

## *Impatiens pathakiana* (Balsaminaceae), a new species from Arunachal Pradesh, north-eastern India

Rajib Gogoi<sup>1,2</sup> and Souravjyoti Borah<sup>1</sup>

<sup>1</sup>Botanical Survey of India, Arunachal Pradesh Regional Centre, Senki View, In-791 111 Itanagar, India.

<sup>2</sup>Author for correspondence: [rajibdzuko@gmail.com](mailto:rajibdzuko@gmail.com)

### Abstract

*Impatiens pathakiana* Gogoi & Borah, a new species is described and illustrated from Arunachal Pradesh, north-eastern India. The species is restricted to hilly slopes along margin of subtropical evergreen broad-leaved montane forests of Chaglagam (Dalai Valley), Anjaw district of Arunachal Pradesh, India. Diagnostic morphological characters distinguishing the new species from the morphologically similar species, *I. fenghwaiana* Y.L.Chen and *I. wuyuanensis* Y.L.Chen are discussed.

### Introduction

*Impatiens* L. (Balsaminaceae) consists of more than 900 species distributed worldwide, except not occurring in South America (Chen *et al.* 2008), Australia and Antarctica. The genus comprises annual and perennial herbs that have conspicuous, striking and yet delicate flowers. The genus is represented by c. 210 species in India with two centres of diversity – the Eastern Himalaya and the Western Ghats (Dessai and Janarthanam 2011). Arunachal Pradesh, a part of Eastern Himalaya harbours a high diversity of *Impatiens* species, as well as a high degree of endemism.

During an expedition to Anjaw district in 2012, the authors collected a pink large-flowered species of *Impatiens*. After critical examination of the specimens and comparison of descriptions published in previous literature (Hooker 1875, 1905, 1908, 1910; Toppin 1920, Grey-Wilson 1989, 1991; Vivekananthan *et al.* 1997; Swaminathan *et al.* 2001; Huang 2006; Chen *et al.* 2008; Dessai and Janarthanam 2011; Yu 2012; Bhaskar 2012; Gogoi and Borah 2013a, b, 2014, 2015; Gogoi *et al.* 2013), it was concluded that this collection represented an undescribed species. The species is here described as new with coloured illustrations.

***Impatiens pathakiana* Gogoi & Borah, sp. nov. Figs 1, 2 (A–C)**

Close to *Impatiens fenghwaiana* Y.L.Chen but differs in the presence of a sub-umbellate inflorescence (sub-racemose in *I. fenghwaiana*), sub-globose stipular glands at the base of the petiole, linear floral bracts, an awn or appendage in the floral buds, an awn in the mouth of lower sepal, a different pattern of lobation in lateral united petals and the clavate capsule. It also differs from *I. wuyuanensis* Y.L.Chen in having a sub-umbellate inflorescence (sub-racemose in *I. wuyuanensis*), sub-globose stipular glands at the base of the petiole, smaller linear floral bract, an awn or appendage in the floral buds, ovate lateral sepals, an awn in the mouth of the lower sepal, and a different lobation in the lateral united petals.

**Holotype:** India: Arunachal Pradesh: Anjaw District, c. 20 km before Chaglagam way from Hyuliang, 96°35'32.87"E, 28°18'0.14"N, 1591 m, R. Gogoi & S. Borah 21827, 9 Sep 2012 (CAL !); isotypes: CAL !, ASSAM !, ARUN !

Perennial succulent herbs up to 70 cm tall. *Stem* glabrous, terete, swollen at nodes, greenish, internodes dark brown to greenish. *Leaves* confined to upper portion of stem, alternate-spirally arranged, stipulate, 2 stipular glands at base of petiole, sub-globose, stalked, apex bulbous, to 2.5 mm long, dark purple; petiole green, 0.8–2 cm long, glabrous; blade elliptic, 3–10 cm long, 1–3.3 cm wide, veins 9–11 pairs, main vein purplish, base acute, slightly attenuate, margin crenate, with purple bristles, apex acuminate. *Inflorescence* axillary, sub-umbellate, 4–9 cm long, ebracteate, peduncle 3.5–4.5 cm long, green or brown with pink spots, 3–7-flowered, floral bud pinkish with distinct awn or appendage; flower pink, bracteate, bract linear, acuminate, pink, to 2 mm long, pedicel pinkish or dark brown, 1.5–2 cm long, glabrous. *Sepals:* *lateral sepals* 2, light green to pink, equal sized, ovate, margin dentate, 2–3 mm long, 1–1.5 mm wide, apex acuminate; *lower sepal* navicular, constricted into a spur, 3.4–4.3 cm long, whitish or pink with darker spots, mouth 6–8 mm wide, with an awn, to 3 mm long, cream-yellow, spur 3–3.5 cm long, curved downward, whitish or pink with darker spots, apex blunt, green to yellow. *Petal:* *dorsal petal* orbicular, 1–1.3 cm long, 1–1.2 cm wide, pink, cucullate, ridged; *lateral united petals* pink, bilobed, sub-equal, 2–3 cm long, basal lobe to 1.3 cm long, to 0.5 cm wide, lanceolate, basal part of basal lobe whitish with purple spots, auricle minute, 1 mm tall, yellow, distal lobe to 1.5 cm long, to 1 cm wide, triangular, apex obtuse; stamens 3–4 mm long, anther lobes obtuse. *Capsule* clavate, greenish with pink spots, 1.5–2 cm long, 0.2–0.3 cm wide; *seeds* ovate, 1–1.5 mm, brown.

**Phenology:** Flowering and fruiting in rainy season, July–September.

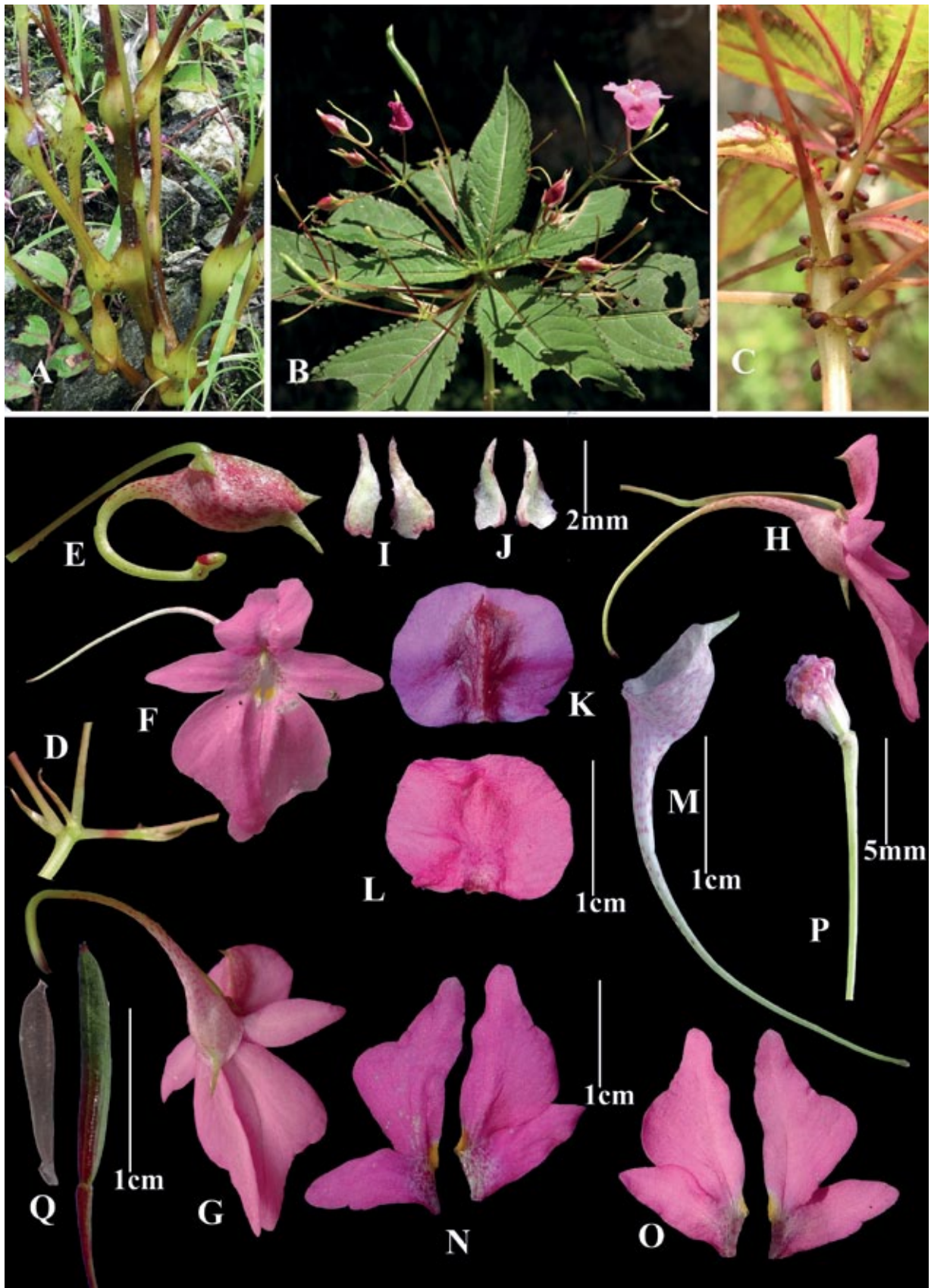
**Distribution and habitat:** *Impatiens pathakiana* is endemic to Chaglagam (Dalai Valley) of Anjaw district of Arunachal Pradesh. It was found growing in the hilly slopes at 1500 m elevation.

**Etymology:** The species is named after the Late Dr. Mithilesh Kumar Pathak, who worked in Central National Herbarium (CAL), Botanical Survey of India. All of his plant hunting expeditions were carried out in Arunachal Pradesh. He died suddenly after cardiac arrest in 2013.

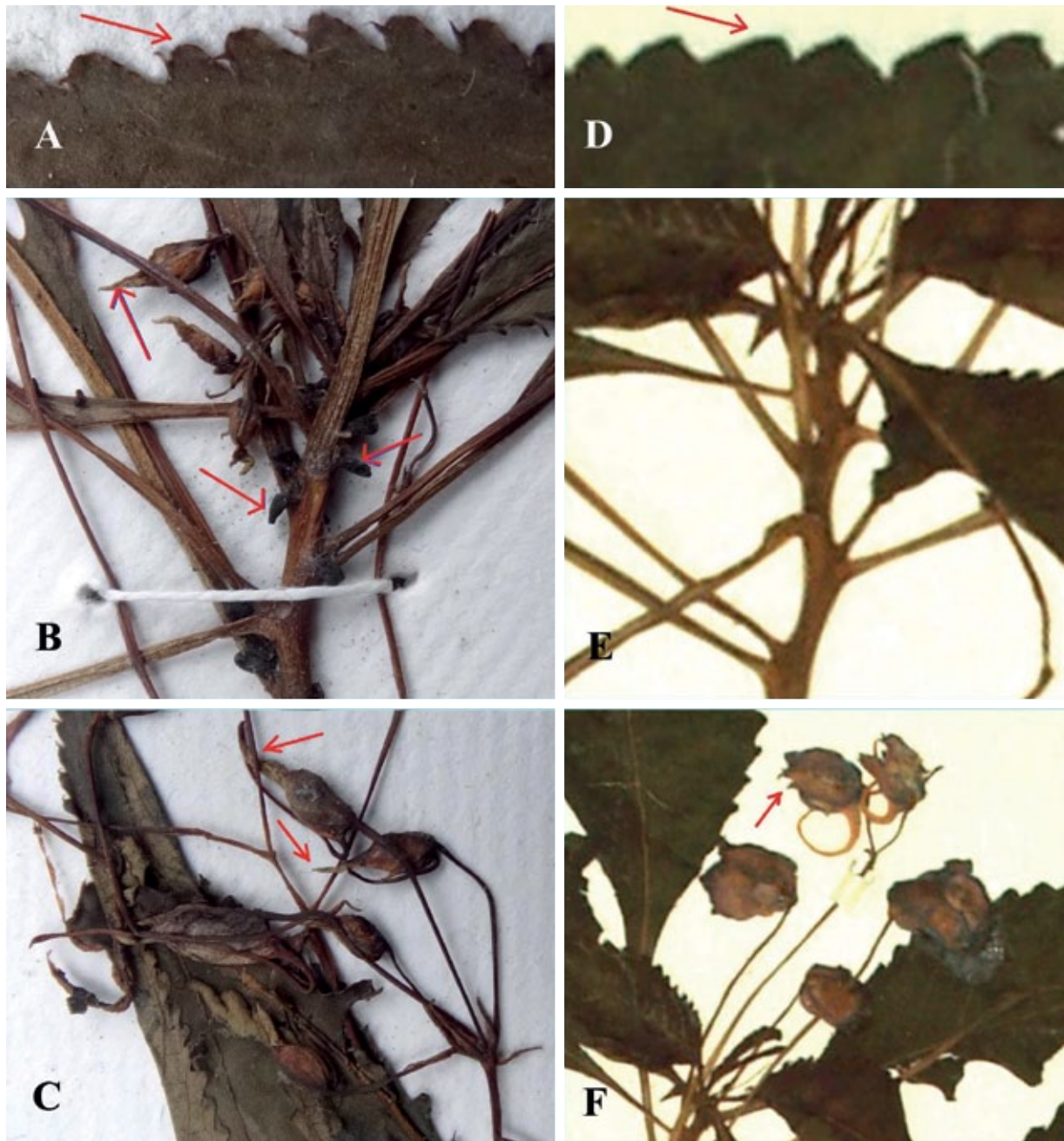
**Note:** Superficially *I. pathakiana* shows similarity with *I. fenghwaiana* Y.L.Chen and *I. wuyuanensis* Y.L.Chen, but the presence of a sub-racemose inflorescence, the absence of stipular glands at the base of the petiole (Fig. 2E), the lack of bristles on the teeth of the leaf margin (Fig. 2D), the ovate to suborbicular floral bracts, the absence of an awn in the floral buds (Fig. 2F) and in the mouth of the lower sepal, a different pattern of lobation in the lateral united petals, and the linear-cylindric capsule in *I. fenghwaiana* Y.L.Chen as well as the presence of a sub-racemose inflorescence, the absence of stipular glands, the larger ovate floral bract, the larger ovate to suborbicular lateral sepals, the absence of an awn or appendage in the floral buds and a different lobation in the lateral united petals in *I. wuyuanensis* Y.L.Chen makes both of these species different from *I. pathakiana*.

**Conservation status:** This species is only known from Chaglagam (Dalai Valley), Anjaw district of Arunachal Pradesh. Although its conservation status is unknown, it should be considered as potentially vulnerable until additional information is available.

**Other specimens examined:** India: Arunachal Pradesh: Anjaw District, c. 20 km before Chaglagam way from Hyuliang, 96°35'32.87"E, 28°18'0.14"N, 1591 m, R. Gogoi & S. Borah 21813, 6 Sept 2012 (CAL !, ASSAM !, ARUN !).



**Fig. 1.** *Impatiens pathakiana*. A. basal portion of stem; B. flowering twig; C. upper portion of stem showing stipules; D. bract; E. floral bud; F. frontal view of flower; G. back view of flower; H. lateral view of flower; I. lateral sepals (dorsal); J. lateral sepals (ventral); K. dorsal petal (dorsal); L. dorsal petal (ventral); M. lower sepal; N. lateral united petals (dorsal); O. lateral united petals (ventral); P. stamens with pedicel; Q. capsule.



**Fig. 2.** Comparisons between Types of *Impatiens pathakiana* (R. Gogoi & S. Borah 21827) and *I. fenghwaiana* Y.L.Chen (PE39706, reproduced with the permission of Chinese National Herbarium, Institute of Botany, Chinese Academy of Sciences). *I. pathakiana* A–C. **A**, showing the leaf margin, **B**, showing stipules and prominent awn in the flower bud, **C**, showing prominent awn in mouth of flower buds; *I. fenghwaiana* D–F. **D**, showing leaf margin, **E**, showing absence of stipule, **F**, showing absence of awn in floral buds.

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## References

- Bhaskar V (2012) *Taxonomic Monograph on Impatiens L. (Balsaminaceae) of Western Ghats, South India: The Key Genus for Endemism*. (Centre for Plant taxonomic study, Bangalore)
- Chen YL, Akiyama S, Ohba H (2008) Balsaminaceae. Pp. 43–114 in Wu Z, Raven PH, Hong DY (eds.) *Flora of China*, vol. 12. (Science Press, Beijing & Missouri Botanical Garden Press, St. Louis, USA)
- Dessai JRN, Janarthanam MK (2011) The genus *Impatiens* (Balsaminaceae) in the northern and parts of central Western Ghats. *Rheedea* 21: 23–80
- Gogoi R, Borah S (2013a) *Impatiens siculifer* Hook. f. (Balsaminaceae) and *Tricarpelema chinense* D. Y. Hong (Commelinaceae) Two Additions to the Flora of India from Lohit Valley of Arunachal Pradesh, India. *Taiwania* 58: 146–150
- Gogoi R, Borah S (2013b). *Impatiens lohitensis*, a new Species of Impatiens (Balsaminaceae) from Arunachal Pradesh, India. *Taiwania* 58: 15–19
- Gogoi R, Borah S (2014) *Impatiens paramjitiana*, a new species of Balsaminaceae from Arunachal Pradesh, India. *Phytotaxa* 175: 171–175 <http://dx.doi.org/10.11646/phytotaxa.175.3.8>
- Gogoi R, Borah S (2015) *Impatiens siangensis* (Balsaminaceae), a new species from Arunachal Pradesh, India. *Phytotaxa* 192 (2): 117–120 <http://dx.doi.org/10.11646/phytotaxa.192.2.5>
- Gogoi R, Barbhuiya H, Borah S (2013). Rediscovery of *Impatiens laevigata* var. *grandifolia* (Balsaminaceae) from NE India. *Taiwania* 58: 311–315
- Grey-Wilson C (1989) *Impatiens bicornuta* and Its Allies: Studies in Balsaminaceae: VII. - *Kew Bull.* 44: 61 <http://dx.doi.org/10.2307/4114645>
- Grey-Wilson C (1991). Balsaminaceae. Pp. 82–104 in Grierson AJC, Long DG (eds), *Flora of Bhutan*, vol 2. (Royal Botanic Garden, Edinburgh, UK)
- Hooker JD (1875) *Impatiens L. Flora of British India*, 1. L. Reeve & Co., London, pp. 440–483
- Hooker JD (1905) An epitome of the British Indian species of *Impatiens*. *Records of Botanical Survey of India* 4: 1–58
- Hooker JD (1908) Les especes du genre “*Impatiens*”. [series 4] *Nouvelles Archives du Museum d'histoire Naturelle* 10: 246
- Hooker JD (1910) Indian species of *Impatiens*. Generis *Impatiens* species Indicae novae et minus rite cognitae a Cl. A. Meebold detectae. *Bulletin Miscellaneous Information, Kew* 1910: 291–300. <http://dx.doi.org/10.2307/4111723>
- Huang SH (2006) Balsaminaceae. Pp. 66–156 in Yu CY (ed.) *Flora Yunnanica*, vol. 16. (Science Press, Beijing)
- Swaminathan MS, Vivekananthan, K, Nair VJ (2001) *Impatiens*. In: Singh NP, Singh DK (Eds.) *Floristic diversity and conservation strategies in India* 4. Botanical Survey of India, Kolkata, pp. 2139–2157
- Toppin SM (1920) Notes on the Balsams of Chitral and the Kachin Hills. *Bulletin of Miscellaneous Information (Royal Gardens, Kew)* 1920: 345
- Yu SX (2012) *Balsaminaceae of China*. Peking University Press, Beijing, 215 pp
- Vivekananthan K, Rathakrishnan NC, Swaminathan MS, Ghara LK (1997) Balsaminaceae. In: Hajra PK, Chakraverty RK, Dixit RD, Mondal MS, Chatterjee U (Eds.) *Flora of India* 4. Botanical Survey of India, Kolkata, India, pp. 95–229