Rodriguésia 74: e00632022. 2023
http://rodriguesia.jbrj.gov.br
DOI: http://dx.doi.org/10.1590/2175-7860202374035

Original Paper

Flora of Espírito Santo: Celastroideae (Celastraceae)

Leonardo Biral [1,4] & *Gabriel Mendes Marcusso* [2,3]

Abstract

Here we present a taxonomic treatment of the subfamily Celastroideae (Celastraceae) in the state of Espírito Santo, southeastern Brazil, as a part of the ongoing project Flora do Espírito Santo. The work is based on analyses of herbaria specimens and fieldwork since 2012. Two genera and thirteen species are reported for Espírito Santo, covering all the vegetation formations found in the state. *Celastrus* is represented by one species, *C. liebmannii*, the unique climbing species of the subfamily in Brazil. *Monteverdia* are shrubs and trees characterized by fruits 2-valved, pericarp coriaceous and white aril. The genus is represented by twelve species, corresponding nearly to one third of the Brazilian species. *Celastrus liebmannii* is formally reported by the first time to Espírito Santo. Morphological descriptions, comments, color photographs plates, and identification keys for genera and *Monteverdia* species are provided.

Key words: Atlantic Forest, Celastrales, *Celastrus*, *Maytenus*, *Monteverdia*.

Resumo

Apresentamos aqui o tratamento taxonômico da subfamília Celastroideae (Celastraceae) no estado do Espírito Santo, como parte da contribuição para o projeto Flora do Espírto Santo. Este trabalho é baseado na análise de espécimes de herbário e trabalhos de campo realizado pelos autores a partir de 2012. Dois gêneros e treze espécies são aqui reportados para o Espírito Santo, presente em todas as formações vegetacionais encontradas no estado. *Celastrus* está representado por uma espécie, *C. liebmannii*, a única espécie trepadeira da subfamília no Brasil. *Monteverdia* incluem arbustos e árvores caracterizados por frutos 2-valvados, pericarpo coriáceo e arilo branco. O gênero está representado por doze espécies, correspondendo a quase um terço das espécies brasileiras. *Celastrus liebmannii* é formalmente registrada pela primeira vez para o Espírito Santo. Descrições morfológicas, comentários, pranchas com imagens coloridas, e chaves de identificação para os gêneros e as espécies de *Monteverdia* são fornecidas.

Palavras-chave: Mata Atlântica, Celastrales, *Celastrus*, *Maytenus*, *Monteverdia*.

Introduction

Celastraceae comprise about 1,200 species and 100 genera found in tropical, subtropical, and temperate areas worldwide (Simmons 2004). As currently delimited, the taxon includes the species formerly recognized in Hippocrateaceae as the subfamilies Hippocrateoideae and Salacioideae (Simmons 2004; Lombardi 2014). Celastraceae *sensu stricto* is nearly restricted to the subfamily Celastroideae, according to provisional delimitation by Simmons (2004).

Celastroideae (*sensu* Simmons 2004) include about 70 genera and 750 species. The subfamily is characterized by having alternate leaves (rarely opposite, in *Zinowiewia* only, in Brazil), intrastaminal disc, isostemonous androecium and stamens alternating with petals. In the New World, Celastroideae comprise erect plants (subshrubs to large trees), and the climbing *Celastrus*. The subfamilies Hippocrateoideae and Salacioideae are mainly climbing plants with opposite leaves (rarely alternate), extrastaminal disc, and with 3(–5)

[1] Universidade Tecnológica Federal do Paraná - UTFPR, Herbário SHPR, Campus Santa Helena, Santa Helena, PR, Brazil. ORCID: <https://orcid.org/0000-0003-2493-8514>.

[2] Universidade Estadual Paulista Julio de Mesquita Filho, Prog. Pós-graduação em Ciências Biológicas (Biologia Vegetal), Inst. Biociências, Depto. Biodiversidade, Rio Claro, SP, Brazil. ORCID: <https://orcid.org/0000-0002-7520-2876>.

[3] Instituto Nacional de Pesquisas da Amazônia, Petrópolis, Manaus, AM, Brazil.

[4] Author for correspondence: leobiral@hotmail.com

stamens. In Brazil, Celastroideae comprise nine genera (eight with only one species) and 56 species, being the genera *Celastrus* and *Monteverdia* found in the state of Espírito Santo.

The Brazilian species in *Celastrus* and *Monteverdia* were first described as *Maytenus*. *Maytenus racemosa* Reissek (1861: 30) was described in *Flora brasiliensis* by Reissek and later transferred to *Celastrus* by Loesener (1896: 459), while all the remaining Brazilian *Maytenus* species were transferred to *Monteverdia* (Biral *et al.* 2017), with the exception of *Maytenus boaria* Molina (1782: 177), which is now the only species in the genus in Brazil.

The first comprehensive taxonomic study including Celastroideae in Brazil was done by Reissek (1861) in *Flora brasiliensis*. In that treatment, Reissek included 59 species of *Maytenus*, 43 of them new and several other previously described in *Flora* by Martius (1841). Much later, *Maytenus* was the subject of a revision of the extra-Amazon species by Carvalho-Okano & Leitão-Filho (2004), with six species reported in Espírito Santo. Later, five additional species were found in the state, all currently recognized in *Monteverdia*: *M. distichophylla* (Mart. *ex* Reissek 1861: 17) Biral (Biral *et al.* 2017: 688), *M. gonoclada* (Martius 1841: 89) Biral (Biral *et al.* 2017: 689), *M. longifolia* (Reissek *ex.* Loesener 1893: 9) Biral (Biral *et al.* 2017: 689), *M. macrophylla* (Martius 1841: 95) Biral (Biral *et al.* 2017: 689) and *M. quadrangulata* (Schräder 1821: 716) Biral (Biral *et al.* 2017: 690). Additionally, one new species, *M. fugax* (Biral & Lombardi 2016: 99) Biral (Biral *et al.* 2017: 688), occurring in the state was described (Biral *et al.* 2015).

Here, we provide a current overview of the subfamily Celastroideae (Celastraceae), in the state of Espírito Santo, in the Atlantic Forest of southeastern Brazil. We also provide identification keys, morphological descriptions, images, and comments on each species. The treatment herein is a contribution to the project Flora of Espírito Santo to fill some lacunae because there are no floristic studies of the family in the state.

Material and Methods

Study site

Espírito Santo (ES hereafter) is a state in Southeastern Brazil (Fig. 1) and is divided into two geomorphological formations. The Barreiras formation occurs in the coastal plain in the south, that begins narrow and widens towards the north. Mountains occupy more inland areas, with the highest points at to 2,980 m, in the Serra do Caparaó (IPEMA 2005). Following the Köppen classification system, the plains are Aw and Am, while the mountains are Cfa and Cfb. Climate is seasonal throughout, with an average rainfall of 1,000 to 1,600 mm, and temperature of 24 ºC in the lowlands and 12 ºC in the highlands (Alvares *et al.* 2013). The Atlantic Forest phytogeographic domain dominates the state, with several types of vegetation, including mangroves, *restingas*, seasonal semideciduous forests, high-altitude grasslands, and dense ombrophilous forest (Simonelli & Fraga 2007; Garbin *et al.* 2017).

Taxonomic treatment

This treatment is based on herbarium material received by the first author while at the HRCB herbarium (acronyms follow Thiers, continuously updated), mostly from MBML and VIES (loans and donations). Additionally, the herbaria CVRD, MBML, RB, SAMES and VIES were visited by both authors. Images from recent

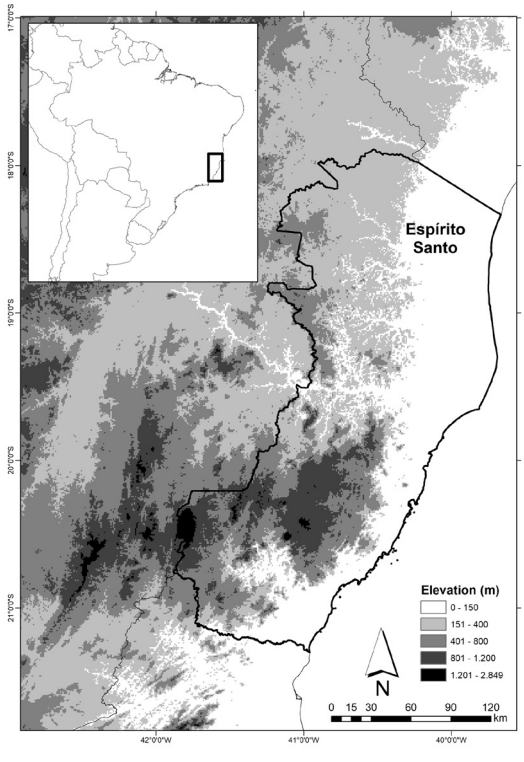

Figure 1 – Map of study area, the Espírito Santo state, Southeast Brazil, highlighting the altitudinal range.

collections were examined from virtual herbaria, available through SpeciesLink network (CRIA 2022) and Reflora - Virtual Herbarium (2022). In addition to examining herbarium specimens, botanical collections in ES have been done sparingly since 2012 and most of those specimens are at HRCB with duplicates at SHPR. Areas visited by the authors included Conservation Units in the municipalities of Cariacica, Santa Teresa, Sooretama and Linhares.

Morphological descriptions followed the model of the species descriptions in Biral *et al.* (2015) and terminology follows Radford *et al.* (1974). Conservation status of the species in the state followed Fraga *et al.* (2019) and CNCFlora "red list" at national level (CNCFlora 2022). Around 480 herbarium specimens were analysed for the elaboration of this floristic treatment.

Results and Discussion

Thirteen species in the Celastroideae are found in ES. The genus *Celastrus* is limited to *C. liebmannii* Standley (1931: 316-317), the only species in the genus in Brazil, and recently identified by the first time in the state. *Monteverdia* comprise twelve species, around 26% of the total species in this genus in the country (BFG 2018). Some species presented by Dutra *et al.* (2015) in the checklist of ES are based on herbarium misidentification [*e.g.*, *Monteverdia horrida* (Reissek 1861: 5) Biral (Biral *et al.* 2017: 689), *M. urbaniana* (Loesener 1893: 10) Biral (Biral *et al.* 2017: 690), *M. aquifolium* (Martius 1841: 91) Biral (Biral *et al.* 2017: 688); see Biral (2022) for an example on the misidentification for the latter] and are not presented here. Three species are threatened in the state (Fraga *et al.* 2019): *M. fugax* and *M. patens* are endangered (EN) and *M. macrophylla* is critically endangered (CR).

Celastroideae Burnett, Outlines Bot. 621, 1140. 1835.

Lianas, shrubs, or trees, glabrous or rarely pubescent on the young twigs, hairs simple. Stipules present, minute and early caducous. Leaves alternate, simple; blade margins entire, crenate/crenulate, sometimes obscurely crenate, crenation along its entire length or only close to the apex, or spinose. Inflorescence axillary, cymose, thyrsoid, fasciculate or an isolated flower; bracts minute, triangular. Flowers actinomorphic, small, 3–6 mm at anthesis, bisexual or functionally unisexual; sepals 5, imbricate, free or connate at the base; petals 5, imbricate, free; disc nectariferous developed, extrastaminal, green to yellowish *in vivu*, black *in sicco*, free or fused with the ovary, annular, rounded, pentagonal, margin entire, undulate, erose or lobed, raised or flat; androecium isostemonous, stamens inserted at the edge of the disc, filaments flattened, broad at the base and attenuated towards the apex, alternate to the petals, anthers oblong to ovate, dehiscing by a longitudinal slit; ovary superior, carpels 2 or 3, style evident or reduced, stigma entire or 3-lobed, placentation axillary, ovules 1 or 2 per locule. Fruits capsular, loculicidal dehiscence, pericarp coriaceous, 2 or 3-valved, black when dry, rounded, trigonal or rarely quadrangular; seeds 1–3, smooth or rugose, blackened or brown when dry; aril white or yellow to red, completely covering the seeds.

Identification key of Celastraceae subfamily Celastroideae genera in Espírito Santo

1. Lianas. Ovary free from the disc. Fruits 3-valved, orange to red aril.....1. *Celastrus*
1'. Erect plants (shrubs or trees). Ovary fused with the disc. Fruits 2-valved, white aril....2. *Monteverdia*

1. *Celastrus* L., Sp. Pl. 1: 196. 1753.

Lianas, glabrous. Stipules large triangular. Leaves margins crenate. Inflorescence a cyme, simple, compound (paniculiform) or thyrsoid, multi-flowered; pedicels articulate, bracts and bracteoles large-triangular to triangular, present at the base of the flowers and at the inflorescence ramifications. Flowers bisexual in Neotropical species; sepals 5, imbricate, free; petals 5, imbricate, free; disc annular, free from the ovary wall, green to yellowish *in vivu*; stamens inserted at the edge of the disc, anthers oblong dehiscing by a longitudinal slit; carpels 3, style evident, stigma 3-lobed, ovules 1 per locule. Fruits spheroid, 3-valved, valve sulcate longitudinally, apex rounded, yellow to greenish when ripe; seeds 1 per fruit, rugose, brown when dry, orange to red aril.

Celastrus is a primarily Asian genus with ca. 30 climbing species. Five species occur in the

Neotropical Region (Biral & Lombardi 2020), where they are characterized by having bisexual flowers, one ovule per locule, and 1-seeded fruits. These exclusively Neotropical characters justified their inclusion in *Celastrus* subgenus *Racemocelastrus*, proposed by Ding Hou (1955) for tropical New World species. In Brazil, the genus is represented only by *C. liebmannii*.

1.1. *Celastrus liebmannii* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 8(5): 316–317. 1931.

Fig. 2a-b

Twining lianas, glabrous; branches cylindrical, blackened, densely lenticeled, twigs flattened, brown to blackened, lenticeled. Stipules 0.45 mm long, margins erose, apex acute; petiole 5–9 mm long, flattened, sub-revolute; blades 5.8–11.1 × 2.9–4.3 cm, obovoid to elliptic, membranaceous, base acute, margin crenate, apex acute; *in sicco* dull brown on both sides, primary vein plane on the adaxial side, prominule on the abaxial side, secondary veins 4–6 pairs, plane to inconspicuous on the adaxial side, slightly raised on the abaxial side. Inflorescences in compound cymes (paniculiform), sometimes thyrsoid, or more rarely a simple cyme; peduncle evident, 2.4–5.9 mm long, flattened, strongly furrowed; bracts 1–2 per ramification, 0.4–0.5 mm long, apex acute to acuminate; bracteoles 1–2(–3) per flower, 0.3–0.35 mm long; pedicels 0.4–1 mm long, flattened, furrowed. Flowers 3.5–4 mm diam., whitish; sepals 0.4–0.5s × 0.4–0.5 mm, ovate, margin erose; petals 1.5 × 1 mm, oblong, margin membranous, slightly undulate; disc 1.5 mm in diam., carnose, green to yellowish *in vivu*, margin slightly lobed. Fruits 14–17 × 8–11 mm, spheroid (immature) to trigonal (ripe), style rarely persistent, smooth, yellow to greenish when ripe, brown to blackened when dry; seeds 7–9 × 6–9 mm, oblong, rugose, glossy.

Selected specimens: Cariacica, Reserva Biológica Duas Bocas, trilha do Pau-Oco, 20º17'30.69"S–20º16'48.07"S, 40º31'10.80"W–40º31'39.63"W, 560–650 m, 24.X.2019, fl. and fr., *J.A. Lombardi et al. 10673* (HRCB, SHPR). Santa Teresa, Nova Lombardia, Reserva Biológica Augusto Ruschi, 22.I.2003, fr., *R.R. Vervloet et al. 1723* (CESJ, MBML, UEC).

Celastrus liebmannii is the only climbing species in the subfamily in Brazil, and the genus is the unique in Brazil that has 3-valved fruits with an orange to crimson aril that surrounds entirely the seed. The paniculiform cyme with a long peduncle identifies the species in the Neotropics. In Brazil, it is found from Bahia to Paraná mainly in the dense ombrophilous forest, and less commonly in the seasonal semideciduous and gallery forests. Even though distributed by a large geographic area, the species is infrequent within its distribution range, being represented by a few herbarium collections. In ES, *C. liebmannii* is found only in Conservation Units. Considering all Brazilian records, it seems that the species occurs mainly in pristine forests.

2. *Monteverdia* A. Rich., Hist. Phys. Cuba, Pl. Vasc. 346. 1845.

Shrubs to large trees, glabrous or rarely pubescent on young twigs. Stipules triangular to large triangular. Leaves margins entire, spinose or crenate/crenulate, along its entire margin or only close to the apex, sometimes obscurely crenate. Inflorescence fasciculate, a cyme, simple or compound, or reduced to an isolated flower, peduncle reduced or rare conspicuous, usually shorter than pedicels, multi or few-flowered; bracts and bracteoles minute, triangular, present at the base of the flowers and more rarely at the inflorescence ramifications. Flowers bisexual or functionally unisexual; sepals 5, imbricate, free; petals 5, imbricate, free; disc rounded, pentagonal or lobed, fused with the ovary wall, green *in vivu*, thickened; anthers ovate dehiscing by a longitudinal slit; carpels 2, style evident or reduced, stigma entire or slightly 2-lobed, ovules 2 per locule. Fruits spheroid or obovoid, 2-valved, red to yellow when ripe, apex rounded or quadrangular, style persistent (tiny) or not; seeds 1–3, smooth or rugose, blackened when dry, white aril.

Monteverdia was re-defined using molecular and morphological evidences and now comprise ca. 120 species widely distributed in the Neotropics (Biral *et al.* 2017). They are identified by their 2-valved fruits, coriaceous pericarp, and white aril that completely covers the seed. Flowers are similar to those in related genera, including *Tricerma*, *Maytenus* and *Plenckia*. Because flowers are not variable, they are not often helpful for differentiating species in the *Monteverdia*. Vegetative characteristics, especially of leaves, twigs (*e.g.*, hairiness, transverse section) and inflorescence architecture are often used to identify species.

Identification key for *Monteverdia* in Espírito Santo

1. Leaves with spinose margins 2
1'. Leaves without spinose margins 3
2. Twigs quadrangular. Leaf blade margin densely spiny (18–33 pairs), spines evenly distributed... ..... 2.11. *Monteverdia quadrangulata*
2'. Twigs flattened. Leaf blade not densely spiny (< 14 pairs), spines evenly distributed or concentrated at the base ..... 2.8. *Monteverdia macrophylla*
3. Twig pubescent. Inflorescence fasciculate 4
3'. Twig glabrous. Inflorescence cymose, fasciculate or reduced to a single flower 5
4. Shrub to tree, 7 m tall; twig carinate. Leaf margin crenate, length:width ratio 3:1 .... 2.3. *Monteverdia evonymoides*
4'. Tree, up to 18 m tall; twig carinate or flattened. Leaf margin entire or obscurely crenate, length:width ratio 2:1 ..... 2.10. *Monteverdia patens*
5. Twigs strongly flattened or winged ..... 2.12. *Monteverdia schumanniana*
5'. Twigs carinate or flattened 6
6. Inflorescence fasciculate 7
6'. Inflorescence in cymes 9
7. Leaf crenate or undulate only close to the apex, secondary veins (11–14) ascending ..... 2.4. *Monteverdia floribunda*
7'. Leaf entire, secondary veins (9–14) not ascending 8
8. Twig densely lenticeled. Leaf pruinose, without mucron at apex ... . 2.2. *Monteverdia distichophylla*
8'. Twig with lenticels absent or sparse. Leaf glabrous, with a mucron at the apex ..... 2.8. *Monteverdia macrophylla*
9. Secondary veins inconspicuous on both sides. Inflorescence compound ..... 2.9. *Monteverdia obtusifolia*
9'. Secondary veins visible at least on the abaxial side. Inflorescence simple or compound 10
10. Leaf margin crenate or crenulate 11
10'. Leaf margin entire or undulate close to the apex..... 12
11. Leaf elliptic, chartaceous, often pruinose. Inflorescence with evident peduncle..... ..... 2.6. *Monteverdia gonoclada*
11'. Leaf elliptic to oblong-elliptic, membranaceous, glabrous. Inflorescence contracted .... 2.7. *Monteverdia longifolia*
12. Leaf margin entire, revolute. Ripe fruit 27–33 × 16–18 mm ..... 2.5. *Monteverdia fugax*
12'. Leaf margin entire or undulate close to the apex, margin flat. Ripe fruits 9–19 × 6–10 mm .... 2.1. *Monteverdia brasiliensis*

2.1. *Monteverdia brasiliensis* (Mart.) Biral, Syst. Bot. 42(4): 688. 2017. *Maytenus brasiliensis* Martius, Flora 24(2, Beibl.): 87–88. 1841.

Fig. 2c-d

Trees, 12 m tall, glabrous; branches cylindrical, brown, sparsely verrucose, lenticels absent or rare; twigs flattened to carinate, gray, lenticels absent or rare. Stipules 0.9 mm long, large triangular, margin erose, apex acuminate; petiole 3–7 mm long; blades 5.8–14.4 × 2–6.6 cm, elliptic to oblong-elliptic, chartaceous, base acute, margin entire to undulate close to the apex, apex acuminate to acute, *in sicco* dull on both sides, brown on the adaxial side, dark green to brownish on the abaxial side, primary vein plane on the adaxial side, raised on the abaxial side, secondary veins 7–9 pairs, inconspicuous on the adaxial side, plane on the abaxial side. Inflorescences in cymes,

simple or compound, commonly few-flowered; peduncle evident or reduced, 2–4.8 mm long; bracts 1 per flower, 1.1 mm long, ovate-triangular, margin erose, apex acute; pedicels 2–4 mm long, flattened, ribbed. Flowers 3–4.5 mm diam., green to green whitish; sepals 1 × 0.8 mm, ovate, margin erose to sparsely ciliate; petals 1.35–1.75 × 1.65–1.80 mm, large-obovate, margin entire to erose; disc 1.2–1.3 mm in diam., rounded, margin entire, light green *in vivu*. Fruits 9–19 × 6–10

Figure 2 – a-b. *Celastrus liebmannii* – a. inflorescence; b. immature fruits. c-d. *Monteverdia brasiliensis* – c. flowers; d. fruits. e. *M. fugax* – leaf and fruit. f. *M. longifolia* – fruits. (a-b. *Lombardi et al. 10673*; c. *Marcusso et al. 951*; d. *Marcusso et al. 1585*; e. *Rossini et al. 466*; f. *Marcusso et al. 1845*). Photos: a-b. Julio Antonio Lombardi; c-f. Gabriel Mendes Marcusso. Scale: e = 1 cm.

mm, oblong to spheroid, apex rounded, smooth, orange to red when ripe; seeds 1–2, 7–10 × 4–7 mm, oblong, rugose-reticulate.

Selected specimens: Cariacica, Reserva Biológica Duas Bocas, trilha do Pau-Oco, 20º16'39.26"–17'30.67"S, 40º31'33.03"–10.79"W, 560–650 m, 31.VII.2019, fr., *G.M. Marcusso et al. 1585* (HRCB, SHPR). Conceição da Barra, área 157 da Aracruz Celulose S.A., 18º35'36"S, 39º43'56"W, 22.XI.1993, fl., *O.J. Pereira et al. 5182* (HRCB, VIES). Governador Lindenberg, Santa Luzia, Firmino, 19º16'33"S, 40º27'48"W, 350–650 m, 2.VIII.2007, fr., *R.R. Vervloet et al. 3148* (MBML). Itapemirim, Fazenda do Ouvidor, Usina Paineiras, acesso pela Rod. ES-490, 20º56'17"S, 41º2'49.8"W, 20–90 m, 15.III.2008, fr., *A.M. Assis et al. 1458* (MBML). Linhares, Reserva Natural Vale, próximo à entrada da Estrada da Orelha de Macaco no Y, 13.XI.2004, fl., *G.S. Siqueira 1014* (CVRD). Marilândia, Liberdade (Água Viva, Pedra do Cruzeiro), propr. Aguilar A. Lorenccini, 19º20'45.5"S, 40º32'57.8"W, 200–650 m, 21.III.2007, fr., *V. Demuner et al. 3348* (MBML). Montanha, propriedade do Sr. Simão/Edson Maria de Jesus, 18º10'56.8"S, 40º28'31.2"W, 18.XII.2013, fl., *M.N. Saka et al. 351* (HRCB, INPA, UFP). Nova Venécia, Serra de Cima, 15.XI.1953, fl., *A.P. Duarte 3938* (RB). Pancas, Chapadão de Pancas, Rio Doce, 2.XII.1943, fl., *J.G. Kuhlmann 6595* (RB, UEC). Santa Leopoldina, Pedra Branca, mata da Serra Santa Lucia, propr. Cristiano Bremencampi, 20º1'44"S, 40º29'50"W, 300–650 m, 3.VIII.2006, fr., *L.F.S. Magnago et al. 1185* (MBML). Santa Teresa, Estação Biológica Santa Lúcia, 19º58'56"S, 40º32'22"W, 630 m, 8.XII.2012, fl., *L. Biral et al. 804* (HRCB, SHPR). Sooretama, Reserva Biológica de Sooretama, 19º01'38.27"S, 40º13'37.63"W, 80 m, 20.I.2018, fl., *G. Marcusso et al. 951* (HRCB, SHPR). Vitória, Parque Municipal da Fonte Grande, 20º19'11"S, 40º20'15"W, 26.VIII.2004, fr., *M.L. Dan 27* (HRCB, VIES). "Goetacazes, Rio Doce", 15.XI.1943, fl., *J.G. Kuhlmann 6454* (RB, VIES).

Monteverdia brasiliensis is found in the Atlantic Forest, in the dense ombrophilous forest, from Southeastern to Northeastern Brazil (BFG 2018). It is among the most common species in the family in Espírito Santo, and, with some variability, is characterized by elliptic leaves that usually dry to pale brown, with entire margins that may be slightly undulate near the apex, inconspicuous secondary veins on the adaxial side, inflorescences in cymes, often simple with few flowers. Flowers are small in comparisons with those of related species. Leaves usually dry wrinkled. Its peduncle (< 5 mm) is not evident, which, in addition to leaves characters, separates it from the related *M. gonoclada* and *M. fugax*.

This species is frequently misidentified as *Monteverdia ardisiifolia* (Reissek) Biral (Biral *et al.* 2017: 688) in herbaria collections. *Monteverdia ardisiifolia* has never been collected in ES, and has larger, elliptic-obovate, leaves that usually dry dull, with 10–14 pairs of inconspicuous, on both sides of the leaf, secondary veins.

2.2. *Monteverdia distichophylla* (Mart. *ex* Reissek) Biral, Syst. Bot. 42(4): 688. 2017. *Maytenus distichophylla* Martius *ex* Reissek, *Fl. bras.* 11(1): 17. 1861.

Shrubs to trees, 8 m tall, glabrous; branches cylindrical, irregular surface, blackened; twigs flattened, something zigzag, black, densely whitish lenticeled. Stipules 0.75 mm long, large triangular, margin erose, apex acute; petiole 5–9 mm long; blades 4.5–22.7 × 3.5–11.9 cm, ovate, large-ovate, elliptic or obovate, subcoriaceous, base rounded to acute, commonly asymmetrical, margin entire to obscurely crenate close to the apex, plane, apex acute, without mucron, *in sicco* pruinose, new leaves black, primary vein plane or immersed on the adaxial side, prominent on the abaxial side, secondary veins 7–10 pairs, inconspicuous on the adaxial side, plane or slightly raised on the abaxial side. Inflorescences fasciculate, multi-flowered; bracts 1–2 per flower, triangular, margin entire, apex acute; pedicels 2–6 mm long, flattened, ribbed. Flowers 3–3.5 mm diam., green to yellowish; sepals 0.75 × 0.75 mm, ovate, margin fimbriate; petals 0.85–1 × 0.8 mm, ovate, undulate; disc 1.15–1.3 mm in diam., rounded, margin entire, green *in vivu*, margin flat. Fruits 7–10 × 4–6 mm, oblong, apex rounded, smooth, style persistent or not, orange when ripe; seeds 1–2, 4–8 × 4–8 mm, rounded, flattened, smooth to slightly rugose.

Selected specimens: Águia Branca, Santa Luzia, prop. Ciro Ferreira, 18º58'40"S, 40º39'56"W, 170–600 m, 18.X.2006, fl., *V. Demuner et al. 2950* (HRCB, MBML). Conceição da Barra, Área 135 da Aracruz Celulose S.A., 18º35'36"S, 39º43'56"W, 21.IX.1993, *O.J. Pereira et al. 4919* (HRCB, VIES). Domingos Martins, floresta ciliar Rio Jucu, 20º18'37.6"S, 40º39'29.7"W, 22.I.2001, *O.J. Pereira & E. Espindula 6783* (HRCB, VIES). Governador Lindenberg, Pedra de Santa Luzia, propriedade Firmino Sottele, 19º16'33"S, 40º27'48"W, 350–680 m, 23.VIII.2006, fl., *V. Demuner et al. 2719* (MBML). Guarapari, Rodovia do Sol, ES-060, km 32, Setiba, 13.IX.1987, fl., *O.J. Pereira 236* (HRCB, VIES). Linhares, Reserva Florestal de Linhares, Estrada Gávea, 22.07 km, 7.III.1994, fr., *D.A. Folli 2238* (CVRD). Marilândia, Liberdade (Água Viva, Pedra do Cruzeiro), prop. Aguilar A. Lovucini, 19º20'53.7"S, 40º33'03.6"W, 150–850 m, 18.I.2006, fl., *V. Demuner*

et al. 1627 (MBML). Pancas, MoNa dos Pontões Capixabas, Pedra do Camelo, 8.VII.2015, fr., *A. Alves-Araújo et al. 1787* (VIES). Presidente Kennedy, Praia das Neves, 23.I.2010, fr., *J.M.L. Gomes et al. 3648* (HRCB, VIES). Santa Leopoldina, Bragança, propr. Assunta Salvador, 20º7'23"S, 40º32'47"W, 400–600 m, 17.V.2006, fr., *L.F.S. Magnago et al. 991* (HRCB, MBML). Santa Teresa, Estação Biológica Santa Lúcia, 19º58'56"S, 40º32'22"W, 630 m, 8.XII.2012, fl., *L. Biral et al. 808* (CESJ, HRCB, NY, RB). São Roque do Cannã, Misterioso, Pedra dos Três Carneiros, 600 m, 24.XII.2003, fr., *A.P. Fontana et al. 685* (MBML). Vila Velha, Morada do Sol, 20º27'43.7"S, 40º20'35.2"W, 3 m, 29.I.2006, fr., *F.A.R. Matos & P.F. Souza 91* (MBML).

Monteverdia distichophylla is endemic to Brazil, occurring from the state of Rio Grande do Norte to northern Espírito Santo (BFG 2018), typically found in *restingas* (sandy soil coastal forests) and in the dense ombrophilous forest. In ES, it is also found in inselbergs and rock outcrops up to 850 m elevation. Leaves of *M. distichophylla* are variable in size and shape. Nonetheless, the species can be identified by the combination of many white lenticels along the branches and twigs, pruinose leaves often asymmetric at the base, and multi-flowered fascicles. Because of the ovate leaves, it is commonly misidentified in herbaria collections as *M. obtusifolia* (Mart.) Biral, from which it can be differentiated by the fasciculate inflorescences (vs. cyme).

2.3. *Monteverdia evonymoides* (Reissek) Biral, Syst. Bot. 42(4): 688. 2017. *Maytenus evonymoides* Reissek, *Fl. bras.* 11(1): 11. 1861.

Shrubs to trees, 7 m tall, pubescent on twigs; branches cylindrical with irregular surface, grayish; twigs carinate, brown, lenticels present. Stipules 0.8–0.9 mm long, large-triangular, margin erose, apex acute; petiole 2–6 mm long; blades 2.3–7.5 × 0.8–3.4 cm, elliptic, membranaceous or chartaceous, base acute, margin crenate, plane, apex acute or acuminate, *in sicco* dull on both sides, primary vein plane on the adaxial side, slightly raised on the abaxial side, secondary veins 6–7 pairs, inconspicuous on the adaxial side, plane on the abaxial side. Inflorescences fasciculate, multi-flowered; bracts 2–3 per flower, ca. 0,6 mm long, triangular, margin fimbriate, apex acute; pedicels 2–5 mm long, cylindrical. Flowers 4.5–5.5 mm diam., green; sepals 0.7–0.9 × 0.8–0.9 mm, ovate, margin erose to sparsely ciliate; petals 1.65–1.95 × 0.95–1.1 mm, oblong, margin erose, undulate; disc 1.5–1.6 mm in diam., rounded, margin undulate, green *in vivu*. Fruits 6–11 × 5–10 mm, spheroid, apex rounded, smooth, yellow when ripe; seeds 1–3, 5–6 × 2–3 mm, oblong to ellipsoid, smooth. **Selected specimens**: Cariacica, floresta na beira da estrada para a localidade de Alegre, 20º18'9"S, 40º28'55"W, 19.X.2008, fr., *R.C. Forzza et al. 5360* (CEPEC, MBM, MBML, RB, UPCB). Castelo, Parque Estadual do Forno Grande, trilha entre as piscinas e o pico do Forninho, 20º31'10"S, 41º05'13"W, 1,204 m, 7.VIII.2013, fl., *R.C. Forzza et al. 7672* (RB, VIES). Domingos Martins, Parque Estadual da Pedra Azul, trilha das Piscinas, 13.VII.2005, fl., *L. Kollmann & R.L. Kollmann 8005* (MBML). Iúna. Parque Nacional do Caparaó, entre Arrozal e Morro do Tesouro, 18.II.2000, fl., *V.C. Souza et al. 23367* (ESA, HRCB). Santa Maria de Jetibá, Caramuru, Sítio Jetibá, propriedade de Ademival e Gildo Adeodato, 27.XII.2003, fr., *L. Kollmann et al. 6317* (MBML). Santa Teresa, Reserva Biológica Augusto Ruschi, estrada para Nova Lombardia, 800 m, 30.I.2002, fr., *L. Kollmann & E. Bausen 5415* (MBML, RB). Venda Nova do Imigrante, propriedade de Audir Cesati, 20º25'57.4"S, 41º5'21.9"W, 1,042 m, 3.I.2008, fr., *M. Simonelli et al. 1421* (MBML).

Monteverdia evonymoides occurs from northeastern Argentina (Misiones), eastern Paraguay and Bolivia, through southern to southeastern Brazil, from 250 to 1,250 m elevation (Biral 2014). Mostly found in the seasonal semideciduous forest, it is less commonly found in savannas, and in the dense and mixed ombrophilous forest (BFG 2018). In Espírito Santo, the taxon is present in the montane or submontane dense ombrophilous forest at medium to high elevation. *Monteverdia evonymoides* is characterized by pubescent, carinate twigs, crenate along the entire leaf margin, and fasciculate inflorescence. Resembling *M. patens*, it can be identified by the leaf length:width ratio, twig cross-section, and life form (see comments on *M. patens* and identification key).

2.4. *Monteverdia floribunda* (Reissek) Biral, Syst. Bot. 42(4): 688. 2017. *Maytenus floribunda* Reissek, *Fl. bras.* 11(1): 16. 1861.

Trees, up to 23 m tall, glabrous; branches cylindrical, gray to blackened; twigs flattened or carinate, gray, smooth, lenticels absent or rare. Stipules 0.9 mm long, large-triangular, margin entire, apex acute; petiole 4–7 mm long; blades 4.1–9.5 × 1.9–3.4 cm, elliptic to obovate, chartaceous, base acute, margin crenate/undulate only close to the apex, plane, apex acuminate to acute, *in sicco* shiny on the adaxial side, dull on the abaxial side, primary vein slightly raised on both sides, secondary veins 11–14 pairs, obscure

on the adaxial side, slightly raised on the abaxial side, ascendant. Inflorescences fasciculate, multi-flowered; bracts 1–3 per flower, 0.8 mm long, triangular, margin erose, apex acute; pedicels 2–5 mm long, cylindrical, with protuberances from older blooms at the base. Flowers 3.5–5 mm diam., light green; sepals 1 × 1 mm, ovate, margin sparsely ciliate; petals 2–2.1 × 0.6–0.7 mm, oblong, margin erose to fimbriate; disc 1.8 mm in diam., rounded to pentagonal, margin slightly raised, green to yellowish *in vivu.* Fruits 9–16 × 6–10 mm, obovoid or oblong, apex rounded, style persistent, orange when ripe; seed 1, 6–6 × 5–6 mm, oblong to rounded, rugose-reticulate.

Selected specimens: Linhares, Reserva Florestal de Linhares, estrada Farinha Seca, km 2.69, 10 m antes do Parajú com matriz nº 06/78, talhão 201, 6.VI.1978, fl., *D.A. Folli 7* (CVRD, MO, UEC). Marilândia, Liberdade (Água Viva, Pedra do Cruzeiro), prop. Aguilar A. Lovucini, 150–850 m, 19º20'53.7"S, 40º33'03.6"W, 13.VII.2006, fl., *V. Demuner et al. 2611* (HRCB, MBML). Santa Teresa, São Lourenço, Reserva Biológica de São Lourenço, trilha da Caravagem, 750 m, 3.II.1999, fr., *L. Kollmann et al. 1806* (RB). Sooretama, Reserva Biológica de Sooretama, estrada do Quirino, 18º59'52"S, 40º07'29"W, X.2017, fr., *Curso de campo UFES, UFRRJ, IBRJ 2017 23* (RB, SAMES).

Additional selected specimens: BRAZIL. MINAS GERAIS: Belo Horizonte, Estação Ecológica da UFMG, 19º52'40"S, 43º58'20"W, 30.VIII.1997, fl., *J.A. Lombardi 1954* (BHCB, HRCB).

Monteverdia floribunda is widely distributed in South America and Caribbean islands, in several vegetation types from sea level to 1,400 m of elevation (Biral *et al.* 2015). It is found in the savannas of central Brazil and Bolivia as well as humid and dry forests in the Atlantic and Amazonian Forests into Ecuador, Colombia, Venezuela, and the Guyanas. In Espírito Santo it is found by a few collections from *tabuleiro* forests. The species is identified from its congeners in ES by the combination of leaves with 11–14 pairs of ascendant secondary veins, leaf margin slightly crenate near the apex, and multi-flowered fasciculate inflorescence.

2.5. *Monteverdia fugax* (Biral & Lombardi) Biral, Syst. Bot. 42(4): 688. 2017. *Maytenus fugax* Biral & Lombardi, Phytotaxa 261(1): 99. 2016. *Maytenus nemorosa* Biral & Lombardi, Phytotaxa 231(1): 57. 2015. Fig. 2e

Trees, up to 25 m tall, glabrous; branches cylindrical, grayish, lenticels absent; twigs flattened, 3–5 ribbed, blackened to grayish, lenticels absent. Stipules 1 mm long, deltoid, base truncate, margin erose, apex acute; petiole 3–10 mm long; blades (4.8–)7.6–26.6 × (1.9–)3.9–9.1 cm, oblong-elliptic, subcoriaceous, base acute to truncate, margin entire, revolute, apex acute; grayish *in sicco*, primary vein plane on the adaxial side, slightly raised on the abaxial side, secondary veins 7–9 pairs, obscure on the adaxial side or slightly impressed on the abaxial side. Inflorescences in cymes, simple or compound, few or multi-flowered; peduncle 2–18 mm long; pedicels 4–8 mm long, cylindrical, longitudinal ribbed; bracts 1–3, per flower, 0.85 mm long, oval-triangular, margin erose, apex acute; pedicels 4-8 mm. Flowers 3.7–4 mm diam., yellow; sepals 0.8–1 × 1 mm, ovate, margin sparsely ciliate; petals 2–2.5 × 1.5–1.75 mm, oblong, margin undulate; disc 1.8–2 mm in diam., lobed, margin entire, green to yellowish *in vivu*. Fruits 27–33 × 16–18 mm, spheroid to obovoid, apex rounded or acute, style persistent or not, yellow when ripe; seed 1–3, 1.2–1.5 × 8–11 mm, oblong, rugose.

Selected specimens: Domingos Martins, Córrego do Cavalo, 19.X.1985, fr., *G. Hatschbach & F.J. Zelma 49964* (MBM, VIC). Santa Leopoldina, Rio das Farinhas, propriedade de Antônio Carlos Barata, 20º07'312"S, 40º36'556"W, 728 m, 15.III.2007, fr., *A.P. Fontana et al. 3035* (HRCB, MBML, RB). Santa Maria de Jetibá, Rio Nove (Ter. L. Kollmann), 24.II.2000, fr., *V. Demuner et al. 794* (MBML). Santa Teresa, Reserva Biológica Augusto Ruschi, em fragmento próximo à caixa d'água, 19º90'S, 40º54'W, 10.XII.2012, fr., *L. Biral et al. 810* (HRCB, MBML, NY, UPCB).

Additional selected specimens: BRAZIL. RIO DE JANEIRO: Teresópolis, mata do Rio Paquerer, próx. ao km 2 da estrada da Barragem, 1,140 m, 4.IV.2004, fl. and fr., *C.S. Pardo 402* (HRCB, MBM, RB).

Maytenus fugax was first described under the illegitimate name *M. nemorosa* Biral & Lombardi (Biral *et al.* 2015: 57), and later transferred to *Monteverdia*. It is endemic to the Atlantic Forest, occurring in the dense ombrophilous forest from southern Bahia to Rio de Janeiro, at 500–1,200 m of elevation. Most collections are from ES, mainly from the municipality of Santa Teresa and are found by only three collections out of the state. The species is unique with its large fruit (27–33 × 16–18 mm), and additional notable character include the pericarp thickness (1.5–2.2 mm), the young twig is flattened with longitudinal ribs, and the oblong leaf has a revolute margin. It is different from *M. gonoclada*, due to its entire and revolute leaf margins (*vs*. crenate and flat margins) and fruit size.

2.6. *Monteverdia gonoclada* (Mart.) Biral, Syst. Bot. 42(4): 689. 2017. *Maytenus gonoclada* Martius, Flora 24(2, Beibl.): 89. 1841. Fig. 3d

Shrubs to trees, 2–7 m tall, glabrous; branches cylindrical, gray to black; twigs flattened, grayish, smooth, lenticels sometimes present. Stipules 0.6 mm long, large triangular, margin entire, apex acute; petiole 6–10 mm long; blades 4.2–9.1 × 1.9–3.7 cm, elliptic, chartaceous, base acute, margin crenate, plane, apex acute or rarely acuminate; brown to blackened *in sicco*, often pruinose, primary vein plane on the adaxial side, slightly raised on the abaxial side, secondary veins 5–8 pairs, inconspicuous on the adaxial side, planes on the abaxial side. Inflorescences in cymes, compound or rarely simple, few or multi-flowered; peduncle evident, 2–5 mm long; bracts 1–3 per flower, 0.5 mm long, large-triangular, margin fimbriate, apex acute; pedicels 1–4 mm long, cylindrical or slightly flattened, smooth. Flowers 3.5–4 mm diam., yellowish; sepals 1 × 1 mm, ovate, margin erose, sparsely ciliate; petals 1–1.5 × 1 mm, oblong, margin membranous, erose, undulate, sometimes sparsely ciliate; disc 1.2–1.4 mm in diam., rounded, margin erose, green to yellowish *in vivu*. Fruits 10–17(–21) × 7–11(–13) mm, spheroid to obovoid, apex rounded, style persistent or not, yellow to orange when ripe; seeds 1–2, 7–10 × 6–8 mm, oblong, smooth.

Selected specimens: Afonso Cláudio, Serra Pelada, Pedra dos Três Pontões, 20º4'34.2"S, 41º2'13.6"W, 1,078 m, 18.V.2007, fr., *A.P. Fontana et al. 3374* MBML). Águia Branca, Rochedo, prop. Aílton Corteleti, 18º57'21"S, 40º48'5.7"W, 250–350 m, 17.VIII.2007, fr., *R.R. Vervloet et al. 3256* (HRCB, MBML). Alfredo Chaves, Santa Luzia, 900 m, 18.X.2000, fr., *G. Hatschbach et al. 71406* (BHCB, CEPEC, CESJ, HUEFS, MBM, SPF, W). Castelo, trilha para o Forninho, 20º30'58"S, 40º05'1"W, 1,100–1,500 m, 14.X.2008, fr., *R.C. Forzza et al. 5314* (MBML, RB, UPCB). Ibitirama, Pedra Roxa, alojamento do ICMBIO, 20º23'828"S, 41º44'110"W, 23.X.2012, fr., *T.B. Flores et al. 1495* (RB, SPF, VIES). Marilândia, Alto Liberdade, propr. Deuclecio Lorenzini, 19º21'13"S, 40º31'1"W, 300–400 m, 19.IV.2006, fr., *L.F.S. Magnano et al. 917* (MBML). Santa Maria de Jetibá, 2 km da cidade, propriedade de Helmar Gummes, 20º1'35.5"S, 40º42'27.2"W, 4.X.2005, fr., *R.N.C. Teixeira et al. 192* (VIC). Santa Teresa, Reserva Biológica Augusto Ruschi, trilha da cachoeira, 19º54'32"S, 40º33'09"W, 770–810 m, 18.I.2018. fr., *G.M. Marcusso 924* (HRCB, SHPR). São Roque do Canaã, Alto Misterioso, 850–1,143 m, 10.IV.2005, fr., *A.P. Fontana et al. 1278* (MBML). Vargem Alta, RPPN Águia Branca, 20º27'17"S, 40º59'30"W, 1170 m, 6.X.2018, fr., *A.M. Assis et al. 4760* (VIES).

Monteverdia gonoclada is probably a complex of species (Biral *et al.* 2017), and is found in many vegetation formations in Brazil, most commonly in the *restingas*, dense ombrophilous and seasonal semideciduous, and also in the Cerrado and *campos rupestres* (rocky, high elevation fields) (Carvalho-Okano & Leitão-Filho 2004). This species is characterized by the combination of flattened twigs, elliptic, often pruinose, leaf with crenate margins, and compound cymes with an evident peduncle (usually longer than the pedicel). In ES, the species occurs in dense, riverine and seasonal forests, at 250–1,143 m of elevation, where it is not as abundant as in similar forests in Minas Gerais and São Paulo. It may be confused with *M. brasiliensis* because of similar leaf size and shape, but it can be differentiated by its pruinose leaf with entirely crenate margins.

2.7. *Monteverdia longifolia* (Reissek *ex* Loes.) Biral, Syst. Bot. 42(4): 689. 2017. *Maytenus longifolia* Reissek *ex* Loesener, Bot. Jahrb. Syst. 15(5, Beibl. 38): 9. 1893. Fig. 2f

Trees, 3–12 m tall, glabrous; branches cylindrical, gray; twigs flattened, slightly expanded at the nodes, brown, smooth, lenticels absent. Stipules 0.6 mm long, deltoid, margin erose, apex acuminate; petiole 2–5 cm long; blades 5.4–15 × 1.8–4.3 cm, elliptic to oblong-elliptic, membranaceous, base acute, margin crenulate, plane, apex acuminate to acute, discolor *in sicco*, blackened on the adaxial side, brownish on the abaxial side, primary vein plane or immersed on the adaxial side, slightly raised on the abaxial side, secondary veins 6–9 pairs, inconspicuous on the adaxial side, planes on the abaxial side. Inflorescences in cymes, simple, contracted, few-flowered; peduncle 1 mm long; bracts 2–3, 0.35 mm long, triangular, margin irregular, apex acute; pedicels 2–4 mm long, cylindrical, smooth. Flowers 3–4 mm diam., light green to yellow; sepals 0.6 × 0.6 mm, ovate, margin sparsely ciliate to erose; petals 0.8–1 × 1 mm, oblong to obovate, margin sparsely ciliate; disc 0.8 mm in diam., pentagonal, margin entire, raised, green to yellowish *in vivu*. Fruits 12–22 × 6–11 mm, obovoid, apex rounded, style persistent, yellow ripe; seed 1, 11–12 × 4–4 mm, oblong, smooth to slightly ribbed (longitudinal).

Selected specimens: Cariacica, Reserva Biológica Duas Bocas, localidade de Alegre, trilha do Pau Oco, 20º16'00"S, 40º31'00"W, 590 m, 4.IV.2008, fl., *A.P. Fontana et al. 5143* (MBML, RB, UPCB). Santa Teresa,

Reserva Biológica Augusto Ruschi, em beira de estrada de terra que corta a Reserva, em frente à entrada principal (Estrada Intermunicipal de Santa Teresa), 19º90'S, 40º54'W, 10.XII.2012, fr., *L. Biral et al. 811* (CESJ, HRCB, MBML, UFP). Santa Maria de Jetibá, Córrego do Ouro/Barra do Rio Posmousser, propriedade privada que pertence a família Berger, 848 m, fr., *R.R. Santos* (MBML-43549). São Roque do Canaã, Alto Misterioso, 19º19'14.9"S, 40º46'7.3"W, 953 m, 25.IV.2007, fl., *M. Simonelli et al. 1360* (MBML).

Monteverdia longifolia is endemic to the dense ombrophilous forest in the states of Espírito Santo and Rio de Janeiro (BFG 2018), at 500–1,000 m elevation. It is characterized by its oblong to elliptic leaf with crenulate margin and contracted few-flowered cymes having an inconspicuous peduncle. The contracted peduncle of the cyme may cause the inflorescence to appear to be a fascicle, and so the base of the inflorescence is important for its identification. *Monteverdia longifolia* can be confused with *M. evonymoides* and *M. patens* because of similar leaf sizes and the crenate/crenulate margin, but the inflorescences (a contracted cyme vs. a fascicle), and its large ripe fruits differentiate *M. longifolia* from the others.

2.8. *Monteverdia macrophylla* (Mart.) Biral, Syst. Bot. 42(4): 689. *Maytenus macrophylla* Martius, Flora 24(2, Beibl.): 95. 1841. Fig. 3a-b

Shrubs, 1.5–4 m tall, glabrous; rough bark, branches cylindrical, gray, irregular surface, lenticels present; twigs flattened, grayish or green, smooth, lenticels absent or rare. Stipules 1.3 mm long, large triangular, margin erose, apex acute to acuminate; petiole 4–14 mm long; blades 11.2–22.8 × 4.1–8.2 cm, elliptic to oblong-elliptic, subcoriaceous, base acute, margin entire or spinose, slightly revolute, up to 14 pairs of spines evenly distributed or concentrate at the base, apex acute, sometimes with a terminal mucron, 0.5 mm long; *in sicco* dull on both sides, pale green, primary vein plane or immersed on the adaxial side, proeminent on the abaxial side, secondary veins 9–13 pairs, slightly raised on both sides. Inflorescences fasciculate, multi-flowered; bracts 3 mm long, triangular, margin erose, apex acute, sometimes absent; pedicels 4–5 mm long, cylindrical to slightly flattened. Flowers 4–5 mm diam., cream; sepals 0.8 × 0.8 mm, ovate, margin sparsely ciliate; petals 1.8–2.2 × 0.9–1.2 mm, oblong to obovate, margin undulate; disc 1.5 mm in diam., rounded, margin conspicuously raised, green *in vivu*. Fruits 7–13 × 6–10 mm, obovoid, apex quadrangular, rarely rounded in some young fruits, verrucose or smooth, red to orange when ripe; seeds 1–2, 7–10 × 3–4 mm, obovate, smooth.

Selected specimens: Águia Branca, Córrego do Trinta, propriedade Domingos Breda, 19º01'23"S, 40º38'52"W, 180–320 m, 19.X.2006, fl., *V. Demuner et al. 3016* (HRCB, MBML). Baixo Guandu, estrada Baixo Guandu a Pancas, km 13, 1.I.2005, fr., *A.A. Luz 271* (CVRD, HRCB). Barra de São Francisco, Córrego da Esperança, terreno de Maria E. Pereira, 13.XII.2000, fr., *L. Kollmann & E. Bausen 3530* (MBML). Cachoeiro de Itapemirim, RPPN Cafundó, 20º50'56"S, 41º06'45"W, 15.II.2009, fr., *J.M.L. Gomes 3202* (HRCB, VIES). Conceição da Barra, Reserva Biológica do Córrego Grande, 18º15'46"S, 39º48'13"W, 26.VII.2017, fl., *L.F.T. Menezes 2470* (SAMES). Itapemirim, Fazenda do Ouvidor, Usina Paineiras, acesso pela Rodovia ES-490, entrada à esquerda, 2,5 km após o trevo da Safra, em direção em Marataízes, 20º55'53,8"S, 41º2'43,4"W, 20–100 m, 25.I.2008, fr., *A.M. Assis & V. Demuner 1364* (MBML). Linhares, mata a 2,6 km do início da estrada não pavimentada a Rio Bananal, o início desta a 10 km NW da cidade Linhares (da ponte sobre o a afluente Rio Doce), 7.XII.1994, fl., *J.R. Pirani et al. 3458* (K, 2 sheets, NY, SPF). Marilândia, 63 m, 19º30'31"S, 40º30'28"W, 29.I.2019, fr., *F.F.F. Mazziero & P. Bonin Jr. 4240* (MBM). Nova Venécia, APA Pedra do Elefante, 8.XII.2015, fl., *B.G. Sossai et al. 77* (VIES). Pinheiros, Santa Rita, 130 m, 1.II.2008, fr., *L. Kollmann & L. Magnago 10534* (HRCB, MBML). Santa Leopoldina, Serra do Ramalhete, Fazenda Caioba, prop. Cláudio Virloni, trilha do córrego Caioba, 20º03'30.8"S, 40º28'14.33"W, 200–500 m, *V. Demuner et al. 1835* (MBML). Santa Teresa, Várzea Alegre, mata do Fausto (próximo à torre de telefone), 19.I.2000, fr., *V. Demuner & E. Bausen 575* (MBM, MBML). Vila Valério, Araribóia, margens da Rodovia ES-360, 19º03'0.2"S, 40º16'54.8"W, 360 m, 1.IX.2012, fl., *A.M. Assis & J. Freitas 3342* (MBML). Urwald am Rio Muttum, nördlich vom Rio Doce, *P. von Lüetzelburg 7148b* (M).

Additional selected specimens: BRAZIL. RIO DE JANEIRO: Saquarema, Restinga de Ipitangas, 10.XII.2013, fl., *M.N. Saka et al. 279* (HRCB).

Monteverdia macrophylla is a shrub from the understory of the dense ombrophilous and the seasonal semideciduous forests, from Bahia to Rio de Janeiro, at from sea level to 500 m elevation. This species is identified by its large, often spinose-margined (sometimes entire) leaf, and quadrangular red (when ripe) fruit. The number of spines on leaves margins is variable: *e.g.*, the specimen *J.R. Pirani et al. 3458* (K, 2 sheets, NY, SPF) has leaves with entire margin, with four pairs of spines near at the leaf base, and with seven pairs of spines evenly distributed along the leaf length. *Monteverdia macrophylla* is sometimes misidentified in herbaria collections as *M. aquifolium* (Mart.) Biral because

of its spinose leaves, but large leaf size and quadrangular, red (when ripe) fruit clearly separate the species. Quadrangular fruit allows confusion with *M. horrida*, from the Caatinga of Minas Gerais and Bahia. According to the label of *Gomes 3202* (HRCB, VIES), the species is locally known by the vernacular name "camboatá-de-espinho".

The species was reported as critically endangered (Fraga *et al.* 2019), but we found recent collections of *Monteverdia macrophylla* from

Figure 3 – a-b. *Monteverdia macrophylla* – a. flowers; b. fruit detail. c. *M. obtusifolia* – fruiting branch. d. *M. gonoclada* – immature fruits. e-f. *M. schumanniana* – e. branch; f. inflorescence (a. *Saka et al. 351*; b. *Luz 271*; c. *Biral & Vergne 1016*; d. *Marcusso 924*; e. *Biral et al. 803*; f. *Pereira & de Deus 7181*). Photos: a. Mariana Saka; b, d, f. Gabriel Mendes Marcusso; c, e. Leonardo Biral. Scales: c = 5 mm; f = 5 mm.

several locations suggesting a larger population size, so its inclusion in this category may need to be re-examined; putatively is not a threatened species in the state. In addition to the 12 municipalities in which it has been found, we found unvouchered specimen from Sooretama.

Maytenus briquetii was described by Loesener (in Pilger 1923: 535) based on two collections, one of them gathered by von Lüetzelburg in Espírito Santo. It was subsequently synonymized with *M. aquifolium* Martius (1841: 91) by Carvalho-Okano & Leitão-Filho (2004) who cited the syntype from Espírito Santo but did not report its occurrence in the state. During the analysis of Celastraceae for this monograph, it was concluded that the species is a heterotypic synonym of *M. macrophylla*, rather than *M. aquifolium* (Biral 2022). *Monteverdia macrophylla* differs from *M. aquifolium* by life form (the former is a shrub to small tree, to 4 m tall, the latter is a tree, up to 15 m), size of the leaves (former: 11.2–30.5 × 4.1–11.0 cm, latter: 5.4–20.9 × 1.8–6.6 cm), and shape and color of ripe fruits (former: apex quadrangular, red to vinaceous, latter: apex rounded, orange).

2.9. *Monteverdia obtusifolia* (Mart.) Biral, Syst. Bot. 42(4): 689. 2017. *Maytenus obtusifolia* Martius, Flora 24(2, Beibl.): 88. 1841. Fig. 3c

Shrubs ramified to trees, 8 m tall, glabrous; bark rough, branches cylindrical, gray, lenticels absent or rarely present; twigs flattened, blackened, smooth, lenticels absent. Stipules 0.5 mm long, large triangular, margin erose, apex acute; petiole 1–3 mm long; blades 3.1–10.9 × 1.6–6.6 cm, ovate, elliptic-ovate or obovate, chartaceous to subcoriaceous, base acute, rounded or cordate, margin entire, undulate or rarely crenate, slightly revolute, apex obtuse or acute, discolor *in sicco*, gray to bluish on the adaxial side, commonly pruinose, reddish on the abaxial side, young leaves strongly blackened, primary vein plane or immersed on the adaxial side, slightly raised on the abaxial side, secondary veins inconspicuous on both sides. Inflorescences in cymes, compound (paniculiform), multi-flowered; peduncle evident, 3–22 mm long, flattened, ribbed; bracts 1–3 per flower, 0.3–0.5 mm long, triangular, margin erose or fimbriate, apex acute to acuminate; pedicels 2–4 mm long, cylindrical, irregular surface. Flowers 3.5–5 mm diam., light yellow to dull green; sepals 1 × 1 mm, ovate, margin erose, sparsely ciliate; petals 2–2.5 × 1 mm, oblong, margin membranous, slightly undulate; disc 1.4–1.6 mm in diam., pentagonal, margin slightly undulate, green to yellowish *in vivu*. Fruits 7–16 × 6–11 mm, spheroid to ellipsoid, apex rounded or acute, style commonly persistent, red to brown when ripe; seeds 1–2, 7–12 × 6–8 mm, oblong or spheroid, grooved. **Selected specimens**: Anchieta, ciliar à Lagoa Mãe-Bá, 20º50’17”S, 40º43’18”W, 13.X.2009, fl., *J.M.L. Gomes & L. Pimentel 3489* (HRCB, VIES). Aracruz, Santa Cruz, Estação Biológica Marinha, 19º57’15”S, 40º09’20”W, 16.V.1989, fl., *O.J. Pereira et al. 1973* (HRCB, VIES). Cachoeiro do Itapemirim, Vargem Alta, Morro do Sal, 16.VIII.1981, fr., *V.F. Ferreira 1868* (NY). Conceição da Barra, Itaúnas, 24.VIII.1987, fl., *G. Hatschbach & A.C. Cervi 51439* (MBM, MO). Itapemirim, região do Gomes, 23.X.2000, fl., *G. Hatschbach et al. 71544* (CEPEC, MBM, VIC). Guarapari, Parque Estadual César Vinha, 20º36’01”S, 40º28’W, 1.XII.1994, fr., *O.J. Pereira & L.H.M. Aquino 5328* (HRCB, VIES). Linhares, Reserva Natural Vale, estrada entre a frente do estacionamento Sapotaceae e viveiro, 21.II.2014, fr., *L. Biral & M. Vergne 1016* (CVRD). Piúma, Ilha do Francês, II.2003, fr., *H. Pinheiro et al. 126* (HRCB, VIES). Presidente Kennedy, Praia das Neves, 21º16’49”S, 40º58’08”W, 2.XI.1987, fl., *J.M.L. Gomes 165* (HRCB, HUFU, VIES). São Mateus, ligação BR-101 a Ponta do Ipiranga, 10.IX.1983, fl., *G. Hatschbach et al. 60084* (ASU, CEPEC, MBM, MO, SPSF). Serra, Nova Almeida, sítio São José, 24.XII.1999, fr., *I.D. Rodrigues 207* (HRCB, VIES). Sooretama, Reserva Natural Vale, 19º08’17.5”S, 40º03’41.3”W, 38 m, 4.II.2013, fr., *M.G. Caxambu et al. 4522* (HCF). Vila Velha, Interlagos, 20º19’47”S, 40º17’32”W, 30.IX.1995, fl., *O. Zambom 112* (HRCB, VIES). Vitória, Manguezal da baía de Vitória, coleta no apicum do manguezal, região norte (próximo à descida com serra), 26.XI.1999, fl., *A.M. Assis et al. 761* (VIES).

Monteverdia obtusifolia is a shrub or treelet endemic to Brazil, from northern coastal São Paulo to Pará state (Carvalho-Okano & Leitão-Filho 2004), found commonly in the *restinga* and mangroves, and less often in the dense ombrophilous and in seasonal forests (*brejo de altitude*) in northeastern Brazil (BFG 2018). Among the commonest species of Celastraceae in ES, it is found in abundance in herbarium collections. *Monteverdia obtusifolia* is easily recognized by leaf and inflorescence. The leaf is variable in size and shape, always with inconspicuous secondary veins visible on both surfaces of the leaf. The leaf is often pruinose and discolor, gray to bluish on the adaxial side and reddish on the abaxial side, when dried. The inflorescence is a ramified cyme, compound (paniculiform), with an evident and long peduncle, longer than the pedicel, unusual for the genus. May be confused with *M. distichophylla* by the leaves but is differentiated by the ramified *versus* fasciculate inflorescence.

2.10. ***Monteverdia patens*** (Reissek) Biral, Syst. Bot. 42(4): 690. 2017. *Maytenus patens* Reissek, *Fl. bras.* 11(1): 13. 1861.

Trees, up to 18 m tall, pubescent on twigs; bark rough, branches cylindrical with irregular surface, grayish, lenticels present; twigs flattened or carinate, blackened, smooth, lenticels absent. Stipules 1 mm long, large triangular, margin erose, apex acute; petiole 1–6 mm long; blades 3.9–8.3 × 1.8–3.4 cm, elliptic to elliptic-ovate, membranaceous, base acute, margin entire to obscurely crenate, plane, apex acute, rare rounded or truncate, discolor *in sicco*, bluish to blackened on the adaxial side, brown on the abaxial side, primary vein plane on the adaxial side, slightly raised on the abaxial side, secondary veins 6–8 pairs, inconspicuous on the adaxial side, plane on the abaxial side. Inflorescences fasciculate, multi-flowered; pedicels 2–5 mm long, cylindrical to slightly flattened; bracts 2–3 per flower, 1.3 mm long, triangular, margin erose, apex acute. Flowers 2.5–3 mm diam., clear green; sepals 0.6 × 0.7 mm, obtuse, margin entire to sparsely ciliate; petals 1.4–1.5 × 1 mm, oblong to obovate, margin undulate; disc 1.1 mm in diam., pentagonal, margin lobed, raised, clear green *in vivu*. Fruits 8–13 × 6–11 mm, obovoid, apex rounded, style persistent, yellowish when ripe; seeds 1–2, 7–8 × 5 mm, oblong, smooth.
Selected specimens: Linhares, Reserva Florestal de Linhares, Caingá, km 0.89, 9.IX.1993, fl. and fr., *D.A. Folli 1980* (CVRD, U, VIC). Santa Teresa, Reserva Biológica de Santa Lúcia, trilha da Pinguela, 27.V.1999, fl., *W.P. Lopes et al. 765* (HRCB, MBML).
Additional selected specimens: BRAZIL. MINAS GERAIS: Salto da Divisa, Fazenda Santana, 16º03'41.4"S, 40º03'22.2"W, 160 m, 21.VIII.2003, fl., *J.A. Lombardi et al. 5341* (BHCB, HRCB).

Monteverdia patens occurs discontinuously in the dense ombrophilous forest from Paraíba to Santa Catarina but can be found in the *brejos de altitude* and in the Caatinga of northeastern Brazil, from 50 to 1,160 m of elevation. In ES, a few specimens have been collected in the *tabuleiros* forests. It is characterized by the combination of pubescent twigs, entire or obscurely crenate leaf-margins and multi-flowered fascicles. The species resembles *M. evonymoides* due to leaf size and inflorescence but the entire or obscurely crenate *versus* conspicuously crenate leaf, the ratio of leaf dimensions (1:2 vs. 1:3), and the life form (tree rather than shrub or small tree) separate the former from the latter. Nonetheless, the distinction between both species is not well delimitated and additional study is necessary.

2.11. ***Monteverdia quadrangulata*** (Schrad.) Biral, Syst. Bot. 42(4): 690. 2017. *Maytenus quadrangulata* (Schrad.) Loes., Nat. Pflanzenfam. 2 ed., 20b: 142. 1942. *Celastrus quadrangulatus* Schrader, Goett. Gel. Anz. 1821(2): 716. 1821.

Trees, 5 m tall, glabrous; branches cylindrical, clefted, grayish; twigs quadrangular, commonly sub-winged, 2–5 mm width, brownish, smooth, lenticels absent. Stipules 0.8 mm long, deltoid, margin erose, apex acuminate; petiole 2–5 mm long; blades 6.7–19.1 × 2.4–4.3 cm, elliptic to narrowly-elliptic, subcoriaceous, base acute, margin spinose, slightly revolute, 18–33 pairs of spines evenly distributed, apex acute, mucron 0.5–1 mm long, *in sicco* brownish to gray, primary vein plane or slightly raised on the adaxial side, proeminent on the abaxial side, secondary veins 9–11 pairs, plane or immersed on the adaxial side, plane or slightly raised on the abaxial side. Inflorescences fasciculate, multi-flowered; bracts not seen; pedicels 3–5 mm long, flattened, smooth. Flowers 3.5–4 mm diam., green; sepals 1.15 × 0.8 mm, ovate, margin fimbriate; petals 1.4–1.5 × 1–1.15 mm, oblong, margin erose; disc 1.3–1.5 mm in diam., pentagonal, margin raised, green *in vivu*. Fruits 5–7 × 4–5 mm, oblong, apex rounded, style persistent 1.5 mm long, smooth, red to brownish when ripe; seed 1, 5 × 3 mm, oblong to obovate, smooth.
Selected specimens: Águia Branca, Mata do Assentamento 16, 18º54'12"S, 40º44'8"W, 150–250 m, 25.VII.2006, fr., *L.F.S. Magnago et al. 1078* (HRCB, MBML). Barra da São Francisco, cabeceira Córrego do Engenho, terreno de Alfredo Bassi, 235 m, 12.XII.2000, fr., *L. Kollmann et al. 3481* (HRCB, MBML, RB). Santa Teresa, Pedra Paulista, propriedade de T. Bride, 26.VI.2000, fr., *V. Demuner 1203* (MBML). Vila Velha, Convento da Penha, estrada do morro do Convento da Penha, 11.IX.2009, fl. and fr., *D.A. Folli 6413* (CVRD, HRCB).

Monteverdia quadrangulata is endemic to Brazil, found in the states of ES, Minas Gerais and Bahia, in the Atlantic Forest (dense ombrophilous forest, seasonal semideciduous forest and rocky outcrops), between 120–600 m of elevation. Few specimens are available in herbaria. It may be confused with *M. macrophylla* because the spinose leaves, but its quadrangular young twigs and many spines on the leaf margin (18–33 rather than 9–13 in the latter) clearly identify it. The species was classified as EN (endangered) in the latest version of the "Red list" provided by CNCFlora (2022).

2.12. ***Monteverdia schumanniana*** (Loes.) Biral, Syst. Bot. 42(4): 690. 2017. *Maytenus schumanniana* Loesener, Notizbl. Bot. Gart. Berlin-Dahlen 13(116–120): 218. 1938. Fig. 3e-f

Shrubs to trees, 1–6 m tall, glabrous; smooth bark, whitish, branches cylindrical, grayish; twigs strongly flattened to winged, 2–4 mm width, blackened or gray, smooth, lenticels absent. Stipules 1 mm long, large triangular, margin entire, apex acute; petiole 3–8 mm long; blades 6.5–21.5 × 2.6–8.2 cm, elliptic to obovate, chartaceous, base acute, margin entire to undulate close to the apex, commonly revolute, apex acuminate to acute, discolor *in sicco*, gray to bluish in the adaxial side, brown to reddish in the abaxial side, primary vein immersed on the adaxial side, raised on the abaxial side, secondary veins 7–9 pairs, inconspicuous on both sides or planes on the abaxial side. Inflorescences in cymes, contracted, few-flowered; bracts 2–3 per flower, deltoid, 0.8 mm long, margin irregular; peduncle 1–4 mm long; pedicels 2–4 mm long, cylindrical, irregular surface. Flowers 5–6 mm diam., green, yellow or white; sepals 1 × 1 mm, ovate, margin entire; petals 1.9–2.1 × 1.5 mm, oblong, margin entire to slightly undulate; disc 2–2.1 mm in diam., pentagonal, margin slightly raised, green to yellowish *in vivu*. Fruits 8–27 × 7–12 mm, obovoid or spherical, apex rounded, red when ripe; seeds 1–2, 7–8 × 3–4 mm, oblong, smooth to slightly rugose. **Selected specimens**: Águia Branca, Águas Claras, propr. Zequinha, 400–500 m, 18º52’17”S, 40º48’46”W, 7.IX.2006, fl., *L.F.S. Magnago et al. 1372* (MBML). Alegre, Parque Nacional do Caparaó, mata ciliar do Rio Norte, 1,110 m, 20º26’45”S, 41º44’07”W, 22.II.2000, fr., *V.C. Souza 23738* (ESA, HRCB). Anchieta, Morro do Urubu, 285 m, 20º44’44.6”S, 40º37’34.3”W, fl., *A.M. Assis et al. 1181* (HRCB, MBML). Aracruz, Comboios, 28.X.1992, fl., *O.J. Pereira 4048* (VIES). Barra de São Francisco, Parque Municipal Sombra da Tarde, terreno do Sr. René, 230 m, 21.XI.2000, fl., *L. Kollmann et al. 3275* (MBML, RB). Cachoeiro do Itapemirim, Floresta Nacional Pacotuba, 20.7500ºS, 41.2833ºW, 1.VII.2007, fr., *L.N. Moreira 35* (VIES). Cariacica, Reserva Biológica Duas Bocas, localidade de Alegre, trilha do Pau Oco, 20º16’00”S, 40º31’00”W, 590 m, fr., *A.P. Fontana et al. 5152* (MBM, MBML, RB, UPCB). Castelo, Parque Estadual do Forno Grande, 30.X.2004, fl., *L. Kollmann et al. 7205* (MBML). Colatina, prop. Manoel (Neco) Zani, Cascatinha do Pancas, 853°19’12.4”S [sic], 40º42’14,2”W, 4.XII.2008, fl., *A.M. Assis 1905* (MBML). Conceição da Barra, Flora do Rio Preto, região extremo sul, 18º26’6”S, 39º50’1”W, 16.XII.2019, fl., *S.C. Dutra et al. 157* (VIES). Conceição do Castelo, Bananal, 800 m, 18.X.1985, fl., *G. Hatschbach & F.J. Zelma 49934* (CEPEC, MBM, MO). Governador Lindenberg, Santa Luzia, Firmino, 350–650 m, 19º16’33”S, 40°27’48”W, fr., *R.R. Vervloet et al. 3155* (MBML). Ibatiba, ca. 22 km de Ibatiba, na estrada para Vitória, Ramal à esquerda, ca. 1,5 km, 20º13’49”S, 41º20’36.3”W, 1,050 m, 19.VII.2006, fr., *P. Fiaschi et al. 3120* (NY, SPF). Ibitirama, Santa Marta, vale do Rio Santa Marta, no Parque Nacional do Caparaó, 20º49’17”S, 41º81’78”W, 15.VI.2013, fr., *J.P.F. Zorzanelli & L. Bacci 721* (VIES). Iúna, Serra do Valentim, caminho para transecto I, 20º21’54”S, 41º28’23”W, 6.III.2012, fl., *J.P. Zorzanelli & J.H. Carvalho Filho 79* (VIES). Jaguaré, propriedade particular situada atrás da residência da Sra. Zilma, 18º57’7”S, 39º54’12”W, 19.IV.2017, fl., *AM.J. Saporetti 58* (SAMES). Linhares, Reserva Florestal de Linhares, Casa de Guarda, 0,712 km, 23.XI.1979, fl., *D.A. Folli 174* (CVRD). Marilândia, Liberdade, propr. Deoclécio Lorenccini, 19°21’7”S, 40º30’51”W, 150–350 m, 22.III.2007, fr., *V. Demuner et al. 3374* (MBML). Muniz Freire, arredores, 15.X.1983 fl., *G. Hatschbach 47852* (CEPEC, HUCS, MBM, MO, NY, SPSF, UPCB). Nova Venécia, Mata após Gameleira, 108 m, 18453.89’S, 40276.10’W, 4.XI.2010, fl., *J. Rossini et al. 734* (HRCB, SAMES, VIES). Piúma, estrada entre Marataízes e Piúma, 29.XI.2006, fl., *V.C. Souza & C.P. Caliari 32479* (ESA, HRCB). Santa Leopoldina, Fazenda Caioba, propr. Virloni, 150–250 m, 20º00’21”S, 40º28’06”W, 6.I.2006, fr., *L.F.S. Magnago et al. 494* (MBML). Santa Maria do Jetibá, 20º10’44”S, 40º82’97”W, 30.IX.2000, fl., *O.J. Pereira & E. Espindula 6604* (HRCB, VIES). Santa Teresa, estrada para Pedra da Onça, 750 m, 30.XII.1998, fr., *L. Kollmann & E. Bausen 1445* (MBML, RB). Serra, APA do Mestre Álvaro, Gruta do Morcego, 200 m, 20º10’45”S, 40º18’27”W, 24.X.2020, fl., *A. Magnano & R. Apelfeler 7* (VIES). Sooretama, Reserva Vale MME - Ministério das Minas e Energia, 19º01’S, 40º12’W, 6.XII.2012, fl., *L. Biral et al. 803* (CVRD, HRCB, MBML NY, SHPR). Vila Velha, Interlagos, 20º19’47”S, 40º17’32”W, 18.III.1997, fr., *O. Zambom 328* (HRCB). Vitória, Parque Estadual da Fonte Grande, 12.VI.2003, fr., *O.J. Pereira & Y.S. de Deus 7181* (HRCB).

Monteverdia schumanniana is a shrub or treelet in the dense ombrophilous forest understory. The species occurs from southern Bahia to Santa Catarina from sea level to ca. 1,000 m (decreasing commonness with altitude). Its winged or strongly flattened young twigs, large flower (5–6 mm diameter) in contracted and few-flowers cymes clearly identify it. The inflorescence in *M. schumanniana* is contracted with an inconspicuous peduncle that may be seen under magnification. The specimen *Kollmann 3275* (MBML, RB) is labelled as a scandent shrub, but which characteristic (scandent) has not been observed or reported elsewhere.

Acknowledgements

We thank the coordination of the Flora of Espírito Santo project for the opportunity to contribute; Henrique Lauand Ribeiro, for elaborating the map (Fig. 1); Mariana Saka, for proving photo of *Monteverdia macrophylla*; Julio Antônio Lombardi, for photos of *Celastrus liebmannii*; James J. Roper, for reviewing the English writing; and the two anonymous reviewers for their valuable corrections. LB is grateful to the curators and staff of the herbaria CVRD, MBML, RB and VIES for the hospitability when visiting these institutions or for loans and gifts of herbarium specimens sent to HRCB. GMM thanks the curador and staff of the herbaria SAMES; the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Código de Financiamento 001; Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP (# 2018/04121-0), for the financial support to the field works; IEMA - Instituto Estadual de Meio Ambiente e Recursos Hídricos; and ICMBIO - Instituto Chico Mendes de Conservação da Biodiversidade, for the collections permissions.

References

Alvares CA, Stape JL, Sentelhas PC, Gonçalves JLM & Sparovek G (2013) Köppen's climate classification map for Brazil. Meteorologische Zeitschrift 22: 711-728.

Biral L (2014) Novidades taxonômicas em *Maytenus* (Celastraceae) para a flora da Argentina. Bonplandia 23: 43-49.

Biral L (2022) On the identity of *Maytenus briquetii* (Celastraceae), from southeastern Brazil. Pesquisas, Botânica 76: 29-31.

Biral L, Smidt EC, Bolson M & Lombardi JA (2015) A new species of *Maytenus* (Celastraceae) from the Brazilian Atlantic Forest, with evidence of molecular phylogeny, and two new synonyms for *Maytenus floribunda*. Phytotaxa 231: 53-62.

Biral L & Lombardi JA (2016) New synonyms and lectotypifications in the genus *Maytenus* (Celastroideae, Celastraceae) and a new name for the illegitimate *Maytenus nemorosa* from Brazil. Phytotaxa 261: 97-100.

Biral L, Simmons MP, Smidt E, Tembrock LR, Bolson M, Archer RH & Lombardi JA (2017) Systematics of the New World *Maytenus* (Celastraceae) and a new delimitation of the genus. Systematic Botany 42: 680-693.

Biral L & Lombardi JA (2020) Celastraceae. *In*: Acevedo-Rodríguez P (org.) Lianas and climbing plants of the Neotropics. Available at <http:// https://naturalhistory.si.edu/research/botany/research/lianas-and-climbing-plants-neotropics/>. Access on 2 February 2022.

BFG - The Brazil Flora Group (2018) Brazilian Flora 2020: innovation and collaboration to meet Target 1 of the Global Strategy for Plant Conservation (GSPC). Rodriguésia 69: 1513-1527.

Burnett GT (1835) Outlines of Botany, including a general history of the vegetable kingdom. Vol. 1. John Churchill, London. 518p.

Carvalho-Okano RM & Leitão-Filho HF (2004) O gênero *Maytenu*s Mol. emend. Mol. (Celastraceae) no Brasil extra-amazônico. *In*: Reis MS & Silva SR (orgs.) Conservação e uso sustentável de plantas medicinais e aromáticas: *Maytenus* spp., espinheira-santa. Ibama, Brasília. Pp. 11-51.

CNCFlora - Centro Nacional de Conservação da Flora (2022) Celastraceae. Available at <http://cncflora.jbrj.gov.br/portal/ptbr/listavermelha/CELASTRACEAE>. Access on 21 November 2022.

CRIA - Centro de Referência e Informação Ambiental (2022) Specieslink. Available at <http://www.splink.org.br/index>. Access on 2 November 2022.

Ding Hou (1955) A revision of the genus *Celastrus*. Annals of the Missouri Botanical Garden 42: 215-302. <https://doi.org/10.2307/2394657>

Dutra VF, Alves-Araújo A & Carrijo TT (2015) Angiosperm checklist of Espírito Santo: using electronic tools to improve the knowledge of an Atlantic Forest biodiversity hotspot. Rodriguésia 66: 1145-1152.

Fraga CN, Formigoni MH & Chaves FG (2019) Fauna e flora ameaçadas de extinção no estado do Espírito Santo. Instituto Nacional da Mata Atlântica, Santa Teresa. 432p.

Garbin ML, Saiter FZ, Carrijo TT & Peixoto AL (2017) Breve histórico e classificação da vegetação capixaba. Rodriguesia 68: 1883-1894.

IPEMA - Instituto de Pesquisas da Mata Atlântica (2005) Conservação da Mata Atlântica no Espírito Santo: cobertura florestal e unidades de conservação. IPEMA, Conservação Internacional, Vitória. 142p.

Linnaeus C (1753) Species Plantarum. Vol. 1. Impensis Laurentii Salvii, Holmiae. 560p.

Lombardi JA (2014) Celastraceae (Hippocrateoideae e Salacioideae). Flora Neotropica Monograph 114: 1-227.

Loesener T (1893) Plantae Glaziovianae novae vel minus cognitae. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 15: 3-19.

Loesener T (1896) Celastraceae. *In*: Engler A & Prantl K (eds.) Die natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten insbesondere den Nutzpflanzen. Nachträge und Verbesserungen zu Teil III, Abteilung 5. Wilhelm Engelmann, Leipzig. Pp. 459.

Martius CPF (1841) Herbarium Florae Brasiliensis. Plantae brasilienses exsiccatae, quas denominatas, partim diagnosi aut observationibus instructas Botanophilis offert Dr. C. Fr. Ph. De Martius. Flora oder Botanische Zeitung 24: 1-112.

Molina GI (1782) Saggio sulla storia naturale del Chili del signor abate Giovanni Ignazio Molina. Nella Stamperia di S. Tommafo d'Aquino, Bologna. 367p.

Pilger R (1923) Plantae Lützelburgianae brasiliensis II. Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem 8: 535-536.

Radford AE, Dickison WC, Massey JR & Bell CR (1974) Vascular plant systematics. Harper & Row, New York. 891p.

Reflora (2022) Virtual Herbarium. Available at <http://reflora.jbrj.gov.br/reflora/herbarioVirtual/>. Access on 2 November 2022.

Reissek S (1861) Celastrinea. *In*: Martius CFP & Eichler AW (eds.) *Flora brasiliensis*. Frid. Fleischer, Lipsiae. Vol. 11, pars 1, pp. 1-34, pl. 1-10.

Richard A (1845) Botanique - Plantes vasculaires. *In*: Sagra R (ed.) Histoire physique, politique et naturelle de l'Ile de Cuba. Vol. 10. Arthus Bertrand, Paris. 663p.

Schräder HA (1821) Illustrationes super plantis quibusdam novis et minus cognitis, a Principe Serenissimo Maximiliano Neowidensi in Brasilia observatis: "Plantarum rariorum a Principe Serenissimo Maximiliano Neowidensi in itinere per Brasiliam observatarum Fascicul. I". Göttingische gelehrte Anzeigen unter der Augsicht der Königlichen Gesellschaft der Wissenschaften 2: 705-720.

Simmons MP (2004) Celastraceae. *In*: Kubitzki K (ed.) The families and genera of flowering plants. VI. Flowering plants. Dicotyledons. Celastrales, Oxalidales, Rosales, Cornales, Ericales. Springer, Berlin. Pp. 29-64.

Simonelli M & Fraga CN (2007). Espécies da flora ameaçadas de extinção no estado do Espírito Santo. IPEMA, Vitória. 147p.

Standley PC (1931) Studies of American plants - V. Publications of the Field Museum of Natural History, Botanical Series 8: 293-398.

Thiers B (continuously updated) Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at <http://sweetgum.nybg.org/science/ih/>. Access on 2 November 2022.

List of examined material

Acácio G 88 (2.8), 139 (2.8). **Agrizzi AP** 3 (2.9). **Alves-Araújo A** 1742 (2.2), 1787 (2.2). **Amorim AM** 7592 (2.7). **Arantes FM** 56 (2.1). **Assis AM** 38 (2.9), 46 (2.9), 239 (2.9), 253 (2.9), 644 (2.9), 761 (2.9), 1162 (2.1), 1235 (2.9), 1364 (2.8), 1458 (2.1), 1905 (2.12), 2991 (2.9), 3122 (2.9), 3342 (2.8), 3677 (2.9), 4482 (2.1). **Bausen E** 88 (2.7), 120 (2.7). **Biral L** 803 (2.12), 804 (2.1), 805 (2.1), 808 (2.2), 809 (2.7), 810 (2.5), 811 (2.7), 949 (2.9), 1016 (2.9). **Boone W** 231 (2.1), 794 (2.1). **Botelho RM** 70 (2.12) **Boudet Fernandes** HQ 1185 (2.1), 1800 (2.7), 2534 (2.7), 2767 (2.5), 2852 (2.6), 3451 (2.2). **Braga JMA** 5635 (2.9). **Braz DM** 239 (2.9). **Britto RC** 52 (2.1). **Campanharo IF** 9 (2.6). **Cardoso MS** 8 (2.9), 17 (2.9). **Carneiro MAM** 7 (2.2). **Caxambu MG** 4522 (2.9). **Cruz TA** 88 (2.5), 90 (2.7). **Curso de campo UFES, UFRRJ, IBRJ** 2017 23 (2.4). **Dan** ML 27 (2.1). **Demuner V** 4 (2.7), 174 (2.7), 197 (2.5), 200 (2.7), 295 (2.7), 296 (2.1), 435 (2.1), 575 (2.8), 794 (2.5), 814 (2.1), 1041 (2.1), 1203 (2.11), 1301 (2.8), 1359 (2.1), 1432 (2.7), 1475 (2.3), 1551 (2.1), 1627 (2.2), 1835 (2.8), 2088 (2.12), 2611 (2.4), 2638 (2.12), 2719 (2.2), 3016 (2.8), 3050 (2.12), 3148 (2.1), 3201 (2.12), 3315 (2.2), 3348 (2.1), 3374 (2.12), 3917 (2.2), 4163 (2.8), 4742 (2.12). **Duarte AP** 3722 (2.8), 3938 (2.1). **Dutra RLS** 309 (2.2), 310 (2.2). **Dutra SC** 157 (2.12). **Farney C** 3330 (2.9), 3332 (2.9). **Ferreira A** VIES 36664 (2.9), VIES 36665 (2.9). **Ferreira MAP** RB 673048 (2.9). **Ferreira VF** 1868 (2.9). **Fiaschi P** 658 (2.1). **Firmino AD** 505 (2.9), 669 (2.9), 879 (2.9), 902 (2.9), 1245 (2.2), 1253 (2.2), 1293 (2.9), 1386 (2.9), 1387 (2.9), 1407 (2.2), 2072 (2.9). **Flores TB** 919 (2.9), 1000 (2.7), 1103 (2.7), 1495 (2.6). **Folli DA** 7 (2.4), 171 (2.2), 174 (2.12), 1709 (2.9), 1831 (2.9), 1980 (2.10), 2090 (2.2), 2126 (2.12), 2238 (2.2), 2634 (2.9), 2814 (2.9), 2950 (2.2), 3491 (2.12), 4037 (2.9), 4974 (2.1), 6044 (2.2), 6413 (2.11), 6448 (2.9), 7515 (2.12). **Fontana AP** 428 (2.9), 685 (2.2), 1278 (2.6), 1279 (2.7), 3035 (2.5), 3374 (2.6), 3625 (2.7), 5143 (2.7), 5151 (2.12), 5152 (2.12). **Forzza RC** 5289 (2.1), 5314 (2.6), 5360 (2.3), 7672 (2.3). **Fraga CN** 1076 (2.2), 1844 (2.7), 3550 (2.2). **Franticelle BS** s.n.-SAMES 1923 (2.9). **Giaretta AO** 444 (2.9), 966 (2.2), 1014 (2.9). **Gomes JML** 165 (2.9), 1209 (2.9); 1570 (2.9), 2476 (2.2), 3202 (2.8), 3424 (2.9), 3489 (2.9), 3648 (2.2), 4220 (2.9), 4609 (2.12), 4772 (2.9). **Groppo M** 980 (2.1), 1623 (2.8). **Grupo de Coletores do Núcleo Juçara** 150 (2.2), 243 (2.2). **Guarnier JC** 167 (2.9), 191 (2.9), 205 (2.9). **Guilherme FAG** 366 (2.5), 379 (2.5). **Hatschbach G** 47852 (2.12), 49934 (2.12), 49964 (2.5), 51439 (2.9), 58027 (2.9), 60084 (2.9), 71406 (2.6), 71544 (2.9). **Jesus MCF** 277 (2.9), 298 (2.9), 383 (2.9), 384 (2.9). **Kollmann L** 172 (2.12), 499 (2.5), 576 (2.7), 923 (2.12), 997 (2.7), 1040 (2.7), 1071 (2.1), 1375 (2.7), 1445 (2.12), 1800 (2.7), 1806 (2.4), 1923 (2.1), 2031 (2.1), 2032 (2.7), 2097 (2.7), 2141 (2.7), 2222 (2.7), 2240 (2.7), 2505 (2.7), 2587 (2.7), 2649 (2.1), 3080 (2.1), 3082 (2.1), 3119 (2.1), 3275 (2.12), 3335 (2.12), 3370 (2.8), 3387 (2.8), 3481 (2.11), 3530 (2.8), 3808 (2.1), 3912 (2.5), 4127 (2.1), 4179 (2.1), 4367 (2.7), 4584 (2.7), 4587 (2.3), 4694 (2.1), 4788 (2.1), 4943 (2.6), 4952 (2.3), 5017 (2.1), 5415 (2.3), 5412 (2.7), 5566 (2.6), 6317 (2.3), 6761 (2.3), 6977 (2.12), 7142 (2.6), 7187 (2.3), 7205 (2.12), 8005 (2.3), 8119 (2.7), 8363 (2.12), 9303 (2.7), 10377 (2.12), 10534 (2.8). **Kuhlmann JG** 409 (2.9), 6454 (2.1), 6595 (2.1). **Labiak PH** 5014 (2.1). **Lemes BX** 41(2.9). **Leoni LS** 6033 (2.1). **Lombardi JA** 10673 (1.1). **Lopes JC** 283 (2.1). **Lopes LCM** 69 (2.2). **Lopes WP** 600 (2.1), 675 (2.1), 765 (2.10). **von Lüetzelburg P** 7148b (2.8). **Luz AA** 271 (2.8). **Machado JO** 26 (2.9). **Magnago A** 7 (2.12). **Magnago LFS** 451 (2.12), 494 (2.12), 673 (2.8), 917 (2.6), 991 (2.2), 1033 (2.12), 1040 (2.8), 1185 (2.1), 1201 (2.12), 1349 (2.2), 1372 (2.12), 1570 (2.12), 1623 (2.2). **Marcusso GM** 924 (2.6), 951 (2.1), 1585 (2.1), 1845 (2.7), 1889 (2.1). **Marquete R** 3905 (2.3). **Martinelli G** 10974 (2.1), 11595 (2.1). **Martins MLL** 168 (2.9), 204 (2.9). **Matos FAR** 21

(2.9), 71 (2.9), 91 (2.2), 74 (2.9). **Mazziero FFF** 4240 (2.8). **Meirelles J** 461 (2.6). **Mello EA** 7 (2.9). **Menezes LFT** 1655 (2.9), 1753 (2.2), 2470 (2.8). **Monteiro MM** 199 (2.2), 203 (2.2), 236 (2.2). **Moraes QS** 199 (2.9). **Moreira LN** 35 (2.12), 65 (2.8). **Nardin EC** 139 (2.9). **Oliveira AG** 444 (2.9), 1014 (2.9). **Oliveira RN** 110 (2.9). **Peixoto AL** 3502 (2.5). **Pena NTL** 207 (2.8). **Pereira OJ** 180 (2.2), 236 (2.2), 1019 (2.2), 1045 (2.9), 1133 (2.2), 1134 (2.2), 1135 (2.2), 1151 (2.2), 1325 (2.9), 1973 (2.9), 2393 (2.2), 2572 (2.9), 2633 (2.9), 3937 (2.9), 4048 (2.12), 4379 (2.2), 4499 (2.2), 4799 (2.2), 4919 (2.2), 4952 (2.9), 5182 (2.1), 5297 (2.9), 5328 (2.9), 5357 (2.9), 5553 (2.9), 5625 (2.9), 5761 (2.9), 5852 (2.9), 5902 (2.9), 6044 (2.9), 6165 (2.9), 6194 (2.2), 6604 (2.12), 6643 (2.6), 6783 (2.2), 7080 (2.1), 7181 (2.12), 7933 (2.9), 8466 (2.9), 8277 (2.9), 8460 (2.9), 8636 (2.9), 8652 (2.9), 8703 (2.9), 8927 (2.9), 9075 (2.9), 9139 (2.9), 9244 (2.9), 9441 (2.9). **Pereira SV** 47 (2.7). **Pinheiro H** 126 (2.9). **Pinheiro RS** 2304 (2.12). **Pirani JR** 1134 (2.8), 2770 (2.9), 3049 (2.9), 3458 (2.8). **Pizziolo W** 237 (2.1), 331 (2.7), 369 (2.1). **Quinet A** 785 (2.1). **Ribeiro M** 34 (2.9), 124 (2.2), 213 (2.9), 598 (2.9). **Rodrigues ID** 136 (2.9), 144 (2.9), 148 (2.9), 192 (2.9), 197 (2.9), 207 (2.9), s.n.-VIES 12755 (2.9), s.n.-VIES 12756 (2.9). **Rosa LV** 224 (2.2). **Rossini J** 329 (2.7), 466 (2.5), 734 (2.12). **Saddi EM** 873 (2.1). **Saiter FZ** 260 (2.1), 263 (2.1), 323 (2.1). **Saka MN** 279 (2.8), 351 (2.1), 365 (2.12). **Santos TS** 2022 (2.12). **Saporetti AMJ** 58 (2.12). **Samagalia Jr. VB** 148 (2.12), 452 (2.9). **Silva IA** 5 (2.10). **Simonelli M** 184 (2.9), 991 (2.9), 987 (2.9), 1360 (2.7), 1421 (2.3). **Siqueira GS** 123 (2.12), 729 (2.12), 1014 (2.1). **Sossai BG** 77 (2.8). **Souza JP** 153 (2.9). **Souza MC** 588 (2.2). **Souza RLD** 129 (2.9). **Souza V** 511 (2.9). **Souza VC** 23367, 23738 (2.12), 32479 (2.12). **Souza VD** 21 (2.9), 154 (2.9). **Souza WO** 235 (2.2). **Sucre D** 4602 (2.9), 5678 (2.1). **Teixeira RNC** 57 (2.5), 126 (2.6), 192 (2.6), 198 (2.6). **Thomas WW** 14006 (2.9). **Thomaz LD** 1048 (2.1), 1052 (2.1), 1067 (2.1), 1340 (2.1), 1342 (2.5), 1609 (2.5), 1784 (2.1), 1789 (2.1), 1794 (2.1), 1833 (2.1); 1836 (2.1). **Tressmann LK** 29 (2.9). **Turma de Taxonomia de Campo 2015** 106 (2.12). **Valadares RT** 406 (2.9), 867 (2.9) 1025 (2.9), 2462 (2.2), 2526 (2.9). **Valente GE** 1316 (2.12), 1881 (2.9). **Vergne, MC** 159 (2.1). **Vervloet RR** 152 (2.7), 168 (2.7), 174 (2.7), 267 (2.1), 322 (2.1), 663 (2.7), 842 (2.3), 846 (2.7), 927 (2.1), 942 (2.3), 1308 (2.7), 1323 (2.6), 1432 (2.1), 1515 (2.5), 1723 (1.1), 1741 (2.7), 1779 (2.1), 1831 (1.1), 2280 (2.7), 2414 (2.7), 2424 (2.7), 2475 (2.12), 2590 (2.2), 2599 (2.2), 2752 (2.12), 2842 (2.12), 3148 (2.1), 3155 (2.12), 3256 (2.6), 3374 (2.12), 3467 (2.2), 3503 (2.12). **Vimercat JM** 127 (2.7), 231 (2.7). **Vinha PC** 959 (2.2), 1122 (2.9), s.n.-VIES 5246 (2.9). **Wandekoken DT** 17 (2.9), 72 (2.2). **Weiler Júnior I** 145 (2.9). **Weinberg B** 340 (2.9). **Zambom O** 112 (2.9), 328 (2.12). **Zorzanelli JP** 79 (2.12), 1109 (2.12), 721 (2.12).

Area Editor: Dra. Tatiana Carrijo
Received on May 17, 2022. Accepted on January 26, 2023.