

A NEW SPECIES OF *MALAXIS* (MALAXIDINAE: ORCHIDACEAE) WITH WHITE FLOWERS FROM COLOMBIA

MARIO ALEXEI SIERRA-ARIZA,^{1,6} JUAN SEBASTIÁN MORENO,^{1,2,3} AND ISLER F. CHINCHILLA^{4,5}

Abstract. *Malaxis susanae* from the Colombian Andes is described and illustrated as a new species of orchid. It resembles *Malaxis carpintera* (Schltr.) Ames, but differs by the flowers that have a white (vs. green) lip and the disc cavity with the margin inconspicuously raised (vs. conspicuously raised in a retuse margin) at the apex. Notes on its distribution, habitat, floral phenology, etymology, related taxa, and conservation assessment are provided.

Keywords: Andes orchids, *Malaxis caracasana*, *Malaxis carlos-parrae*, *Malaxis excavata*, *Malaxis lobulata*, *Malaxis pittieri*

Resumen. *Malaxis susanae* de los Andes colombianos es descrita e ilustrada como una nueva especie de orquídea. Se asemeja a *Malaxis carpintera* (Schltr.) Ames, pero se diferencia por tener flores con el labio blanco (en comparación con verde) y la cavidad del disco con el margen discretamente elevado (en comparación conspicuamente elevado en un margen retuso) en el ápice. Se proporcionan notas sobre su distribución, hábitat, fenología floral, etimología, taxones relacionados y evaluación de conservación.

Palabras claves: orquídeas andinas, *Malaxis caracasana*, *Malaxis carlos-parrae*, *Malaxis excavata*, *Malaxis lobulata*, *Malaxis pittieri*

Malaxis Sol. ex Sw., (Swartz, 1788) is a genus of orchids belonging to the tribe *Malaxidinae* (Bentham and Hooker, 1883: 465). In its traditional circumscription, this genus is cosmopolitan and comprises approximately 300 species. It is widely distributed in pantropical zones, with some species growing in temperate regions of the Americas, Asia, and Europe (Pridgeon et al., 2005). Species growing in the tropics occupy a variety of habitats that range from dry and humid lowland forests to the paramos in mountain ranges, from sea level to 3650 m (González-Tamayo, 2002; Bogarín and Pupulin, 2021; Chinchilla et al., 2022).

In the Americas, 143 species of *Malaxis sensu lato* have been recognized, with Mexico having the highest diversity with 71 published species (Chinchilla et al., 2022). The genus includes terrestrial or epiphytic plants, frequently with rhizomatous stems that produce small pseudobulbs covered by membranous cataphylls. Each sympodial unit produces one or two leaves and has inflorescences in racemes or corymbs that emerge at the apex of the

pseudobulbs. The flowers are generally small, green, and not resupinate, and the lip often has a concave disc at the base divided by a longitudinal costa; the column is short, erect, and dorsiventrally complanate (Pridgeon et al., 2005; Pérez-Escobar and Blanco, 2014; Chinchilla et al., 2022).

In Colombia, 13 species of *Malaxis* have been identified so far, eight of which are endemic (Ministerio de Ambiente y Desarrollo Sostenible and Universidad Nacional de Colombia, 2015; Bernal et al., 2016). Due to the taxonomic complexity of *Malaxis* and the few taxonomic studies on these plants in Colombia, the known diversity of the genus in the country, as well as its ecological and taxonomic particularities, is preliminary. It's quite possible that there could be more species of *Malaxis* in Colombia, but more exploration as well as taxonomic, systematic, and ecological studies are necessary for this genus. Here, we describe and illustrate a new species of *Malaxis* distributed in the three mountain ranges of Colombia, and compare it with its morphologically most similar species.

MATERIALS AND METHODS

Field work to collect material from the new species of *Malaxis* was carried out in December 2018 during an expedition for the research project titled “*Síntesis de las orquídeas del río Azufrado, Tolima-Colombia*.” From this project, seven new orchid species were discovered, identified, and published under the following names: *Acianthera villahermosae* Sierra-Ariza, Rinc.-González, & Karremans, *Oncidium tolimense* Sierra-Ariza & A. Albino-Bohórquez, *Pleurothallis petroana* Sierra-Ariza, *Pleurothallis villahermosae* Sierra-Ariza, Rinc.-González,

& Villanueva, *Epidendrum villahermosaense* Sierra-Ariza & Hágsater, *Epidendrum rioazufrense* Sierra-Ariza, Hágsater, & E. Santiago, and *Kefersteinia universitatis-tolimae* Sierra-Ariza. Images of the specimens were captured using a Nikon D5300 camera equipped with a Micro NIKKOR AF 105 mm f/2.8 D lens. Subsequently, flowers of the specimens were kept in spirit. The collected material was incorporated into the collection of the TOLI Herbarium at the University of Tolima. Specimens of *Malaxis*—including types—were examined in the following herbaria: AMES,

Our most sincere thanks to A. Albino Bohórquez for her participation and company in the expedition in which orchids of the new species were discovered. Thanks to H. López Toscano, R. Garza, and C. Alzate for sharing with us photographs of the new species with their respective locality data, which served to determine the distribution of the species. We thank our friend and colleague, K. Gil Amaya, for helping us locate *Malaxis* specimens in the herbarium of Universidad Nacional de Colombia (COL) and the staff at COL for allowing access to their orchid collections.

¹ Grupo de Investigación Schultes, Fundación Ecotonos, 760001, Valle del Cauca, Cali, Colombia

² Departamento de Biología, Universidad del Valle, Calle 13 # 100-00, Cali, Colombia

³ Jardín Botánico de Cali-FZC, Cra. 2 Oe. #21, Valle del Cauca, Cali, Colombia

⁴ Centro de Investigación Jardín Botánico Lankester, Universidad de Costa Rica, P.O. Box 302-7050, Cartago, Costa Rica

⁵ Escuela de Biología, Universidad de Costa Rica, Apartado 11501-2060, San José, Costa Rica

⁶ Corresponding author: mrsierraariza80@gmail.com

CR, COL, F, HLDG, JBL, MO, SEL, TOLI, US and USJ (physically), and B, BM, BRIT, COLO, DAO, G, GH, GM, GOET, HPUJ, IBUG, JBB, K, L, M, NY, P, PMA, UCH, and W (through digital images).

A Lankester Composite Dissection Plate (LCDP) of the new species was created using Adobe Photoshop® CS6, and the geographical distribution map was made with QGIS 3.36.2 tools. The conservation status of the species

was assessed according to the International Union for Conservation of Nature Red List categories and criteria (IUCN, 2022). The Extent of Occurrence (EEO) and Area of Occupancy (AOO) were estimated based on the studied specimens using geographical data with the Geospatial Conservation Assessment Tool (GeoCAT, Royal Botanic Gardens, Kew: <http://geocat.kew.org>).

TAXONOMY

Malaxis susanae Sierra-Ariza, J.S. Moreno, & Chinchilla, *sp. nov.* Fig. 1–2.

TYPE: COLOMBIA. Tolima: Municipio de Villahermosa, Vereda la Lorena, 2216 m, 17 December 2018, *M. A. Sierra Ariza & A. Albino Bohórquez 99* (Holotype: TOLI [029458]).

The new species is similar to *Malaxis carpintera* (Schltr.) Ames, but is distinguished from it by the flowers that have a white (vs. green) lip, and the disc cavity that has an inconspicuously raised margin (vs. conspicuously raised in a retuse margin) at the apex.

A terrestrial, erect, caespitose *herb* up to 29 cm tall, including the inflorescence. *Roots* flexuous, short, up to 15 cm long, 2 mm in diameter, pubescent. *Pseudobulbs* 4.5–5.3 × 1.4–2.2 cm, epigeous, heteroblastic, conical, greenish, separated by an ascending rhizome with two internodes, each with one cataphyll, 2–3 cm long, greenish when immature, covered with leaf sheaths that become scarious and papyraceous with age, and one ovate, obtuse, green cataphyll, 3.5–5.3 × 1.3–2.4 cm, the margins connate below the proximal half, shedding as the pseudobulb matures. *Leaves* two per sympodial unit, produced from the base of the pseudobulb, long-petiolate, conduplicate, soft-textured; sheaths light green, margins connate above 3/4 of their length, forming a pseudostem, 8.0–8.6 × 0.4–0.6 cm; blade ovate, round, acuminate, margins slightly wavy, nine-veined, 8.5–11.0 × 4.5–5.5 cm, slightly anisophyllous, horizontal to ascending, subopposite to alternate, adaxially dark green, lustrous, abaxially light green, dull. *Inflorescence* produced from the apex of the pseudobulb, erect, corymbose, 18.5 cm long; peduncle 15–17 × 0.2–0.3 cm, light green, covered up to the proximal half with leaf sheaths, seven-keeled; rachis 2 cm long. *Floral bracts* ovate, caudate to acute, concave, greenish, lustrous, 0.8–1.4 × 0.5–0.7 mm. *Pedicels* plus ovaries terete, inconspicuously keeled, with 180-degree twisting, 6–10 mm long, white on lower 3/4, apically greenish. *Flowers* nonresupinate, spreading, lustrous; sepals and petals white to greenish-white, lip white, slightly greenish at the apex, column greenish, with a yellowish operculum; flowers becoming ochre with age. *Dorsal sepal* ovate, acute, convex, adpressed to the ovary, three-veined, 2.4–3.2 × 1.4–1.7 mm. *Lateral sepals* elliptic, obtuse, convex, divergent, margins becoming recurved as anthesis progresses, three-veined 2.8–3.2 × 1.1–1.5 mm, connate at the base 0.6–0.8 mm. *Petals* linear, obliquely truncate, recurved, arcuate, sometimes surrounding the ovary, margins revolute, one-veined, 2.1–2.3 × 0.25–0.40 mm. *Lip* trilobed, sagittate, trifid, deeply concave, papillose, fleshy, margins entire, thick, 3.0–3.5 × 2.0–2.2 mm; lateral lobes

triangular, acute, recurved, spreading, 8 × 7 mm; midlobe ovate, trifid, 2.6–3.0 × 2.0–2.2 mm, with the disc cavity ovate in outline, subcordate, obtuse, 1.1–1.5 × 1.0–1.5 mm × 0.9 mm deep, divided by a pandurate costa, similar in width at the base and apex, adaxially tapered, flattened above, with subcavities abaxially deeply convex, laterally cavate by ca. 0.2 mm, apically delimited by a semilunate, emergent thickening, with the margin inconspicuously raised; apical margin short, transversely elliptic, trifid, margins incurved, 0.8 mm long, lateral teeth obtuse, convergent, 0.4 mm, central tooth obtuse, incurved, 0.4 mm. *Column* 0.8–1.3 × 0.8–1.2 mm, subquadrate, dorsiventrally complanate, apex ventrally four-lobed; rostellum erect, truncate, abaxially incurved, appearing retuse, bearing two viscaria at the apex; stigma obcordate, concave, longitudinally bilobed. *Pollinia* four in two obovoid, ventrally concave hemipollinaria, 0.4 × 0.2 mm. Fruits not seen.

Distribution and habitat: Known only from Colombia. In the type locality, the plants grow in a fragment of very humid montane forest (BMH-MB) in the Azufrado River basin in the municipality of Villahermosa in the northern area of the Tolima department, between 2000 and 2300 m elevation, as a terrestrial, understory plant, on soils with abundant humus and humidity, and with limited exposure to sunlight.

Plants of this species inhabit the three mountain ranges of the Colombian Andes. In the Eastern Andes, it is found in the municipality of Floridablanca, Santander Department; in the Central Andes, in the municipalities of Medellín and Amalfi, Antioquia Department; and in the type locality, Tolima Department. Additionally, in the Western Andes, it has been found in the municipality of Roldanillo, Valle del Cauca Department (Fig. 3–4).

Phenology: Plants were documented in flower in January, April, September, and December.

Eponymy: Named in honor of María Susana Muhamad González, a distinguished Colombian political scientist and environmentalist, who currently serves as the Minister of Environment of Colombia. She is celebrated for her unwavering commitment to the care, restoration, and conservation of Colombia's environment. In 2023, she was recognized by Reuters Impact as one of the top 25 female leaders globally in the fight against climate change. Additionally, in 2024, the Women Economic Forum honored her as the Woman of the Decade in Colombia for her exceptional efforts. Her achievements include securing significant resources to combat deforestation in the Amazon and leading Colombia's successful bid to host COP16 on biodiversity in 2024.

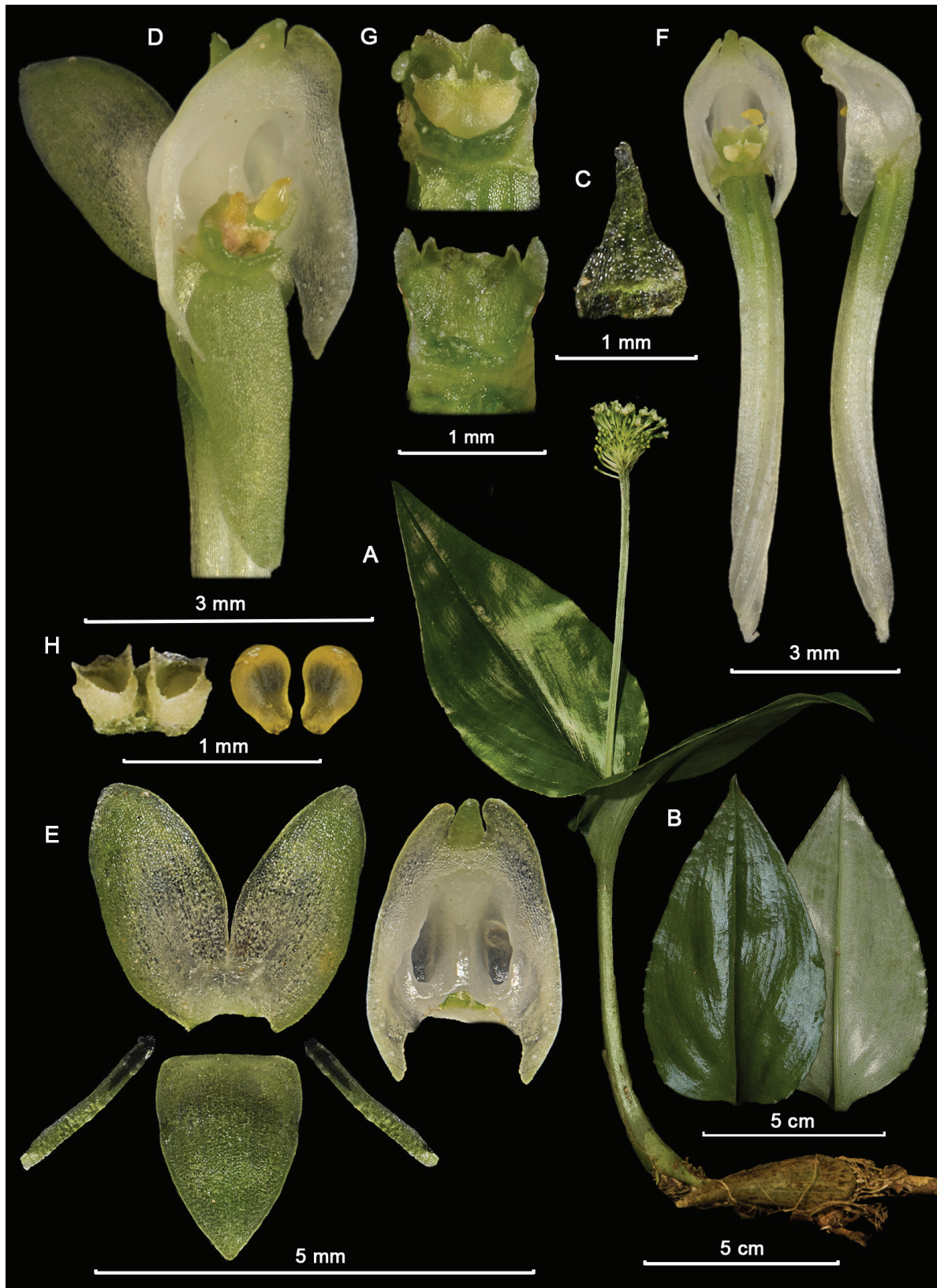


FIGURE 1. Lankester Composite Digital Plate of *Malaxis susanae* Sierra-Ariza, J.S. Moreno, & Chinchilla. **A**, Habit; **B**, Leaves; **C**, Floral bract; **D**, Flower, oblique view; **E**, Dissected perianth (lip to the right); **F**, Pedicel and ovary, lip and column, frontal (left) and lateral (right) views; **G**, Column, dorsal (top) and ventral (bottom) views.; **H**, Operculum (left) and pollinia (right). LCDP by M. A. Sierra-Ariza from the holotype (*Sierra Ariza & Albino Bohórquez* 99, TOLI).



FIGURE 2. Flowers of *Malaxis susanae* Sierra-Ariza, J.S. Moreno, & Chinchilla. From left to right: front, oblique, lateral and back views. By M. A. Sierra-Ariza from the holotype (Sierra Ariza & Albino Bohórquez 99, TOLI).



FIGURE 3. Comparison of flowers of *Malaxis susanae* Sierra-Ariza, J.S. Moreno, & Chinchilla from different locations in Colombia. **A**, Valle del Cauca Department, 2 May 2015 by C. Alzate; **B**, Tolima, 18 December 2018 by M. A. Sierra-Ariza; **C**, Santander, 24 September 2018 by H. López. Prepared by M. A. Sierra-Ariza.

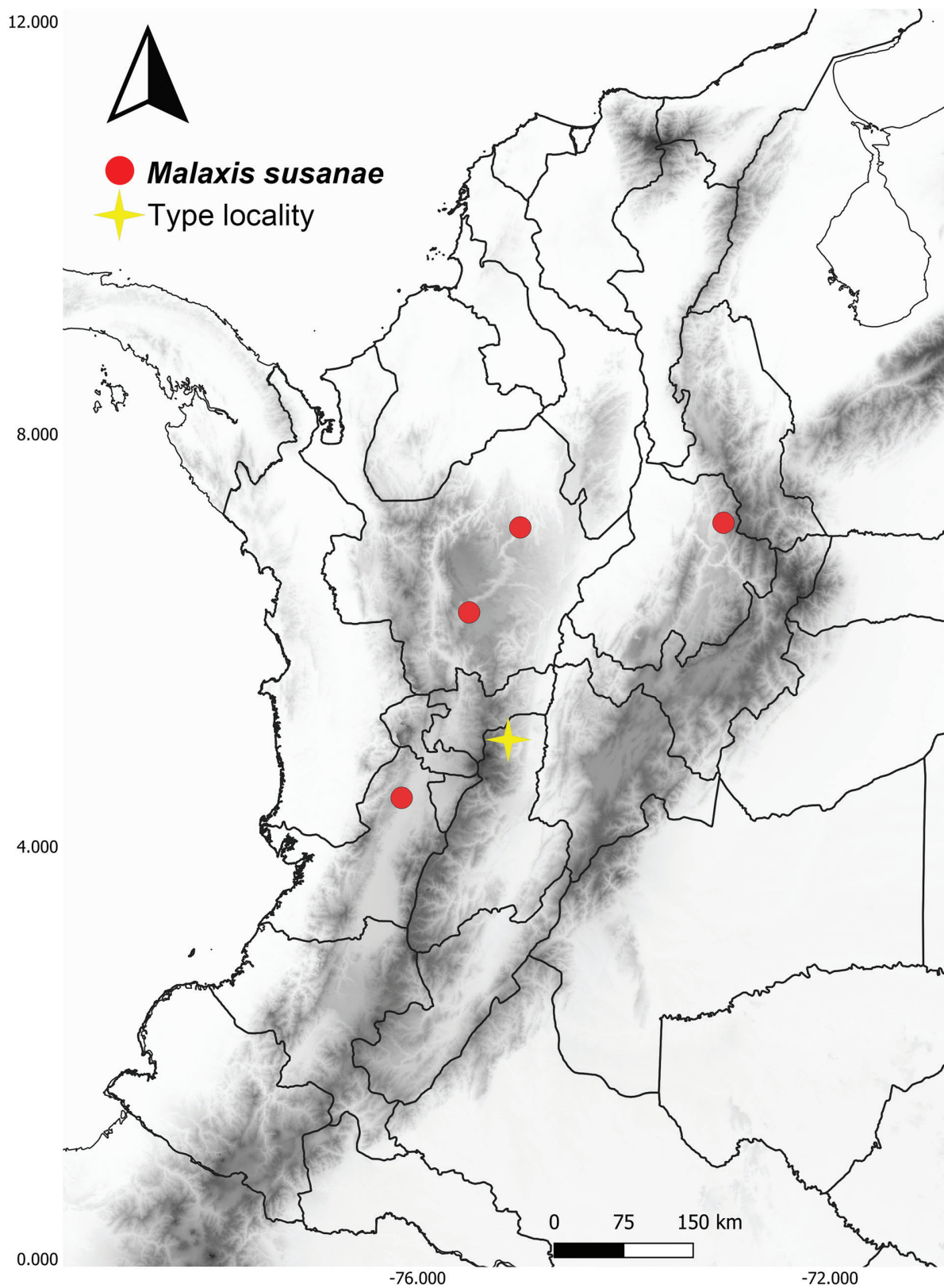


FIGURE 4. Distribution of *Malaxis susanae* Sierra-Ariza, J.S. Moreno, & Chinchilla in western Colombia based on field observations (no vouchers were made) and on the type locality. Prepared by J. S. Moreno.

Conservation status: *Malaxis susanae* is endemic to Colombia and known from five locations in the Andes Cordillera. Its extent of occurrence (EOO) was estimated to be 38,847 km² with an area of occupancy (AOO) of 20 km². In these known localities, plants of *Malaxis susanae* grow in forest relicts, which are not protected, or near protected wildlife areas. Fragmentation and loss of habitat caused by deforestation and expansion of the agricultural frontier are the main latent threats in the surrounding area. Studies on the population size and ecology of this species are needed to further assess its conservation status. Therefore, the species is listed as Vulnerable (VU), under criteria B1ab(i,ii)+2ab(i,ii).

Malaxis susanae can be easily recognized by its caespitose growth, with two leaves per sympodial unit, with ovate, rounded, acuminate blades. The corymbose inflorescence has flowers with white to greenish-white sepals and petals, and the lip is white, trilobate, sagittate, trifid, deeply concave, with two cavities. The whitish flowers of *Malaxis susanae* are similar to the flowers of *Malaxis pittieri* (Schltr.) Ames, a species native to Costa Rica and Panama, but the latter is morphologically very different: it is proportionally smaller, has one leaf per sympodial unit, with the cordate-amplexicaul blade at the base, has a lax, racemose inflorescence, and the lip has an entire midlobe at the apex (see Chinchilla et al., 2022).

The new species is also similar to *M. carpintera*, a species endemic to Costa Rica; however, in addition to the characteristics included in the diagnosis, *M. susanae* is distinguished by its dark green (vs. light green) leaf blades, an inflorescence with whitish (vs. greenish) pedicels, flowers with whitish (vs. greenish) sepals and petals, and the lip, as it ages, with incurved (vs. erect) apical margins.

Among species of *Malaxis* that grow in Colombia,

Malaxis susanae is morphologically similar to *Malaxis caracasana* (Klotzsch ex Ridl.) Kuntze, *Malaxis lobulata* L.O. Williams, and *Malaxis carlos-parrae* Szlach. & Kolan., because of its caespitose growth, ovate, acuminate leaf blades, corymbose inflorescence, flowers with the three-lobed, sagittate, concave lip, with triangular, recurved lateral lobes, and the ovate, trifid midlobe, with two subcavities. *Malaxis susanae* is distinguished from *M. caracasana* by its ovate (vs. lanceolate), larger leaf blades (8.5–11.0 × 4.5–5.5 cm vs. 3.8–4.8 × 1.2–1.6 cm), flowers with whitish (vs. greenish) sepals and petals, its ovate (vs. lanceolate) dorsal sepal, the elliptic (vs. lanceolate) lateral sepals, and the white lip (vs. green), with an ovate (vs. oblong-quadrate) midlobe. *M. lobulata* can be distinguished from *M. susanae* by its greenish sepals, petals, and lip, the midlobe of which is oblong, subpandurate (vs. ovate), with rounded (vs. obtuse) apical lobes forming shallow (vs. deep) sinuses, and the midlobe exceeds more than twice the length of the lateral lobes (vs. subequal teeth). *M. carlos-parrae* is differentiated from *M. susanae* by its lip that has a bipartite disc cavity with a broad (vs. narrow) costa, apically delimited by a crescentic emerging thickening, raised on an erose (vs. inconspicuously raised) margin at the apex; the apical margin has inconspicuous, rounded (vs. conspicuous), up to 0.4 mm, obtuse) lateral lobes, and the middle lobe exceeds twice the length of the lateral lobes (vs. subequal).

From the set of characters discussed above, *M. susanae* may somewhat resemble *Malaxis excavata* (Lindl.) Kuntze, a species from Mexico, but the latter has flowers with green (vs. white) sepals, petals and lips, the sepals approximately exceeding double the length of the lip (vs. subequal), and the midlobe of the lip has an elongated middle tooth, more than twice the length of the lateral teeth.

LITERATURE CITED

- BENTHAM, G., AND J. D. HOOKER. 1883. *Genera Plantarum* 3, Pars II. L. Reeve, Londini.
- BERNAL, R., S. R. GRADSTEIN, AND M. CELIS (editors). 2016. *Catálogo de plantas y líquenes de Colombia*. Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá: <http://catalogoplantadecolombia.unal.edu.co>
- BOGARÍN, D., AND F. PUPULIN. 2021. The orchid flora of Barra Honda National Park, Nicoya, Guanacaste, Costa Rica. *Harvard Papers in Botany* 26(1): 7–99.
- CHINCHILLA, I. F., A. P. KARREMANS, AND M. A. BLANCO. 2022. New Species and a New Record of *Malaxis* (Malaxidinae) from Costa Rica. *Lankesteriana* 22(1): 37–51.
- CHINCHILLA, I. F., A. P. KARREMANS, AND M. A. BLANCO. 2023. *Malaxis dressleriana*, a new orchid species honoring a botanist for all seasons, Robert Louis Dressler. *Orchids, The Magazine of the American Orchid Society* 92(8): 608–613.
- GONZÁLEZ-TAMAYO, R. 2002. *Malaxis* (Orchidaceae), breve discusión de los rasgos específicos y dos taxones nuevos. *Ibugana* 10(1–2): 67–75.
- IUCN STANDARDS AND PETITIONS COMMITTEE. 2022. Guidelines for Using the IUCN Red List Categories and Criteria, version 15.1. Prepared by the Standards and Petitions Committee: https://nc.iucnredlist.org/redlist/content/attachment_files/RedListGuidelines.pdf
- MINISTERIO DE AMBIENTE Y DESARROLLO SOSTENIBLE Y UNIVERSIDAD NACIONAL DE COLOMBIA. 2015. Plan para el estudio y la conservación de las orquídeas en Colombia. Texts by: Betancur, J., H. Sarmiento-L., L. Toro-González, y J. Valencia. Ministerio de Ambiente y Desarrollo Sostenible, Colombia. Universidad Nacional de Colombia, Bogotá D.C.
- PÉREZ-ESCOBAR, O. A., AND M. A. BLANCO M. 2014. Rediscovery of *Malaxis nana* (Orchidaceae: Malaxideae) in Costa Rica, with an updated description. *Lankesteriana* 14: 109–114.
- PRIDGON A. M., P. J. CRIBB., M. W. CHASE, AND F. RASMUSSEN. 2005. *Genera Orchidacearum*, Vol. 4: Epidendroideae (Part 1). Oxford University Press, Oxford.
- SWARTZ, O. 1788. *Orchidaceae*. Pages 118–126 in M. SWEDERI, ED., *Nova Genera et Species Plantarum seu Prodromus*. Holmiæ, Upsala & Abo.