



A new species of *Impatiens* (Balsaminaceae) from northern Gayo Plateau, northern Sumatra

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ABSTRACT: *Impatiens bungeilang* Mustaqim is described here as a species new to science based on plants collected from the northern Gayo Plateau, northern Sumatra. A detailed description, notes on distribution, ecology, phenology, notes, and color photographs are provided. According to the IUCN Red List Criteria, this species is here considered Critically Endangered due to its small geographic range and heavily fragmented as well as degraded habitats.

KEY WORDS: *Impatiens bungeilang*, *Impatiens calendulina*, *Impatiens heterosepala*, Indonesia, Malesia, montane plant, taxonomy

INTRODUCTION

Sumatra is home to at least 8,391 plant species, with around 11 percent of the total species being endemic (Middleton *et al.*, 2019). This means that Sumatra has a great number of plant species and has already been categorized as a center of diversity (Barthlott *et al.*, 2005, Sabatini *et al.*, 2022). However, those publications were prepared from the limited number of research. In the past, Dutch did a limited number of expeditions compared to the surrounding islands like Java (Meijer, 1981). In recent years, the findings of new species are frequent, from an unlikely description of a 45 m tall peat swamp forest tree (Randi *et al.*, 2022) to unique plants like pitcher plants (Victoriano, 2021) and species-rich families like orchids (Metusala, 2017, 2020; Cavestro, 2020a, 2020b; Cavestro and Gruss, 2020; Handoyo *et al.*, 2020; Yudistira *et al.*, 2020) and myrtle (Widodo and Lucas, 2018).

In insular South East Asia, *Impatiens* L. has its highest diversity in Sumatra. From at least 54 species known from Indonesia, Sumatra has at least 42 species, of which 40 are endemic to the island. Quite many species have only been described after the 2000s (Utami, 2005, 2009, 2011, 2012a, b, 2013, 2020; Utami and Nurainas, 2012; Utami and Wiradinata, 2002, 2010; Mustaqim *et al.*, 2021-onwards), showing the poor taxonomic knowledge of this genus, which was also mentioned by Grey-Wilson (1989).

During several fieldwork trips to the northern Gayo Plateau, located in the northernmost tip of Sumatra, bright-red-flowered *Impatiens* specimens were collected. There are not many species of *Impatiens* in Sumatra having red flowers, which so far only known in *I. calendulina* Grey-Wilson, *I. rubriflora* Grey-Wilson

(Grey-Wilson, 1989; Utami, 2006), and also partial red floral organs from the recently described *I. tribuana* Utami and Nurainas (Utami, 2012b). The recently collected materials do not belong to any of these and are described here as a species new to science.

TAXONOMIC TREATMENT

Impatiens bungeilang Mustaqim, *sp. nov.*

Fig. 1

Type: INDONESIA. Aceh Province, Bener Meriah, Uning Teritit (4°39'54.9"N 96°52'34.3"E), 1975 m, fl. fr. 13 Sep. 2022, *Mustaqim et al.* 2458 (holotype LGS; isotype MEDA).

Diagnosis. *Impatiens bungeilang* has a similar flower morphology to *Impatiens heterosepala* Hook.f. by the flowers arranged in raceme, each with bucciniform lower sepal that more or less abruptly constricted into a filiform spur, and long lateral sepals. However, *I. bungeilang* differs in having pseudowhorled leaves (vs spiral), lamina with more lateral veins (9 (–10) vs 3–6 pairs), more flowers per inflorescence (5–14 vs 1–2), and larger flowers having lower sepals with spur thickened in the upper 3/5 (vs only at the apex). Besides that, *I. bungeilang* is also similar to *Impatiens calendulina* Grey-Wilson, especially by having the whorled leaves and the bucciniform lower sepal, but differs by the leaves bearing more lateral veins (9 (–10) vs 5–6 pairs), flower bracts ovate (vs linear-lanceolate) and longer (9–11 mm vs 5–7 mm), lower sepal more or less gradually (vs abruptly) constricted into spur, spur shorter (16 mm vs 21 mm long) thickened for 3/5 of its length (vs only at the very apex), and lower petals of lateral petals with small oblong and strongly recurved lobes at the base of apical margin (vs

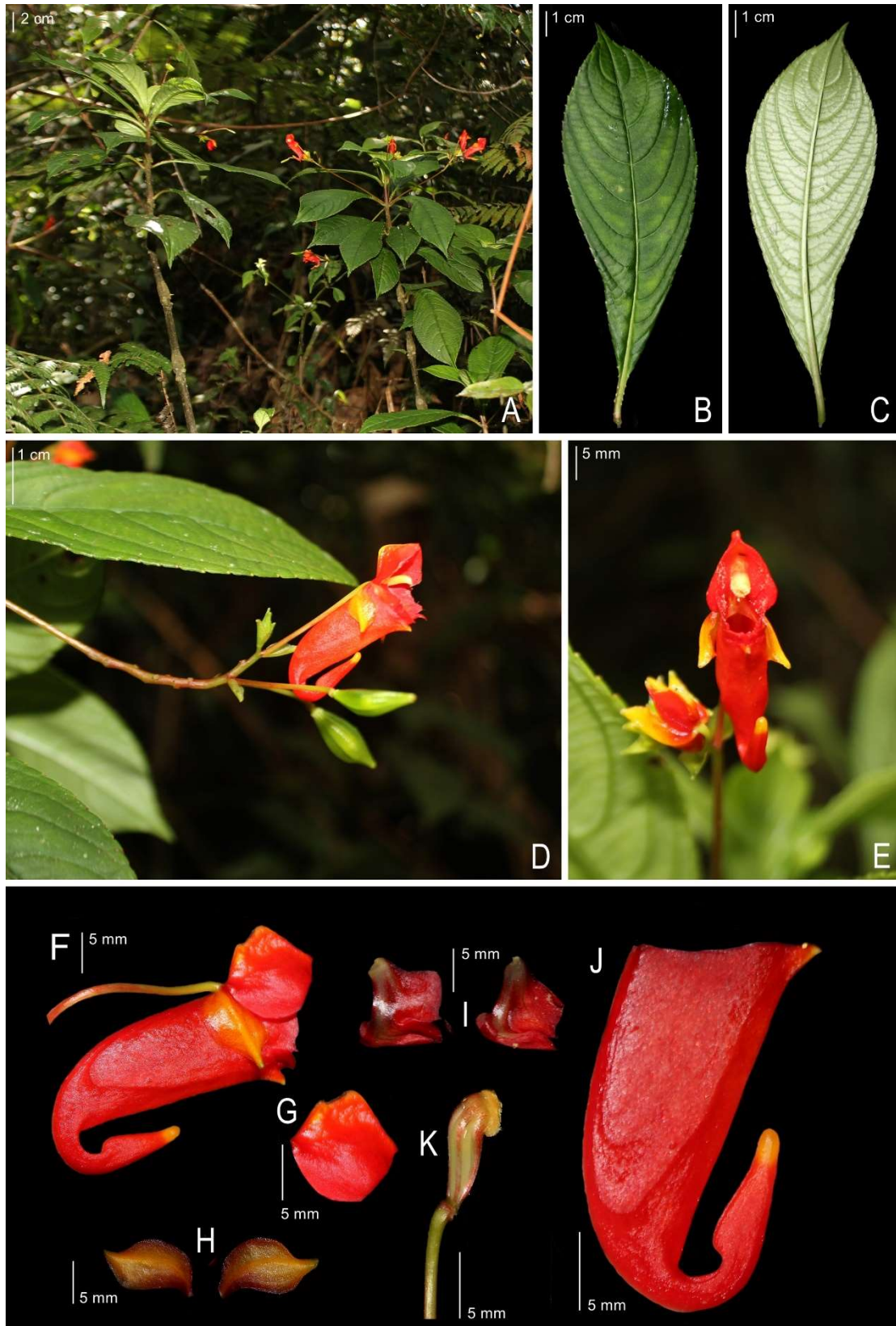


Fig. 1. Morphology of *Impatiens bungeilang* Mustaqim, sp. nov. **A.** Living plant. **B.** Leaf (adaxial). **C.** Leaf (abaxial). **D.** Inflorescence. **E.** Flower (front-view). **F.** Flower (lateral view). **G.** Dorsal petal. **H.** Lateral sepals. **I.** Lateral united petals. **J.** Lower sepal. **K.** Stamens and pistil. Photographs By Wendy A. Mustaqim.

**Table 1.** Comparison of morphological characters of *I. bungeilang*, *I. calendulina* and *I. heterosepala*

Characters	<i>I. bungeilang</i>	<i>I. calendulina</i>	<i>I. heterosepala</i>
Plant			
Height (cm)	> 100	ca. 150	< 45
Leaves			
Arrangement	whorled	whorled	spiral
Lamina shape	obovate to oblanceolate	elliptic to -oblanceolate	elliptic-lanceolate or obovate
Margin	serrate-dentate	shallowly serrate	coarsely serrate
Lateral veins pairs	9–10	5–6	3–6
Inflorescence			
Flowers numbers	5–14	2–3	1–2
Type	raceme	raceme	reduced raceme
Flower's color	red	bright orange-yellow	orange-yellow
Peduncle length (cm)	8–10.5	4.4–8	1.5–6.5
Bracts shape	ovate	linear lanceolate	linear
Bracts length (cm)	9–11	5–7	3–6
Bracts persistence	persistent	caducous	persistent
Lateral sepals			
Shape	obliquely obovate	ovate	asymmetric oblanceolate
Length (mm)	c. 11	c. 6	9–15
Width (mm)	c. 5	c. 4	-
Apex	acuminate	apiculate	acute
Lower sepals			
Length (mm)	c. 13	c. 15	7–9
Depth (mm)	c. 23	c. 22	9–11
Apex	ca. abruptly constricted into incurved spur	abruptly constricted into an incurved filiform spur	ca. abruptly constricted into incurved filiform spur
Spur length (mm)	c. 16	c. 21	3–4
Thickening	thickened for 3/5 apex	slightly swollen at the tip	slightly swollen at the apex
Dorsal petals			
Shape	cucullate	cucullate	cucullate, gibbose
Length (mm)	c. 11	c. 11	8–9
Width (mm)	c. 16	c. 10	6–7
Lateral united petals			
Length (mm)	c. 13	16	8
Upper pair shape	broadly ovate	suborbicular	obovate
Length (mm)	c. 7	c. 9	c. 5
Width (mm)	c. 7.5	c. 6	c. 5
Length/width	c. 1 times	c. 1.5 times	c. 1 times
Lower pair shape	ovate	oval	narrowly ovate
Length (mm)	c. 6	c. 8	c. 5
Apical inner margin lobe	present	absent	present
Reference	-	Grey-Wilson (1989)	Grey-Wilson (1989), Hooker (1924)

lobes absent or short and not recurved) (Table 1).

Erect perennial, glabrous *herbs*, stem to c. 1 m tall. Stem gradually becoming leafless and woody, branches lax. **Leaves** in whorls of 3 to 4, lamina plain green, turn yellow before falling off, abaxial side distinctly glaucous when dry, lamina narrowly obovate or oblanceolate, sometimes slightly unequal, $9.5\text{--}16.5 \times (2.4\text{--}) 7\text{--}5.8$ cm, length per width 2.8–3.4 times, apex abruptly acuminate, margin serrate-dentate, base long attenuate; lateral veins 9(–10) pairs, strongly ascending; petiole channeled above, 10–25 mm long, with 3–4 raised glands on its margin. **Inflorescence** 5–14-flowered raceme; flowers red, with yellow dorsal sepal's crest, lateral sepals, and apex of spur. **Peduncle** ascending, terete, 8–10.5 cm long. **Bracts**

ovate, $9\text{--}11 \times 6\text{--}7$ mm, green, persistent until sometimes at fruiting, midrib strong. **Pedicels** terete, slender, orange-yellow, 22–27.5 mm long. **Lateral sepals** obliquely obovate, c. 11×5 mm, apex acuminate, keel prominent, slightly protruding at the apex. **Lower sepals** bucciniform, c. 13 mm long, c. 23 mm deep, gradually constricted into c. 16 mm long spur, thickened for 3/5 apex, spur yellow at the apices, apex rounded. **Dorsal petal** cucullate, broadly ovate when flattened, c. 11×16 mm, dorsally crested, crest c. 4 mm high, base rounded, apex obtuse to rounded; apical margin of crest yellow. **Lateral united petals** c. 13 mm long, upper petals of each pair broadly ovate, c. 7×7.5 mm, apex with short filiform appendages, c. 0.5 mm long, lower petal of each pair ovate, c. 6×4 mm,

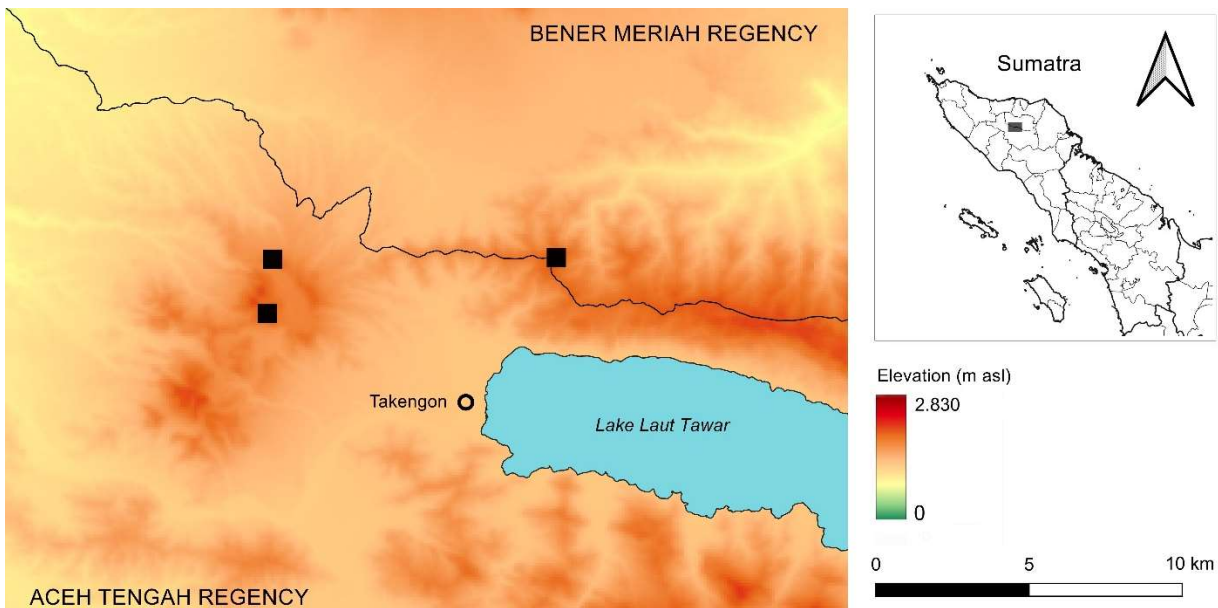


Fig. 2. Geographical distribution of *Impatiens bungeilang* in northern Gayo Plateau.

with a small oblong lobe at the base of lower inner margin, apex with short filiform appendages, c. 0.5 mm long. **Stamens** 5, filaments reddish, linear, 5.8–8.2 mm long, glabrous; anthers c. 0.8 mm long. **Ovary** ellipsoid, c. 7×1.7 mm, glabrous. **Capsule** (immature) green, fusiform, c. 17×6 mm.

Phenology: Flowering and fruiting in September.

Distribution and Ecology: Endemic to Sumatra: northern part of Gayo Plateau (Fig. 2). This species was found in mid montane forest, usually on shaded localities, from 1805 to 1985 m elevation.

Etymology: The epithet *bungeilang* is derived from the Gayonese language ('bunge' means flower, 'ilang' means red), refers to the red color of the flower.

Preliminary conservation status assessment. This species is known from three different fragmented populations, giving an AOO of 12 km² and an EOO of around 7.6 km². All populations are located in nationally or internationally unprotected forest fragments which are threatened by conversion for agricultural activities, mainly the coffee plantations, which is still ongoing. Following IUCN (2012) and IUCN Standards and Petitions Committee (2022), the species is assigned as Critically Endangered (CR B1ab(iii)).

Notes: In Sumatra, this species alongside *I. calendulina* Grey-Wilson, can be recognized by the whorled leaves and bucciniform lower sepals but differs in some morphological characters mentioned in the diagnosis. Besides that, the flowers of *I. calendulina* are bright orange-yellow, while in *I. bungeilang*, the flowers are generally red with some yellow colorations in the dorsal sepal's crest, lateral sepals, spur apex, and staminal heads. The pollinations of *I. bungeilang* and *I. calendulina* are likely facilitated by birds by its

bucciniform lower sepal, lateral united petals as long as the lower sepal, and the red or orange flower as found in the African species like *I. nianniamensis* Gilg and *I. ulugurensis* Warb. (Grey-Wilson 1980). *Impatiens calendulina*, is also a mountainous inhabitant found in Mount Pucuk Angkasan [Putjuk Angasan], on the mossy forest at slightly higher elevations (c. 2200 m asl), and is known only from the type specimen (Grey-Wilson, 1989).

In Sumatra, there is another species with red flowers, *I. rubriflora* Grey-Wilson, but this species differs in having spirally arranged leaves. The species was recorded from a single mountain named Mount Goh Lembuh in the central part of Aceh Province (Grey-Wilson, 1989), with some further photographs of this plant also available from Mount Tujuh, Jambi Province, central part of Sumatra (Fig. S1).

Additional specimens examined: INDONESIA. Aceh Province, Aceh Tengah Regency, Bebesen, Kute Panang, Pantan Sile, 4°40'01.7"N 96°47'47.0"E, 1805 m, fl., 19 Sep. 2022, *Mustaqim et al.* 2494 (LGS, MEDA); *ibid.* Bebesen, Bur Ni Papanji, 4°39'07.0"N 96°47'27.9"E, 1985 m, fl., 25 Sep 2022, *Mustaqim et al.* 2540 (LGS, MEDA).

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Supplementary materials are available from Journal Website