



# Taxonomy of the genus *Begonia* (Begoniaceae) in Mindanao, Philippines I: *Begonia olganunezae*, a new *Begonia* section *Petermannia* species discovered in the province of Bukidnon

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**ABSTRACT:** A new species, *Begonia olganunezae* from the mountains of Bukidnon province, southern Philippines is herein described and illustrated. It is morphologically allied to *B. affinis* and *B. bangsamoro* in having terminal inflorescences and staminate flowers with 4 tepals but differs significantly in having lanceolate stipules, and glabrous ovary and capsule. A detailed description, comparison with its allied species, colour plate, notes on phenology, distribution, and a provisional IUCN conservation assessment are provided below.

**KEY WORDS:** *Begonia affinis*, *Begonia bangsamoro*, biodiversity, conservation, endemic, Southeast Asia, Plant Taxonomy.

## INTRODUCTION

With about 2,039 accepted species, *Begonia* Linnaeus is one of the largest genera of flowering plants which are distributed in tropical and subtropical regions of the world (Hughes *et al.*, 2015–). *Begonia* section *Petermannia* (Klotzsch) de Candolle, comprising about 450 accepted species, is the most species-rich section in the Philippines with over 70 species recorded (Naive *et al.* 2018; Rubite *et al.*, 2021). The number of species is increasing as new species continue to be found such as *B. benitotanii* Rubite *et al.* (2021), *B. makuruyot* Rule *et al.* (2020), *B. bangsamoro* Buenavista *et al.* (2021) and many more. Given the known species diversity and distribution patterns of *B. sect. Petermannia* and the genus *Begonia* as a whole, as well as the fact that large portions of the Philippine archipelago still have low collecting densities, new fieldwork is likely to result in the discovery of additional new species or species that are already known from neighbouring countries (Hughes and Coyle, 2009; Mazo *et al.*, 2021).

As part of our ongoing work on the taxonomy of the genus *Begonia* for the island of Mindanao, a peculiar species identified as a member of *Begonia* sect. *Petermannia* by having protogynous inflorescences, and three locular ovaries with bilamellate placenta was collected by the authors in one of the mountains of Bukidnon province in November 2020 and June 2021. After meticulously examining all relevant literature and comparison of available digitized type specimens for the

genus *Begonia* sect. *Petermannia* from across the Philippine archipelago and neighbouring countries (*viz.* B, BO, E, K, L, P, NY, US; Hughes *et al.* 2015–), results revealed that this taxon collected does not match any other known *Begonia* species and is divergent. We therefore describe and illustrate it here as *Begonia olganunezae* Naive & Cababan, a species new to science and the 150<sup>th</sup> representative of the genus in the Philippines. The present paper is the first in a series aimed at documenting the diversity of *Begonia* species on the island of Mindanao.

## MATERIALS AND METHODS

The measurements and descriptions were based on fresh collected materials unless otherwise indicated. Photos were taken using Canon EOS 1200D and colour plates were prepared in Affinity Photo software. The general plant descriptive terminology follows Beentje (2016). Herbarium citations follow Index Herbariorum (Thiers, 2021). Relevant type specimens of *Begonia* section *Petermannia* species from the Philippines and neighbouring countries were examined in various herbaria through high resolution images at the Begonia Resource Centre accessed at <https://padme.rbge.org.uk/Begonia/data>. An assessment of conservation status was carried out following IUCN (2019). A map showing the distribution of this new species was prepared using ArcGIS v. 10.5 based on the gathered coordinates.



## TAXONOMIC TREATMENT

*Begonia olganunezae* Naive & Cababan, *sp. nov.*

**Figs. 1–2**

Section *Petermannia* (Klotzsch) de Candolle

**Type:** PHILIPPINES. Mindanao, Bukidnon, Valencia City, Barangay Lourdes, elev. 1523 m, 10 June 2021, *M.A. Cababan 3* (holotype PNH [PNH258562]; isotypes HNUL [HNUL0020800], Bukidnon State University Herbarium).

**Diagnosis:** *Begonia olganunezae* is morphologically allied to *B. affinis* Merr. and *B. bangsamoro* D.P.Buenavista, Pranada & Y.P.Ang in having terminal inflorescences and staminate flowers with 4 tepals. The new species differs significantly to *B. affinis* in having a sparsely strigose stem, lanceolate stipules, longer, sparsely to densely strigose petiole, narrowly ovate to ovate leaves with 7–8 major veins, and glabrous ovary. It differs from *B. bangsamoro* in having lanceolate, glabrous stipules with cuspidate apex, staminate flowers with broadly ovate, rounded apex outer tepals and canaliculate inner tepals, and glabrous ovary.

**Description:** Perennial monoecious, terrestrial herb, up to 55 cm tall. **Stem** occasionally branching, erect to ascending, 5–8 mm in diameter, terete, succulent, crimson to greenish maroon, sparsely strigose, nodes swollen, internodes to ca. 1.5–8 cm long. **Stipules** persistent, lanceolate, concave, 7–15 mm long by 3–5 mm wide, membranaceous, greenish red to maroon, glabrous, keeled, margin entire, apex cuspidate. **Leaves** alternate, petiolate; *petiole* 5.5–7.0 cm long, 3–4 mm in diameter, terete, succulent, sparsely to densely strigose, maroon to purplish red; *lamina* asymmetric, basifixed, ovate to elliptic, 3.5–15.0 cm long by 4–7 cm wide, chartaceous, adaxially glossy dark olive green, abaxially maroon, glabrous both sides, margin distantly serrate to biserrate, ciliate, base asymmetrically cordate, apex long acuminate; *venation* basally palmate, purplish red, 7–8 major lateral veins on both sides, branching dichotomously, abaxially sparsely or occasionally pubescent. **Inflorescence** terminal, cymose, protogynous, bisexual, short, ca. 5–7 cm long; *peduncle* ca. 1.7 cm long, terete, glabrous, red to pale red; *bracts* persistent, lanceolate, 8–9 mm long by 4 mm, glabrous both sides. **Staminate flowers** basal, short, simple cymes, pink to pale pink; *pedicel* ca. 3–7 mm long, terete, glabrous, pinkish red to pink; *tepals* 4, outer tepals broadly ovate, 9–11 mm long by 5–6 mm wide, glabrous both sides, margin entire, apex rounded, inner tepals lanceolate, 6–7 mm long by 2.5–3.0 mm wide, glabrous both sides, canaliculate, margin entire, apex acute; *androecium* actinomorphic, 2–3 mm across, the stamens ca. 20, lemon yellow, anthers obovoid, 1.0–1.1 mm long, apex obtuse, filament 1.5 mm long. **Pistillate flowers** borne in pairs or solitary, pale pink; *pedicel* 1.0–1.3 cm long, terete, glabrous, pale pink to whitish pink with a hint of green in the apex; *tepals* 5, outer tepals oblanceolate, 9–16 mm long by 3–4 mm wide, margin entire, apex obtuse,

inner tepals oblanceolate, 10–11 mm long by 3 cm wide, margin entire, apex acute; *ovary* trigonous-ellipsoid, dull violet red to pinkish with a hint of green in the wings, glabrous, 5–8 mm long by 4–5 mm wide (wings excluded), 3-locular, wings equal, triangular, apex obtusely acute, placentation axile, bilamellate; *style* 3, 3 mm long, bifid, apically forked; *stigmas* spirally twisted, papillose all around. **Fruit** 17–21 mm long, recurved; *pedicel* 12–13 mm long, pale pink; *tepals* deciduous; *capsule* dull violet red to pinkish, 5.0–9.7 mm long by 5.0–8.1 mm wide (wings excluded), glabrous, wings 3, equal, 8.0–12.1 mm long by 3.3–8.3 mm wide, broadly triangular when young, subrhomboid when mature, apex obtuse.

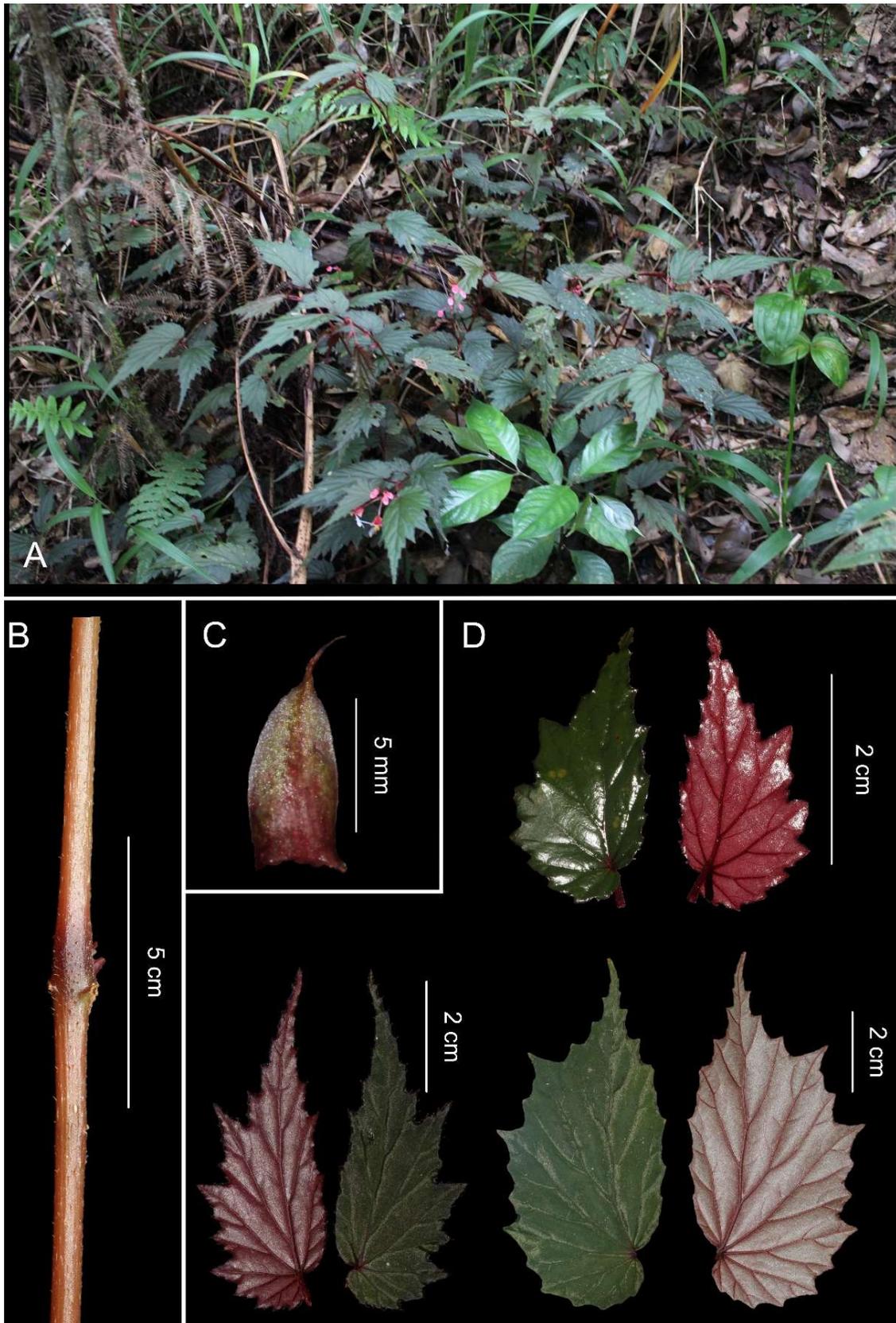
**Distribution and habitat:** Endemic to Mindanao, southern Philippines (Fig. 3). So far, this species was found and documented from its type locality i.e., Barangay Lourdes, Valencia City, Bukidnon. In December 2014, the species was documented in Mt. Kitanglad Range Natural Park, Sitio Kalanganan, San Vicente, Baungon, Bukidnon province and was erroneously identified as *Begonia incisa* D.C. (Pelser *et al.*, 2011). The species was found growing as terrestrial under a close to semi-open canopy in the montane forest with a cool environment between an elevation of 1000 to 1600 m asl.

**Phenology:** Flowers and fruits were observed in May, June, November and December.

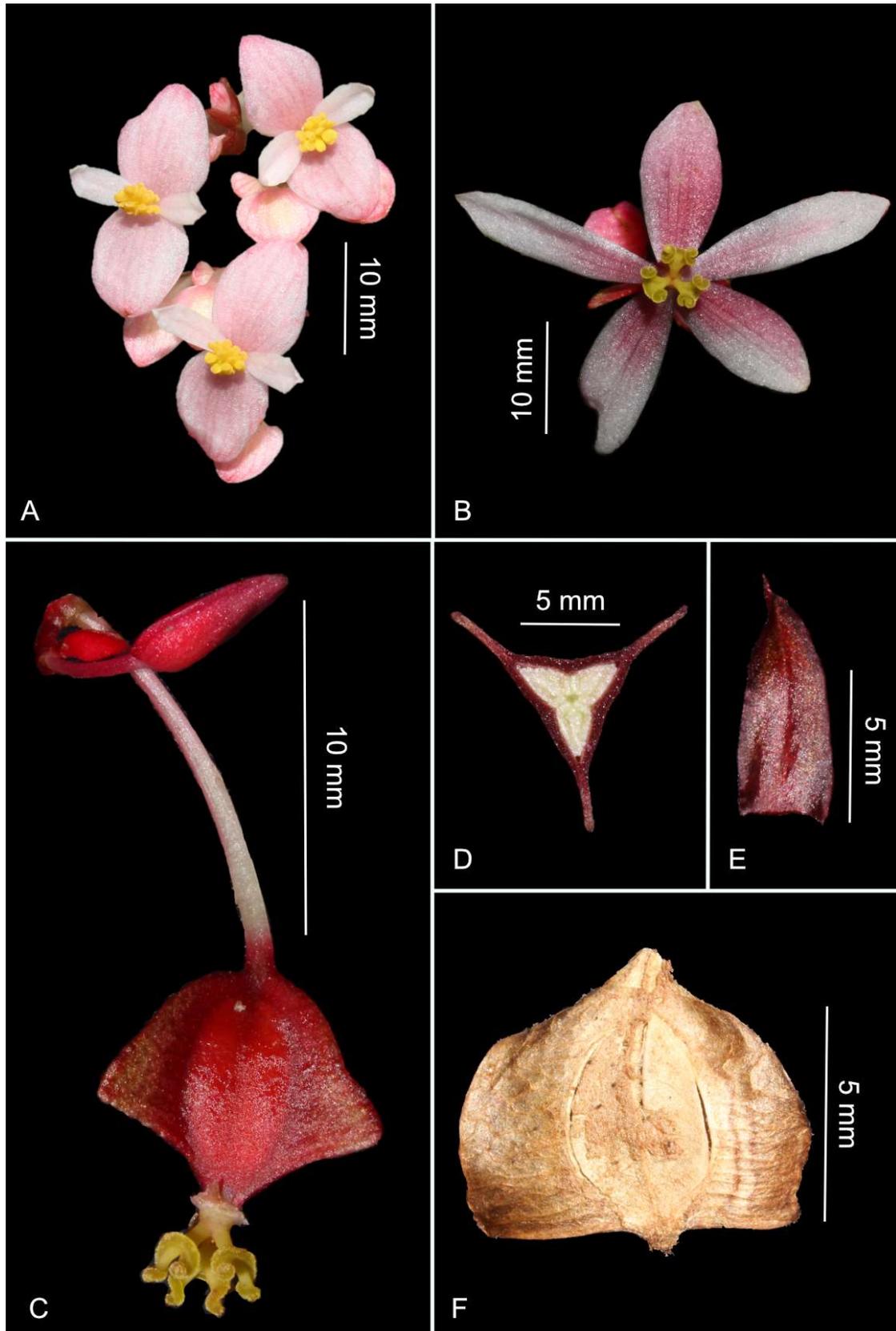
**Etymology:** The species is named in honour of Professor Dr. Olga M. Nuñez, an eminent professor and scientist in Mindanao State University - Iligan Institute of Technology (MSU-IIT) to recognize her efforts in documenting, studying, and conserving the flora and fauna of Mindanao while mentoring the next generation of scientists, including the first author.

**Other specimen examined:** *Begonia affinis*: PHILIPPINES, Mindanao: Zamboanga del Norte, Leon B. Postigo, Brgy. Tinuyop, elev. 344 m, 7 February 2021, *KRM 0001* (CMUH); District of Zamboanga, Sax river mountains back of San Ramon, in damp ravines, elev. 900 m, 27<sup>th</sup> Nov. 1911, *Merrill 8251* (P [P01900742-image seen!]); *Begonia bangsamoro*: PHILIPPINES, Mindanao: Bukidnon, Valencia City, Lourdes, elev. 1484 m, 10 June 2021, *M.A. Cababan 4* (HNUL, **new provincial record**).

**Provisional conservation status:** The extent of occurrence of *Begonia olganunezae* cannot be calculated. The area of occupancy is estimated to be 8 km<sup>2</sup> (calculated in GeoCAT with 2 km defined cell-width, Bachman *et al.*, 2011), complying with the criterion B2 for the Critically Endangered category. Although found in two mountains considered as protected areas, the species grows in the buffer zone vegetation near human settlement areas where agricultural expansion such as abaca plantation and grazing of cows were observed. In the type locality, only about 50–100 mature individuals were seen. Based on the facts mentioned, we herein provisionally considered this species as ‘Endangered’ (EN B2ab(ii,iii,v)), following the Red List criteria of the IUCN Standards and Petitions Subcommittee (2019).



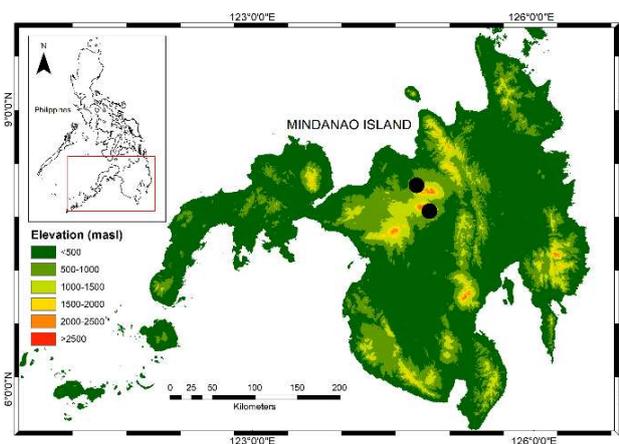
**Fig. 1.** Vegetative parts of *Begonia olganunezae* Naive & Cababan, *sp. nov.* **A.** Habit **B.** Stem **C.** Stipule **D.** Leaves. All from M.A. Cababan 3. (Photos by: MA Cababan and Prepared by: MAK Naive).



**Fig. 2.** Reproductive parts of *Begonia olganunzae* Naive & Cababan, *sp. nov.* **A.** Male flowers **B.** Female flowers **C.** Pedicel, ovary **D.** Ovary cross-section **E.** Bract **F.** Fruit (dried). All from M.A. Cababan 3. (Photos by: MA Cababan and Prepared by: MAK Naive).

**Table 1.** Morphological comparison between *Begonia olganunezae* and its allied species.

Characters	<i>B. affinis</i>	<i>B. bangsamoro</i>	<i>B. olganunezae</i>
<b>Stem</b>			
vestiture	densely setose	red to white pilose	sparsely strigose
internode length	2–6 cm	3.3–6.6 cm	1.5–8.0 cm
<b>Stipule</b>			
shape	triangular	ovate	lanceolate
vestiture	glabrous	abaxially sparsely hairy on the upper half of keel	glabrous
apex	long acuminate	aristate	cuspidate
<b>Petiole</b>			
vestiture	densely setose	red pilose	sparsely to densely strigose
length	0.4–0.8 cm	0.15–0.21 cm	5.5–7.0 cm
<b>Leaf</b>			
shape	oblong-obovate to obovate-oblancheolate	lance-ovate	ovate to elliptic
dimension	9–14 × 4.5–4.8 cm	7.6–10.8 × 3.1–4.1 cm	3.5–15.0 × 4–7 cm
<b>Venation</b>			
number	3–5	7	7–8
vestiture	sparsely pubescent	glabrous	abaxially sparsely or occasionally pubescent
<b>Staminate flower</b>			
outer tepals shape	elliptic	ovate to widely elliptic	broadly ovate
outer tepals apex	obtusely rounded	bluntly obtuse	rounded
inner tepals surface	non-canalicate	non-canalicate	canalicate
<b>Ovary</b>			
vestiture	sparsely echinate	sparsely minute hirsute	glabrous
length	10 mm	6–7 mm	5–8 mm
wings shape	subrhomboid	subrhomboid	triangular
wings apex	rounded	proximally and distally truncated	obtusely acute

**Fig. 3.** Map showing the distribution of *Begonia olganunezae* Naive & Cababan, *sp. nov.*

**Taxonomic notes:** Among the *Begonia* section *Petermannia* species present in Mindanao, *Begonia olganunezae* is morphologically similar to *B. bangsamoro* and *B. affinis* by having terminal inflorescences and 4-tepaled staminate flowers. *B. olganunezae* differs significantly from *B. affinis* in having sparsely strigose stem (vs. densely setose stem in *B. affinis*), lanceolate stipules (vs. triangular stipules in *B. affinis*), petiolate leaves (vs. sessile in *B. affinis*), sparsely to densely strigose petiole (vs. densely setose petiole in *B. affinis*), narrowly ovate to ovate leaves with 7–8 major veins (vs. oblong-obovate to obovate-

oblancheolate leaves with 3–5 major veins in *B. affinis*), and glabrous ovary and capsule (vs. sparsely echinate ovary and capsule in *B. affinis*). It is also comparable to *B. bangsamoro* but differs significantly in having lanceolate, glabrous stipules with cuspidate apex (vs. ovate, abaxially sparsely hairy on the upper half of keel with aristate apex in *B. bangsamoro*), staminate flowers with broadly ovate outer tepals and canalicate inner tepals (vs. staminate flowers with ovate to widely elliptic outer tepals and non-canalicate inner tepals in *B. bangsamoro*), and glabrous ovary and capsule (vs. sparsely minute hirsute ovary and capsule in *B. bangsamoro*). A detailed comparison of *B. olganunezae* and its allied species is presented in Table 1.

The discovery of this new endemic species highlights the urgent need to conduct more extensive fieldwork focusing on the genus *Begonia* in Mindanao as more species await discovery. It also highlights the critical need for the implementation of conservation programs to protect this critically endangered species where protected area policies do not apply.

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