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ORIGINAL RESEARCH

A new species of *Miconia* (Melastomataceae) with domatia from the Andean Cordilleras of Colombia

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Abstract

Miconia andinodomatia is proposed as a new species in the *M*. sect. *Cremanium*, from the mountains of Colombia, where it is widely distributed in the sub-Andean and Andean forests of the Western, Central, and Eastern Cordilleras of Colombia. *Miconia andinodomatia* is similar to several species, such as *M. cremophylla*, *M. lehmannii*, *M. theaezans*, *M. tovarensis* and *M. turgida*. However, it can be distinguished from all these by a combination of characters, including occurrence of leaf domatia, presence of a prominent interpetiolar line, and anthers with four terminal pores. The new species is herein formally described and illustrated, and its relationships to morphologically closely related taxa are discussed. An identification key to the species with leaf domatia placed in the *Miconia* III clade from Colombia is also provided. Additionally, comments about its distribution, ecology, habitat, floral biology, phenology, uses and conservation status are presented. Finally, the possible novel role played by domatia in the species is discussed.

Keywords Taxonomy · *Miconia* III · Andean mountains · ecological novelties

Introduction

The tribe Miconieae, within the genus *Miconia* Ruiz & Pav., constitutes the largest tribe in the family Melastomataceae. Within this genus, *Miconia* sect. *Cremanium* (D.Don) Hook.f. is defined by the presence of subcuneiform to obovate anthers opening by 1, 2, or 4 broad apical pores (Angulo & Michelangeli, 2023) and also by anthers with the same color as the corolla in most species (Judd et al., 2022). This section primarily includes species from the Andes from medium and high elevations (ranging between 1,000 and 2,800 m above sea level). However, they are also found in both low and high mountain ecosystems in Central America and the Caribbean (Goldenberg et al., 2013). Colombia, with over 61 species, stands as the most diverse country, and many of the *Miconia* species of this section are endemic there (Goldenberg et al., 2013). *Miconia* sect. *Cremanium* belongs to the *Miconia* III clade (sensu Goldenberg et al., 2008), which also includes Andean members from *Miconia* sect. *Amblyahrrena* (Naudin) Triana ex Hook. f., and *M.* sect. *Chaenopleura* (Rich. ex DC.) Hook. f., as well as the genus *Killipia* Gleason and some species of *Clidemia* D. Don (Goldenberg et al., 2008).

In nature, there are several complex associations that are generally overlooked. One of these includes the arthropod-plant associations, in which arthropods can be hosted in some plant-produced cavities named domatia (Wilkinson, 1979; Mound, 1993). These domatia consist of more or less pronounced cavities or tufts of hairs (Schnell, 1969). When these structures are restricted to vein axils, they are called leaf domatia (Walter, 1996). It is known that leaf domatia can host arthropods (O'Dowd & Willson, 1989), where this association could be explained as an arthropod-plant mutually beneficial relationship (Walter, 1996). Initially, it was proposed that predators of herbivores use leaf domatia as a shelter for their eggs (Pemberton & Turner, 1989; Agrawal & Karban, 1997; Agrawal et al., 2000; Romero & Benson, 2005), which in turn favors the increase of their populations (Agrawal & Karban, 1997). Consequently, the number of herbivores would be reduced, providing a benefit to the plant (Agrawal et al., 2000).

In addition, domatia can also be categorized by their morphologies, and five classes have been recognized: (1) tuft

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domatia, (2) pocket domatia, (3) sac domatia, (4) pit domatia, and (5) margin domatia (see Wilkinson, 1979). Tuft domatia are formed as hairs in vein axils; pocket domatia are shaped like flattened funnels with wide distal openings; sac domatia are similar to pocket domatia, but they are not flattened and the pockets are extended, sometime appearing as projections of the leaf; pit domatia are holes sometimes appearing as raised domes; and margin domatia are formed as revolute margins at leaf bases.

Within *Miconia* in the broad sense, the presence of leaf domatia has been reported in the vast majority of species previously treated in former genera, such as *Clidemia, Tococa, Maieta, Ossaea*, or *Conostegia*, but also in some species of *Miconia* belonging to sections *Tamonea, Cremanium, Miconia* and *Amblyarrhena* (Michelangeli, 2010; Cardenas et al., 2014; Mendoza & Posada Herrera, 2018; Judd et al., 2022), as well as in the species of Caribbean *Miconia* section *Calycodomatia* (Majure et al., 2015; Judd et al., 2022). In *Miconia* sect. *Cremanium*, they are uncommon, but some species from the high mountains of Colombia, Ecuador, and Peru have developed domatia in their leaves. Within this section, in Colombia, leaf domatia have so far been reported only in the high mountain species *Miconia crocea* (Desr.) Naudin, *Miconia ligustrina* (Sm.) Triana, and *Miconia reclinata* (Bonpl.) Naudin, as well as in the *M*. sect. *Amblyarrhena* species *Miconia brigittei* Humberto Mend. & Posada-Herrera.

In this study, we describe a new species of *Miconia* sect. *Cremanium* characterized by developed leaf domatia and a thick interpetiolar line. Additionally, we discuss the geographical, morphological and ecological aspects of the new species.

Materials & Methods

Relevant literature on the genus *Miconia* was reviewed, and the most similar species to the new taxon were compared, including the two subspecies and 18 varieties of *Miconia theazans* (Bonpl.) Cogn. The description of the new species was based on the morphological analysis of specimens of *Miconia* deposited at FAUC, HUQ, and JAUM herbaria (acronyms according to Thiers, 2023). Some specimens were also seen in the online databases of the Colombian National Herbarium (COL) (http://www.biovirtual.unal.edu.co/es/colecciones/search/plants/), the Herbario Forestal (UDBC) (http://herbario.udistrital.edu.co/herbario/public/es), the Herbarium of the Missouri Botanical Garden (MO) (https://tropicos.org), and the United States National Herbarium (US) (https://collections.nmnh.si.edu/search/botany). Structures were measured with a digital vernier caliper (resolution 0.1 mm, accuracy ± 0.2 mm). Flower measurements were based on samples preserved in alcohol from freshly collected material or rehydrated with boiling water. Species delimitation was based on the diagnostic species concept (Wheeler & Platnick, 2000). Natural populations of the species were visited in order to describe and photograph the habitat, ecology, floral biology and uses. Additionally, some exsicatae were prepared and deposited in multiple herbaria (COL, CUS–P, CUVC, FAUC, HUA, UDBC, UIS). Arthropods found visiting flowers and inside leaf domatia were collected in alcohol and determined to the rank of order in the Biological Collections Laboratory of the University of Caldas (Manizales).

The phenological data were obtained from fertile specimens and categorized as flowering, fruiting, or both, and graphed in *MonographaR* (Reginato, 2016). Estimates of the extent of occurrence (EOO) and area of occupancy (AOO) were calculated with the package *ConR* (Dauby & de Lima, 2023) in the statistical software *R* (R Core Team, 2024) based on the geographical data provided on the labels of studied specimens. For the parameters, the Convex Hull method was used to compute EOO, and 2 × 2 km grid cells were set, and this grid was randomly overlaid 100 times to calculate AOO. A preliminary Red List assessment was carried out for the new species following the IUCN (2024) guidelines. Finally, a geographical distribution map was created using *QGIS* 3.32 (2024) and a key was created for identifying species with leaf domatia within the *Miconia* III clade present in Colombia.

Taxonomic Treatment

Miconia andinodomatia Posada-Herrera & Gut.-Duque, sp. nov. TYPE: Colombia: Risaralda, Mun. Pereira, vía Pereira-Armenia, 4°43'50.7"N, 75°38'15.4"W, 1,880 m, 15 Feb 2023 (fl., fr.), *D. Gutiérrez & J.M. Posada 484* (holotype: FAUC, barcode 27138 [!]; isotype: COL [!]). Figs. 1, 2, 3, and 4.

Diagnosis. *Miconia andinodomatia* is characterized by an arborescent habit, nodes with a noticeable interpetiolar line, by plinerved veins with foliar-pocket domatia, and anthers with four terminal pores. It differs from *M. cremophylla* and *M. turgida* by the absence of a linear thickening at the petiole bases (vs. generally presenting a linear thickening at the petiole bases), anthers with four terminal pores (vs. anthers with two terminal pores), the presence of leaf domatia (vs. absence), and a prominent, conspicuous interpetiolar line (vs. interpetiolar line absent or inconspicuous).

Description. Shrubs or trees 2–9 m tall, 4–25 cm diameter at breast height, with open branching. Distal internodes rounded-quadrate, 1.4–6.2 cm long, twig diameter 0.2–0.5 cm; nodes expanded 2.9–7.6 mm wide, nodal lines present, thickened 0.2–0.4 mm. Indumentum on distal internodes, adaxial surfaces of petioles, and primary and secondary elevated veins on abaxial foliar surfaces consisting of a moderate to dense cover of brown dendritic trichomes with short axes and terete radiating arms, 0.1–0.2 mm long. Leaves opposite, isophyllous;

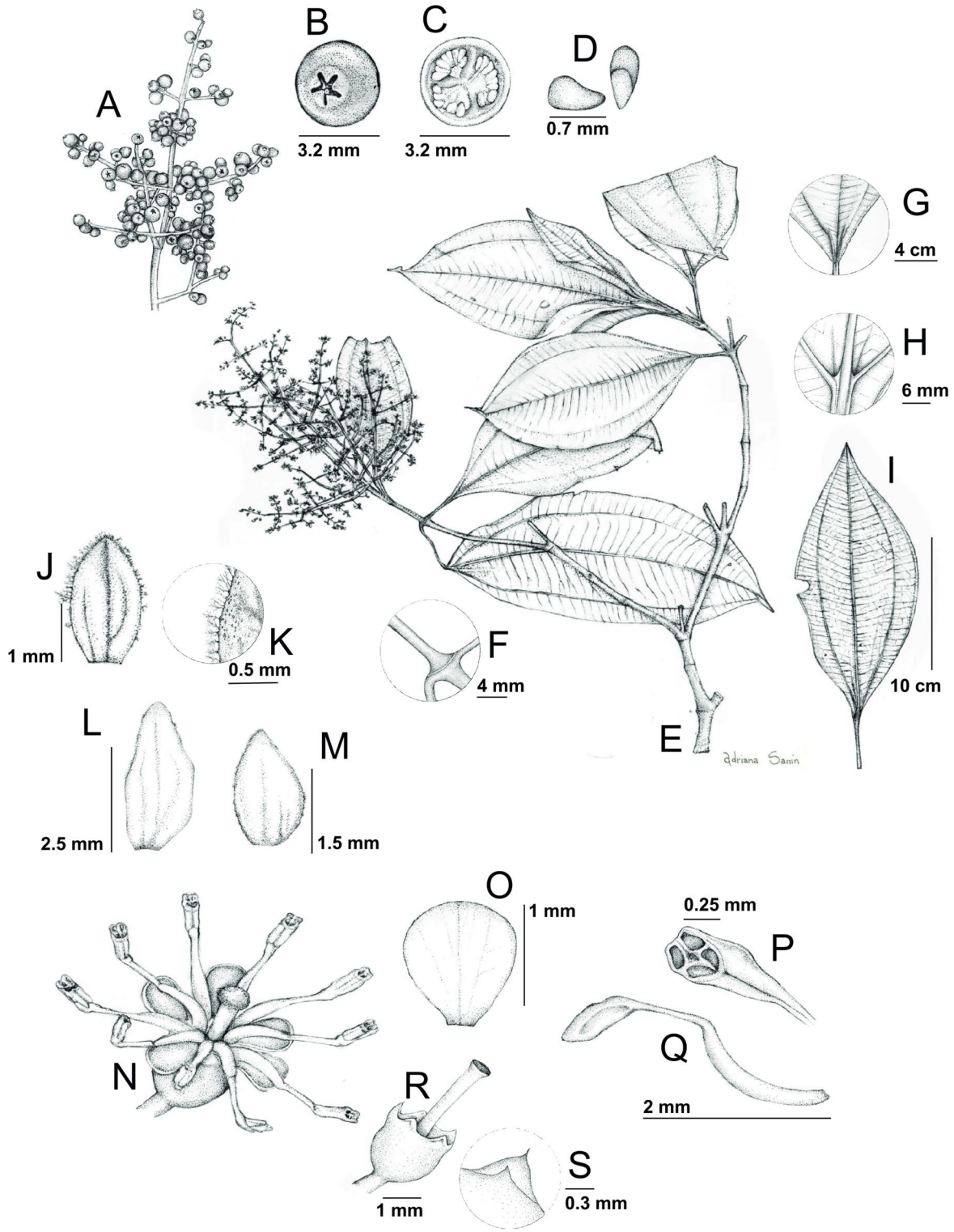

Fig. 1. *Miconia andinodomatia*. **A.** Fruiting branchlet. **B.** Fruit. **C.** Fruit transversal section. **D.** Seeds. **E.** Habit. **F.** Close-up of node (see nodal line). **G.** Close-up of leaf base on the upper side. **H.** Close-up of leaf base on the lower side (see pocket domatia). **I.** Leaf. **J, M.** Bracteole. **K.** Close-up of bracteole. **L.** Bract. **N.** Flower. **O.** Petal. **P.** Anther (see four truncate apical pores). **Q.** Stamen lateral view. **R.** Flower with petals and stamens removed (see hypanthium, style and stigma). **S.** Close-up of calyx (see calyx lobe and exterior calyx tooth). (A–F, N–S from the holotype *Gutiérrez & Posada 484*, FAUC; G–I from the isotype *Gutiérrez & Posada 484*, COL*;* J–K from *Mendoza & Quevedo 2487*, HUQ; L–M from *Agudelo* et al. *706*, HUQ). Illustration by Adriana María Sanín.

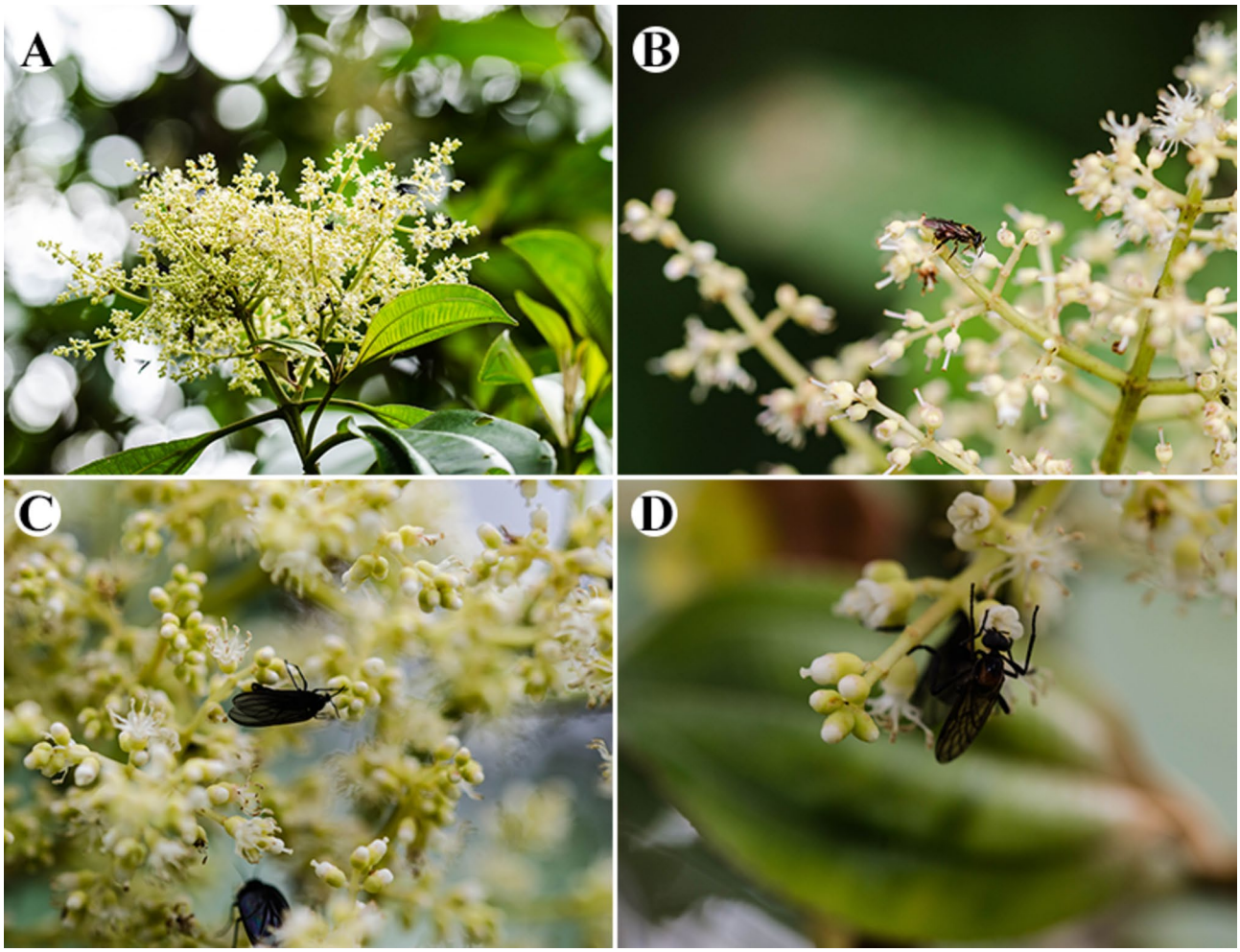

Fig. 2. *Miconia andinodomatia*. **A.** Inflorescence. **B–D.** Flower-visiting arthropods. Credits: J. M. Posada Herrera.

petioles 0.5–3.4 cm long, 1.1–2.8 mm wide near the apex, deeply canaliculate; blades 9.9–20.7×3.4–8.5 cm, narrowly ovate to ovate-lanceolate, the base acute to cuneate, the apex acute to attenuate, the margin essentially entire or vaguely denticulate, chartaceous when dry; pocket domatia immersed in the lower side of the leaf blade base, 2.3–12.0×0.6–4.9 mm, a pair of bulges observable on the upper side of the leaf; two pairs of secondary veins (including the tenuous marginal pair), the inner pair plinerved, diverging from the midvein above the domatia apex evident on the abaxial side, with 34–52 tertiary veins moderately sinuous, emerging at a slightly acute angle to the midrib vein, 1.8–7.0 mm apart along the midrib in the medial portion of the leaves; adaxial surface of mature blade glabrescent, but commonly with dendritic trichomes with short axes that persist to varying degrees along the primary veins and at the point where these veins diverge from each other at the domatia, the juvenile leaves covered by a dense light brown layer of these same trichomes; abaxial surface of mature leave essentially glabrescent, but commonly with dendritic trichomes with short axes that persist to varying degrees along the primary veins and short stalked trichomes on all veins, 0.1 mm long. Inflorescence a terminal panicle with more than 500 flowers, 14.0–43.2 cm long; rachises light green; peduncles bluntly quadrangular, green or whitish green; first internode 1.3–3.5 cm long or absent; first paraclade 5.8–11.0 cm long; paraclades with triflorous apex; bracts 3.9–4.0×1.5–1.7 mm, ovate to narrowly ovate, having dendritic hairs with well developed axes, deciduous; bracteoles 1.3–2.6×0.6–1.3 mm, ovate to narrowly ovate, with the same dendritic hairs as the bracts, deciduous. Inflorescences panicles, pedicels yellowish white, 1–5 mm long. Flowers 5-merous; hypanthia yellowish white, 0.7–1.3 mm long, 1.0–1.4 mm wide, campanulate, slightly covered with the same dendritic trichomes as the bracts, 0.1 mm long. Calyx open in bud and persistent in fruit, white, glabrous, lobes 0.1–0.3×0.1–0.5 mm, broadly triangular, the margin entire, the apex bluntly acute; exterior calyx teeth 0.1×0.1 mm, triangular. Petals white, 0.8–1.2×0.6–0.9 mm, widely obovate, the margin entire, the apex rounded, papillose on both surfaces, slightly inflexed at anthesis. Stamens 10, isomorphic,

Fig. 3. *Miconia andinodomatia*. **A.** Fruiting branchlet. **B.** Close-up of fruiting branchlet (see cyan blue mature fruit). **C–D.** Fruits being consumed by the bird *Tangara nigroviridis* (see how the cyan blue mature fruit gets removed by the bird). Credits: J. M. Posada Herrera (A, B); A. C. Castro (C, D).

Fig. 4. *Miconia andinodomatia*. **A.** Domatia can be observed as a pair of bulges on the upper side of the leaf. **B.** Domatia on the lower side of the leaf. **C.** Leaf longitudinal section (see pocket domatia chamber). Credits: J. M. Posada Herrera.

radially spreading at anthesis; filaments 1.6–2.1 mm long, 0.1–0.2 mm wide near the base, white, glabrous, geniculate at anthesis; anthers with 4 locules, thecae 0.5–0.9×0.3 mm, wide oblong, opening by four truncate apical pores, 0.16×0.12 mm, white; connective white, prolonged dorso-basally into two mounds, 0.28×0.06 mm. Ovary 3-locular, completely inferior, 0.6–0.8×0.7–0.9 mm, ovules arranged in axile placentation; style 1.5–1.9 mm long, 0.1–0.2 mm wide at the base, terete, white, glabrous; stigma white, capitate, slightly expanded, 0.2–0.4 mm wide. Berries 1.5–3.6×1.7–4.0 mm, globose to

subglobose, whitish-green to reddish when immature turning bright cyan blue when mature, glabrous; pedicels light green, 0.2–0.8 mm long. Seeds 0.4–0.7 × 0.2–0.3 mm, ovoid; testa light brown; raphal zone slightly darker.

Selected Specimens Examined: **COLOMBIA. Antioquia:** Mun. Envigado: vereda El Escobero, sector La Morena, 2393 m, May 2014 (fl.), *A. Gómez* et al. *20* (JAUM [!]). Mun Urrao: vereda Santa Catalina—La Gulunga, finca La Dorada, pasando el río Pavón, 06°11′01.2"N, 76°08′14.6"W, 1,920 m, 16 Sep 2016 (fr.), *J. P. Tobón* et al. *1818* (JAUM [!]). **Caldas:** Mun. Anserma: vereda Marapra, 5°12′26.73"N, 75°46′16.52"W, 1,829 m, 24 Jan 2024 (fl), *J. M. Posada* et al. *1432* (FAUC [!]). Mun. Aranzazu: Vereda Moravia, Finca La Rocallosa, 5°14′21.54"N, 75°26′24.67"W, 2,452 m, 01 Mar 2024 (fl.), *J. M. Posada* et al. *1465* (FAUC [!]). Mun. Manizales: Ecoparque Los Yarumos, 2,140 m, 27 Jul 2022 (fl.), *D. Gutiérrez* et al. *363* (COL [!], FAUC [!], HUA [!]). Mun. Riosucio: 2,300 m, 14 Aug 1997 (fl.), *L. Ríos 416* (COL [image!]). Mun. Villamaría: Termales del Otoño, 2,300 m, 21 Apr 1990 (fr.), *Orozco* et al. *4* (FAUC). **Cauca:** Mun. Popayán: La Capilla, 25 km north of Popayán, 1,740 m, 24 May 1944 (fr.), *E. P. Killip 38,470* (COL [image!], US [image!]); 1,700 m, 22 Oct 1944 (fr.), *K. von Sneidern 4767* (COL [image!], MO [n.v.]). Mun Tambo: La Romelia, Parque Natural Nacional Munchique, 2,600–2,800 m, 5 Aug 1980 (fr.), *G. Lozano 3669* (COL [image!]). **Quindío:** Mun. Armenia: vereda San Juan, Sena Agropecuario, 1,500 m, Feb 1996 (fl., fr.), *J. J. Peña 44* (HUQ [!]). Mun. Buenavista: vereda La Granja, 1,550–2,020 m, 17 Jul 1994 (fr.), *M. C. Vélez* et al. *4266* (HUQ [!]). Mun. Circasia: vereda Membrillal, finca San Agustín, 1,830 m, 13 Dec 1990 (bud, fl., fr.), *C. A. Agudelo* et al. *706* (COL [image!], HUQ [!]). Mun. Filandia: vereda Bambuco Alto, finca La Esperanza, 1,780 m, 30 Jul 1987 (fl.), *G. Arbeláez* et al. *2185* (COL [image!], HUQ [!]). Mun. Montenegro: hacienda Versalles, 28 Mar 1982 (fr.), *H. Gutiérrez* et al. *24* (HUQ [!]). Mun. Salento: carretera San Juan-Canaan, a borde de carretera, 1,660 m, 27 Dec 1984 (fl.), *G. Arbeláez* et al. *572* (HUQ [!], US [image!]). **Risaralda:** Mun. Dosquebradas: vereda El Nudo, finca Las Hortensias, 2,060 m, 6 Jun 1997 (fr.), *L. M. Álvarez & C. M. Ospina 2268* (FAUC [!]). Mun. Marsella: vereda El Nudo, Reserva Forestal, 2,050 m, 13 Oct 1988 (fr.), *J. Henao 30* (HUQ [!]). Mun. Pereira: vereda La Suiza, Amparo de Niños San Marcos, 1,780 m, 20 May 2003 (bud), *J. E. Mendoza & F. L. Quevedo 2487* (HUQ [!]). Mun. Santa Rosa de Cabal: 1,700 m, Feb 1852 (fl.), *J. J. Triana n.n.* (COL [image!]). Mun. Santuario: vereda Planes de San Rafael, 2,000 m, May 2011 (fr.), *B. Watteijne-Cerón 8* (HUQ [!]). **Santander:** Mun. Encino: vereda Rio Negro, Reserva Biológica Cachalú, 1,850 m, May 2004 (fr.), *A. Pinzón 35* (UDBC [image!]). **Valle del Cauca:** Mun. Sevilla: 1,500 m, 26 Jan 1947 (fl.), *J. M. Duque-Jaramillo 4602* (COL [image!]).

Distribution. *Miconia andinodomatia* is widespread in the Andean mountains of Colombia, being distributed in the departments of Antioquia, Caldas, Cauca, Quindío, Risaralda, Santander, and Valle del Cauca (Fig. 5). The species is found on forest edges and in regeneration zones in sub-Andean and Andean forests of the Western, Central and Eastern Cordilleras (sensu Cuatrecasas, 1958), on ranges between 1,400 and 2,700 m. Following the biogeographic regionalization of Colombia made by González-Orozco (2021), the species is distributed along the Popayan plateau, the Cauca valley, the Volcanic massif, the Northeastern slope of the Western cordillera, the Antioquia mountain, and the Santander mountain.

Ecology & Habitat. *Miconia andinodomatia* is commonly found along roads, on the edges of forests, in the interior of secondary forests and within regeneration areas, often appearing as small trees. For example, during the census of a sub-Andean forest, Gutiérrez-Duque et al. (2024) found that this species is an important component of the forest structure, being the woody species with the ninth highest importance value index (IVI). In addition, a higher abundance of *Miconia andinodomatia* was found to be associated with medium disturbance (Gutiérrez-Duque et al., 2024), reflecting its ability to grow in disturbed areas.

Floral Biology. Its flowers produce nectar and emit a strong fragrance that can be perceived from several meters away, attracting a variety of insects from the orders Diptera (7 species), Hemiptera (2 species), and Coleoptera (1 species) (Fig. 2B–D). The Observations of flower visitors, combined with nectar production, fragrance, large pore size, and flower coloration, suggest that *Miconia andinodomatia* has a generalist pollination system similar to that reported for *M. theaezans* and other high-altitude species of the genus *Miconia* (Kriebel & Zumbado, 2014; Brito et al., 2016, 2017, Manrique-Valderrama et al., 2022).

Ecology Notes. The presence of arthropods from the class Collembola (1 sp.) and the orders Thysanoptera (3 spp.), and Araneae (1 spp.), and mites (1 sp.), were frequently observed inside the domatia. Additionally, the mature fruits have a sweet taste, and their consumption by the bird *Tangara nigroviridis* was documented (Fig. 3C–D).

Phenology. *Miconia andinodomatia* flowers and produces fruits throughout the year, but has its greatest flowering peaks in the middle of the dry seasons and fruiting at the beginning and end of the rainy seasons (Fig. 6).

Domatia Morphology. The domatia are shaped like funnels with wide distal openings (Fig. 4), thus we categorized them as pocket domatia (see Wilkinson, 1979), which, although they are not completely flattened, the bulges are not extended enough to be considered sac domatia.

Etymology. The epithet *andinodomatia* refers to the species location in Andean ecosystems, and the presence of domatia at the base of the leaf blades, a trait uncommon in Andean species of *Miconia* section *Cremanium*.

Common names. This species is known as *miguelillo* (*Orozco* et al. *4*) or *nigüito* (*N. R. Mejía* et al. *36*) in the municipality of Manizales, department of Caldas; and as *punta de lanzo* (*B. Watteijne 8*) in the municipality of Santuario, department of Risaralda.

Uses. Although the species has no reported uses, it could be used in ecological restoration plans due to its ability to grow in disturbed areas (see *Ecology and Habitat*). It could also be planted as an ornamental along roads due to its beautiful foliage and flowers.

Preliminary Conservation Status. Although the new species is endemic to Colombia, it is relatively widespread in the country, currently known from seven departments and 22 municipalities. The Andean region where the species is found corresponds to one of the most disturbed regions of Colombia, where deforestation, urban expansion, livestock and coffee plantations predominate (Rudas et al., 2007; Myster, 2020). Even so, we consider that this is not a serious

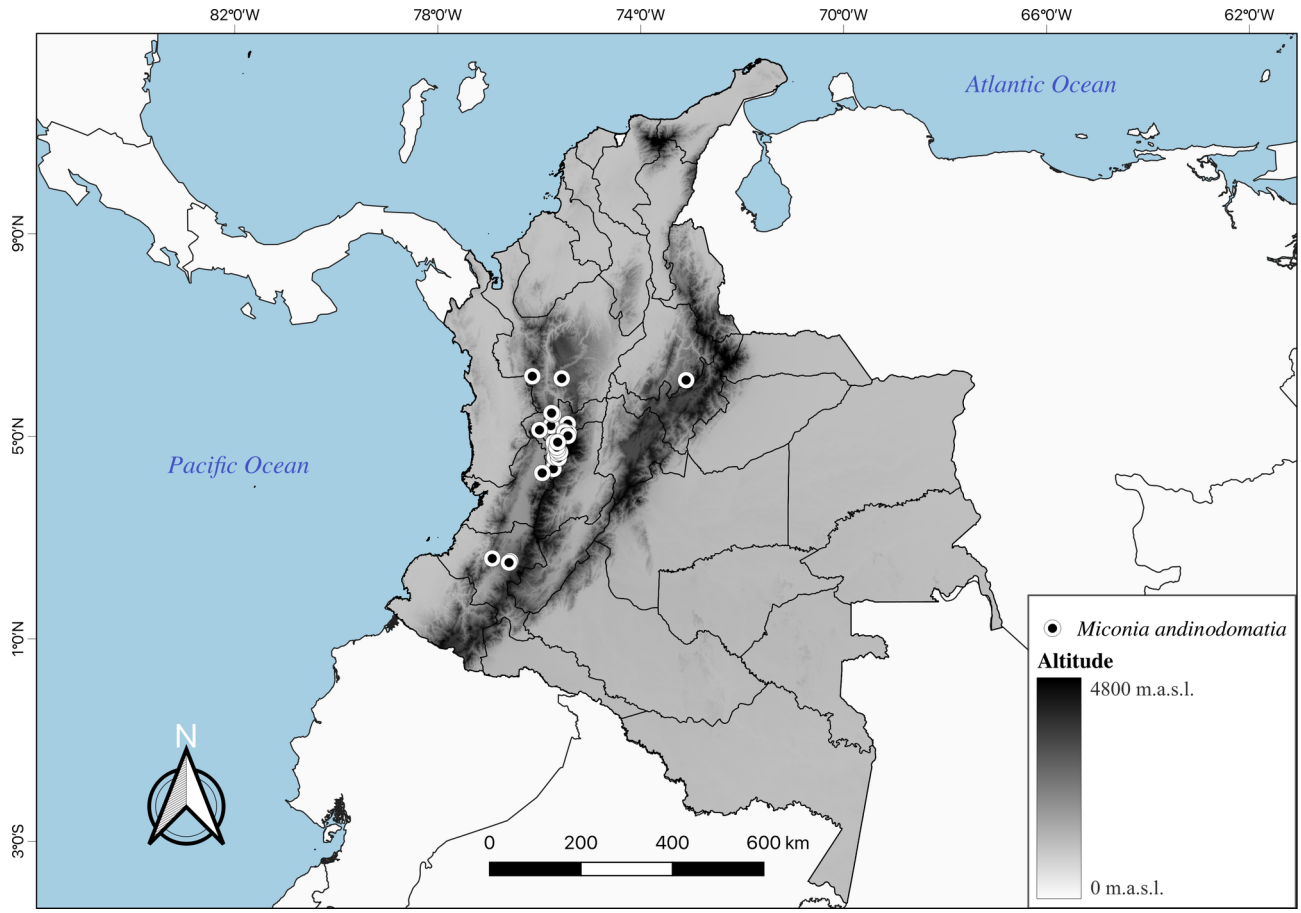

Fig. 5. Geographical distribution map of *Miconia andinodomatia*. Circles represent data points of specimens examined (Appendix 1). Map created in QGIS 3.32. (2024).

factor that could threaten its populations, as it is a tree species that has been found to grow successfully along roads, on the edges of forests, and within regeneration and disturbed areas (see *Ecology and Habitat*). Additionally, the extent of occurrence (EOO) was estimated to be 76,554 km^2, with an area of occupancy (AOO) of 172 km^2. As a result, we propose the preliminary IUCN Red List assessment of the species as Least Concern (LC) under IUCN criteria.

Key to the Colombian Species of the *Miconia* III Clade with Leaf Domatia

1. Leaves with tuft domatia; domatia pubescent……..2
1. Leaves with pocket domatia; domatia glabrous……..3
2. Stems sub-tetragonous; laminae more than 11 cm long; flowers 5-merous……..*M. briggittei*
2. Stems terete; laminae less than 7 cm long; flowers (6) 7–8 (9)-merous……..*M. crocea*
3. Shrubs to trees; leaf laminae more than 9 cm long……..*M. andinodomatia*
3. Strictly shrubs (< 4 m); leaf laminae less than 5 cm long……..4
4. Leaf laminae elliptical with entire margin; inflorescences pendulous; growing in high-Andean ecosystems……..*M. reclinata*
4. Leaf laminae obovate with denticulate margin at apex; inflorescences erect; growing in paramo and sub-paramo ecosystems……..*M. ligustrina*

Discussion

Taxonomic Affinities. *Miconia andinodomatia* resembles multiple other species in the genus, such as *M. cremophylla* Naudin, *M. turgida* Gleason, *M. tovarensis* Cogn., *M. lehmannii* Cogn. and *M. theaezans* (Bonpl.) Cogn., but it differs from all of those by a combination of characters, such as the occurrence of leaf domatia (Figs. 1H and 4B), the presence of a prominent interpetiolar line (Fig. 1F), and/or anthers with four terminal pores (Fig. 1P). *Miconia adinadomatia* differs from *M. cremophylla* and *M. turgida* by the absence of the linear thickening in the petiole bases (vs. generally presenting a linear thickening in petiole bases), anthers with four terminal pores (vs. anthers with

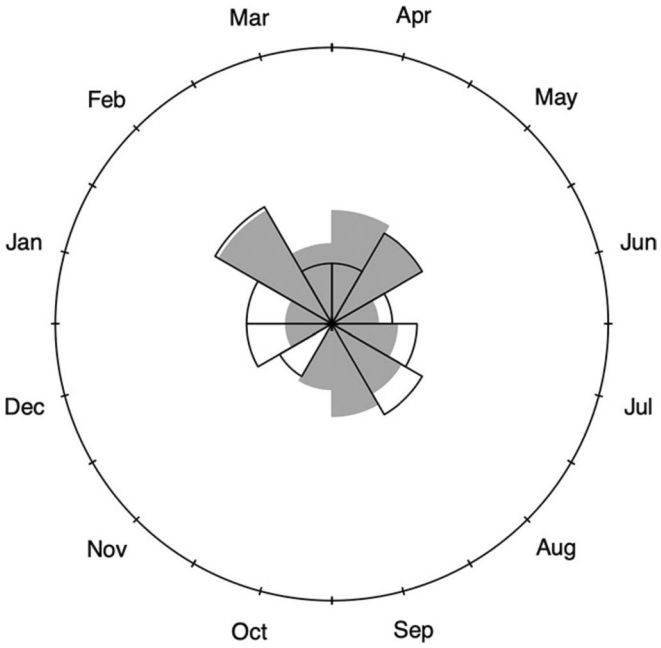

Fig. 6. *Miconia andinodomatia* phenology. White slices indicate flowering specimens, and gray slices indicate fruiting specimens. Size of each slice represents the relative number of total specimens that were flowering and/or fruiting during that month. Names of the months are abbreviated. ($n = 51$). Graph created in *MonographaR* (Reginato, 2016).

two terminal pores), presence of leaf domatia (vs. absence of leaf domatia) and an interpetiolar line that is prominent and conspicuous (vs. interpetiolar line absent or inconspicuous). *Miconia andinodomatia* differs from *M. tovarensis* by its plinerved venation (vs. venation basinerved), the presence of leaf domatia (vs. absence of leaf domatia), calyx lobes that are 0.1–0.3 mm long (vs. calyx lobes 1.2–1.3 mm long), and anthers with four well-defined terminal pores (vs. anthers with two terminal pores or incompletely four terminal pores). *Miconia andinodomatia* differs from *M. lehmannii* by having tertiary veins that are not impressed above (vs. tertiary veins impressed above), stigma slightly expanded (vs. stigma strongly expanded), anthers with four terminal pores (vs. anthers with two terminal pores), and the presence of leaf domatia (vs. absence of leaf domatia). Lastly, *Miconia andinodomatia* differs from *M. theaezans* by having more tertiary veins [34–52 tertiary veins, vs. (14–) 20–28 tertiary veins in *M. theaezans*], smaller hypanthia that are 0.7–1.3 × 1.0–1.4 mm [vs. 1.0–2.0 (–2.5) × 1.2–2.0 mm] and generally bigger leaves, 9.9–20.7 × 3.4–8.5 cm (vs. 3.0–18.5 × 2–6 cm). Moreover, with regard to leaf domatia, Gonçalves-Costa (1977) observed in Brazilian *M. theaezans* subsp. *flavescens* Cogn. a type of myrmecodomatia that are not fully developed on the leaf bases, and they proposed that these represent intermediate structures between acarodomatia and true myrmecodomatia. Those pocket domatia seem to be similar to those observed in *M. andinodomatia*, but *M. theaezans* has smaller leaves, fewer tertiary veins and bigger hypanthia. Additionally, Colombian specimens of *M. theaezans* do not present leaf domatia (pers. obs.), and they are morphologically similar to *M. theaezans* subsp. *viridis* Cogn., in which no domatia have yet been reported.

The newly described species has been found already represented in herbarium collections, most of which have been identified as either *Miconia lehmannii* or *M. turgida*. Some specimens, however, were determined as *M. theaezans*, including Triana's specimen (*Triana s.n.*, COL, barcode 24,289), which was initially determined by him as *Cremanium* sp. and later determined by the botanist Lorenzo Uribe as *M. theaezans* var. *milleflora* (DC.) Cogn. (a variety included in *M. theaezans* subsp. *flavescens*). This finding led us to examine the types and protologues of all subspecies and varieties of *Miconia theaezans*, allowing us to confirm that *M. andinodomatia* differs from all these taxa.

Ecological Aspects of the Domatia. In *M. andinodomatia* various arthropod groups such as Thysanoptera (3 spp.), Collembola (1 sp.), mites (1 sp.) and Araneae (1 sp.) were observed, but not ants. It is interesting because in Melastomataceae domatia are commonly reported to be used by ants (Metcalfe & Chalk, 1957; Michelangeli, 2010), which were absent inside the domatia of the species. But there were found other arthropods also observed previously in other studies. The presence of mites is usually mentioned in leaf domatia of the family Melastomataceae (Almeda, 2009; Larcher et al., 2012; Cárdenas et al., 2014; Judd et al., 2022). Additionally, the presence of a species of Thysanoptera has also been

documented in the leaf domatia of another Neotropical plant, *Psychotria graciliflora* Benth (Rubiaceae) (Mound, 1993), and members of the order Araneae have been found in the domatia of several myrmecophilous species of the genus *Vachellia* (Fabaceae) (Gómez-Acevedo, 2021), but these arthropods have not previously been observed in Melastomataceae.

This case presents a novel example within the family of plants using domatia, where a potential mutualistic relationship between arthropods and the plant may be occurring. The presence of domatia appears to be linked to a higher abundance of predators, such as thrips (Thysanoptera) and spiders (Araneae), inside the domatia. As a result, there could be a reduction in the number of herbivores per leaf, suggesting that thrips and spiders may provide biological control, reinforcing the idea of a mutualistic relationship.

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Author's Contributions

DGD conceived the study, acquired data, and reviewed collections. JMPH acquired data, reviewed collections and contributed images. DGD and JMPH contributed to the writing of the manuscript.

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Declarations

Competing Interests

The authors have no competing interests to declare that are relevant to the content of this article.

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