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Begonia mizoramensis (Begoniaceae, section *Platycentrum*), a new dioecious species from Mizoram, Northeast India

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ABSTRACT: *Begonia mizoramensis* (Begoniaceae) under *Begonia* sect. *Platycentrum* (Klotzsch) A.DC. is described as a new species from Mizoram, Northeast India. It shares similarities in habit, leaf morphology and inflorescence with *Begonia longifolia* Blume and *Begonia acetosella* Craib, but differs in several characters, including longer internode, anthers with dehiscence extending beyond half their length, shorter pedicel in pistillate flower and a puberulent ovary with unequal wings. Taxonomic notes and pollen micromorphology are presented to confirm its novelty and sectional placement. Based on the available data, the newly discovered species has been provisionally assessed as Critically Endangered (CR) under the IUCN Red List Categories and Criteria.

KEY WORDS: *Begonia acetosella*, *Begonia longifolia*, *Begonia mizoramensis,* Indo-Burma Hotspot, Mizoram, *Platycentrum*.

INTRODUCTION

Begonia L. (1753: 1056) is one of the largest and most diverse genera of angiosperms, exhibiting a pantropical distribution, particularly in tropical and subtropical regions worldwide. The genus comprises herbs, shrubs and lianas with 2,198 accepted species classified into 70 taxonomic sections (Hughes *et al*., 2015–; Moonlight *et al*., 2018). Asia hosts approximately 1,299 species organized into 19 recognized sections, with the majority concentrated in Southeast Asia (Doorenbos *et al*., 1998; Shui *et al*., 2002; Hughes *et al*., 2015–). Tropical and subtropical Asia accounts for about 45% of global species diversity, with Southeast Asia alone supporting approximately 1,046 species (Hughes *et al*., 2015–; Moonlight *et al*., 2018). Members of the *Begonia* exhibit distinctive traits such as asymmetrical leaves, unisexual flowers, twisted papillose stigmas and winged capsules (Doorenbos *et al*., 1998). They are typically perennial herbs with stipules, bearing flowers with tepals resembling petals, and exhibiting centripetal stamen development and producing seeds with minimal endosperm (Tebbitt, 2005). Phylogenetic evidence suggests that the genus originated in Africa, with present day species in South America and Southeast Asia resulting from parallel radiation over the last 20–50 million years (Plana *et al*., 2004; Goodall-Copestake *et al*., 2010; Thomas *et al*., 2011).

Begonia exhibits remarkable species diversity, with a significant increase in new species discoveries in recent years. This surge reflects factors such as narrow endemism, high morphological variability driven by hybridization and polyploidy and intensified botanical exploration in previously under-surveyed regions (Ardi *et al*., 2022). In India, the genus was historically represented by 56 species (Uddin, 2007), and 41 species in Northeast India (Borah *et al*., 2021a). Extensive botanical surveys in this region have revealed an immense yet incompletely documented floristic wealth, underscoring its biodiversity significance. Notable recent discoveries include *Begonia atrofusca* Wahlsteen & D.Borah, *Begonia bijantiae* D.Borah, Taram & M.Hughes, *Begonia himalaica* D.Borah, Chowlu, A.Shenoy & Taram, *Begonia kekarmonyingensis* Taram, D.Borah & M.Hughes, *Begonia lorentzonii* Wahlsteen & D.Borah, *Begonia neisti* B.Hajong, N.Bhat & P.Bharali, *Begonia nyishiorum* A. Shenoy, A.K.Soni & Ab. Kumar, *Begonia pasighatensis* D.Borah, Taram & Wahlsteen, *Begonia rushforthii* Wahlsteen & D.Borah and *Begonia tripurensis* Dix.Bora, B.K.Datta & D.Borah. Species from Northeast India are classified into four sections as *Begonia* sect. *Diploclinium* (Lindl.) A.DC., sect. *Parvibegonia* A.DC., sect. *Platycentrum* (Klotzsch) A.DC., and sect *Monophyllon* A.DC. (Moonlight *et al*. 2018).

Mizoram, located in the southern part of Northeast India, forms a critical yet comparatively underexplored component of the Indo-Burma biodiversity hotspot. The state currently records 18 species of *Begonia,* including recently described taxa *Begonia dampae* Odyuo, B.K.Sinha, Murug. & A.Uddin and *Begonia murlenensis* N.Krishna & Pradeep (Singh *et al*., 2002; Odyuo *et al*., 2018; Krishna *et al*., 2021). Repeated botanical explorations conducted during 2024 to 2025 across various localities in Mizoram resulted in the collection of a unique *Begonia* species exhibiting several morphological similarities to the *B. longifolia* and *B. acetosella*, yet distinct from all the known taxa. Initial collections were made prior to the flowering stage from two separate localities and cultivated in pots for observation. Upon flowering, the species was found to be dioecious, with male

and female flowers borne on separate plants. Detailed morphological examinations and comparative analyses confirmed that both specimens represent a single, previously undescribed species. This new species is named as *Begonia mizoramensis* and its detailed description and illustrations are presented below.

MATERIALS AND METHODS

Field explorations were conducted between November 2024 and November 2025 with the objective of collecting *Begonia* species from various localities of Mizoram. During these surveys, numerous specimens belonging to the genus were collected. Subsequent critical examinations revealed the presence of an unidentified species, confirmed after meticulous analysis of morphological characters. Upon flowering, it was determined that the species is dioecious, with male plants bearing staminate flowers and female plants bearing pistillate flowers. Identification was carried out through comprehensive review of relevant literature, including floristic works and recent description of new species and records from the region (Grierson,1991; Singh *et al*., 2002; Tebbitt, 2003; Gu *et al*., 2007; Peng and Ku, 2009; Camfield and Hughes, 2018; Odyuo *et al*., 2018; Wahlsteen, 2018, 2019; Wang *et al*. 2025, Chen *et al*., 2019; Taram *et al*., 2020, 2021; Krishna *et al*., 2021; Tian *et al*., 2021; Borah *et al*., 2021a,b,c,d, 2023, 2024a,b, 2025; Das *et al*., 2022; Bora *et al*., 2024; Basumatary *et al*., 2025; Soni *et al*., 2025). To evaluate and confirm the novelty of the species, types and protologues of morphologically similar taxa were examined. Additionally, specimen images were assessed through online resources such as Global Biodiversity Information facility (https://www.gbif.org), JSTOR Global Plants (http://plants.jstor.org), Missouri Botanical Garden's TROPICOS (https://tropicos.org), Plants of the World Online (POWO, 2026) and *Begonia Resource Centre* (Hughes *et al*., 2015–). The conservation status was assessed in accordance with IUCN Red List Categories and Criteria (IUCN, 2024).

Field and laboratory photographs were captured using Sony DSC-W610 digital camera (Tokyo, Japan) and a BT-E Benchtop Biological Digital Microscope (Cilika, Thane, India). Micromorphological observations of the pollen grains were made on fresh samples, with dimensions recorded as polar axis (P) × equatorial axis (E) in micrometre (μm). Pollen samples were carefully removed from the anthers, dehydrated and subjected to critical point drying. They were then sputter-coated with gold using a Fine Coat Ion Sputter JFC-1100. Surface features were examined and photographed using an Environmental Scanning Electron Microscope (ESEM) FEI Quanta™ 250 FEG. Descriptions of pollen morphology follow the terminologies given by Punt *et al*. (2007) and Halbritter *et al*. (2018).

TAXONOMIC TREATMENT

Begonia mizoramensis Vanlalawmpuia, Khomdram & Yumkham, ***sp. nov.*** **Figs. 1–3**

Section ***Platycentrum***

Type: INDIA. Mizoram, Aizawl District, Ṭhiak, 23° 28′ 07.78″ N, 92° 43′ 0.77″ E, 1,037 m elevation, 22 May 2025, *Vanlalawmpuia 00130* (holotype, ASSAM! ♂; isotype, MZUH! ♂, MUMP! ♂).

Diagnosis: *Begonia mizoramensis* resembles *B. longifolia* and *B. acetosella* in habit, leaf morphology and inflorescence but differs by anthers with dehiscence extending beyond half their length, shorter pedicel in pistillate flower (3 mm) and puberulent ovary with unequal wings. *B. mizoramensis* differs from *B. longifolia* in sexuality (dioecious *vs*. monoecious), pedicel in staminate flowers (7–11 mm *vs*. 25–30 mm) and ovary (puberulent, not inflated *vs*. glabrous, slightly crested, inflated). It also differs from *B. acetosella* in peduncle (1–5.5 mm long, glabrous *vs.* 2–10 mm long, puberulous), tepal number in pistillate flower (6 *vs.* 4) and in ovary (3-loculed *vs*. 4-loculed).

Description: Perennial herb, dioecious, rhizomatous, evergreen, 40–115 cm tall. Rhizome short, unbranched, reddish brown, 4.4–9.8 cm. Stem erect, reddish brown, glabrous, internode 13–55 × 1.4–3.6 cm, longitudinal white stripes present, 0.3–2.4 cm long. Stipules persistent, lanceolate, light green to translucent, 1.8–2.2 × 0.4–0.7 cm, glabrous, margin entire, apex acuminate. Petiole reddish brown, puberulent, 3–11 × 0.2–0.4 cm. Leaves simple, alternate, oblong to lanceolate, 18–21 × 5–6.5 cm, adaxial green, abaxial greyish green, both surfaces muriculate, base obliquely cordate, margin serrate, tooth prominent at vein ends, venation palmate, midrib and veins dark red, strigose. Inflorescence dichasial cyme, axillary, peduncle 1–5.5 mm long, branched once or twice, glabrous, reddish brown. Bracts caducous, glabrous, lanceolate, 8–11 × 2–5 mm, light green to translucent, apex acuminate. Staminate flower: 2–5 per inflorescence, pedicel glabrous, pinkish white, 7–11 mm; tepals 4, subequal, outer 2, ovate to elliptic, 1–1.4 × 0.7–1.1 cm, concave, apex acute, adaxial white, middle pink, glabrous, abaxial sparsely hairy; inner 2, sub-orbicular, strongly spathulate, 9–13 × 6–8 mm, apex broad, pinkish white, both surfaces glabrous; 74–90 stamens, filaments free, 1–1.5 mm long, anther yellow, 2–3 mm long, oblanceolate, connective slightly extended, dehiscence extending beyond half their length. Pistillate flower: solitary, pedicel light green, upto 3 mm long, glabrous; tepals 6, unequal, glabrous, pinkish white; outer 3, elliptic to oblong, 1.0–1.5 × 0.4–0.7 cm, apex acute to obtuse; inner 3, narrower, apex broad, 1.0–1.1 × 0.4–0.5 cm; style 3, style with stigma 6 mm long, golden yellow, stigma bifid, spirally twisted twice with bands. Ovary 6 × 7 mm long, yellowish to light green, reddish at base and wings, puberulent, not inflated, dorsal wing triangular to rhomboid, lateral wings triangular

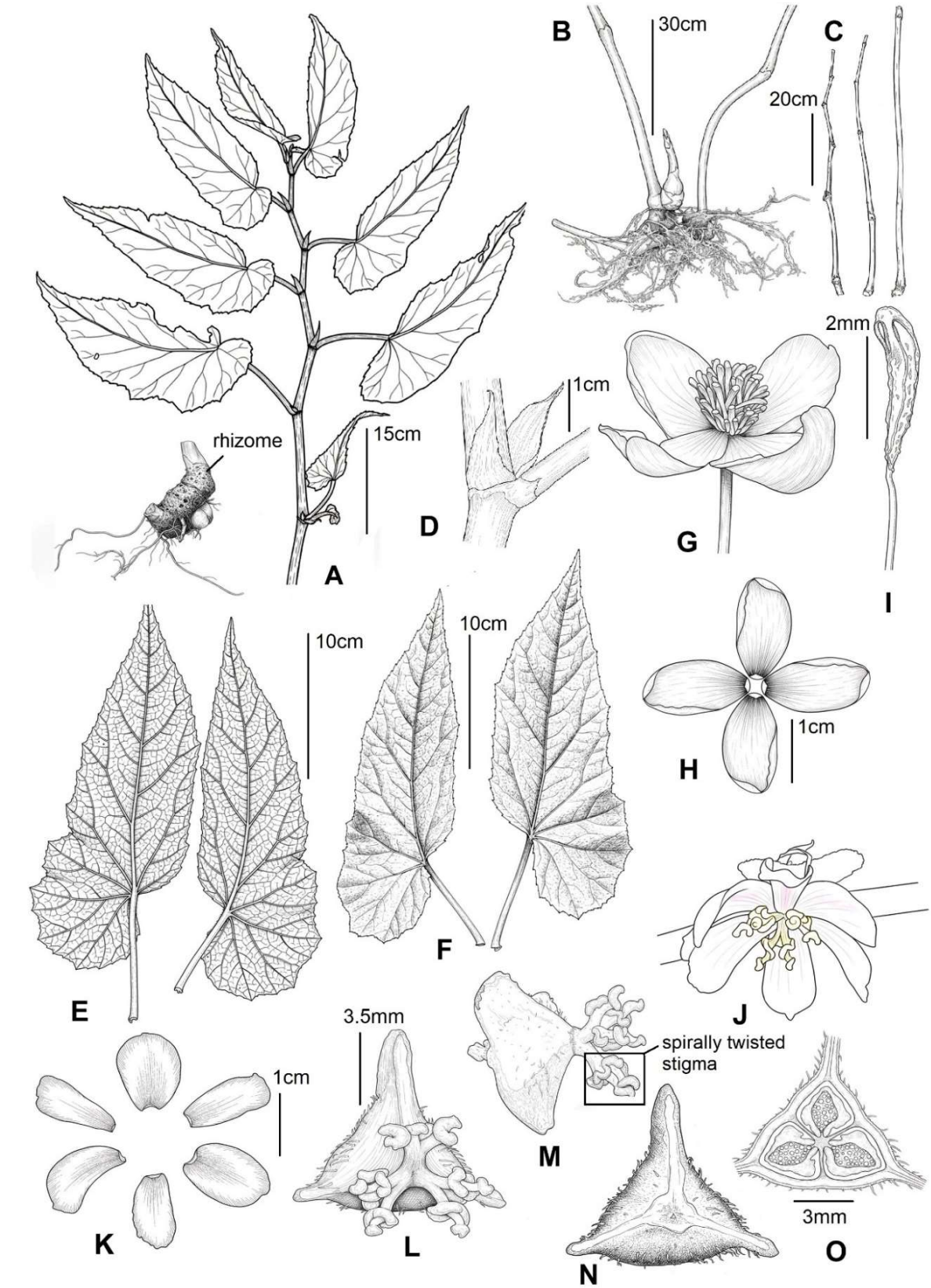

Fig. 1. ***Begonia mizoramensis*** Vanlalawmpuia, Khomdram & Yumkham **A.** Male flowering branch and rhizome. **B.** Stem base and rhizome; **C.** Internodes; **D.** Stipule, **E.** Leaves (adaxial), **F.** Leaves (abaxial); **G.** Staminate flower; **H.** Male tepals. **I.** Stamen. **J.** Pistillate flower. **K.** Female tepals. **L–M.** Frontal (L) and side (M) view of ovary and stigma. **N.** Immature fruit. **O.** Cross section of ovary.

Fig. 2. ***Begonia mizoramensis*** Vanlalawmpuia, Khomdram & Yumkham sp. nov. **A–B.** Habit (A. inset rhizome). **C–D.** Flowering twigs of male flowers (bee pollination in D). **E.** Solitary female flower, **F.** Flowering twig (abaxial surface). **G.** Portion of leaf (adaxial surface). **H.** Portion of leaf base with petiole (abaxial surface). **I.** Bracts. **J.** Stipules. **K–M.** Male Flowers. **N.** Androecium. **O.** Stamen showing dehiscence line.

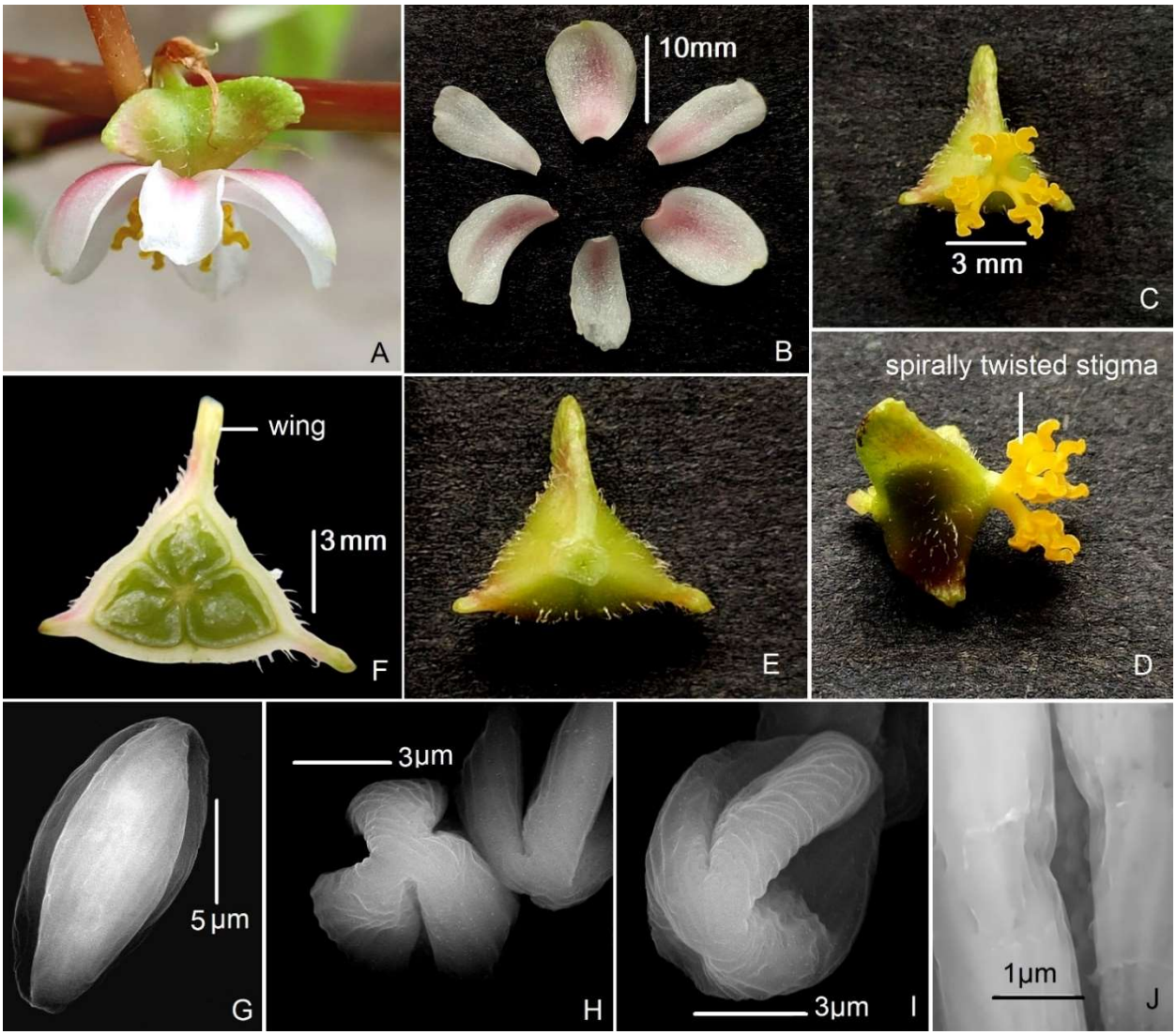

Fig. 3. ***Begonia mizoramensis*** Vanlalawmpuia, Khomdram & Yumkham sp. nov. **A.** Pistillate flower. **B.** Female tepals. **C-D.** Frontal (C) and side (D) view of ovary and stigma. **E.** Immature fruit. **F.** Cross section of ovary. **G–J.** SEM images of pollen grains with finely striate exine and psilate area lacking a margo (J).

to sub-oblate, dorsal wing 4.5–5 mm wide, lateral wing 2–4 mm wide, placentation axile, 3-loculed. Fruit berry-like, puberulent, wings unequal.

Pollen grains*:* Monad; isopolar; small 15–17 × 6.4–7 µm; triangular with rounded corners amb; perprolate (P/E ratio between 2.33–2.42); tricolporate; exine finely striate with psilate in between; margo absent (Fig. 3G–J).

Distribution and ecology: The newly described species is currently known from Ṭhiak Village (Aizawl District) and from Khawrihnim Village (Mamit District) in Mizoram (Fig. 4). Male plants were collected from both localities, whereas female plants were collected exclusively from Ṭhiak Village. It inhabits humid, moist rocky slopes and stream banks within broad-leaved evergreen forests, at approximately 950 m to 1,037 m elevations. The species grows in association with dominant plants from diverse families, including Orchidaceae (*Aerides multiflora* Roxb., *A. odorata* Lour., *Thunia alba* (Lindl.) Rchb.f.), Acanthaceae (*Strobilanthes* sp.) and Dennstaedtiaceae (*Pteridium* sp.).

Phenology: Flowering May–Oct, Fruiting Aug.–Oct. This species is pollinated by bee (Fig. 2D).

Etymology: The specific epithet *mizoramensis* refers to Mizoram, a state in India, where the new species was found.

Vernacular name: *Ram-Sheikhupthur* in Mizo language.

Provisional conservation assessment: *Begonia mizoramensis* is currently found along streamside habitats in Ṭhiak village, Aizawl District and Khawrihnim Village, Mamit District of Mizoram, where it is represented by only two known populations comprising fewer than 20 individuals. The estimated area of occupancy (AOO) is less than 10 km^2 and the species faces a high risk of decline due to ongoing habitat degradation, primarily associated with road construction

Table 1. Morphological comparisons of ***Begonia mizoramensis***, ***B. longifolia*** and ***B. acetosella***

Characters	*B. mizoramensis*	*B. longifolia*	*B. acetosella*
Plant sexuality	dioecious	monoecious	dioecious
Height (cm)	40–115	50–200	150–200
Internode	13–55 cm, glabrous	8–12 cm, glabrous or with minute glandular hair	10–20 cm, hispid
Stipule	lanceolate	lanceolate to linear	ovate
Leaf blade	18.9–21 × 5–6.5 cm, muriculate on both surfaces	6–(10–18) × 2.5–6 (–10) cm, glabrous to less muriculate	8–18(–30) × 2–7 (–15) cm, muriculate to hirsutulous
Peduncle	1–5.5 mm long, glabrous	4–10 mm long, glabrous	2–10 mm long, puberulous
Bracts	lanceolate	lanceolate	ovate
Tepal colour	pinkish white	white	pinkish to white
Staminate flower			
pedicel length	7–11 mm	25–30 mm	4–10 mm
outer tepals	ovate to elliptic	ovate to orbicular	ovate to obovate
inner tepals	suborbicular, strongly spathulate	obovate	obovate
stamens no.	74–90	35–90	60–100
filament size	1–1.5 mm	1–1.5 mm	1–3 mm
anther shape, length	oblanceolate, 2–3 mm	oblong-elliptic, 2 mm	oblong-obovate, 1–2 mm
dehiscence	through slits more than half its length	through slits about half its length	through slits less than half its length
Pistillate flower			
number	1	>1	1–3
pedicel length	upto 3 mm	14 mm	4–10 mm
tepal no.	6	5–6	4
outer tepals	elliptic to oblong	orbicular to elliptic	broadly elliptic
inner tepals	oblong–lanceolate or elliptic	elliptic	obovate elliptic
ovary	3-loculed, puberulent, not inflated, wing horned	3-loculed, glabrous, slightly crested, inflated	4-loculed, glabrous, inflated, triangular wings
Fruit	Berry like with unequal wings	Berry like with equal wings	Berry like with equal wings
Flowering time	June–October	June–December	March–April

Hughes and Girmansyah, 2011; Camfield and Hughes, 2018

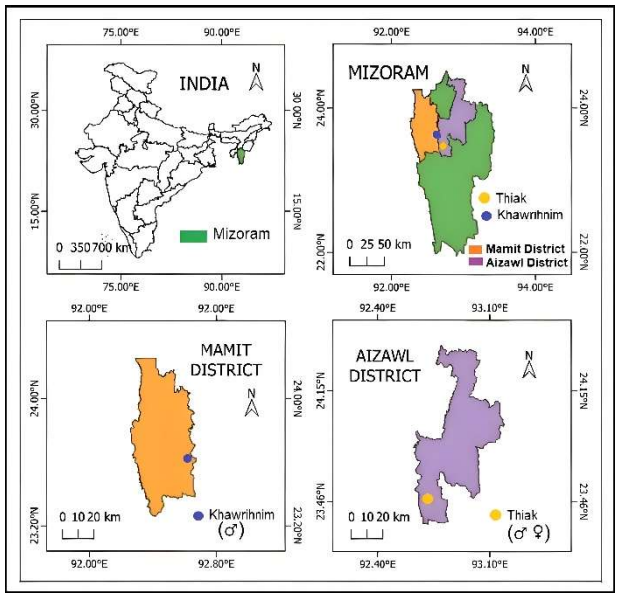

Fig. 4. Map showing collection sites of ***Begonia mizoramensis*** Vanlalawmpuia, Khomdram & Yumkham sp. nov.

and urbanization. According to the IUCN Red List Categories and Criteria (IUCN, 2024), *B. mizoramensis* qualifies as Critically Endangered (CR) under criteria B2ab(ii, iii, v); C(ii, iii, iv); D, as the number of mature individuals is estimated to be fewer than 50, with each population containing fewer than 20 individuals. The extremely small population size renders the species highly vulnerable to stochastic events, habitat disturbance, and environmental change, emphasizing the urgent need for targeted conservation measures.

Additional specimens examined **(paratypes)**: INDIA. Mizoram, Aizawl District, Ṭhiak, 23° 28′ 07.78″ N 92° 43′ 0.77″ E, 1,037 m elevation, 23 May 2025 *Vanlalawmpuia 00135* (MZUH! ♀; MUMP! ♀); INDIA. Mizoram, Mamit District, Khawrihnim, 23°37′40.12″ N, 92°37′18.82″ E, 950 m elevation, 7 August 2025, *Vanlalawmpuia 00137* (MZUH! ♂; MUMP! ♂).

Notes: *Begonia mizoramensis* is assigned to *Begonia* sect. *Platycentrum* based on its rhizomatous habit, axillary inflorescence, 4-tepaled staminate flowers, extended anther connectives, 3-locular ovary and convolute stigma. This sectional placement is further corroborated by micromorphological analysis, which provides critical insights into its taxonomic placement

and evolutionary significance. The pollen grains are monads, isopolar, and tricolporate, exhibiting a distinctly perprolate shape with a high P/E ratio (2.33). Their dimensions (15–17 × 6.4–7 μm) conform to the diagnostic norms of sect. *Platycentrum*. Furthermore, the finely striate exine and psilate area has been observed in the SEM studies. These combined characters unequivocally confirm the assignment of this taxon to *B.* sect. *Platycentrum* and validate its recognition of a new species (Rajbhandary *et al.,* 2012). The discovery of *B. mizoramensis* reinforces that Asia represents the principal center of diversity for sect. *Platycentrum*.

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