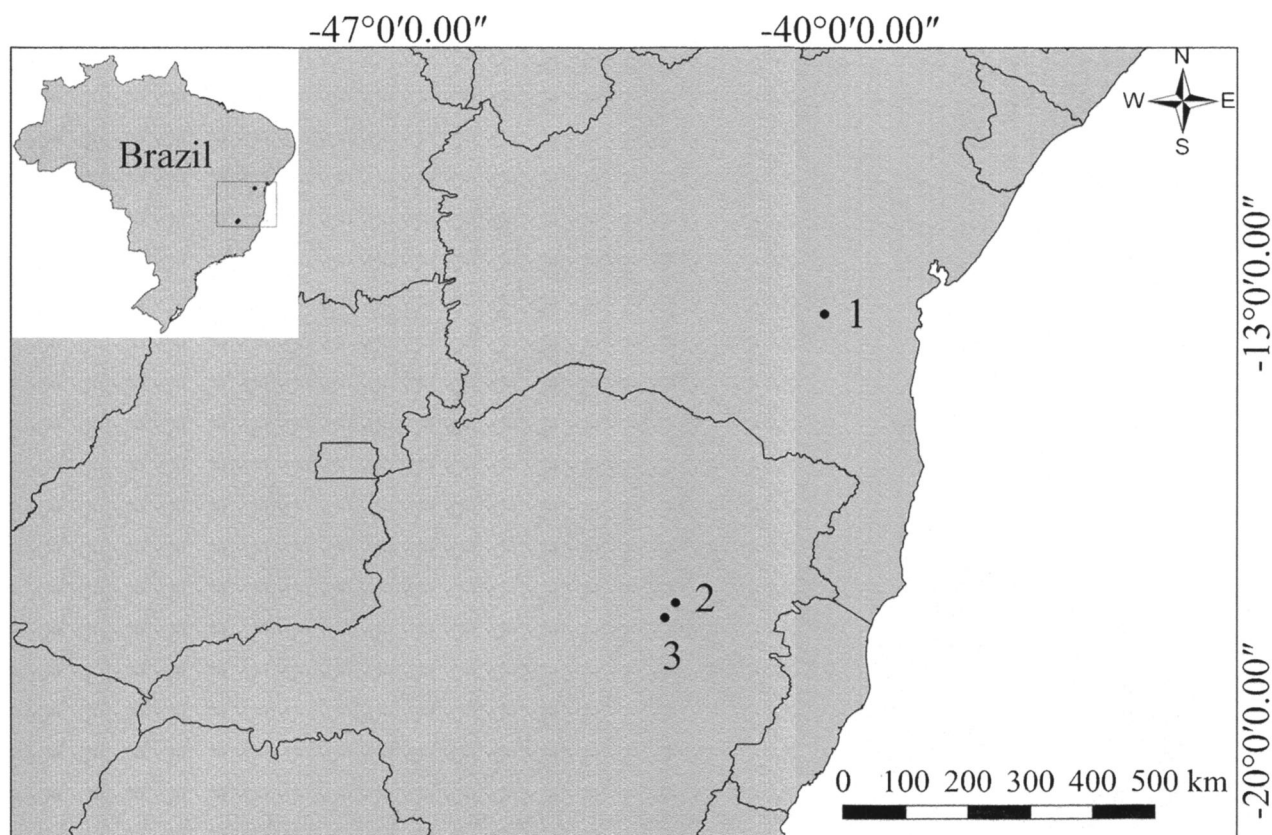
2. *Eugenia salacifolia* Bunger & Mazine sp. nov. Type: Brazil, Minas Gerais, Itamarandiba, 1813'51"S, 4251'54"W, 13 Jan. 1998, (fl.), J. R. Pirani *et al.* 3954 (holotype BHCb 027616!, isotype SPF!).

<http://www.ipni.org/urn:lsid:ipni.org:names:60476448-2>

Treelets to 3 m tall; young twigs rusty, glabrous. *Leaves* with petioles 7.7 – 13.1 × 2.1 – 2.3 mm, canaliculate, glabrous; blades elliptic, 105.2 – 154 × 42.1 – 61.4 mm, coriaceous, discolorous, glabrous, glandular dots scarcely visible on both sides, apex acute; base acute; margin revolute; midvein sulcate adaxially, raised abaxially; lateral veins 14 – 23 on each side, visible on either side, sometimes faintly raised adaxially; marginal vein 2.0 – 2.61 mm from the margin. *Inflorescences* axotelic, terminal, pedicels 10.5 – 20.3 mm long, rusty-pubescent; deltate bracteoles concealing the ovary, 3.4 – 11.9 × 2.9 – 10 mm, apex rounded, rusty-pubescent, not



Fig. 1. *Eugenia magnisepala* Bunger & Mazine. Holotype: M. V. Moraes 600 (BHCB).



Map 1. Geographical distribution of *Eugenia magnisepala* and *E. salacifolia*. 1 *Eugenia magnisepala*: Municipality of Maracás in Bahia State (M. V. Moraes 600, BHCB); 2, 3 *E. salacifolia*: Municipality of Itamarandiba in Minas Gerais State (J. R. Pirani *et al.* 3954, BHCB; N. F. O. Mota *et al.* 1331, BHCB).

ciliate, persistent at anthesis. Buds not seen; calyx lobes 4, of equal size, ovate, apex acute, 10.6–14.4 × 9.7–12.8 mm, rusty-pubescent, not ciliate; petals not seen; ovary c. 4 × 7.8 mm, rusty-tomentose; style c. 7.4 mm long, staminal ring subquadrate. Fruits globose, 15.6–23.5 mm diam., rusty pubescent, 1 seed c. 11.1 mm diam.; embryo with two fused cotyledons and no visible hypocotyl. Fig. 2.

RECOGNITION. *Eugenia salacifolia* is related to *E. macrantha* O. Berg (*E. sect. Umbellatae* O. Berg), however the new species has auxotelic (vs fasciculate) inflorescences, larger (3.4–11.9 mm long vs c. 2–4 mm long), persistent bracteoles (vs caducous) and larger calyx lobes (10.6–14.4 mm long vs 4–8 mm long).

DISTRIBUTION. *Eugenia salacifolia* occurs in the municipality of Itamarandiba, Minas Gerais, Brazil (Map 1).

SPECIMENS EXAMINED. BRAZIL. Minas Gerais, Itamarandiba, 18°13'51"S, 42°51'54"W, 13 Jan. 1998, (fl.), J. R. Pirani *et al.* 3954 (holotype BHCB!, isotype SPF!); Entorno do Parque Estadual da Serra Negra, estrada que vai para a torre, 17°59'42"S, 42°42'05"W, 1135 m alt., 24 Aug. 2008, (fr.), N. F. O. Mota *et al.* 1331 (BHCB!).

HABITAT. Between 1000–1135 m a.s.l. in the north-centre of the state of Minas Gerais, Brazil. This region is tropical with two rainy periods during the year

(IBGE 2016). The municipality of Itamarandiba forms part of the central portion of the Espinhaço Range and is heavily influenced by the Cerrado biome.

CONSERVATION STATUS. Specimens of *Eugenia salacifolia*, collected as *E. magnisepala*, were found outside a protected area surrounded by *Eucalyptus* plantations. *Eugenia salacifolia* is considered Endangered (EN) under the IUCN (2016) conservation status criteria B1ab(iii). Criterion B1 recognises an extent of occurrence of less than 5,000 km², criterion "a", occurrence in less than five localities and "b(iii)", a continuing decline in the area and quality of the habitat.

PHENOLOGY. *Eugenia salacifolia* is known to flower in January and fruit in August.

ETYMOLOGY. *Eugenia salacifolia* is so named in recognition of its leaves that are similar in shape and size, to the leaves of species of *Salacia* (Celastraceae).

NOTES. *Eugenia salacifolia* belongs to *Eugenia* sect. *Phyllocalyx* which is characterised by showy calyx lobes and bracteoles and fruits with persistent bracteoles. This section has auxotelic inflorescences in which the axis of the inflorescence continues growth beyond the flowering region. *Eugenia* sect. *Phyllocalyx* is also distinct in the degree of branching and/or number of internodes or their inflorescence elongation. In



Fig. 2. *Eugenia salacifolia* Bunger & Mazine. Holotype: *J. R. Pirani et al.* 3954 (BHCB).

MYRTACEAE

Eugenia macrontha O. Berg
det. M. Sobral 2004

Brasil, Minas Gerais, Mun. Itamarandiba, Santa Joana, Estrada Coluna-Itamarandiba. Carrascal a W da rodovia. 18° 13' 51" S, 42° 51' 54" W, 1.000m alt.

Arvoreta 3m alt., no carrasco em transiao para mata do fundo do vale. Petas e estames brancos.

Col: J.R.Pirani 3954, A.C. Marcato, R.C.Forzza, A. Rapini & M.Meguro. 13.01.98

young branches, species have 2 – 4 or even more flowers united in lateral or terminal “inflorescences”. But, when the shoots are well developed, these appear as solitary flowers along the branch. This inflorescence arrangement is particularly important to distinguish *E. salacifolia* from *E. macrantha* which belongs to *Eugenia* sect. *Umbellatae*. The latter species has flowers arranged in determinate inflorescences: fascicles, glomerules or racemes. Besides the morphology of the inflorescence, *E. salacifolia* differs from *E. macrantha* in having larger bracteoles (3.4 – 11.9 mm long vs c. 2 – 4 mm long) and larger calyx lobes (10.6 – 14.4 mm long vs 4 – 8 mm long).

Acknowledgements

We thank the curators of the herbaria visited, for allowing us to study the specimens and we are grateful to Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for financial support received by the first and last authors.

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