

# First record of *Zomicarpella maculata* (Araceae, Caladieae) in Brazil, with taxonomic notes and an updated distribution

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**Abstract.** *Zomicarpella maculata* N.E.Br. (Araceae, Caladieae) a rare species previously known only from Cuzco, Peru, is here recorded for the first time from Brazil. The species was found in a semi-deciduous forest within the Estação Ecológica da Serra das Araras, Mato Grosso. This represents an eastward range extension of over 1,500 km. Diagnostic morphological characters, habitat information, taxonomic notes, and an updated distribution map are provided. This finding significantly expands the species' range and underscores the critical role of protected areas in conserving rare taxa.

**Keywords.** Aroid, Cerrado, Mato Grosso, Neotropical region, new records

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## Introduction

Araceae Juss., with 150 genera and approximately 4,500–4,600 accepted species, is a morphologically diverse and ecologically significant cosmopolitan group of monocot plants with a pantropical distribution (Boyce et al. 2025; Haigh et al. 2023; WFO 2026). The family is widely represented in Brazil, especially in the phytogeographic domains of the Amazon and the Atlantic Forest, where it stands out for its high species richness and endemism (Forzza et al. 2010; Flora e Funga do Brasil 2026); in the Cerrado domain there are currently 22 genera and 92 species reported (Flora e Funga do Brasil 2026). The remarkable diversification includes a wide variety of life forms, ranging from terrestrial and aquatic herbs to hemiepiphytes and vines, reflecting adaptations to different environmental conditions (Croat 1988; Croat and Ortiz 2020).

This family is divided into eight subfamilies, of which Aroideae is one of the most diverse (Mayo et al. 1997; Henriquez et al. 2020). Within this subfamily, the tribe Caladieae is notable for comprising predominantly Neotropical genera (Croat and Ortiz 2020) mainly distributed in seasonally dry tropical forests and composed mostly of aquatic to geophytic species (Mayo et al. 1997; Cusimano et al. 2011; Croat and Ortiz 2020).

Phylogenetic studies have established the tribe Caladieae as the sister group of the monotypic tribe Thomsonieae, which encompasses the genus *Amorphophallus* Blume ex Decne., distributed in tropical Asia and Africa (Pouchon et al. 2023). Within Caladieae, seven genera have been recognised (Croat and Delannay 2019). Nevertheless, recent studies have recovered the genus *Zomicarpella* N.E.Br., previously placed in the tribe *Zomicarpeae* alongside *Zomicarpa* Schott, *Ulearum* Engl., and *Filarum* Nicolson (Bogner 2007), as part of the tribe Caladieae. Furthermore, *Zomicarpella* has also been recovered in recent phylogenetic analyses as the sister genus to *Idimanthus* E.G.Gonç. (Gonçalves 2018). Although closely related, they are morphologically distinct: *Zomicarpella* is characterised by purple male flowers with a flat anther connective and the absence of a sterile apical appendage, whereas *Idimanthus* possesses orange male flowers with a rostrate connective and a prominent sterile apical appendage, in addition to greenish-yellowish female flowers (Gonçalves 2018).



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The genus *Zomicarpella* comprises two species, *Z. amazonica* Bogner and *Z. maculata* N.E.Br., both small tuberous herbs with entire leaf blades and delicate inflorescences, characteristics that make them easily overlooked during fieldwork (Bogner 2007). *Zomicarpella amazonica* is known from Colombia, Peru, and Brazil (Amazonas), whereas *Z. maculata* has historically been recorded only from Cuzco, Peru and, with few known collections, is considered rare. *Zomicarpella maculata* was originally described in 1881 based on cultivated material from Colombia, where it has not been found since, but this species was rediscovered in 2007 in southeastern Peru, after more than a century (Bogner 2007).

During recent field expeditions to the Estação Ecológica da Serra das Araras, in the state of Mato Grosso, Brazil, individuals of *Z. maculata* were found. Our new data represent the first records of the species from Brazil. Here, we report the rediscovery of *Z. maculata* 18 years after its last confirmed collection in Peru and provide its first record from both Brazil and the Cerrado domain. In addition, we present a diagnosis, an identification key, photographs, an updated distribution map, and taxonomic notes, thereby contributing to the knowledge of this rare species.

## Methods

The Estação Ecológica da Serra das Araras (EESA) is a federal conservation unit and a very important natural remnant protecting the rivers that form the Alto Paraguai basin. The study area covers 27 million ha and is located between the municipalities of Porto Estrela (97.7% of the area) and Cáceres (2.93%), Mato Grosso, Brazil (ICMBio 2016). Despite its location within the Cerrado domain, the region harbours an area of confluence between the Cerrado, Amazon, and Pantanal; it has an Aw climate (under the Köppen-Geiger classification scheme; Peel et al. 2007), with a rainy summer season and dry winter season, an average annual rainfall of 800–1,200 mm, and a temperature that varies throughout the year (ICMBio 2016). The vegetation comprises mainly nine phytophysionomies of Cerrado, with upland forest formations and well-drained soils (ICMBio 2016).

We collected *Zomicarpella maculata* during a botanical expedition in November 2025. The fertile material, with inflorescences, was prepared according to standard techniques (Croat 1985) and deposited at the UFMT herbarium. Duplicates will be sent to UB and RB (acronyms according to Thiers 2025). We identified *Z. maculata* using the taxonomic key and original description by Bogner (2007), and a comparison was made with images of the type material available online and with reference specimens. Geographic distribution was mapped using QGIS v. 3.28 (QGIS Development Team 2022) and including geographic coordinates of previously known records from Peru and our new data from Brazil. Biogeographic provinces of the Neotropical region follow Morrone (2022) to show that both *Zomicarpella* species occur in the Rondônia province. Additionally, the vegetation and land-use shapefile for Mato Grosso, based on the Brazilian vegetation classification system (IBGE 2012), was used to contextualise our new record of *Z. maculata*. This shapefile includes the phytogeographic domains of Pantanal, Seasonal Forest, Ombrophilous Forest, Savanna (Cerrado), and Transition Areas and Estação Ecológica da Serra das Araras (EESA Serra das Araras) boundary file (in KML format) and was obtained from the ICMBio website (ICMBio 2026).

## Results

***Zomicarpella maculata* N.E.Br.**, Gard. Chron., ser. 2, 16: 266. 1881

Figures 1, 2

**New records.** BRAZIL — MATO GROSSO • Porto Estrela, Estação Ecológica da Serra das Araras, Trilha Cachoeira Boca do José; 15°39'10"S, 057°12'41"W; 230 m alt.; 22.X.2025; A.K. Koch & T.G. Duarte leg. 2323; UFMT 49670 • same locality; 06.XI.2025; A.K. Koch & T.G. Duarte leg. 2324; UFMT 49671.

**Additional material examined.** PERU — Cuzco • Distr. Camisea, Campamento San Martín C, Camisea Production Unit, west of camp; 467 m alt.; 11°47'08"S, 072°41'57"W; 13.I.1997; P. Acevedo-Rdgz., with D. Bell, K. Rankin & S.F. Smith leg. 8717; primary, moist, lowland non-flooded forest dominated by bamboo (*Guadua*); K, MO, US 3356063 • Prov. La Convención, Distr. Echarati Armihuari, Río Camisea; 11°55'01.0"S, 072°46'39.9"W; 11.X.1998; P. Núñez, L. Acurio, R. de La Colina & W. Naurý leg. 24196; US 3383601 • Prov. La Convención, Distrito de Echarati, San Martín 3 Site Well; 11°46.89'S, 072°42.10'W; 400 m alt.; 02.XI.1998; H. Beltrán, with W. Naurý & R. de La Colina leg. 3258; bosque colinoso disturbado de *Guadua sarcocarpa*; US 3383590.

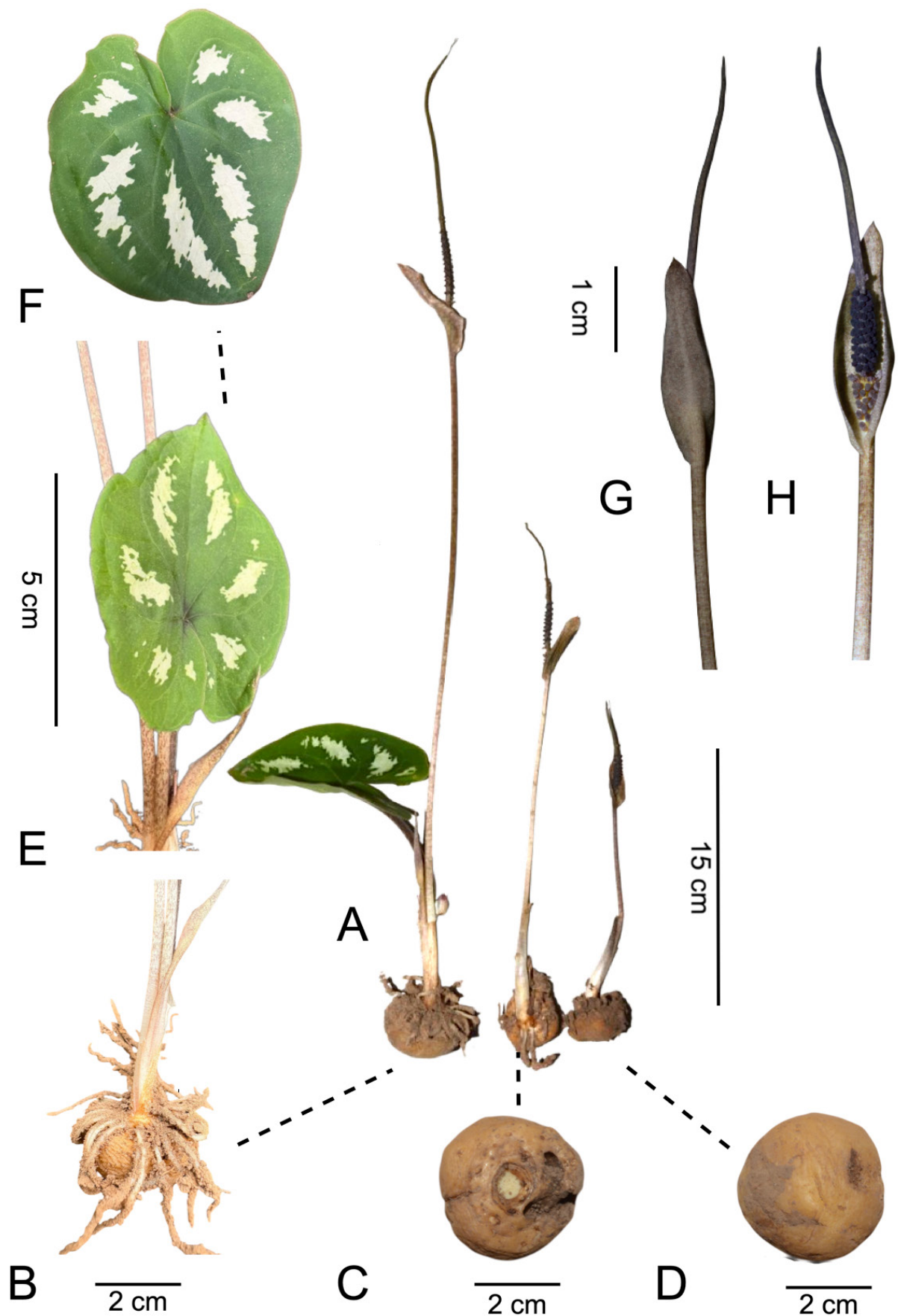


**Figure 1.** *Zomicarpella maculata* N.E.Br. **A.** Habit, showing three entire plants. **B.** Tuberos stem. **C.** Tuber, apical view. **D.** Tuber, side view. **E.** Detail of petiole and leaf blade. **F.** Cor-date leaf blade with white variegations between primary midrib and lateral veins. **G.** Vinaceous spathe, smaller than spadix. **H.** Inflorescence detail, showing a dark-purple spadix with three distinct floral zones. Photographs by Ana K. Koch.

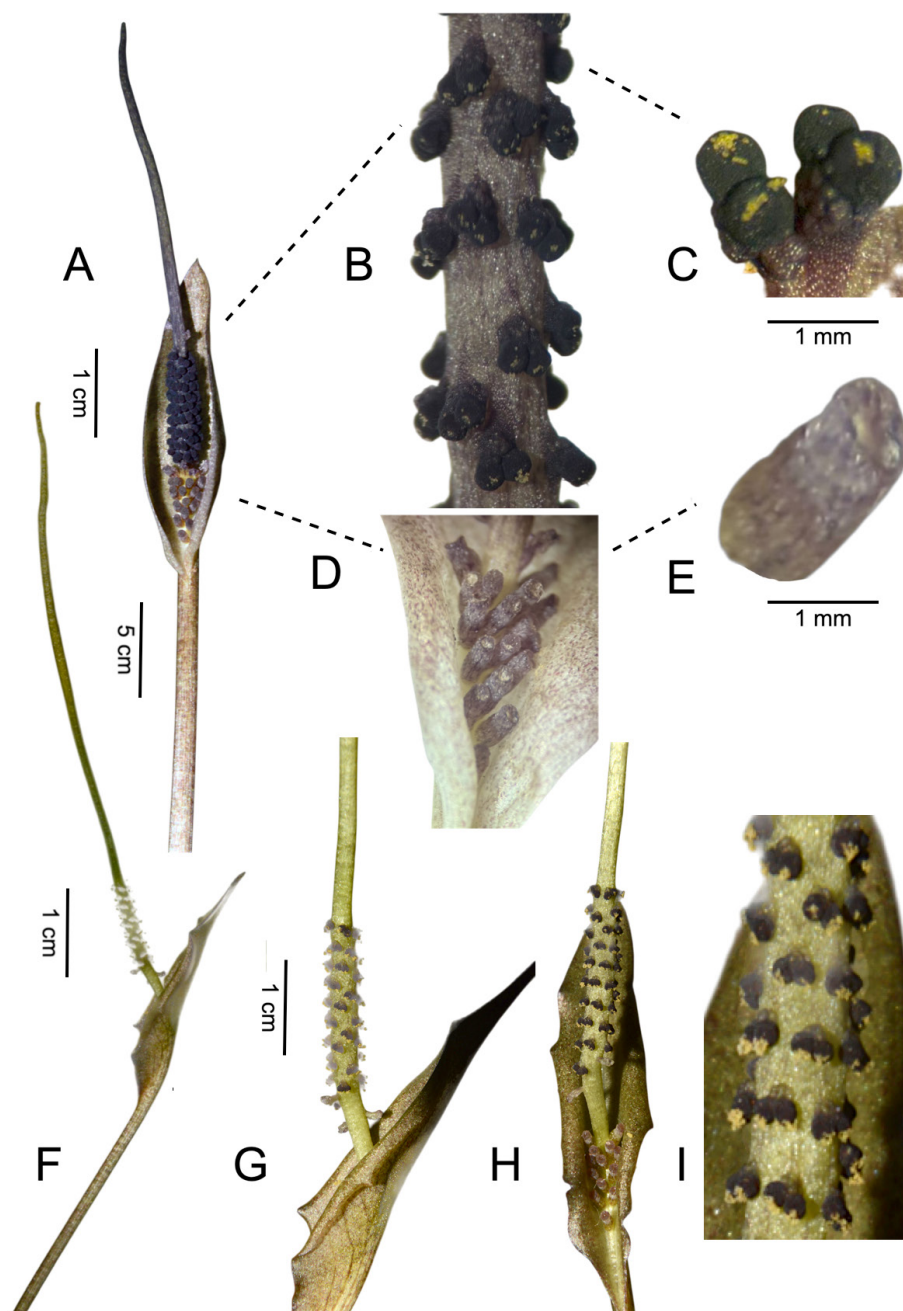


**Figure 2.** Individuals of *Zomicarpella maculata* N.E.Br. found in EESA area exhibit inflorescence ranging from dark-purple to greenish. **A.** Inflorescence showing a dark purple spadix with three distinct floral zones. **B.** Staminate flowers. **C.** Detail of four dark stamens with yellow pollen grains. **D.** Pistillate flowers adnate to spadix. **E.** Gynoecium with style and vinaceous stigma, showing a truncate stigma at the apex. **F.** Inflorescence showing greenish spadix and spathe. **G.** Greenish spathe with the staminate flower zone of spadix free. **H.** Greenish spadix with staminate flowers (below). **I.** Detail of greenish spadix and dark-purple staminate flower zone with yellow pollen grain. Photographs by Ana K. Koch.

**Identification.** Tuberos herb, 10–18 cm tall. Tubercle depressed-globose, 1–2 cm in diameter. Leaves 1 or 2; petiole 9–15 cm long, olive-green with darker, irregular cross-fissures; sheath 0.5–1 cm long. Leaf blade cordate to sagittate, (4.5–)6–10 × (3–)4.5–8 cm, light green on abaxial surface, dark green with pale green irregular spots on adaxial surface; apex acute to broadly acute; basal lobes developed; sinus rounded. Inflorescence 1 or 2 per plant; peduncle 4.5–18.0 cm long, off-white to light green; spathe lanceolate, 1.5–2.5 × 0.6–1.3 cm, non-constricted, pink to greenish; spadix 3.5–7 × 0.1–0.2 cm, longer than spathe; female zone adnate to spathe, with 8–12 vinaceous flowers; male zone with loosely to moderately arranged staminate, purple to dark-purple; male sterile zone with filiform appendix, 3–5 × 0.1 cm, dark; staminoidea flowers with a single stamen, purple to dark purple, globose, subsessile, 0.40–0.45 mm in diameter, each opening by a pore; inconspicuous connective (never elongate); pollen orange, inaperturate, spherical, 30–31 µm in diameter; exine spinose; spines 1.8–2.0 µm long. Pistillate flowers ellipsoid, 0.80–1.20 × 0.08–0.10 mm, dull brownish olive; stigma subsessile, discoid, 0.3 mm; ovary externally with very small spots, unilocular; placentation basal; ovule 1, anatropous, 0.4 mm long, and with a very short funicle. Infructescence ca. 1 cm long, with 12 fruits; spathe persistent. Berries oblong-ellipsoid, 3–4 × 1–2 mm, 1 seed per berry; pericarp thin, with remnant of style and stigma, pale green with vinaceous spots. Seed ellipsoid-oblong, 2.8–3.0 × 1.5 mm.

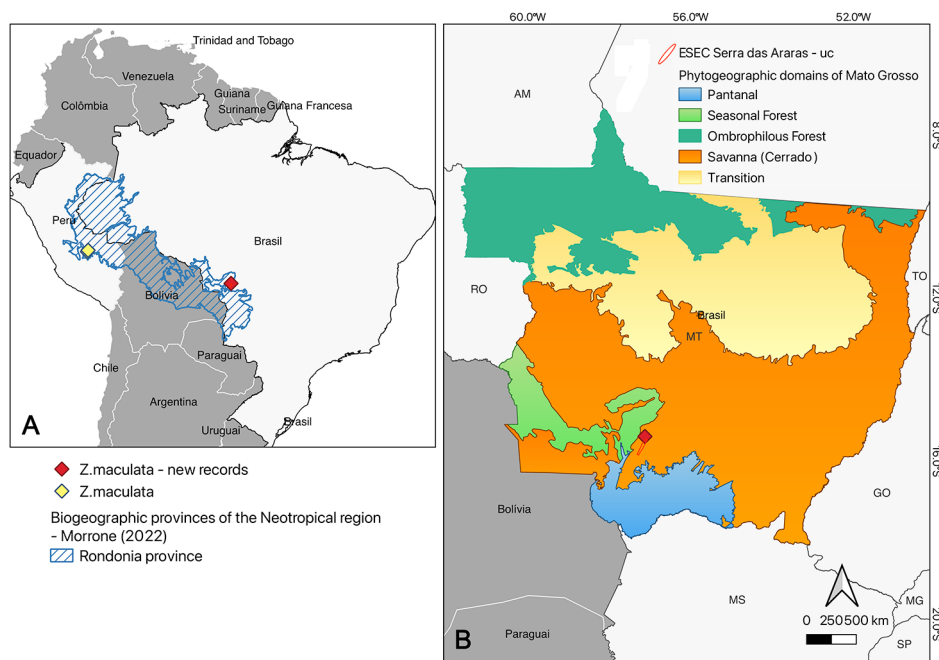


**Figure 3.** Map location of first Brazilian record of *Zomicarpella maculata* N.E.Br. **A.** Caption: red diamond: new records; yellow diamond: previously known records; Biogeographic provinces of the Neotropical region, Rondônia province: hatched in blue (Morrone 2022). **B.** Phyto-geographic domains of Mato Grosso, blue: Pantanal; light green: Seasonal Forest; Medium green: Ombrophilous Forest; orange: Savanna (Cerrado); yellow: Transition (IBGE 2012); red: Serra das Araras Ecological Station (ICMBio 2026). Map by Mel Camelo.

**Habitat and distribution.** *Zomicarpella maculata* was previously known only from the type collection (based on cultivated material reported from Colombia, with unknown wild origin) and Peru (departments of Cuzco and La Convención). The present record in Brazil (Mato Grosso) extends its distribution by more than 1,500 km to the east (Figure 3). The species was found in Cerrado area and in a semideciduous seasonal forest, a type of non-floodable upland forest, where it occurs under a closed canopy in moist, organically rich soil. This forest environment is dominated by the Babaçu Palms (*Attalea speciosa* Mart. ex Spreng.), suggesting a possible ecological association. However, more studies are needed to confirm the nature of this relationship (Figure 4). In the EESA, we found fertile individuals along one trail (Figure 4), but the species also occurs along other forest trails, with one population exceeding 100 individuals.

**Comments.** *Zomicarpella* is characterised by male flowers that are purple to dark-purple, with a flat anther connective, and the absence of an sterile apical appendage. The arrangement of male flowers varies from dense to very lax, as observed by Bogner (2007). *Zomicarpella maculata* is easily distinguished from the other species, *Z. amazonica*, by a suite of morphological characters. *Zomicarpella maculata* differs from *Z. amazonica* by its cordate to sagittate (vs. hastate to sagittate) leaf blade, non-constricted (vs. slightly constricted) spathe, and a spadix longer than the spathe (vs. shorter). Additionally, the colour of the spathe can vary from pink to greenish (Figure 1) and the spadix can be purple to dark-purple or greenish (Figure 2); this phenotypic plasticity may be a response to environmental conditions or associated with a developmental stage.

**Figure 4.** Collection area at the Estação Ecológica da Serra das Araras. **A.** Seasonal Forest habit where *Zomicarpella maculata* N.E.Br. occurs in soil, associated with *Attalea speciosa* Mart. ex Spreng. (babaçu). **B.** A single inflorescence emerging without a leaf. **C.** A single inflorescence emerging alongside the leaf blade. **D.** Two inflorescences emerging alongside the leaf blade. Photographs by Ana K. Koch.



## Discussion

Our records of *Zomicarpella maculata* in Brazil extends this species' distribution by over 1,500 km to the east and represents a rediscovery of the species after 18 years. This find underscores the continued need for floristic exploration, even within established protected areas. Its occurrence in the EESA highlights the essential role of protected natural areas for the conservation of rare and geographically restricted species.

The disjunct distribution of *Z. maculata*, now documented from Peru and the Mato Grosso in the Central-West region of Brazil, suggests a wider, yet undocumented presence across the Amazon Basin and adjacent transitional forests. Interestingly, the three previously known collections from Peru are all from the Camisea region in Cusco, where the species was recorded in primary, moist, lowland non-flooded forest dominated by bamboo (*Guadua* spp.), as well as in disturbed hill forests with *Guadua sarcocarpa* Londoño & P.M.Peterson from the collections (Acevedo-Rodríguez 8717, Núñez 24196, Beltrán 3258). Our Brazilian records share a similar ecological context, occurring in semideciduous seasonal forest with a dense understory dominated by the *Attalea speciosa*. Although the dominant species differ geographically *Guadua* in the Andean foothills of Peru and *Attalea* in the Cerrado–Amazon transition of Brazil, both habitats represent non-floodable, well-drained forests with a closed canopy and a structurally dominant monocot in the understory. This ecological similarity suggests that *Z. maculata* may be associated with such environments, and that its apparent rarity could reflect collection bias rather than true geographic restriction.

Its small stature and ephemeral flowering phenology likely contribute to its scarcity in collections. Therefore, targeted field efforts in similar “terra firme” and semideciduous forest habitats, particularly those dominated by *Attalea speciosa* or bamboo, are crucial for revealing further populations and better defining its ecological preferences and full geographic range.

In conclusion, this Brazilian record of *Z. maculata* significantly expands this species' known geographical distribution and provides detailed morphological and ecological data, thereby substantially enhancing current knowledge of this rare species. This case reinforces that meticulous taxonomic work and floristic inventories remain fundamental tools for uncovering hidden biodiversity, with conservation units playing an indispensable role in preserving these often-neglected elements of plant diversity.

**Identification key to *Zomicarpella* species**

(Adapted from Bogner 2007)

- a** Tuberous stem, leaf blade cordate to sagittate, non-constricted spathe, spadix much longer than the spathe; female flowers with an ellipsoid to oblong ovary, stigma sessile, distinctly apparent ..... *Z. maculata* N.E.Br.
- b** Rhizomatous stem, leaf blade sagittate to hastate, slightly constricted spathe, spadix shorter than spathe; female flowers with depressed-globose ovary and a distinct style, stigma small, somewhat indistinct (as broad as style) ..... *Z. amazonica* Bogner

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## Additional information

**Conflict of interest**

The authors declare that no competing interests exist.

**Ethical statement**

No ethical statement is reported.

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**Authors contribution**

Conceptualization: MCC. Data curation: MCC, AKK, MANC. Formal analysis: MCC. Funding acquisition: CMS. Investigation: MCC, AKK, MANC. Methodology: AKK. Project administration: CMS. Supervision: CMS. Validation: MCC, MANC. Writing – original draft: MCC, AKK, MANC, CMS. Writing – review and editing: MCC, AKK, MANC, CMS.

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**Data availability**

All data that support the findings of this study are available in the main text.

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