

Lectotypification of *Impatiens acuminata* Benth. ex Hook.f. & Thomson and notes on its geographical distribution

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Abstract. *Impatiens acuminata* Benth. ex Hook.f. & Thomson, endemic to Meghalaya in North-Eastern India, is lectotypified here. The species was collected/observed only five times in the 20th century. A detailed description and photographic illustrations based on live plant material is provided for its easy identification along with its comparison to closely related species *I. parkinsonii* C. E. C. Fisch. Geographical distribution, conservation status and horticultural potentials of the species are also discussed.

Key words: distribution, endemic, horticulture, lectotype, Meghalaya

1. Introduction

In India, genus *Impatiens* is represented by more than 210 taxa distributed mainly in eastern Himalayas, including North-Eastern states and the Western Ghats (Hooker 1875; Vivekananthan *et al.* 1997; Bhaskar 2012). Newly described species are added yearly (Chowlu *et al.* 2017; Gogoi & Borah 2017; Gogoi *et al.* 2017a, 2017b, 2017c; Hareesh & Sabu 2017a, 2017b; Hareesh *et al.* 2017a, 2017b; Lidén & Bharali 2017; Moaakum *et al.* 2017). Meghalaya is one of smaller Indian states (22,429 km²), sandwiched between Bangladesh to the south and Assam to the east and north. The state is hilly, with the highest point reaching 1961 m above sea level. The most prominent climatic feature is summer monsoon, bringing very abundant rains. These conditions support growth of about 40 species of *Impatiens* (Mao *et al.* 2016). Two more species were added to the Meghalaya and Indian flora in recent years (Odyuo *et al.* 2015; Verma *et al.* 2016a) and one recollected after more than 60 years (Verma *et al.* 2016b).

2. Materials and methods

Recently, during a field exploration to the West and South West of Khasi Hills district, Meghalaya, North-eastern India, in July 2016, and November 2016 under annual action plan project of Botanical Survey of India, Shillong, two of the authors (CD & SRT) collected a few *Impatiens* species. After critical examination and review of relevant literature (Hooker & Thomson 1859; Hooker 1875, 1905; Vivekananthan *et al.* 1997) accompanied by the examination of herbarium samples deposited at CAL, ASSAM, K, B (<http://sweetgum.nybg.org/science/ih/>), one plant collected during the Survey was identified as *Impatiens acuminata* Benth., endemic to Northeastern India (Vivekananthan *et al.* 1997). The species was introduced in the Botanical Garden of Botanical Survey of India, Shillong. In June 2000, the same species was also collected by another author (BBTT) from Nongstoin, West Khasi Hills, Meghalaya while on a plant collection trip for ex-situ conservation of RET species by Botanical Survey of India. The species was introduced to Experimental Botanical Garden, Botanical

Survey of India, Barapani, Meghalaya and established there as a self-propagating population.

The name *Impatiens acuminata* Benth. appeared first in Wallich Catalogue (*Wallich* Numer. List no 4754) in 1832, based on the collection of H. Bruce from Khasi Hills of the present day Meghalaya. The name was a “nomen nudum” but later validated by J. D. Hooker and T. Thomson in 1859. “The Plant List” mentioned the name of this beautiful endemic species as “unresolved” (<http://www.theplantlist.org/tp1.1/record/kew-2862091>) due to lack of its recent collections and taxonomic account; hence the present communication is to highlight its true identity from fresh collections along with consultations to type collections and to lectotypify the name. While describing *Impatiens acuminata*, Hooker & Thomson cited three gatherings. In the absence of indication of a single specimen as type, all of the specimens cited in the protologue are to be treated as syntypes (Art. 9.5 of ICN, McNeill *et al.* 2012). Hence, a lectotype is designated here from original material (Fig. 1). The species was collected only five times in the 20th century, hence a detailed morphological description and coloured illustrations (Fig. 2) are provided from live plants to facilitate its easy identification. Geographical distribution of the species in comparison with literature is also discussed, as well as its horticultural potential.

“The Plant List – a working list of all plant species” mentioned *I. acuminata* Benth. ex Hook.f. & Thomson as an unresolved name (<http://www.theplantlist.org/tp1.1/record/kew-2862091>), probably the species is known only from dry collections, nobody studied it thoroughly from fresh material and its affinities to related species. Looking at its morphological charters, it shows closeness to *I. parkinsonii* C. E. C. Fisch., another

species found in Northeast India to Myanmar (Gogoi *et al.* 2015), but both species are distinct with regard to their unique morphological characters. A comparison table is provided to show morphological differences of *I. acuminata* and *I. parkinsonii* (Table 1).

3. Results and discussion

3.1. Description

Impatiens acuminata Benth. ex Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 4(no. 15): 145. 1859 [8 Dec 1859]. (Figs. 1 & 2)

Impatiens acuminata Benth., Numer. List no. 4754. 1831. *nom. nud.*

Type citation: Mont. Khasia region subtropica, alt. 4000-5000 ped.! *De Silva, & C.*

Type: Lecto, here designated India, Meghalaya, Jentya Mountain, June 1829, *H. Bruce* (K001039827 image!), Fig. 1.

Residual syntype: India, Meghalaya, Jentya Mountain, 1829, *H. Bruce* (K001039831 image!, B 100365174 image!, B 100365175 image!, B 100365176 image!, CAL 0000027213!; India, Meghalaya, Regio Temperate, Khasia, 4000-5000 ft, 1850, *J.D. Hooker & T. Thomson* K001039832 image!, CAL0000005168 image!, CAL0000005169 image!, CAL0000005170 image!, CAL0000005171 image!)

Perennial stout herb with simple stem, 15-45 cm high. Stem terete, nodes not swollen. Leaves crowded mainly to the upper part of the plant, alternate; petiole 1.3-2.6 cm long, glabrous, reddish; stipule absent. Lamina thick and succulent, lanceolate, 10.0-12.5 cm long, 1.0-2.1 cm wide, glabrous, green above, pale green

Table 1. Morphological differences between *Impatiens acuminata* and *I. parkinsonii*

Characters	<i>Impatiens acuminata</i>	<i>I. parkinsonii</i>
Habit	Erect, branched herb up to 45 cm tall	Prostrate or creeping, unbranched herbs up to 30 cm tall
Petiole	petiole 1.3-2.6 cm long	petiole 0.5-0.8 cm long
Lamina	Usually lanceolate, 10.0–12.5 cm long, 1.0-2.1 cm wide, apex acuminate to caudate	Lanceolate to oblanceolate, 2-6 cm long, 0.5-1.6 cm wide, apex acute to acuminate but never caudate
Inflorescence	3-9 flowered	1-6 flowered
Flower	Orange-red	Purple with deep purple streaks
Pedicel	To 1.8 cm long, reddish	To 1 cm long, pubescent, green with pink tinged
Lateral sepals	Orange-red outside, paler inside, 1.1-1.3 × 0.8-0.9 cm	Yellowish green with pink tinged, up to 0.5 × 0.3 cm
Dorsal petal	Orange-red both side	White with purple streaks ventrally
Lower sepal (lip)	Orange-red	Purplish white
Spur	Orange-red, up to 2 cm long	Spur light purple, up to 2 cm long.
Capsule	Reddish, fusiform, to 1.3 cm long	Greenish with purple tinge, to 1 cm long



Fig. 1. Lectotype of *Impatiens acuminata* Benth. [H. Bruce (*Wallich Cat. no. 4754*) K001039827 (K-W) <http://specimens.kew.org/herbarium/K001039827/>]

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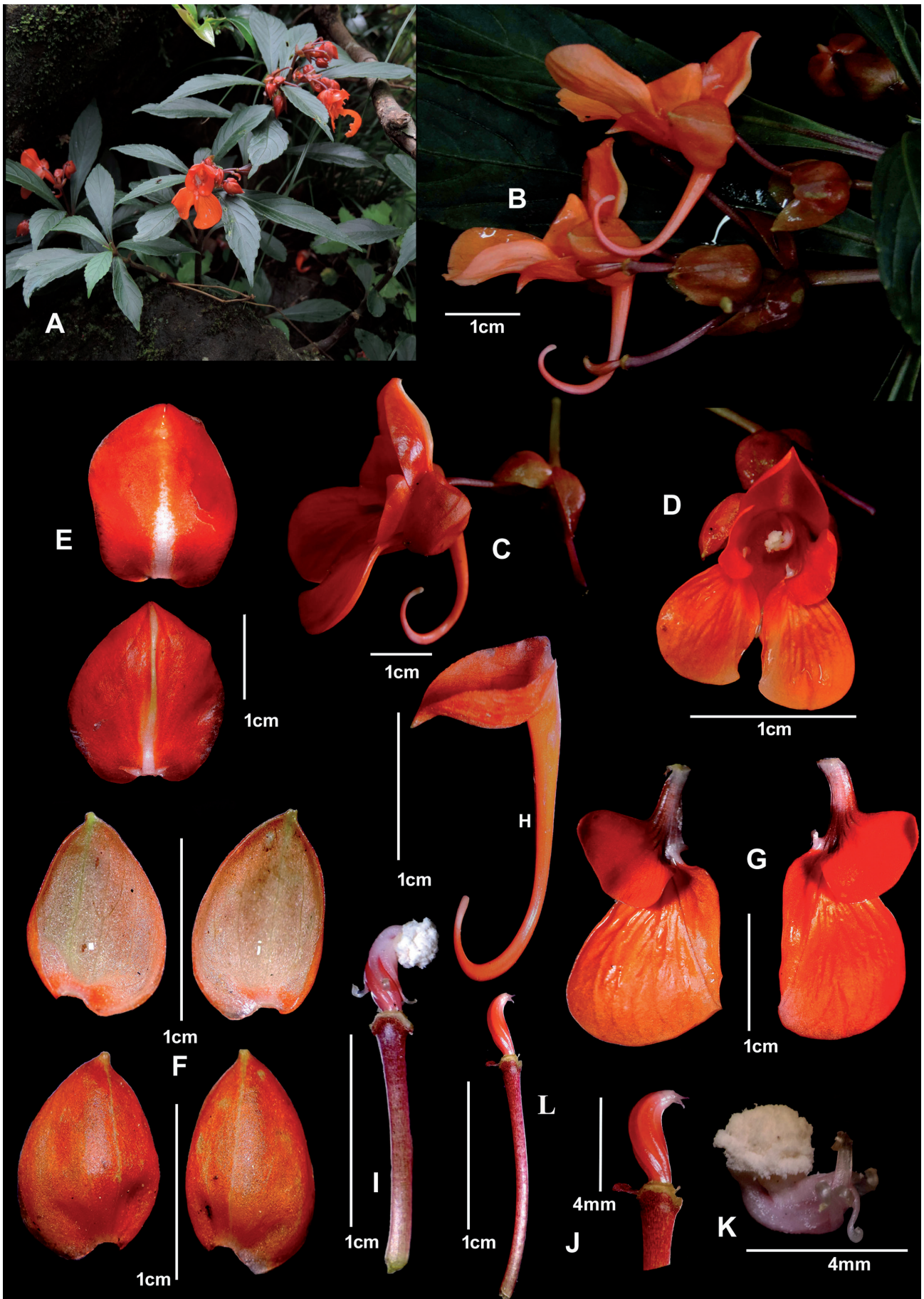


Fig. 2. *Impatiens acuminata* Benth. ex Hook.f. & Thomson

Explanations: A – habit, B – inflorescence, C – flower, side view, D – flower, front view, E – dorsal petal (ventral & dorsal views), F – lateral sepals (ventral & dorsal views), G – lateral united petals, H – lower sepal, I – pedicel & ovary encircled by stamens, J – ovary, K – stamens, L – fruit (after Deori & Talukdar 134320, 134511, ASSAM). Photoplate by C. Deori

beneath, base narrowly cuneate, margin crenate with slight bristles, apex caudate-acuminate, lateral veins up to 6 pairs, sub-opposite. Inflorescence auxiliary, umbelled or racemed, 3-9 flowered, peduncle stout with red markings, 2-4 cm long; pedicel to 1.8 cm long, glabrous, reddish. Flowers orange-red, 3.2 × 2.4 cm, bracts at base of pedicel, 1.0 × 0.8 cm, ovate to orbicular, obtuse, concave, greenish brown. Lateral sepals 2, asymmetrically navicular with weak keel, acuminate, orange-red outside, paler inside, 1.1-1.3 × 0.8-0.9 cm. Dorsal petal showy, sub-orbicular, slightly cucullate, 1.5 × 1.1 cm wide, orange-red, with whitish midrib, apex acute to slightly mucronate. Lower sepal navicular, abruptly narrowed into a slender incurved spur, orange-red, mouth of lower sepal with acute tip, spur to 2 cm long. Lateral united petals bilobed, subequal, 2.5 cm long, orange-red; basal lobe reniform, 1.1 cm wide, with apex acute; distal lobe suborbicular, 1.6 × 1.1 cm, apex obtuse; basal auricle present, 1.5 mm long, rounded, pale. *Stamens* 5, curved, to 6 mm long; filaments light pinkish. Ovary reddish. Capsule reddish, fusiform, to 1.3 cm long, seeds many, minute, woolly.

Flowering: July-September.

Distribution: India: Meghalaya, South West Khasi Hills and West Khasi Hills, East Khasi Hills and Jaintia Hills districts. Vivekananthan *et al.* (1997) give broader distribution, including also Arunachal Pradesh and Assam; however, a recent study of *Impatiens* genus in Arunachal Pradesh (Gogoi 2017) did not confirm presence of *I. acuminata* in this state. Authors were also unable to find any material confirming presence of this species in the state of Assam. This way *I. acuminata* seems to be endemic to eastern and central parts of Meghalaya state. Probability of finding the species in other places is low, as wide areas of lowlands separate hills and plateaus of Meghalaya from other mountain ranges with potentially adequate climatic conditions.

Habitat: Moist subtropical broad-leaved forest margins near stream side on rocks at an altitude of 1432 m in association with *Begonia* sp. (Begoniaceae), *Panicum* sp. (Poaceae), *Dicranopteris linearis* (Gleicheniaceae), *Persicaria hydropiper* (Polygonaceae), *Cyanotis vaga* (Commelinaceae), *Cyperus cyperinus*, *Fimbristylis nigrobrunnea* (Cyperaceae).

Conservation status: Due to scarcity of collections, the species is little known up-to-date, although it has potential horticultural importance due to showy, orange-red coloured flowers (Fig. 2). The present study revealed its natural populations mainly confined to the West Khasi Hills and South Western Khasi Hills districts of Meghalaya without any threat to its existence. As stated above, the species is growing with an established

population in Experimental Botanical Garden, Botanical Survey of India, Barapani, East Khasi Hills of Meghalaya as a part of ex-situ conservation.

Other specimens examined: India: Meghalaya: South Western Khasi hills, Mawchawma, 1432 m, 7th July 2016, C. Deori & S. R. Talukdar 134320 (ASSAM); South Western Khasi hills, Mawchawma, 1432 m, 30th November 2016, C. Deori & S. R. Talukdar 134511 (ASSAM); West Khasi Hills, Nongstoin Forest, 4th July 1980, A. S. Chauhan 73886 (ASSAM); East Khasi Hills, Pongtung, 5th Nov. 1938, S. R. Sharma 17903 (ASSAM); East Khasi Hills, Sohra to Nongthala, 18th Aug. 1968, N. P. Balakrishnan 46710 (ASSAM); Khasi Hills, Kunroot, 5 Nov 1871, C. B. Clarke 15974 (CAL); West Khasi Hills, Nongstoin, 17 June 1958, G. Panigrahi 16374 (CAL).

3.2. Lectotypification

Wallich (1832) mentioned the specimens of H. Bruce in his Numer. List with No. 4754 and mentioned 'Silhet' as collection locality against the name *I. acuminata*. However, one specimen (K001039827) also bears one annotation on a piece of paper indicating Coll. No. as HB 54, June 1829 with its locality from Jentya Mountain which is the present day Jaintia Hills of Meghalaya treated as synonymous with "Silhet" of the erstwhile British India. Therefore, the specimen deposited at K, CAL and in B of H. Bruce with *Wallich Numer. List No.* 4754 is the original material from which the name was derived originally. Hooker and Thomson (1859), while validating the name *I. acuminata*, examined the collection of H. Bruce (*Wallich Cat.no.4754*), De Silva and his own collections with T. Thomson. The specimens of De Silva could not be traced anywhere but the specimens of H. Bruce (Meghalaya, India), two held at K (K001039827 & K001039831) and three at B and one at CAL and J. D. Hooker & T. Thomson's five specimens, one at K (K001039832) and four at CAL (CAL0000005168, CAL0000005169, CAL0000005170, CAL0000005171) are extant now. Hence, the specimens K001039827 of H. Bruce (*Wallich Cat.no.4754*) is designated as lectotype and other collections housed at K, B & CAL of H. Bruce and J. D. Hooker & T. Thomson are treated as residual syntypes.

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