



## *Priogymnanthus colombianus* (Oleaceae), a new species and first record of genus to Colombia

JOSÉ LUIS FERNÁNDEZ-ALONSO<sup>1\*</sup> & PAULA ANDREA MORALES MORALES<sup>2</sup>

<sup>1</sup>Real Jardín Botánico –CSIC. Departamento de Biodiversidad y Conservación. Plaza de Murillo 2, 28014 Madrid. España. Email: [jlfernandez@rjb.csic.es](mailto:jlfernandez@rjb.csic.es). ORCID ID: <http://orcid.org/0000-0002-1701-480X>

<sup>2</sup>Herbario Universidad de Antioquia, Facultad de Ciencias Exactas y Naturales, Apartado aéreo 1226, Medellín. Colombia. Email: [paumoralessm@gmail.com](mailto:paumoralessm@gmail.com). ORCID ID: <http://orcid.org/0000-0002-9167-6027>

\*Corresponding author

### Abstract

*Priogymnanthus colombianus*, a new species and the first record of the South American genus of Oleaceae for Colombia is described and illustrated also we present a dichotomic key for the known species of genus. The new species differs from the three known for *Priogymnanthus* by: leaves oblong or oblong-elliptic, completely glabrous, petioles 10–17 (19) mm; inflorescences 15–20 (25) mm in length, with glabrous rachis, anthers about 3 mm length; fruits (10) 12–15 mm in diameter. *P. colombianus* occurs on premontane and dry forest in Colombia between 719 and 1213 m of elevation. Based on general threats to its ecosystems and few records found, we categorize the species as EN (endangered) following IUCN criteria.

### Resumen

Se describe e ilustra *Priogymnanthus colombianus*, una nueva especie y primer representante de este género suramericano de Oleaceae en Colombia, y se presenta una clave dicotómica para la identificación de las especies conocidas del género. Esta nueva especie se diferencia de las tres especies conocidas de *Priogymnanthus* por la siguiente combinación de caracteres: hojas oblongas a oblongo-elípticas, enteramente glabras, peciolo de 10–17(19) mm; inflorescencias de 15–20(25) mm de diámetro, raquis glabro, anteras de 3 mm de longitud y frutos de (10)12–15 mm de longitud. *P. colombianus* se encuentra en bosques secos y premontanos de Colombia entre 719 y 1213 msnm. De acuerdo con el nivel actual de intervención de estos ecosistemas en el país y los pocos registros encontrados, sugerimos la categoría de amenaza EN (En Peligro) de acuerdo con los criterios de la UICN.

### Introduction

Historically, Oleaceae (Lamiales) were only represented in Colombia by two native species of the Panropical genus *Chionanthus* Linnaeus (1753: 8). In recent years, new records for two cultivated species and descriptions of three new species in 2016, increased this number to seven, all in the same genus (Bernal 2015, Fernández-Alonso & Cogollo 2016, Fernández-Alonso & Cogollo 2017). The new species of *Priogymnanthus* P.S. Green (1994: 280) (subfamily: Oleoideae, tribe: Oleae (Hoffmannsseg & Link ex Brown 1810: 522) Dumortier (1827: 52), subtribe: Oleinae (Hoffmannsseg & Link 1809: 62) Wallander & Albert (2001: 390)) described here, adds a second Oleaceae genus to the Colombian flora and a fourth member to this genus. The genus *Priogymnanthus* formerly included the two species: *P. apertus* (Ståhl 1991: 54) P.S. Green endemic to Ecuador and *P. hasslerianus* (Chodat in Chodat & Hassler 1903: 914) P.S. Green from Bolivia, Brazil and Paraguay. Later, *P. saxicolus* Lombardi (2015: 66) was described from Brazil.

Recent molecular studies place *Priogymnanthus* together with *Forestiera* Poiret (1812: 664) and *Hesperelaea* A. Gray (1876: 83) in an isolate monophyletic lineage with strong to moderate support (Wallander & Albert 2000, Zedane *et al.* 2016). *Priogymnanthus* is distinguished from its close relative *Forestiera* by the presence of corollas and hermaphrodite flowers, which are very rare in the latter genus (Lombardi 2015). From *Hesperelaea*, an extinct genera Guadalupe Island (Mexico) endemic, differs by smaller flowers (ca. 5 mm) with linear-lanceolate petals without calyx

versus longer flowers (ca. 10 mm) with clawed petals and calyx presence. It is further distinguished from *Chionanthus* by the absence of calycine verticil, the presence of early deciduous corollas, and the androecium always consisting of four stamens. Although flowers with four stamens are also present in some species of *Chionanthus* and *Hesperelaea* members of Oleaceae are typically recognized by flowers with two stamens (Sher & Weber 2009).

The new species presented here was first collected almost 40 years ago in Tolima (Magdalena Valley) Colombia by Raúl Echeverry. The specimen had only immature inflorescences and remained indetermined until we could find two other flowering records from Antioquia. Using flower and fruit samples from trees of one of these localities fixed in 70% ethanol, we were able to confirm that it clearly represents a new species of *Priogymnanthus* and thus also the first record of the genus for Colombia.

## Materials and methods

For the present study, we followed classic taxonomic morphological methods. We described color of vegetative and reproductive parts, and indumentum from both live plants and herbaria specimens. We did measurements of reproductive organs from material conserved in ethanol, but some herbarium material like young inflorescence and flowers were rehydrated and dissected. We use a stereoscopic microscope Nikon SMZ645 to dissect, and measure flowers and fruits. In addition, detailed photographs were taken using a Canon Power Shot A70 camera. Physical specimens were studied from HUA and COL (acronyms according to Thiers B. 2016), additional material was consulted as digital images in Tropicos (2018) and JSTOR (2018). To assess the conservation status for the new species, we followed IUCN criteria and subcriteria that are based on geographical information (Criteria B), because there is no information about population size or population size trends. (IUCN 2017). We used the R package “ConR” to estimate the following Red List parameters: Extent of occurrence (EOO), number of subpopulations, number of locations, and proportion of occurrences within protected areas (Dauby 2018) (R Core Team 2018). For these analysis in ConR, we used the shape file of protected areas in Colombia available at The World Database on Protected Areas (Protected Planet 2019). ConR provides the output distribution map.

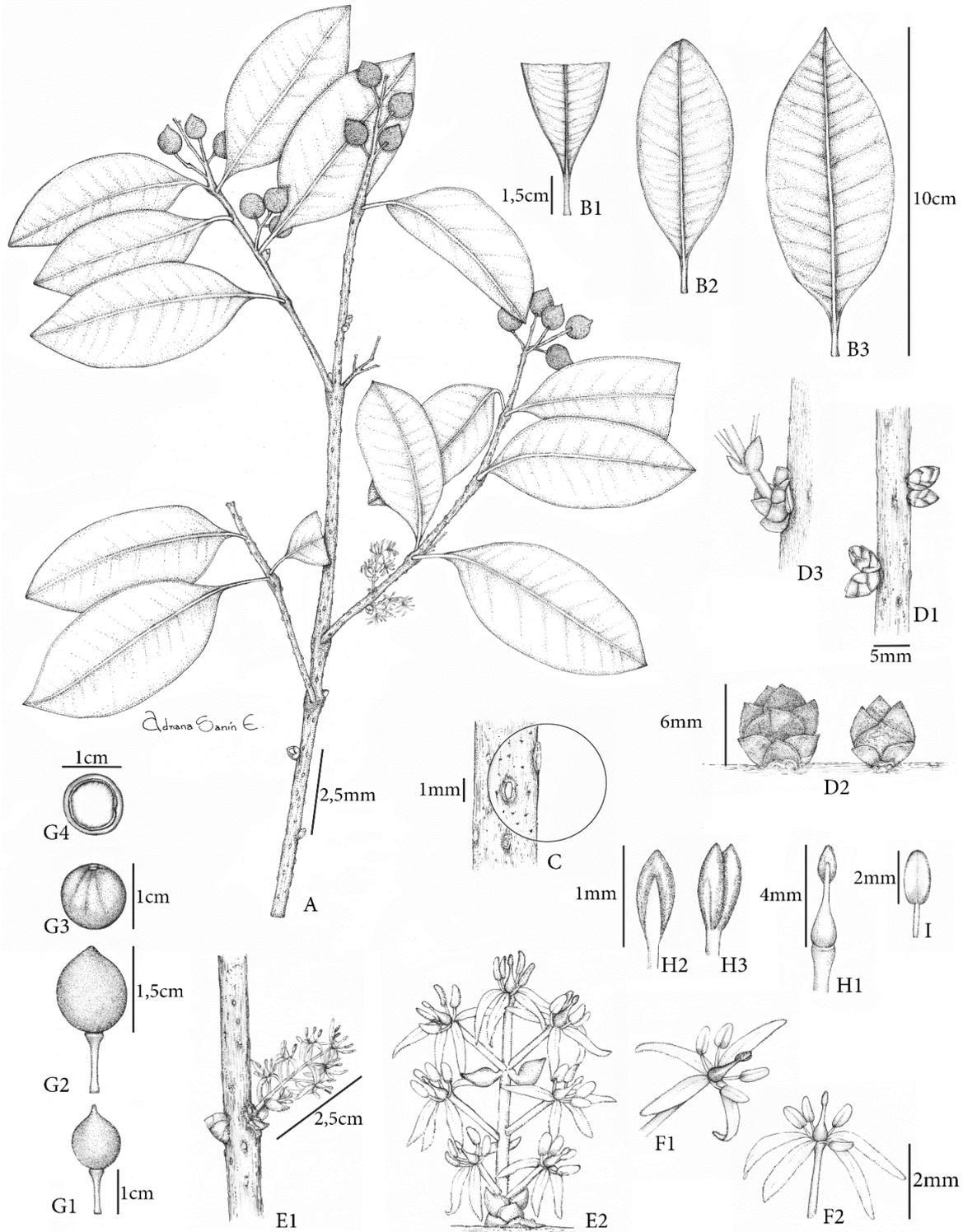
## Results

### *Priogymnanthus colombianus* Fern.Alonso & P.A. Morales-M., *sp. nov.* (Figure 1,2,3)

Type:—COLOMBIA. Antioquia. Municipio de Sonsón, Vereda Naranjal Abajo, borde de quebrada Magallo cerca de su desembocadura en el Rio Aures, 1213 m, 19 oct 2017 (fl), *Morales P. 1230* (Holotype HUA-211572; Isotypes: HUA!, COL!, JAUM!, MA!, MO!).

It resembles *Priogymnanthus apertus* (B. Sthal) P.S. Green by leaves oblong-elliptic and glabrous, but differs in longer petioles (10–19 mm vs. 5–10 mm), longer inflorescences ((15)18–25 mm vs. 15–19 mm), petals linear-lanceolate of 4–5 mm long vs. petals narrowly elliptic, 2 mm long, shorter anthers (3 mm vs 3–4 mm), and smaller globose fruits (10–15 × 11–14 mm vs. obpyriform fruits, 20–25 × 17–20 mm).

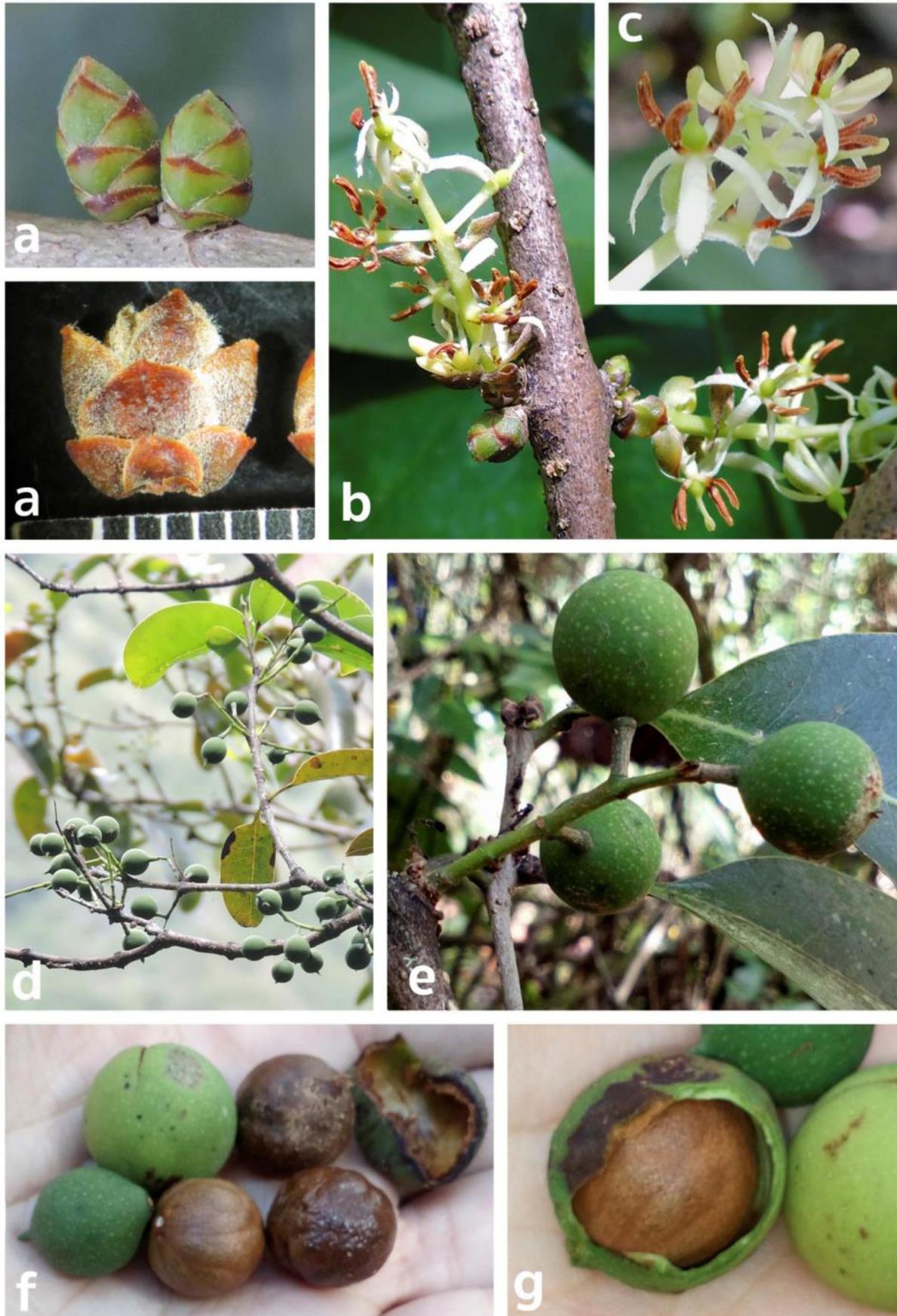
Trees semideciduous, 8–13 m tall and 15–30 cm diameter at breast height; bark slightly rugose, brown-reddish; branches glabrous when old, with conspicuous lenticels, terminal axis dorsally flattened; internodes (1.5)2–3 cm long; nodes slightly thickened. Leaves opposite (rarely subopposite), simple, mainly disposed in distal portion of branches; petiole 10–17(19) × 1.5–2 mm, slightly grooved, yellowish in live plants and blackish when dry; blade (7)8–13 × (3.5)4.5–5.5(6) cm, chartaceous, oblong to oblong-elliptic, base cuneate to attenuate, apex acute to acuminate (rarely obtuse), margin entire but slightly sinuate in dry specimens, both surfaces glabrous, shiny in adaxial side; venation pinnate, midrib yellowish, immersed above and prominent below, secondary veins of 8–10 (11) pairs and slightly flattened, tertiary venation slightly conspicuous adaxially and less abaxially; domatia and stipules absent. Inflorescence axillary or terminal (subterminal), cymose, frequently 1–3 on nodes (usually leafless) before the inferior pair of leaves. Young inflorescence 4–7 × 4–5 mm, compactly bracteate, ovoid to conic; cataphylls (2.5)3–5 × 2–5 mm, 5–6 pairs, triangular, concaves, decussate, coriaceous, shiny, green or blackish with reddish margins, covered by white finely lanate indumentum (yellowish when dry), mainly at base and margins. Elongated Inflorescence (15)18–25 × 8–10 mm, 7–9(11) flowers in 4–5 cymes of one pair of decussate flowers, except the last one with 3 flowers; peduncle ca. 1 mm, cylindrical, with 1–2 pair of dry cataphylls followed by 2 basal bracts 2.5 × 2.0 mm, connate, narrowly triangular, green with reddish margin; rachis glabrescent, pale green, 1–4 pair of cataphyll remaining dry basally; floral bracts



**FIGURE 1.** *Priogymnanthus colombianus* Fern.Alonso & P.A. Morales-M. A. Terminal branch with leaves arrangement, inflorescence and fruits. B1. Leaf below. B2-B3. Leaves above C. Lenticels on old branches. D1. Inflorescence buds on branches before opening. D2. Detail of bud inflorescences. D3. Basal portion of an opened inflorescence. E1. Inflorescence lateral view. E2. Inflorescence front view with basal cataphylls and cymes with their respective deciduous floral bracts. F1-F2. Flower showing petals, stamens and pistil position. G1. Immature fruit. G2. Mature fruit. G3. Pyrene. G4. Pyrene cross section. H1. Pistil. H2. Stigma detail. H3. Stigma detail lateral view. I. Stamen. Illustration by Adriana Sanin of HUA herbarium based on spirit collections, photographs, and paratypes *Morales P.* 1231 (HUA-211573) and *Herrera M.* 14 (HUA-208683).



FIGURE 2. *Priogymnanthus colombianus* Fern.Alonso & P.A. Morales-M Holotype.



**FIGURE 3.** *Priogymnanthus colombianus* Fern.Alonso & P.A. Morales-M. A. Inflorescences buds before opening from living plant and exsiccate. B. Inflorescences with basal cataphylls and floral bracts. C. Flowers detail. D. Branches with immature fruits. E. Mature fruits. F. mature and immature fruits, and pyrenes showing longitudinal grooves. G. Mature fruit detail. Photos by P.A. Morales M.

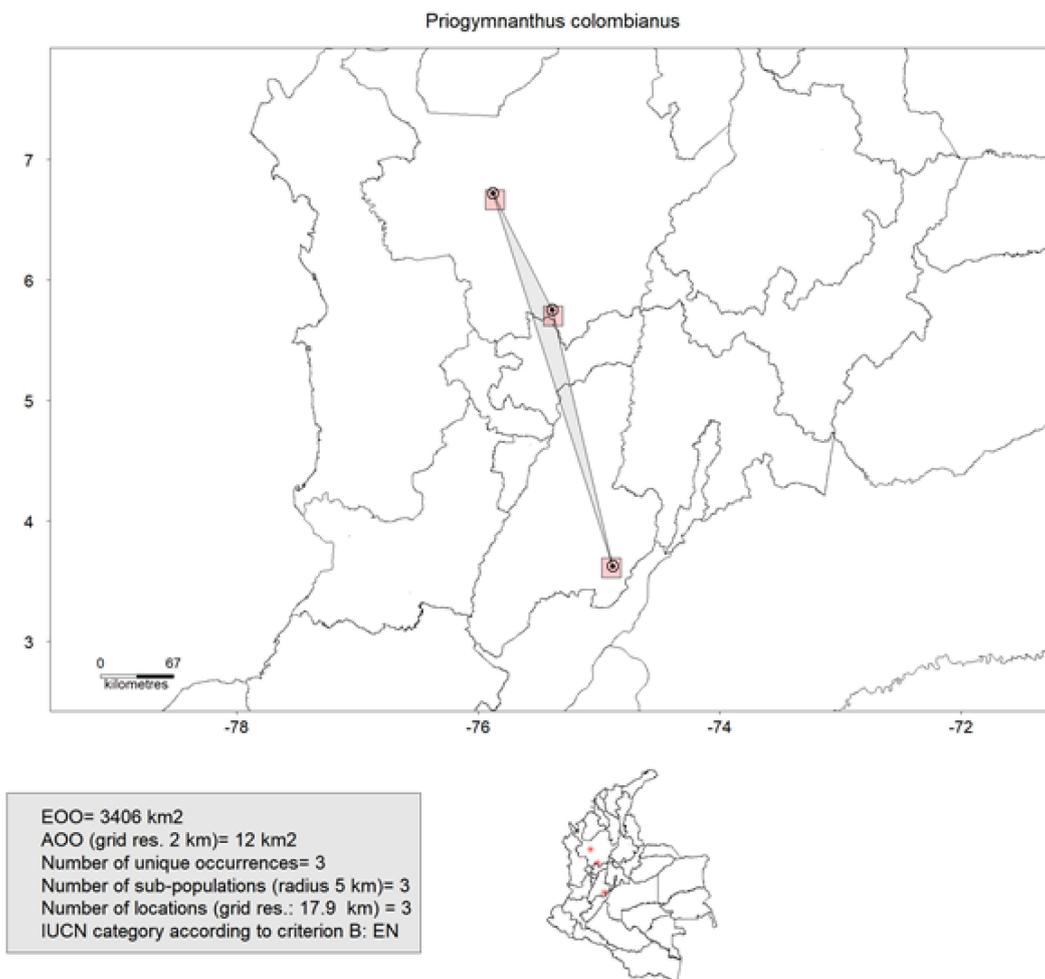
2 × 1 mm, membranous, elliptic, concave, promptly deciduous leaving visible scars, green, whitish lanate indumentum in both surfaces. Flowers bisexual; pedicels (1)2–3 mm long during anthesis, glabrous; calyx absent; petals 4–5 × 1 mm, white, alternate with statements, promptly caducous, linear-lanceolate, apex acute, puberulous above and beneath, margin ciliate, stamens 4, ca. 4 mm long, 2-sporangiate, 4-thecate, white yellowish before dehiscence, brown after that, sometimes alternating opened and closed, filament thick, 1 × 0.5 mm, connective inconspicuous, anther ca. 3 × 0.8 mm, botuliform, slightly arched towards floral axis, falcate after dehiscence; pistil 3 mm long, glabrous, green, ovary 1 mm diameter, superior, 2-locular, style ca. 1.2 mm long, cylindrical, stigma 0.8–1 mm long, deltoid with 2 terminal and flattened lobes. Infructescence with 1–3 developed fruits but until 20–30 per terminal branch; peduncles ca. 8–11 × 1.5 mm, slightly thickened on distal portion, lenticelate, green. Fruits (10)12–15 × 11–14 mm, drupes, globose, slightly narrowed at base with an apiculum distally, glabrous, green; pericarp olive green with sparsely minute white spots, black-bluish when dry and finely tuberculate surface with pruinose aspect; pyrene 8–12 mm diameter, globose, brown, free of pericarp with a space of 1–2 mm when mature with a basal rounded scar, smooth surface with 4 longitudinal striates. Seed is rounded with a white nut inside.

**Etymology:**—The specific epithet refers to the country of origin for the known collections of this species.

**Vernacular name and uses:**—Cerezo. Timber species and feeding for animals like squirrels.

**Phenology:**—According to *Priogymnanthus colombianus* specimens and phenological record, this species is flowering from April to October and fruiting from November to February. After flower pollination ripening of fruits takes at least two months

**Distribution and habitat:**—*Priogymnanthus colombianus* is distributed in Colombia with only three records from the departments Antioquia and Tolima. It occurs in in the Cauca Valley between the western slope of Cordillera Central and the eastern slope of Cordillera Occidental, as well as areas close to Magdalena Valley on the western slope of Cordillera Oriental in the Colombian Andes (Figure 4). It seems to thrive in the transitional zone from premontane forests to dry forest, at elevations between 719–1213 m. The Antioquia population grows on very steep and rocky soil on the humid banks of a creek.



**FIGURE 4.** *Priogymnanthus colombianus* occurrence map and main IUCN parameters.

**Conservation status:**—The main threat to this species is unsustainable harvesting of timber. Its wood has been frequently used and is valued by locals in Sonsón. They suggested that it was more frequent in the forest a couple decades ago (Montoya pers. comm.). Historic deforestation and the associated loss of habitat in ecosystems like dry forest and premontane forest in Colombia due to mining, livestock and agriculture, threaten conservation efforts for *Priogymnanthus colombianus* in its extent of occurrence. Deforestation data across dry forest ecosystem in Colombia indicate that the potential range for this species in this ecosystem has decreased by 90% by the end of the 20th century (Pizano & Garcia 2014).

Up to date there are only three records, all of them in non-protected areas in forest fragmented and disturbed inside transitions between premontane humid forest and tropical dry forest. More field work is needed to check for undetected populations in similar conditions, like in Argelia, Antioquia (Montoya pers. comm.).

After analyzing the Red List parameters obtained in ConR: EOO of 3406 km<sup>2</sup>, only three locations and subpopulations, any subpopulation inside protected areas, and evaluated current threats, potential distribution and potential habitat available for this species, *Priogymnanthus colombianus*, is categorized as Endangered (EN), according to B1ab(ii)b(iii) IUCN Red List Criteria (IUCN 2012).

**Taxonomic relationships:**—*Priogymnanthus colombianus* can be recognized by the following character combination of leaves oblong or oblong-elliptic, chartaceous, entirely glabrous, petioles 10–17(19) mm, inflorescences (15)18–25 mm with glabrescent axis, anther about 3 mm long and relatively small fruits (10)12–15 × 11–14 mm. It differs from *P. hasslerianus* (Chodat) P.S. Green by blade shape (elliptic-ovate) and consistency (coriaceous), longer petiole (15–30 mm). *P. apertus* (B.Stühl) P.S.Green differs by shorter petioles (5–10 mm), shorter petals (2 mm), longer anthers (3–4 mm) and longer fruits (20–25 mm). *P. saxicolus* Lombardi diverge by smaller elliptic leaves (4–9 cm), shorter petioles (6–9 mm) and persistent villose indumentum on abaxial blades and inflorescences of smaller size (7 × 7 mm) with sessile anthers and thicker pistil.

**Paratypes:** COLOMBIA. Antioquia. Municipio de Sonsón, Vereda Naranjal Abajo, borde de quebrada, 1213 m, 19 November 2017 (fr), *P. Morales 1231* (HUA-211573, JAUM); Antioquia. Municipio de Buriticá, Vereda Higabra, 719 m, 1<sup>st</sup> March 2017 (fl, fr), *Herrera M. 14* (HUA-208683); Tolima. Municipio de Dolores, Vereda Los Guásimos, Finca San Miguel, 842 m, 16 April 1980 (fl), *R. Echeverry 3439* (COL-217753).

**Other *Priogymnanthus* specimens examined:**—*Priogymnanthus apertus*: ECUADOR. Prov. El Oro: Zaruma, Portovelo (gold mine near Zaruma), 600–1000 m, 30 August–1 September 1923, (fl, fr), *A.S. Hitchcock 21223* (Holotype, NY-00039610); Ibidem: 60 Km SE of Arenillas, along road to Loja, (Dry zone, steep slopes with forest along the rivers), 400 m, 13 November 1982, (fr), *T.D. Pennington & G. Tenorio 10722* (QCA-162958); Prov. Manabi: San Sebastian, 400–550 m, 16 October 1992, (fl, fr), n.v. Francisco; *Josse et al. 839* (QCA-162962). *Priogymnanthus hasslerianus*: BOLIVIA. Santa Cruz: Prov. Angel Sandoval, alrededores de San Fernando, 16 October 2001, *J.C. Catari et al. 146* (MO). PARAGUAY. Ad ripamrivi Salado, September 1898–1899, (fl), *E. Hassler 3240* (Holotype G00381135; Isotype G00381136, Isotype BM000021533, Isotypus P00753776); Central: in regione lacus Ypacaray, August 1913, *E. Hassler 11889* (C, MO).

### Key to the species of *Priogymnanthus*

1. Leaves (4.5)5–10 cm wide, coriaceous, broadly elliptic-ovate, apex obtuse to rounded; anthers 4 mm long ..... *P. hasslerianus*
- Leaves always less than 5 cm wide, chartaceous, oblong to oblong-elliptic, apex acute or acuminate; anthers 2.5–3.5(4) mm long ..... 2
2. Abaxial blades villose; inflorescence about 7 mm; anthers 2.5 mm long ..... *P. saxicolus*
- Abaxial blades glabrous; inflorescence longer than 7 mm; anthers 3–4 mm long ..... 3
3. Leaves with petioles 5–10 mm long, inflorescences 15–19 mm long, 5–9 flowered; petals 2 mm long, narrowly elliptic; anthers 3–4 mm long, stigma subglobose, 0.5 mm long; fruit obpyriform, 20–25 × 17–20 mm ..... *P. apertus*
- Leaves with petioles 10–19 mm long, inflorescences (15)18–25 mm long, 7–11 flowered; petals 4–5 mm long, linear-lanceolate; anthers 3 mm long; stigma deltoid, 0.8–1 mm long; fruit globose, 10–15 × 11–14 mm ..... *P. colombianus*

### Acknowledgements

We thank to the curators of HUA and COL herbariums for facilitating access to their collections and equipment. To the Spanish National Research Council (CSIC), and the Ministry of Economy and Competitiveness for financing the project CGL 2010–19747, that facilitated the herbarium work in Colombia of JLF. To Adriana Sanin and HUA herbarium for provide the illustration for this species, to Diego Zapata for his help with photoshop work, to Maribel

Herrera for share her observations and photos from her Buriticá collections, to Oscar Montoya for share his knowledge about Cerezo and his important help during field season in Sonsón, and finally Jenny Muñoz, Álvaro Idárraga, and Chistian Bräuchler for their helpful comments and suggestions to the manuscript.

## References

- Bernal, R. (2015) Oleaceae. In: Bernal, R., Gradstein, S.R. & M. Celis, M. (Eds.) *Catálogo de plantas y líquenes de Colombia*. Instituto de Ciencias Naturales, Univ. Nacional de Colombia, Bogotá.
- Brown, R. (1810) *Prodromus Florae Nova Hollandiae* 1. Richard Taylor & associates, London, 590 pp.
- Chodat, R. & Hassler, E. (1903) Plantae Hasslerianae soute numération des plantes récoltées au Paraguay par le Dr. Émile Hassler, d'Aarau (Suisse) de 1885 à 1902. *Bulletin de l'Herbier Boissier* Série 2, 3: 906–941.
- Dauby, G. (2018) ConR: Computation of Parameters Used in Preliminary Assessment of Conservation Status. R package version 1.2.2. Available from : <https://CRAN.project.org/package=ConR> (accessed 26 March 2019)
- Dumortier, B.C.J. (1827) *Florula belgica*. J. Casterman, Tournai, 172 pp.
- Fernández-Alonso, J.L. & Cogollo-Pacheco, A. (2016) *Chionanthus megistocarpus* (Oleaceae), a new species from the Western Cordillera of Colombia. *Phytotaxa* 269 (1): 14–20.  
<https://doi.org/10.11646/phytotaxa.269.1.2>
- Fernández-Alonso, J.L. & Cogollo-Pacheco, A. (2017) Sinopsis de *Chionanthus* (Oleaceae) en Colombia y países limítrofes y descripción de una nueva especie. *Anales del Jardín Botánico de Madrid* 74 (1): 1–12.  
<https://doi.org/10.3989/ajbm.2442>
- Gray, A. (1786) Miscellaneous botanical contributions. *Proceedings of the American Academy of Arts and Sciences* 11: 71–104.
- Green, P.S. (1994) A revision of *Chionanthus* (Oleaceae) in S. America and the description of *Priogymnanthus*, gen. nov. *Kew Bulletin* 49: 261–286.  
<https://doi.org/10.2307/4110264>
- Hoffmannsegg, J.C. & Link, J.H.F. (1809) *Flore Portugaise*. Tome 1. Charles Frédéric Amelang, Berlin, 458 pp.
- IUCN (2012) *IUCN Red List Categories and Criteria*. Version 3.1. 2<sup>a</sup> edition. Prepared by the IUCN Species Survival Commission. Gland and Cambridge. United Kingdom.
- JSTOR (2018–Present) Global Plants database JSTOR. Available from: <https://plants.jstor.org/> (accessed 17 July 2018)
- Linnaeus, C. (1753) *Species plantarum* 1–2. Stockholm, Laurentii Salvii, 1200 pp.
- Lombardi, J.A. (2015) *Priogymnanthus saxicolus* (Oleaceae), a new species from Minas Gerais, Brazil. *Phytotaxa* 221 (1): 66–70.  
<http://dx.doi.org/10.11646/phytotaxa.221.1.6>
- Pizano, C. & García, H (Eds.) (2014) *El Bosque Seco Tropical en Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH). Bogotá, Colombia, 349pp.
- Poiret, J.L.M. (1812) *Encyclopédie méthodique. Botanique, Supplement* 2 (2). Chez Plomteux, Liège, 491 pp.
- Protected Planet (2019) The World Data Base on Protected Areas. Available from: <https://www.protectedplanet.net/> (accessed 26 March 2019)
- R Core Team (2018) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Available from: <https://www.R-project.org/> (accessed 26 March 2019)
- Sher, A.M. & Weber, A. (2009) Floral ontogeny of Oleaceae and its systematic implications. *International Journal of Plant Sciences* 170 (7): 845–859.  
<https://doi.org/10.1086/599074>
- Ståhl, B. (1991) Oleaceae. *Flora of Ecuador* 43: 47–56.
- Thiers, B. (2016 [continuously updated]) Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/ih/> (accessed 26 March 2019)
- Tropicos.org (2018–present) Tropicos.org. Missouri Botanical Garden. Available from: <http://www.tropicos.org> (accessed 17 July 2018)
- Wallander, E. & Albert, V.A. (2000) Phylogeny and classification of Oleaceae based on rps16 and trnL-F sequence data. *American Journal of Botany* 87 (12): 1827–1841.  
<https://doi.org/10.2307/2656836>
- Wallander, E. & Albert, V.A. (2001) Erratum. *American Journal of Botany* 88: 390.  
<https://doi.org/10.2307/2657102>
- Zedane, L., Hong-Wa, C., Murienne, J., Jeziorski, C., Baldwin, B.G. & Besnard, G. (2016) Museomics illuminate the history of an extinct, paleoendemic plant lineage (*Hesperelaea*, Oleaceae) known from an 1875 collection from Guadalupe Island, Mexico. *Biological Journal of the Linnean Society* 1117: 44–57.