Rodriguésia 73: e00402021. 2022
http://rodriguesia.jbrj.gov.br
DOI: http://dx.doi.org/10.1590/2175-7860202273011

Flora of Espírito Santo, Brazil

Flora of Espírito Santo: Chloranthaceae

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Abstract
Chloranthaceae comprises four genera and about 70 species. In Brazil, the family is represented by *Hedyosmum*, with three species, occurring in the Amazon, Cerrado, and Atlantic forest. In the state of Espírito Santo, the family is represented by *Hedyosmum brasiliense*. In this study we provide a morphological description, geographic distribution, photographs, and comments on this species.
Key words: Atlantic Forest, flora of Brazil, *Hedyosmum brasiliense*, taxonomy.

Resumo
Chloranthaceae compreende quatro gêneros e aproximadamente 70 espécies. No Brasil está representada apenas pelo gênero *Hedyosmum* com três espécies, que ocorrem na Amazônia, Cerrado e Floresta Atlântica. No Espírito Santo a família está representada por *Hedyosmum brasiliense*, que é aqui tratada. Apresentamos a descrição morfológica, distribuição geográfica, fotografias e comentários para a espécie.
Palavras-chave: Floresta Atlântica, flora do Brasil, *Hedyosmum brasiliense*, taxonomia.

Introduction

Chloranthaceae (Chloranthales) comprises four genera and ca. 70 species with a disjunct distribution: *Ascarina* (10–20 species), *Chloranthus* (10 species) and *Sarcandra* (2 species) occur in East Asia and Oceania, and *Hedyosmum* (ca. 50 species) occurs from South Mexico to the south of South America (except Chile, Argentina, and Uruguay), and in Asia represented by one species (Todzia 1993; Lan 2002; Eklund *et al.* 2004).

Chloranthaceae is the first lineage of the five (plus eudicots, magnoliids, monocots, and *Ceratophyllum*) that compose the Mesangiospermae (Cantino *et al.* 2007). Morphological and molecular analyses have indicated that Chloranthaceae is monophyletic, being *Hedyosmum* basal and *Ascarina* sister to *Sarcandra* and *Chloranthus* (Qiu *et al.* 1999; Zhang & Renner 2003; Eklund *et al.* 2004; Soltis *et al.* 2005; Zhang *et al.* 2011, 2015). The genera of Chloranthaceae have extremely simple flowers: *Chloranthus* and *Sarcandra* have bissexual flowers that lack perianth, and *Ascarina* and *Hedyosmum* have unissexual flowers, subtended or not by bracts (Todzia 1993). The flowers are small and have 1–5 stamens and/or 1 carpel (Todzia 1993). The family also has monosulcate pollen and vessels with scalariform perforations, regarded as less derived features (Doyle & Endress 2018).

In Brazil, three species of *Hedyosmum* occur in the Amazon, Caatinga, and Atlantic forest (Filardi & Leitman 2020). *Hedyosmum* occurs from Mexico to the south of Southern America, except in Chile, Uruguay, and Argentina (Todzia 1988). In Brazil, the genus is represented by *Hedyosmum neblinae* Todzia (1988: 61) and *Hedyosmum racemosum* (Ruiz & Pav.) G. Don (1834: 434), distributed in the Amazon, and *Hedyosmum*

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brasiliense Mart. *ex* Miquel (1852: 3), occurring in the Amazon, Caatinga, and Atlantic Forest (BFG 2015; Filardi & Leitman 2020).

Despite the wide geographic distribution in the country, few taxonomic studies have been conducted in Brazil with the family: flora of Chloranthaceae of the state of Santa Catarina (Reitz 1965), flora of Serra do Cipó, in the state of Minas Gerais (Pirani 1987), flora of the state of São Paulo (Rossi 2002), flora of Grão-Mogol, in the state of Minas Gerais (Pirani 2003), and flora of the state of Bahia (Matos *et al.* 2016).

This work aims to present the flora of Chloranthaceae of the state of Espírito Santo with morphological description, geographical distribution, photographs, and comments.

Material and Methods

Descriptions were based on material deposited in physical or online collections (indicated with *) in CEPEC*, CVRD*, ESA*, HUNI*, MBM, MBML, NY*, P, RB, SPF, UPCB* and VIES. Herbarium acronyms follow Thiers (continuously updated). We also used records available at iNaturalist (<https://www.inaturalist.org>). The morphological terminology follows Radford *et al.* (1974) and Todzia (1988, 1993). Phytophysiognomies follow Garbin *et al.* (2017) and geographic distribution maps were made based on the specimens analysed with the software Quantum-GIS 2.12 (Quantum Gis Development Team 2015).

Results and Discussion

The flora of Chloranthaceae of Espírito Santo is represented by *Hedyosmum brasiliense*. The species occurs in seasonally semidecidual forest and ombrophilous dense forest in elevations of 600–1,500 m. It was registered in the following municipalities: Castelo, Conceição de Castelo, Dores do Rio Preto, Ibitirama, Iúna, Linhares, Nova Venécia, Santa Leopoldina, Santa Teresa, and Vargem Alta.

Chloranthaceae R.Br. *ex* Sims.

Shrubs or trees, aromatic. Leaves simples, usually glabrous, petiolate, stipulate. Staminate inflorescences spicate, flowers composed of a single naked stamen, elongated when in senescence. Pistillate inflorescences racemose or thyrsic, flowers subtended by a bract which often becomes fleshy, usually grouped into cymules.

1. *Hedyosmum brasiliense* Miq. *Flora brasiliensis* 4(1): 3. 1852. Type: BRAZIL. "Crescit prope Sabará in provincia Minarum, locis humidis", *Martius & Stephen s/n* (BR!), designated by Todzia, Fl. Neotrop. 48: 77 (1988). Figs. 1-2

Shrubs or small trees, 2–6 m tall, dioecious, stems vinaceous or green. Leaves opposite, decussate, elliptic, 5.9–15.5 × 1.6–4.4 cm, apex acuminate, base cuneate, margin crenate up to 4/5 of the leaf, chartaceous or coriaceous, glabrous, lustrous, pinnately veined, petiole vinaceous, 0.4–2.2 cm long, the base of petioles forming a sheath enclosing the stem, petiolar sheaths vinaceous, ca. 1 cm long. Staminate flowers composed by 1–3 opposing pairs of cymose groups of spikes on a short rachis terminated by a single spike, axillary or terminal, green-yellowish, flowers reduced to a single stamen, stamens congested in the spike. Pistillate flowers in thyrsic triflorous cymes, axillary or terminal, sessile or on short peduncles, bract chartaceous, white, perianth lobes ca. 3 mm long, stigma white, papillose. Fruits drupe, white, globose, 3–5 mm diam.

Examined material: Castelo, Parque Estadual do Forno Grande, 31.X.2004, ♂ fl., *A.P. Fontana 977* (MBML); trilha para o Forninho, 14.X.2008, ♂ fl., *R.C. Forzza 5320* (CEPEC, RB, MBML, UPCB); 30.X.2004, ♀ fl., *L. Kollmann et al. 7153* (MBML); 30.X.2004, ♂ fl., *L. Kollmann et al. 7199* (MBML); trilha para as piscinas, 8.IV.2009, ♀ fl., *A.P. Fontana 5859* (CEPEC, MBML, NY, RB, SPF, UPCB). Conceição de Castelo, 20°16'39.8"S, 41°14'23.2"W, próximo à comunidade Santa Luzia, 25.VII.2012, ♂ fl., *F. Mareto* <https://www.inaturalist.org/observations/70396937>. Dores do Rio Preto, 21.X.2012, ♂ fl., *T.B. Flores et al. 1367* (CVRD, ESA, MBML, RB, VIES). Ibitirama, Parque Nacional do Caparaó, I.2013, ♀ fl., *I.F. Campanharo 22* (VIES); IV.2012, ♀ fl., *I.F. Campanharo 06* (VIES). Iúna, Serra do Valentim, X.2011, ♀ fl., *J.P.F. Zorzanelli 558* (VIES); X.2011, ♂ fl., *J.P.F. Zorzanelli 559* (VIES); 14.VIII.2011, ♀ fl., *J.P.F. Zorzanelli & M.A.A.S. Jacobem 162* (VIES). Linhares, Reserva de Sooretama, Lagoa do Macuco, 16.VII.1969, fl., *C. Sucre 5601* (RB); Rio Barra Seca, 7.X.1996, fl., *D.A. Folli 2795* (CVRD, HUNI, RB); Reserva Natural Vale, estrada Jueirana-Vermelha, ♀ fl., 24.VII.2003, *D.A. Folli* 4562 (CVRD). Nova Venécia, APA Pedra do Elefante, Mata do Fuxico, 25.IV.2010, fr., *A.M. Assis et al. 2436* (MBML). Santa Leopoldina, Bragança, Mata do Tyrol, prop. Elcio Tomazini, 14.IV.2007, fr., *V. Demuner 3717* (MBML). Santa Teresa, Penha, Sítio do Zurlo, 19.VIII.1998, ♂ fl., *L. Kollmann et al. 419* (MBML); Reserva Biológica Augusto Ruschi, 25.X.2001, ♂ fl., *L. Kollmann et al. 4920* (MBML); 9.I.2002, fr., *L. Kollmann et al. 5267* (MBML); 16.X.2002, fr., *R.R. Vervloet et al.*

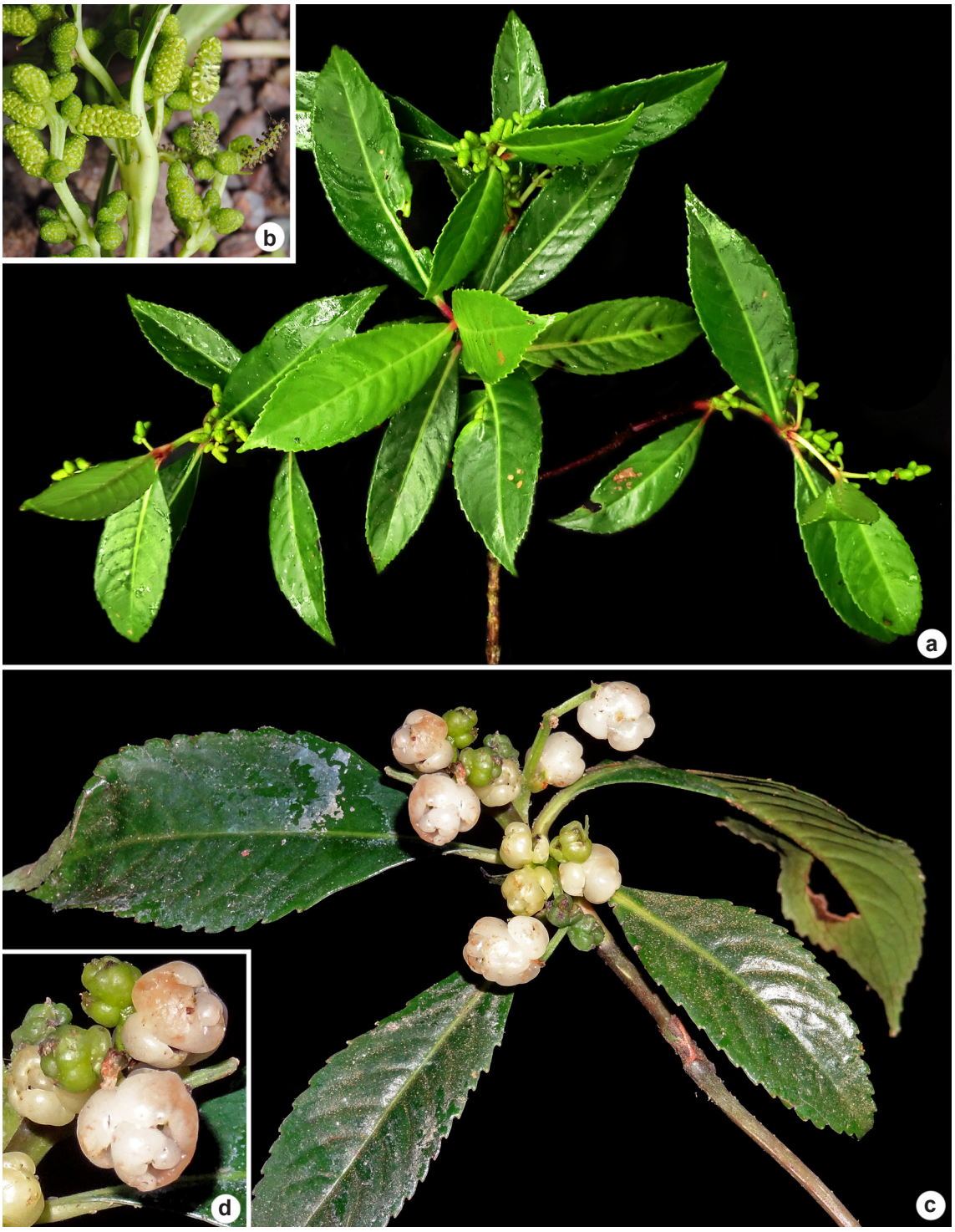

Figure 1 – a-d. *Hedyosmum brasiliense* – a. branch with staminate flowers; b. detail of staminate inflorescences; c. branch with pistillate flowers; d. detail of pistillate inflorescences. Photos: a. Fábio Mareto; b. Marcio Verdi - IFFSC (Inventário Florístico Florestal de Santa Catarina); c-d. Rafael G. Barbosa-Silva.

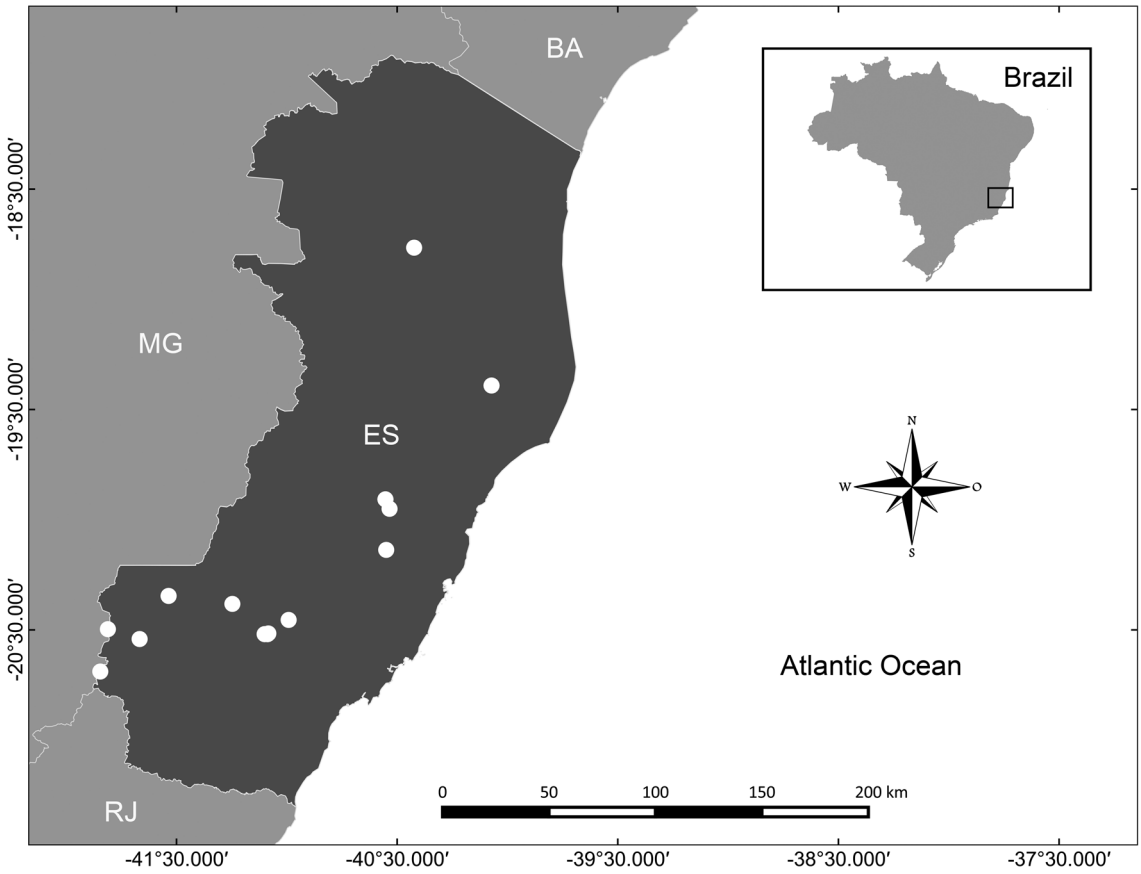

Figure 2 – Geographic distribution of *Hedyosmum brasiliense* in Espírito Santo, Brazil, represented by white dots. BA = Bahia; ES = Espírito Santo; MG = Minas Gerais; and RJ = Rio de Janeiro.

1230 (MBML); 24.IX.2002, ♂ fl., *R.R. Vervloet 1064* (MBML). Vargem Alta, RPPN Águia Branca, 6.X.2018, fr., *A.M. Assis et al. 4773* (VIES).

The species can be easily recognized by its opposite leaves with crenate margins, persistent sheaths in the base of petioles, staminate inflorescences with 1–4 nodes of oppositely paired cymes of spikes terminated by a single spike, and thyrsic cymose pistillate inflorescences that are shorter than the leaves. The length of leaves and petioles are variable characters in the wide geographic distribution of the species (Todzia 1988). The species is known as "barandi-do-brejo", "barandi-da-lama", "cidreira" or "chá-de-soldado" in Espírito Santo.

Acknowledgments

We acknowledge the curators of the herbaria visited. EJL thanks CAPES, for the post-doctoral fellowship. AAA thanks FAPES, for a research grant ("Capixaba Researcher Fellowship" #525/2018). The authors thank Fábio Mareto, Marcio Verdi, and Rafael G. Barbosa-Silva, for the permission to use their photographs.

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Area Editor: Dra . Tatiana Carrijo
Received in March 05, 2021. Accepted in July 09, 2021.