



## A new species of *Impatiens* from Nagaland, India

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**ABSTRACT:** A new species of Balsam, *Impatiens pfutserensis* S.Singh, B.Singh & M.Bhuyan, belonging to *Impatiens* sect. *Racemosae* Hook.f. & Thomson, is described herein from the Phek District of Nagaland, India. The species is distinguished by a unique combination of diagnostic characters: unwinged stems lacking swollen nodes, forward-directed marginal leaf teeth, an eight-flowered inflorescence, and pink flowers with white patches. It is further characterized by a long spur and a ridged capsule. While morphologically similar to *I. stanantha* Hook.f. and *I. prainii* Hook.f., *I. pfutserensis* differs from both in several key traits. Inhabiting subtropical montane forest ecosystems, the species is presented here with detailed data on its morphology, distribution, phenology, and conservation status, alongside photographic documentation to facilitate accurate identification.

**KEY WORDS:** Balsaminaceae, biodiversity hotspot, eastern Himalaya, *Impatiens pfutserensis*, Indo-Burma, Nagaland, new taxon.

### INTRODUCTION

The genus *Impatiens* Riv. ex L. (family Balsaminaceae) with around 1,167 species globally (POWO, 2026), is one of the most species-rich genus in Angiosperms, with over 1,000 species native to Asia (Song *et al.*, 2021). The genus is widely recognized as exhibiting a pronounced biogeographic pattern, with five distinct centers of diversity distributed across the Old World tropics, which include tropical Africa, Madagascar, southern India and Sri Lanka, the eastern Himalaya, and Southeast Asia (Hooker, 1874; Dessai and Janarthanam, 2011; Akiyama, 2021), collectively reflecting the genus's evolutionary history, ecological adaptability, and diversification across varied tropical and subtropical habitats (Yuan *et al.*, 2004; Janssens *et al.* 2009). Many of its species are cultivated as ornamentals, while others are valued for their medicinal and cosmetic uses (Singhal *et al.*, 2017). Members of this genus are commonly referred to as 'balsams' or 'jewel weeds' (Dessai and Janarthanam, 2011). India is home to more than 280 species, most of which are found in areas with high biodiversity, such as the Eastern Himalayas particularly in North-eastern states and the Western Ghats (Ramasubbu *et al.*, 2020; Saravanan and Kaliamoorthy, 2024; Singh, 2025). Taxonomic interest in *Impatiens* has surged in Northeast India in recent decades, with numerous novel taxa being described (Gogoi and Borah, 2017; Gogoi *et al.*, 2018; Tiwari, 2023), highlighting the region's high endemism. Unlike the Western Himalaya, the Eastern Himalayan and part of Indo-Burma Hotspot

regions are less explored floristically due to remote locations and snow-clad mountains (Singh *et al.*, 2021a,b; Singh,B., 2021). Most species are either annual or perennial herbs, characterised by four petals fused into two lateral petals and a 5-valved capsule (Rheede, 1689; Hooker, 1874). Being microhabitat-specific, the flowers of *Impatiens* exhibit remarkable diversity and each species possesses a well-defined ecological environment.

From Nagaland (India), only 18 species of *Impatiens* have been recorded from different pockets of the state by different botanists and researchers (Mao *et al.*, 2017). This genus is not fully botanically explored from interior locations such as Pfutsero, Phek district, Nagaland, and many of the forested hills and mountain ranges are still botanically understudied. A unique member of *Impatiens* sect. *Racemosae* Hook.f. & Thomson was discovered during a recent botanical expedition in Pfutsero in August 2025. After detailed examination of collected specimens and comparison with balsams described from NE India and adjacent areas (Hooker and Thomson, 1860; Hooker, 1875; Toppin, 1920; Grey-Wilson, 1989; Huang, 2006; Chen *et al.*, 2008; Yu, 2012; Cai *et al.*, 2015; Hareesh *et al.*, 2016; Mao *et al.*, 2017; Gogoi *et al.*, 2018; Akiyama, 2021), the authors determined that this species can be readily distinguished from the closely related taxa *I. stanantha* Hook.f. and *I. prainii* Hook.f. based on differences in plant habit, lateral venation, inflorescence structure, and the presence of a longer spur, among other diagnostic characters. Accordingly, it is described here as a novel species and is illustrated with photographs of living specimens.

**Table 1.** Comparative morphology of *Impatiens pfutserensis* sp. nov. with its allied species.

Character	<i>I. pfutserensis</i>	<i>I. stenantha</i>	<i>I. prainii</i>
Habit	annual, succulent, subtropical forests	perennial, non-succulent, lower alpine forests	annual, succulent, temperate forests
Plant height	15–30 cm tall	40–90 cm tall	30–40 cm tall
Stem	simple, node not swollen, not winged	many-branched, swollen node, winged	few branched, stem slightly ribbed, nodes not swollen
Leaves	short petiolated; petioles 0.2–0.8 cm long, without visible glands, tip light glandular, pink; blade elliptic-lanceolate, 2.5–6.8 × 1.2–2.8, apex acuminate; margins sharply serrulate with forward-directed teeth; lateral veins 4–6 pairs	petioles 1–3.5 cm long, without visible glands, tip red; blade elliptic-ovate, 7–15 × 3–4.5, apex acute; margins serrate; lateral veins 7–11 pairs	short petiolated; petioles 0.3–0.5 cm long, without visible glands; blade narrowly elliptic, 1–8 × 0.3–1.5 cm, apex acuminate, deeply serrulate margin with setose between teeth; lateral veins 5–8 pairs
Inflorescence	axillary, racemose or sub-umbellate, 8-flowered	sub-terminal, racemose, 3–4 flowered	axillary, usually shorter than leaf, 2–3-flowered.
Flower	pink with white patches; flower mouth pink-crimson	yellow with dark red spots; flower mouth yellow	white flushed with pink; flower mouth white
Lateral sepals	2 nos., pink with white spots, apex acute	2 nos., yellow to reddish, apex acuminate	2 nos., white, apex acuminate
Dorsal sepals	orbicular, slightly white with pink dots, not ridged, apex acute	suborbicular, yellow, dorsally minutely ridged, apex emarginate	suborbicular, white, ridged, apex acute
Spur	2.5–2.7 cm long, slender, 90° curved	1.7–2.0 cm long, oblique, 180° curved	0.4–0.6 cm long, 90° curved
Capsule	clavate to subfusiform, 0.7–1.0 cm long, tip light green	linear, 1.3–2.2 cm long, tip reddish	linear, green, smooth, 2–2.5 cm long, tip light green

## TAXONOMIC TREATMENT

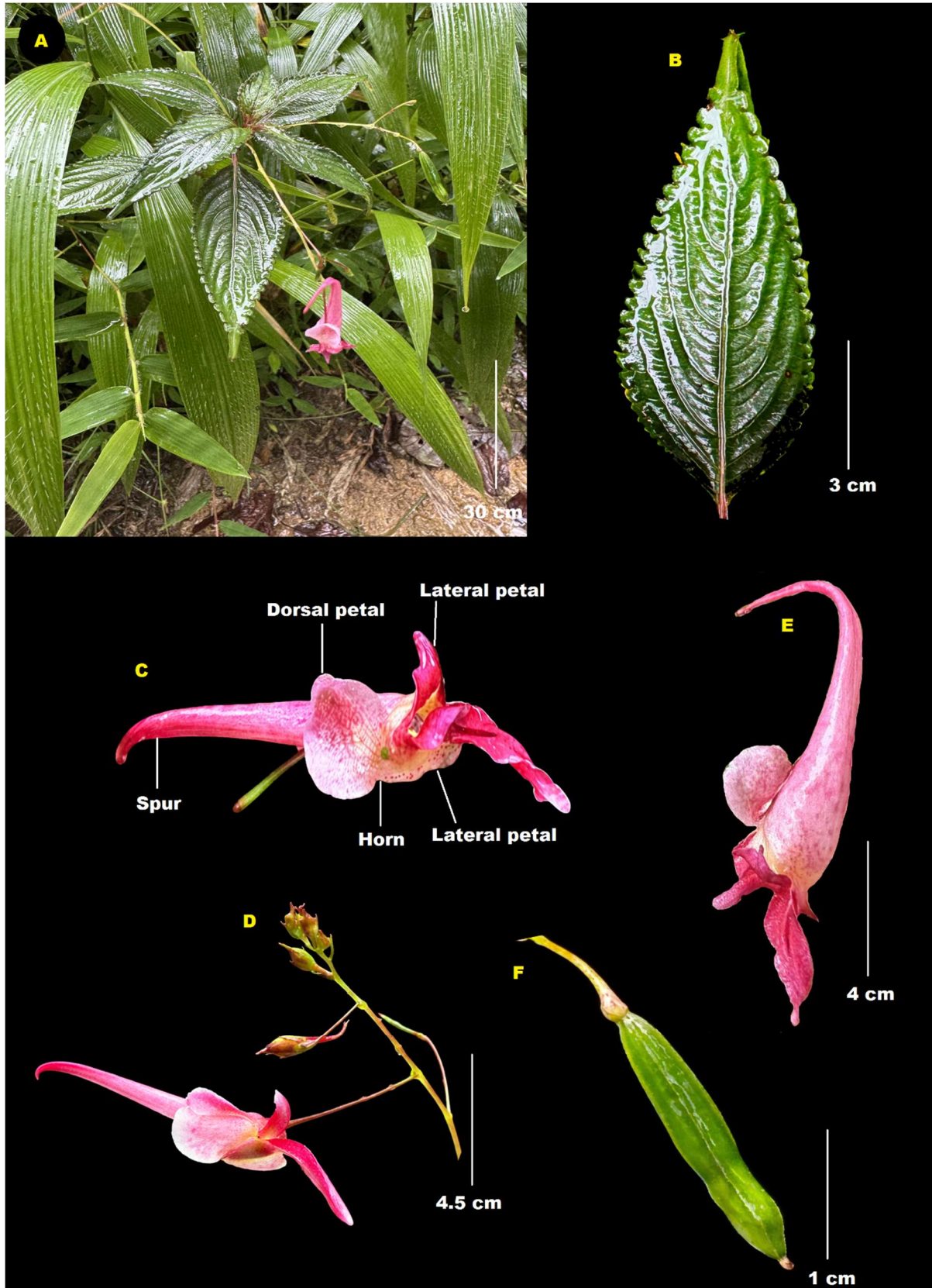
*Impatiens pfutserensis* S.Singh, B.Singh & M.Bhuyan, *sp. nov.* **Figs. 1–2**

**Type:** INDIA, Northeast region, Nagaland, Phek district, Pfutsero, 25.587733°N, 94.313161° E, 1787 m.asl, 08 August 2025, *Sumit Singh, Mantu Bhuyan & Bikarma Singh 1080* (holotype: ASSAM-102816), isotype: CSIRNEIST).

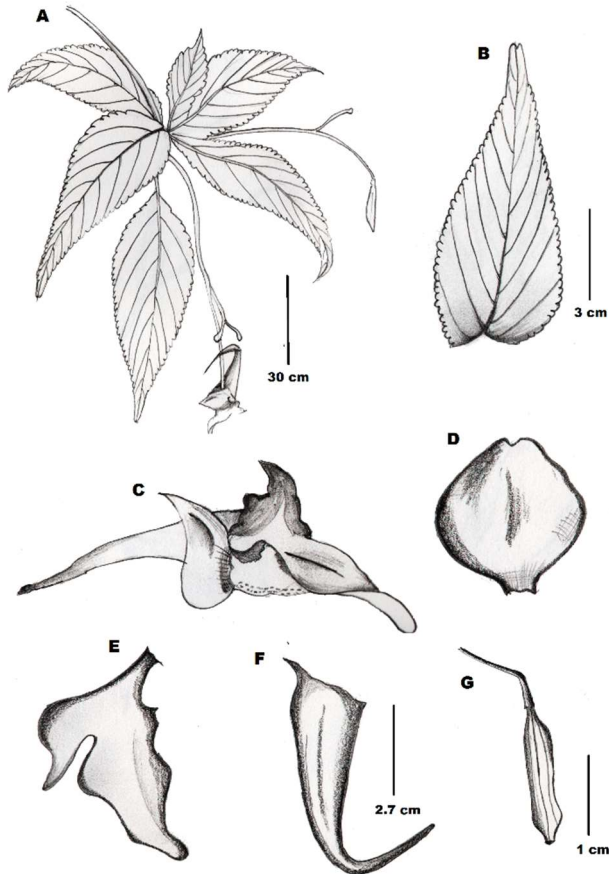
**Diagnosis:** The new species is morphologically similar to *Impatiens stenantha* Hook.f. (Table 1), but can be distinguished with the later by its plant habit (succulent vs. non-succulent), plant height (15–30 cm tall vs. 40–90 cm tall), node (not swollen vs. swollen), stem (not winged vs. winged), lateral veins (4–6 pairs vs. 7–11 pairs), inflorescence (8-flowered vs. 3–4 flowered); flower colour (pink with white patches vs. yellow with dark red spots), longer spur (2.5–2.8 cm vs. 1.7–2.2 cm), capsule (clavate to subfusiform vs. linear). The new species is also resembling *I. prainii* Hook.f., and varies by its stem (unbranched, hollow, translucent-green to reddish with adventitious roots vs. branched, solid), leaves (without stipule vs. distinct glandular stipule), inflorescence (8-flowered vs. 2 or 3-flowered), lower sepal (with long curved spur vs. short straight spur), and capsule (clavate vs. linear).

**Description:** Annual succulent herbs, 15–30 cm tall, unbranched, fibrous root shallow, adventitious roots arise from lower nodes. Stems erect, simple, fleshy, translucent-green to reddish, glabrous, not winged, without swollen nodes; internodes 2.2–3.1 cm long, dark brown to greenish. Leaves confined to upper portion of stem, spirally arranged, alternate, occasionally sub-opposite in upper nodes, shortly petiolated; petiole 0.2–0.8 cm long, slightly channelled, without visible glands, tip light pink, subglobose, stalked; blade elliptic-

lanceolate, 2.5–6.8 cm long, 1.2–2.8 cm wide, chartaceous to slightly succulent; margins sharply serrulate with forward-directed teeth, base cuneate to narrowly attenuate, apex acuminate; adaxial surface medium-green, glabrous, abaxial surface pale-green, often tinged reddish along midrib and lateral veins; lateral veins 4–6 pairs, arching forward; stipules absent. Inflorescence axillary, racemose or subumbellate, typically 8 flowered; peduncle 1–2 cm long, bracts minute, linear-lanceolate, deciduous; floral bud light green to purplish with distinct awn. Flowers pink with white patches, flower mouth pink-crimson, zygomorphic, showy, 1.4–2.2 cm across, resupinate, bracteate; bract slightly inserted at base, linear, acuminate; pedicel 1.4–3.2 cm long, filiform, ebracteolate or rarely with a small bracteole near the middle, white to light pink. Lateral sepals 2, ovate, bigger sepal, 1.6–2.2 cm long, 0.4–0.6 cm wide, pink with white spots, margin entire, membranous, base acute, apex acute; smaller sepal, 0.8–1.8 cm long, 0.3–0.4 cm wide, less pink with more white spots, margin entire, membranous, base acute, apex acute. Lower sepal conspicuously saccate, 1.8–2.3 cm long, 0.7–0.9 cm wide, funnel-shaped, gradually narrowed into a slender spur, sub-terete, slightly curved, apex blunt or minutely dilated; spur 2.5–2.7 cm long, slender, 90° curved, light pink to white patches, glabrous. Dorsal petal orbicular, slightly white with pink dots, 1.9–2.3 cm long, 0.8–1.2 cm wide, not ridged, lightly hooded, base acute, apex acute with conspicuous median crest; margin entire, spreading; lateral united petals 2-lobed, base rounded, apex acute; basal lobes shorter, oblong, 0.6–0.8 mm long, slightly pink to deep crimson; distal lobes reflexed, falcate, 12–15 mm long, somewhat pink to deep crimson. Stamens 5, filaments short; anthers elliptic, ca 0.2 mm across, white, persistent during anthesis, connate into a cap surrounding;



**Fig. 1.** *Impatiens pfutzerensis*: A. natural habit, B. single leaf, C. different parts of a complete flower, D. inflorescence E. close look of complete flower, F. capsule.



**Fig. 2.** Illustration of the *Impatiens pfutserensis* sp. nov. **A.** habit, **B.** single leaf, **C.** complete flower, **D.** dorsal petal, **E.** lateral petal, **F.** spur, **G.** capsule.

filaments 6–7 mm long, free at the middle, narrow at base and broader at apex. Ovary fusiform, ca. 4 mm across, glabrous; style short, stigma obscurely 5-lobed. Capsule clavate to subfusiform, matured capsule 0.7–1.0 cm long, glabrous, tip light green, ridged. Seeds oblong-ovoid, rugose, explosively dehiscent when matured.

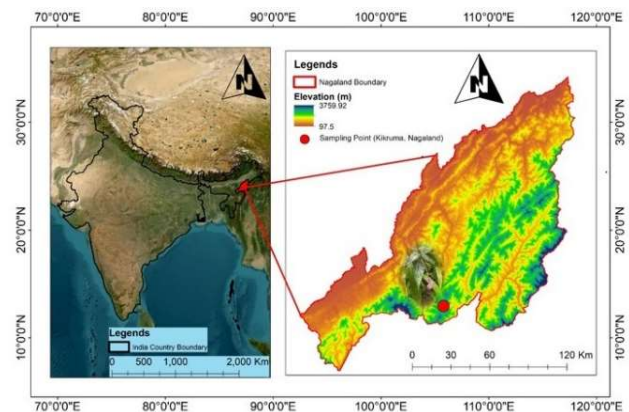
**Phenology:** July to October

**Etymology:** The species epithet is named after its type locality, the scenic ‘Pfutsero’ located in Phek district of Nagaland State, India, part of Indo-Burma Biodiversity Hotspot. This region is known for its scenic beauty and rich biodiversity.

**Distribution and habitat:** *Impatiens pfutserensis* is known only from the Pfutsero area of the Phek District in Nagaland, NE India, occurring at elevations between 1,700 and 2,100 m. The species typically inhabits humus-rich soils mixed with leaf litter, primarily localized along the margins of subtropical broad-leaved forests, seepage zones, and shaded to semi-shaded wet slopes. Populations are generally small and dispersed, occurring as understory elements or along stream banks in association with various perennial herbs and shrubs. The species thrives in high-humidity environments with moderate canopy cover; it flowers from July to September during

the monsoon season, with fruiting occurring from August to October. The associated herbaceous layer includes *Elatostema lineolatum* Wight, *Pilea scripta* (Buch.-Ham. ex D. Don) Wedd., *Polygonum chinense* (L.) H. Gross, and *Selaginella delicatula* (Desv.) Alston. The overstory is characterized by tree species such as *Quercus griffithii* Hook. f. & Thomson ex Miq., *Alnus nepalensis* D. Don, and *Castanopsis tribuloides* (Sm.) A. DC.

**Conservation status:** At present, the new species is known only from its type locality in Pfutsero, Phek District, Nagaland. It was observed as a single subpopulation restricted to damp, shady slopes and forest margins at elevations between 1,700 and 2,000 m. While the restricted range and specific habitat requirements might suggest a status of Endangered (EN) under IUCN (2024) guidelines, further surveys are required to determine its presence in adjacent areas. Given that only one locality has been thoroughly explored to date, the species is preliminarily categorized here as Data Deficient (DD).



**Fig. 3.** Geographic map showing the location of *Impatiens pfutserensis* sp. nov.

## DISCUSSION

*Impatiens pfutserensis* reflects the pattern of local endemism, with potential significance for phylogenetic studies. These narrowly endemic species may represent recent evolutionary radiations or ancient relictual lineages shaped by quaternary climatic shifts. The discovery of *Impatiens pfutserensis* from Pfutsero, Nagaland, significantly enriches the floristic record of the Indo-Burma biodiversity hotspot. Northeastern India is a key hotspot of this diversity, supporting more than 100 species, many of which are narrowly endemic to the region (Singh, 2016; Gogoi *et al.*, 2017). The identification of *I. pfutserensis* highlights the need for intensified botanical exploration in the under-documented region of Nagaland. Morphologically, *I. pfutserensis* resembles *I. stanantha*, however, distinct differences in flower colour, spur curvature, dorsal petal ornamentation and petal shape justify its recognition as a



separate species. On the other hand, the newly described *I. pfutserensis* also resembles *I. prainii* but differs in various characters like stem type, leaves, inflorescence, lateral sepals, lower sepal and capsule which again justify its recognition as a separate novel species. Such subtle but consistent traits are typical in *Impatiens*, where microhabitat specialisation drives rapid speciation. Ecologically, *I. pfutserensis* is confined to moist, shaded slopes at 1700–2000 m, favouring seepage zones with humus-rich soil—conditions that suggest sensitivity to environmental disturbance. This narrow ecological niche likely contributes to its low abundance and restricted distribution, a pattern echoed across many Himalayan *Impatiens* species. Conservation efforts are required for the conservation of threatened species.

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