

Impatiens unguiculata and *I. bomiensis* (Balsaminaceae): Two new additions to the flora of India from the Eastern Himalaya

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Abstract: *Impatiens unguiculata* K.M.Liu & Y.Y.Cong and *I. bomiensis* Y.Y.Cong & Y.C.Peng (Balsaminaceae), hitherto known only from their type localities in Xizang (Tibet), China, are reported here for the first time from the Eastern Himalaya in India. In the present communication, we provide augmented morphological descriptions for both species, together with details on their distribution, phenology, habitat, associated taxa, and photographs. For *I. unguiculata*, we additionally provide a morphological comparison table with closely allied species, along with its first photographic record. These findings highlight the shared phytogeographical links across the Sino-Himalayan region and emphasize the need for continued botanical explorations in the Eastern Himalayan biodiversity hotspot region, particularly Arunachal Pradesh.

Keywords: Biodiversity hotspot, New record, Phytogeography, Sino-Himalaya, Taxonomy.

Introduction

The genus *Impatiens* L. (Balsaminaceae), commonly known as balsam, touch-me-not or jewelweed is one of the largest and taxonomically complex angiosperm genera, comprising 1,187 species worldwide (POWO, 2026) most of them distributed across tropical Africa, Madagascar, Western Ghats and Sri Lanka, the Sino-Himalayan region and Southeast Asia and a few species in Europe and North America (Yuan *et al.*, 2004). India harbours more than 300 species of *Impatiens*, with

the Eastern Himalaya recognized as a major centre of diversity and endemism (Gogoi *et al.*, 2018, 2020), as well as place of origin of section *Racemosae* (Xue *et al.*, 2025). A regional revision of Eastern Himalayan Balsams documented 83 species (Gogoi *et al.*, 2018), underscoring the floristic richness of this region. Further, 45 taxa are reported from Sikkim and Darjeeling Himalaya (Gogoi *et al.*, 2021).

Arunachal Pradesh, located within the Eastern Himalayan biodiversity hotspot, harbours exceptionally rich *Impatiens* diversity, yet vast areas remain botanically underexplored. Since the comprehensive revision by Gogoi *et al.* (2018), several new species of *Impatiens* have been described from the state, including *Impatiens tirbinensis* Hareesh & M.Sabu and *I. shiyomiensis* Hareesh & M.Sabu (Hareesh & Sabu, 2020), *I. pasighatensis* D.Borah, R.Kr.Singh & Taram (Borah *et al.*, 2022), *I. tajoensis* U.L.Tiwari (Tiwari, 2023) and *I. rajibiana* Chowlu, Borah & A.Shenoy (Chowlu *et al.*, 2025). In addition, *I. desmantha* Hook.f., *I. medogensis* Y.L.Chen, *I. microcentra* Hand.-Mazz., and *I. nyimana* C.Marquand & Airy Shaw (Lidén & Adhikari, 2019; Lidén & Bharali, 2020) were added to the flora of India from Arunachal Pradesh, while *I. sikkimensis* Govaerts & Chakrab. and *I. tuberculata* Hook.f. & Thomson, earlier known from Sikkim, have recently been documented from Arunachal Pradesh as extensions of their distributional range (Chowlu & Borah, 2024).

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Impatiens unguiculata K.M.Liu & Y.Y.Cong (Cong *et al.*, 2013) and *I. bomiensis* Y.Y.Cong & Y.C.Peng (Peng *et al.*, 2020) were both recently described from Xizang (Tibet), China, and were, until now known only from their type localities. During recent floristic surveys in eastern Arunachal Pradesh, specimens of both these species conforming to their type descriptions were collected. The present study confirms their occurrence within the geographical boundaries of India, thereby representing significant additions to the Indian flora. Finding of these two previously unreported species brings the total number of *Impatiens* species in Arunachal Pradesh to 74, of which 28 species are endemic. These discoveries highlight the need for further explorations in the little explored isolated mountains and valleys of Arunachal Pradesh (see also Lidén & Adhikari, 2019; Lidén & Bharali, 2020) with further high possibilities of getting more species (new or unreported) in the Eastern parts of Arunachal Pradesh.

Materials and Methods

Field expeditions were conducted in Anjaw and Shi Yomi districts of Arunachal Pradesh during August to September 2025. Fresh flowers were dissected in the field and photographed with D5600 DSLR camera (Nikon, Japan). All morphological measurements were taken from fresh material collected in the field. Detailed notes on morphology, locality, altitude, GPS coordinates, habitat and phenology were recorded in the field notebook. Voucher specimens were collected following Jain and Rao (1976), pressed, dried and mounted using standard herbarium techniques, and later deposited at the FRLH Herbarium, TDU, Bengaluru. Identification was confirmed by comparing the collected specimens against original protologues of *I. unguiculata* (Cong *et al.*, 2013) and *I. bomiensis* (Peng *et al.*, 2020). Detailed augmented morphological descriptions of both the species are provided based on the Indian specimens (our collection).

Taxonomic Treatment

Impatiens unguiculata K.M.Liu & Y.Y.Cong, Ann. Bot. Fenn. 50(3): 165. 2013; *Type*: CHINA, **Xizang** (Tibet), Motuo County, Yaluzangbu Grand Valley Nature Reserve, alt. 1054 m, 29°19'44.34" N, 95°10'40.44" E, in moist semi-shaded places along rivers, 08.08.2008, *Ke-Ming Liu & Yi-Yan Cong* 791424 (*holo* HNNU; *iso* HNNU, KUN).

Figs. 1 & 2

Perennial erect herbs, 30–120 cm tall. Stems erect, glabrous, nearly tetragonous, succulent, simple or occasionally shortly branched, green in the upper part and purple in the lower part. Leaves opposite in lower part of stem, alternate or pseudo-vericillate on upper branches; petiole 0.5–5.5 cm long, often with filiform and tuberculate glands, 2–4 mm long; lamina lanceolate to ovate-lanceolate, 5–15 × 2.5–6 cm, glabrous on both surfaces, lateral veins 5–8 pairs, base cuneate, margin crenate-serrate, apex acuminate. Inflorescences axillary, racemose, 2–6-flowered; flower buds enclosed in bracts; peduncle 6–14 cm long; pedicels 0.8–1.5 cm long; bracts ovate, 8–12 × 5–6 mm, apex acuminate, green to purplish brown, caducous, glabrous with prominent mid vein. Flowers yellow with reddish blotches, 3.7–4 cm long and depth up to 4.5 cm, twisted to left at maturity. Lateral sepals 4 (2 pairs); outer pair ovate, 8–9 × 4–5 mm, apex acute, green with a prominent midrib; inner pair linear, 4–5 × c. 1 mm, pale yellow to translucent. Lower sepal navicular, 1.2–1.3 cm across mouth, 3.8–4.2 cm deep along spur, bright yellow, apex with a prominent long awn, 1.3–1.5 cm long, reddish brown, rarely green; spur yellow, curled upward, up to 4.2 cm long, tip yellow (sometimes green), slightly notched-bifid. Dorsal petal deflexed, cucullate, c. 1.3 × 1.2 cm, yellow with reddish keeled portion, apex rounded. Lateral united petals 2-lobed, unequal, c. 31 × 8 mm, yellow, occasionally with slight red blotch; upper lobe c. 8 × 6 mm, apex acute; lower lobe 22–23 × 7–8 mm, elongated dolabriform; auricle 1–1.5 mm. Column 4–5 mm long. Stamens 5; anthers



Fig. 1. *Impatiens unguiculata* K.M.Liu & Y.Y.Cong: **a.** Inflorescence—closeup; **b.** Up-rooted plant showing plant habit with roots; **c.** Flowering plants habit (photographed by Ashutosh Sharma and Pakgam Ngulom Lendo).

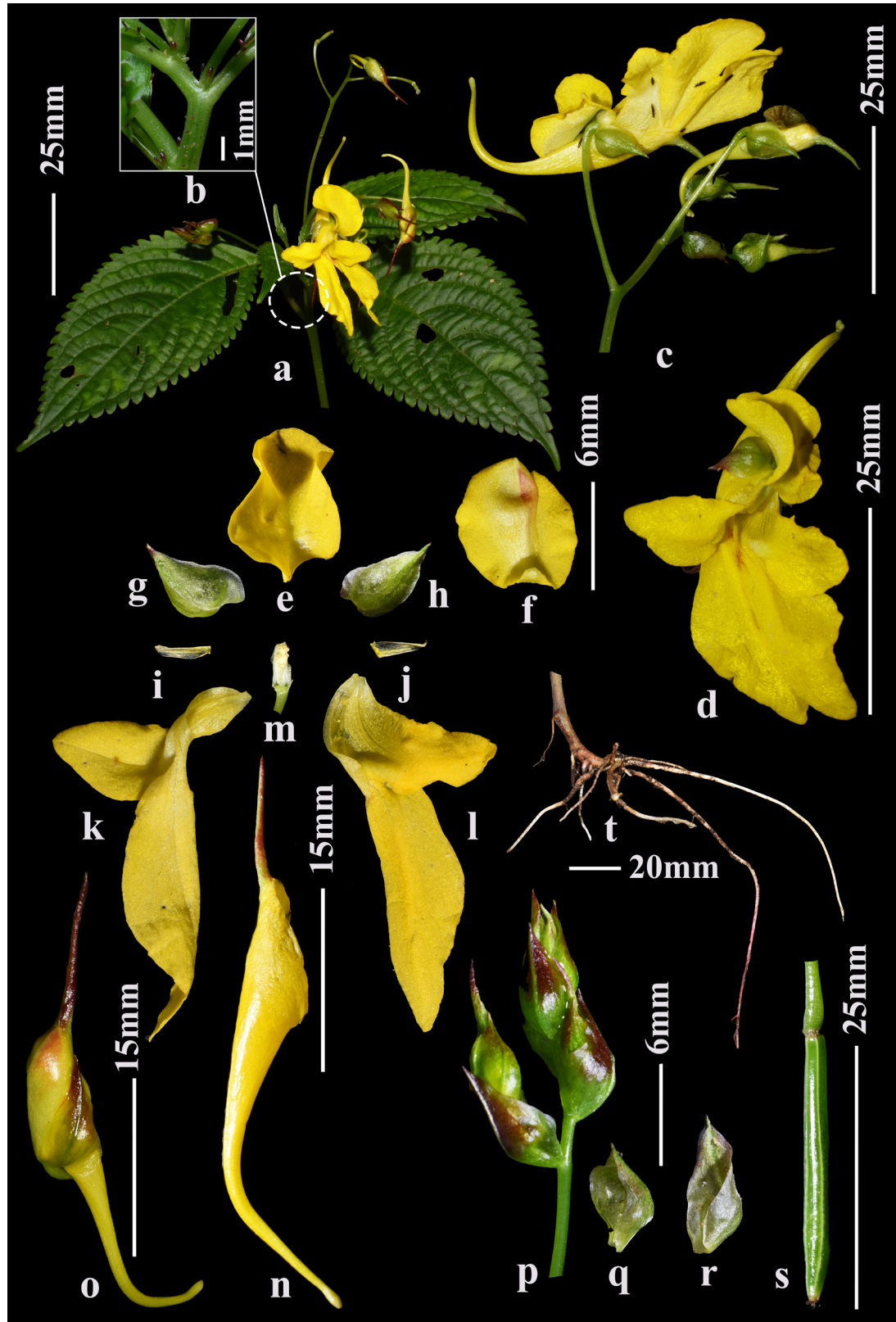


Fig. 2. *Impatiens unguiculata* K.M.Liu & Y.Y.Cong: **a.** Inflorescence & leaves; **b.** Close-up of apical stem showing glands; **c.** Flowers & buds—sideview showing lower sepal & spur; **d.** Flower—frontview; **e.** Dorsal petal—adaxial view; **f.** Dorsal petal—abaxial view; **g.** Outer lateral sepal—abaxial view; **h.** Outer lateral sepal—adaxial view; **i.** & **j.** Inner pair of lateral sepals; **k.** Lateral united petals—abaxial view; **l.** Lateral united petals—adaxial view; **m.** Column; **n.** Lower sepal & spur; **o.** Flower bud showing long awn; **p.** Inflorescence with buds enclosed by bracts; **q** & **r.** Bracts; **s.** Capsule; **t.** Roots (photographed by Ashutosh Sharma & Pakgam Ngulom Lendo).

with appendage. Ovary fusiform, c. 4 mm long, 5-carpellate. Capsules linear to narrowly clavate, c. 3.5 cm long, glabrous, green; seeds many.

Flowering & fruiting: Flowering and fruiting from April to October.

Habitat: During field observations, *Impatiens unguiculata* was frequently encountered in moist, shaded habitats along roadside and stream margins. It coexisted with *Impatiens tropaeolifolia* Griff. ex Hook.f., *I. citrina* Hook.f. & *I. walongensis* Hareesh, M.Sabu & Borah (Balsaminaceae), *Elatostema* spp. & *Pilea* sp. (Urticaceae), *Persicaria chinensis* (L.) H.Gross, *P. hydropiper* (L.) Delarbre (Polygonaceae), *Colocasiasp.* (Araceae) and *Diplazium* sp. (Aspleniaceae) along with several other fern species.

Distribution: China (Tibet) and India (Anjaw district, Arunachal Pradesh).

Specimens examined: INDIA, **Arunachal Pradesh**, Anjaw district, On the way to Chaglohagam, 28°17'56.2"N, 96°35'23.3"E, 1550 m, 15.09.2025, Pakgam Ngulom Lendo & Ashutosh Sharma 128390 (FRLH!); Chaglohagam (Chaglagam), near waterfall, 28°18'36.97"N, 96°37'10.98"E, 1626 m, 15.09.2025, Pakgam Ngulom Lendo & Ashutosh Sharma 128490 (FRLH!); Chaglagam, Dalai Valley, 06.09.2012, R. Gogoi & S. Borah 21811 (BSHC!); 2 Km before reaching Chaglagam, Dalai Valley, 09.09.2012, R. Gogoi & S. Borah 21837 (BSHC!).

Notes: In the protologue (Cong et al., 2013), *I. unguiculata* was compared with the widespread *I. drepanophora* Hook.f. However, it appears more closely allied to a group of yellow flowered species from the southern slopes of the Eastern Himalaya, several of which were described in the last decade (Gogoi et al., 2018). A morphological comparison with these closely related taxa from Eastern Himalaya is therefore provided here to facilitate distinction (See Table 1).

Impatiens bomiensis Y.Y.Cong & Y.C.Peng, Nordic J. Bot. 38(8): e02761. 2020. *Type:* CHINA, **Xizang**, Bomi County, under moist rocky and

shady places, 29°47'07.60"N, 95°56'49.18"E, altitude 3035 m, 17.08.2016, Yi-Yan Cong 32486 (*holo* HNNU; *iso* HNNU). **Fig. 3.**

Annual herbs, 30–90 cm tall. Stems tetragonous, succulent, erect, simple or sparingly branched, glabrous, green distally, suffused with purple proximally, hollow. Leaves opposite in lower part of stem, spirally arranged above; petiole 0.5–5.5 cm long, bearing a pair of globose glands at base, 3–4 mm long; lamina lanceolate or ovate lanceolate, 4–13 × 2.5–5.5 cm, lateral veins 5–7 pairs, base cuneate, margins crenate-serrate, apex attenuate, adaxial surface dark green, abaxial surface pale green with prominent reticulate venation. Inflorescences axillary, subcorymbose-racemose, 3–7-flowered; peduncles 3.5–5.0 cm long; pedicels 0.8–1.5 cm long; bracts linear-lanceolate, 3–4 mm long, caducous. Flowers pale pink to lavender with deep pinkish-maroon to reddish purple throat, spur yellowish green, 1–2 cm long, depth up to 2.8 cm, a smaller spurless form occasionally present. Lateral sepals 4 (2 pairs), outer pair obliquely ovate, 3–5 × 2.5–3 mm; adaxial surface purplish-green with a pale green midrib, abaxial surface pale green, inner pair linear-lanceolate, minute, 1–2 × 0.5–1 mm, pale pink to whitish, subhyaline, inconspicuous; lower sepal shallowly funnelform, 0.8–1 cm across mouth and 2–3 cm along spur, with deep pinkish-maroon to reddish-purple throat and yellowish interior in the deeper part, narrowed into a slightly incurved spur; spur filiform, 1.0–1.6 cm long, yellowish-green (paler towards tip), rarely absent. Dorsal petal sub-orbicular, 6–8 × 6–7 mm, emarginate and mucronulate at apex, with abaxial midvein inconspicuously thickened. Lateral united petals 2-lobed, 1–1.7 cm long, sessile; upper lobe sub-ovate, 7–9 × 3–6 mm, entire; lower lobe dolabriform (pickaxe shaped), 8–11 × 3–5 mm, rostellate at apex; auricle inconspicuous. Stamens 5; filaments linear, c. 3 mm long; anthers obtuse. Ovary fusiform, erect, 3–4 mm long, 5-carpellate. Capsules linear, 1.5–2.8 cm long, green; seeds up to 14, ovoid, brown, c. 3 × 1.5 mm.

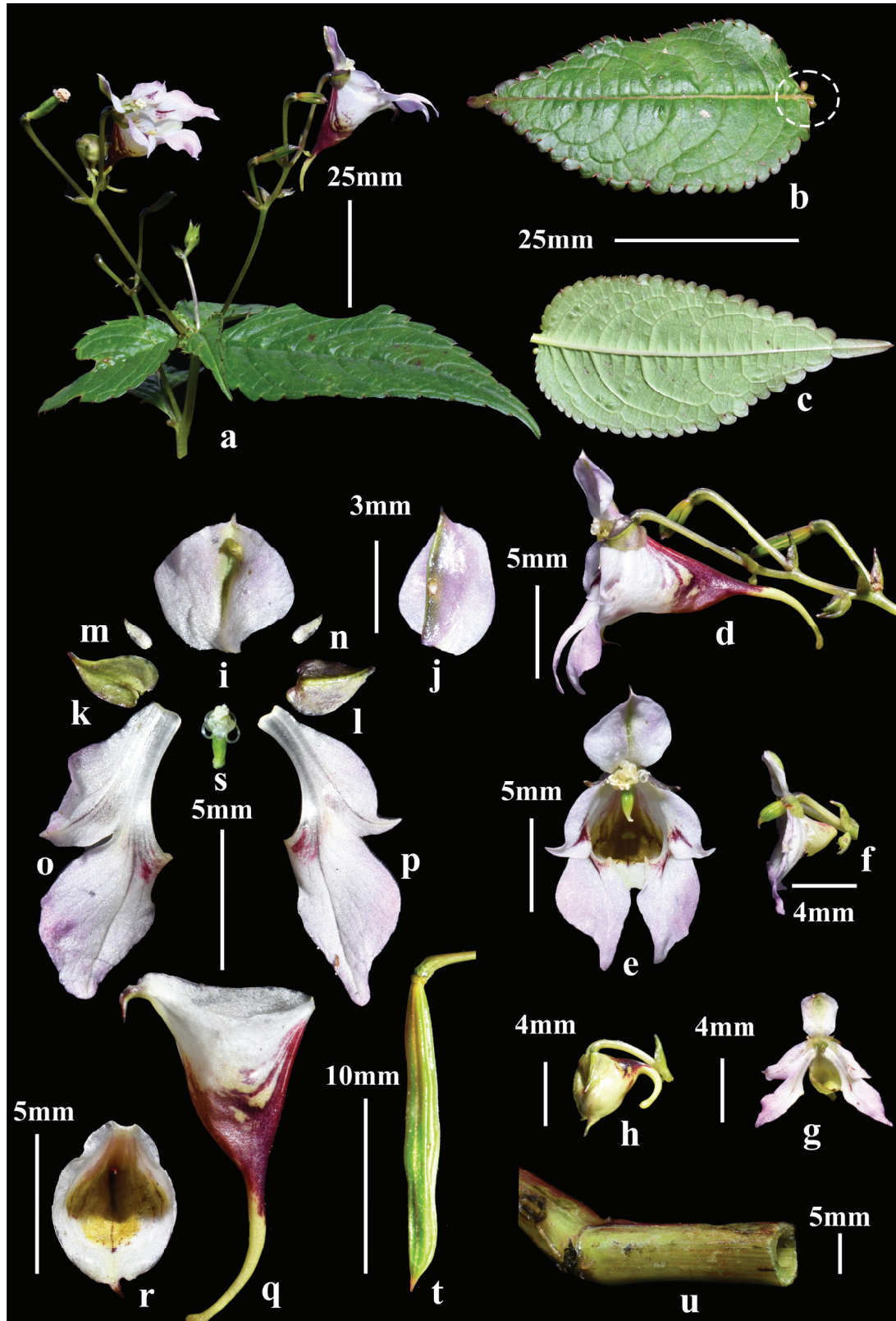


Fig. 3. *Impatiens bormiensis* Y.Y. Cong & Y.C. Peng: **a.** Inflorescence & leaves; **b.** Leaf—adaxial view with a pair of globose glands at base; **c.** Leaf—abaxial view; **d.** Flower—side view showing lower sepal & spur; **e.** Flower—front view; **f.** & **g.** Flower variation (smaller and spurless form); **h.** Flower bud with bract; **i.** Dorsal petal—abaxial view; **j.** Dorsal petal—side view showing crest; **k.** & **l.** Outer pair of lateral sepals—abaxial & adaxial view; **m.** & **n.** Inner pair of lateral sepals; **o.** & **p.** Lateral united petals—adaxial & abaxial view; **q.** Lower sepal & spur; **r.** Lower sepal mouth—inside view; **s.** Column; **t.** Capsule; **u.** Stem T.S. showing hollow centre (photographed by Ashutosh Sharma & Pakgam Ngulom Lendo).

Table 1. Morphological comparison of *Impatiens unguiculata* with allied species (data for allied species is taken from the protologues and Gogoi et al. 2018).

Characters	<i>I. unguiculata</i>	<i>I. citrina</i>	<i>I. pseudocitrina</i>	<i>I. lohitiensis</i>	<i>I. zironiana</i>
Habit	Perennial	Annual	Annual	Perennial	Perennial
Inflorescence	2–6-flowered	up to 10-flowered	2–3-flowered	5–7-flowered	2–4-flowered
Peduncle	6–14 cm long	up to 12 cm long	2.5–3.5 cm long	5.5–12 cm long	up to 5.5 cm long
Bracts	Green to purplish brown, ovate, 8–12 × 5–6 mm, with prominent mid vein	Green, navicular, c. 6 × 4 mm	Pale green or pale pink, broadly-ovate, 2–2.5 × 1.75–2 mm	Green, navicular, ovate, large, 10–12 × 6–8 mm, with prominent mid vein	Yellowish white, ovate-lanceolate, c. 15 × 7 mm, with prominent mid vein
Lateral sepals	2 pairs: 1 st pair-green, ovate with acute apex, cucullate, 8–9 × 4–5 mm; 2 nd pair pale yellow, linear, 4–5 × c. 1 mm	1 pair, greenish yellow, obliquely ovate, apex acuminate, 3 × 2 mm	1 pair, pale green, orbicular, acute at apex, 4–5.5 × 4–4.5 mm	1 pair, green, navicular, oblong, apex acuminate, c. 10 × 5 mm	1 pair, golden yellow, obliquely ovate, apex acute to narrowly acute, c. 10 × 5 mm
Lower sepal	Yellow, navicular, 1.2–1.3 cm across mouth, 3.8–4.2 cm deep along spur	Yellow, navicular, 0.4–0.6 cm across mouth, up to 3.0 cm deep along spur	Yellow with numerous red spots within, saccate or elongate-bucciniform, 0.4–0.5 cm, across mouth, 1.4–1.6 cm deep along spur	Yellow, navicular, c. 1.2 cm across mouth, 3.0–4.6 cm deep along spur	Yellow with red blotched, navicular, c. 1.5 cm across mouth, 4–4.5 cm deep along spur
Awn on lower sepal	13–15 mm long	Up to 3 mm long	Absent	Up to 2 mm long	Up to 1 mm long
Spur	Yellow, not filiform, upcurved (never straight), up to 4.2 cm long, tip yellow/green, slightly notched-bifid	Yellow, filiform, slightly upcurved, up to 2.5 cm long, tip yellow	Yellow, filiform, strongly upcurved, 0.8–1.0 cm, tip yellow	Reddish, linear-filiform, slightly upcurved, downcurved when young, 2.0–3.2 cm long, tip green, bifid	Red (rarely yellow), linear-filiform; straight, pointing upward, up to 4.5 cm, tip red
Dorsal petal	Yellow with reddish keeled portion, up to 1.3 × 1.2 cm	Yellow, c. 1 × 0.6 cm, acuminate	Yellow with pale green keeled portion, slightly keeled 0.5–0.7 × 0.5–0.65 cm	Yellow, c. 1.5 × 1.5 cm, beaked, dorsal side with mild ridge, slightly raised	Yellow, 1.3–2 cm; dorsally non-ridged
Lateral united petals	Yellow, sometimes with slight red spots on lower lobe, up to 3.1 × 0.8 cm; upper lobe c. 0.8 × 0.6 cm, ovate, apex acute, not clawed; lower lobe elongated dolabriform, 2.2–2.3 × 0.7–0.8 cm, auricle, 1–1.5 mm	Yellow, up to 2.4 cm; upper lobe triangular, 1–1.3 × 0.4–0.5 cm not clawed, apex acute; lower lobe elongated dolabriform, 1.6 × 0.4–0.6 cm, basal one lobe bent upward in united petals, auricle c. 1 mm	Yellow, 1.6–1.8 × 0.8–1.0 cm; upper lobe 0.7–0.8 × 0.4–0.45 cm, ovate, not clawed, apex obtuse; lower lobe irregularly dolabriform to oblong, 1.0–1.2 × 0.35–0.5 cm; dorsal auricle elongated, crispate, c. 1 mm	Yellow, red blotch in the base of the upper lobe, c. 3 × 1.6 cm, upper lobe 1–1.3 × 0.7 cm, oblong lanceolate, apex acuminate, clawed, claw 2 mm; lower lobe elongated dolabriform, c. 0.8–1.0 × 0.4 cm, auricle absent	Yellow without blotch, 3.0–3.5 × 1.5–2.0 cm; upper lobe c. 1.3 × 0.8 cm, ovate, apex obtuse-acute, clawed (basal appendage), claw up to 4 mm long; lower lobe elongated dolabriform, 2.0–2.3 × 1.0 cm, apex acute to obtuse; auricle absent
Capsule	Linear to narrowly clavate, up to 3.5 cm long, glabrous, green	Clavate, up to 1.6 cm long, ribbed, green	Linear, up to 2.5 cm long, glabrous, green	Linear, green, up to 3.2 cm long, tip & base reddish, slightly constricted above the middle	Linear, up to 3.2 cm long, green with red or brown blotches, slightly ridged

Flowering & fruiting: Flowering and fruiting from July to September.

Habitat: *Impatiens bomiensis* was observed in comparatively drier habitats, often along forest margins and open slopes, where it coexisted with *Impatiens radiata* Hook.f., *Impatiens* sp. (Balsaminaceae) and *Cyananthus inflatus* Hook.f. & Thomson (Campanulaceae). The surrounding sub-alpine vegetation included shrubby elements of *Ribes* sp. (Grossulariaceae), *Berberis* sp. (Berberidaceae), *Rubus* spp. (Rosaceae) and *Vaccinium glaucoalbum* Hook.f. ex C.B. Clarke (Ericaceae). Occasional representatives of *Koenigia* spp. (Polygonaceae) were also present.

Distribution: China (Tibet) and India (Shi Yomi district, Arunachal Pradesh).

Specimen examined: INDIA, **Arunachal Pradesh**, Shi Yomi district, Lamang Pass, along the roadside, 28°45'35.7"N, 93°57'32.2"E, 3288 m, 24.09.2025, Ashutosh Sharma & Pakgam Ngulom Lendo 128491 (FRLH!).

Notes: The protologue of *I. bomiensis* (Peng *et al.*, 2020) describes two lateral sepals. Examination of the Indian material, however, reveals four lateral sepals arranged in two pairs: an outer pair of obliquely ovate, greenish sepals and an inner pair of very small (1–2 mm), linear-lanceolate, subhyaline sepals that are easily overlooked (Fig. 3m & n). Hooker (1904) noted that ‘*when there are 5 sepals, the 2 additional, always small and often slender, are inserted within and above the two bigger lateral*’. Such minute inner lateral sepals are known in several other species of *Impatiens*, viz., *I. adamowskiana* Gogoi & Borah (pers. obs.), *I. nilalohitae* Hareesh & M. Sabu, *I. occultans* Hook.f., *I. scitula* Hook.f. and *I. stenantha* Hook.f., and may therefore have been overlooked in the type material. The occasional occurrence of spurless flowers (Fig. 3f & g) is reported here as a new observation for the species. Comparable spurless and cleistogamous flower forms have been documented in other Himalayan balsams, particularly in populations at higher,

sub-alpine elevations, e.g., *I. laxiflora* Edgew., *I. racemosa* DC. and *I. thomsonii* Hook.f. (Hooker, 1904).

Impatiens bomiensis is morphologically allied to *I. fragicolor* C. Marquand & Airy Shaw (see Peng *et al.*, 2020: Fig. 3 for comparison), which occurs in parts of Xizang (Tibet) adjacent to Arunachal Pradesh (Yu, 2012); its occurrence in the alpine zone of the state therefore cannot be ruled out.

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