



Research article

Morpho-taxonomic study and distributional note on two less known species of Assam

Selim Mehmud^{1*}, Kangkan Kumar Das² and Himu Roy¹

¹Department of Botany, Cotton University, Panbazar, Guwahati-781001, Assam, India

²Pragya Academy of Science, Kamrup-781381, Assam, India

*Corresponding Author: mehmudselim@gmail.com

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Abstract: Present paper dealt with the taxonomic account and distributional record of two angiosperm species viz. *Caulokaempferia secunda* and *Impatiens pulchra* in Assam. Distribution of the species recorded in the study area and their occurrence confined only to certain pockets in Assam.

Keywords: Assam - *Caulokaempferia* - *Impatiens* - Distribution.

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INTRODUCTION

The state Assam is with diverse geographical conditions and the vegetation both in tropical and sub-tropical ranges, comprising with total 189 families, 1011 genera and 2752 species belongs to dicotyledons and 40 families, 368 genera and 1080 species of monocotyledons (Barooah & Ahmed 2014) and situated in between 24° 44' N to 27° 45' N and 89° 41' E to 96° 02' E (Baishya *et al.* 2015). However, numerous botanical explorations were still going on by different workers to reinforce the taxonomic documentation of the region. In this process, authors have conducted many field explorations in various parts of Assam during 2017–2019. During the survey, two species viz., *Caulokaempferia secunda* (Wall.) K. Larsen and *Impatiens pulchra* Hook.f. & Thomson belongs to the family Zingiberaceae and Balsaminaceae respectively were collected. After detailed study of the available literature (Kanjilal *et al.* 1934–1940, Roy & Barbhuiya 2013, Barooah & Ahmed 2014, Gogoi *et al.* 2018), it has been established that these two species were not been collected previously from the current political boundary of Assam. Rao & Verma (1972) reported 19 genera of the family Zingiberaceae including *Caulokaempferia* from Assam and mentioned that the plants belong to the family require more detailed study. Gogoi *et al.* (2018) mentioned horticultural prospects of 24 wild species of *Impatiens* including *I. pulchra*. Therefore, an attempt has been made to provide a comprehensive taxonomic account of the species along with their distribution, phenology and other supporting information.

MATERIAL AND METHODS

Field surveys were conducted in various parts of the study area to collect the specimens from their natural habitats (Fig. 1) and their descriptions were based on observation of both fresh and dry materials. Additional information such as habit, habitat, distribution, flower odor etc. was also noted. Herbarium preparation has been followed by the routine herbarium processes as prescribed by Jain & Rao (1977). Identity of the specimens was ascertained by critical morphological analyses of the specimens, previously published literature (Rao & Verma 1972, Roy & Barbhuiya 2013, Gogoi *et al.* 2018) and also with the help of virtual herbaria. The voucher specimens were deposited to herbarium of Department of Botany, Cotton University and duplicate at ASSAM (Eastern Regional Center, BSI, Shillong).

RESULTS

1. *Caulokaempferia secunda* (Wall.) K. Larsen [Zingiberaceae]

[Fig. 2]

Aromatic rhizomatous herbs; pseudostems 10–25 cm in length; leaves 1–10 × 0.9–2.1 cm, glabrous, entire, alternate, lanceolate to ovate, acuminate at apex, adaxial surface comparatively dark green, lateral nerves 2–3 in

number., mid vein abaxially prominent, glabrous. Petiole 5–6 × 1 mm, adaxially channeled and abaxially rounded; glabrous. Ligule prominent, tightly attached at the stem, 5–7 mm long, glabrous, entire, acute. Leaf sheath light green, mature leaves yellow. Rhizomes 1–3 × 0.2–0.3 cm. Inflorescence terminal, 3–4 cm long; flowers 3.5–4.0 cm long. Bracts 2–3 in number, largest one 3.0 × 1.4 cm, ovate, entire, acuminate, green, glabrous, others 2.6 cm long with 1.2 cm long pedicel; each bract bears 5–7 flowers. Bracteole one, 5 × 4 mm, ovate, angular, green to membranous, entire and acute. Calyx tubular, 1.0–1.3 cm long, two lobed, glabrous, membranous. Corolla blue colour, tube 2 cm long; lateral staminodes 1.0 × 0.3cm, ovate to oblong. Corolla lip pink to light blue, 1.4 × 1.2 cm, ovate, tip with two lobed. Anthers crust 4 × 3 mm, filament *ca.* 1.5 mm long. Fruit 1.0 × 0.3 cm, ovate to oblong, light green, pubescent. Seeds *ca.* 2 mm long, ellipsoid, brown, white arillode at top.

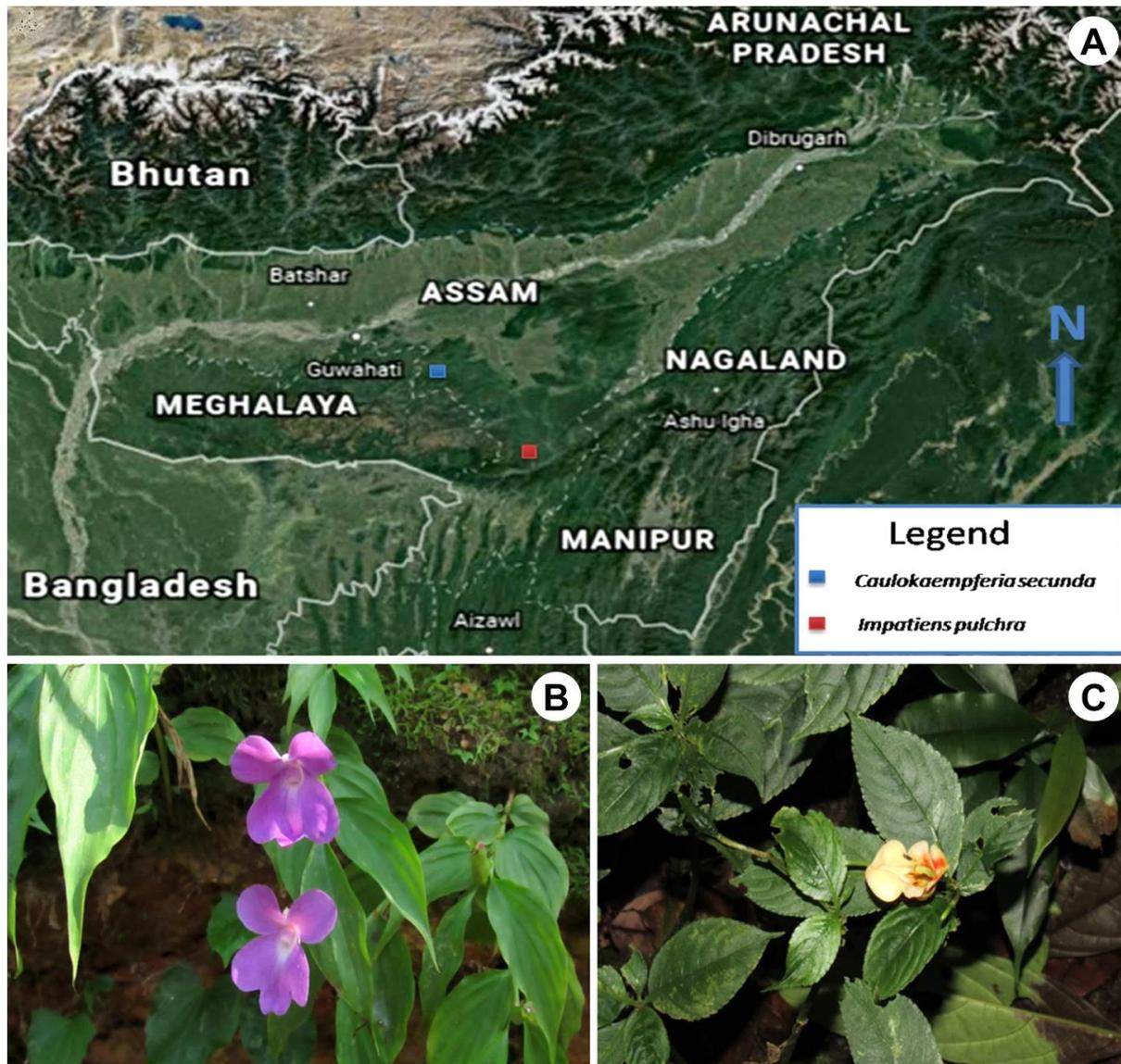


Figure 1. A, Map of the study area showing collection site of *Caulokaempferia secunda* (Wall.) K. Larsen and *Impatiens pulchra* Hook.f. & Thomson; B, Habitat of *Caulokaempferia secunda*; C, Habitat of *Impatiens pulchra*. [Map source (A): Google Earth]

Flowering: June–September

Specimens examined: Sillet, s. coll., 6591 (K000640525, digital image!). INDIA: Assam, Karbi Anglong (W), Neli to Umapanai Road, elev. 516 m, 26° 0' 8.8" N, 92° 15' 49.2" E, 17.09.2019, S. Mehmud & K. K. Das 212.

Distribution and ecology: India (Assam, Meghalaya, Sikkim), Bangladesh, Myanmar. Prefer generally rock surface, shady and sloppy damp areas, grows along with grasses, other annual herbs and mosses.

Note: *Caulokaempferia secunda* was previously reported from Khasi and Jaintia Hills of Assam (Rao & Verma 1972); Khasi and Jaintia Hills later separated from Assam to form a new state Meghalaya. However, many

authors (Roy & Barbhuiya 2013, Mir *et al.* 2019) also accounted the distribution of this species from Meghalaya. Findings contributed by Roy & Barbhuiya (2013) were based on live specimens collected during field survey and herbarium material; none of the examined materials in the study were collected from Assam. An updated list of Angiosperm prepared by (Barooah & Ahmed 2014) excluded distributional record of *C. secunda* from current political boundary of Assam.



Figure 2: *Caulokaempferia secunda* (Wall.) K. Larsen: A-B, Whole plant; C, Pseudostem with ligule; D, Rhizomes; E, Bracteole; F, Complete flower; G, Sepals; H, Petals; I, Lateral stamens; J, Labellum; K-L, Anther crust; M, Fruit; N, Immature seed with arrillode; O, Mature fruit.

2. *Impatiens pulchra* Hook.f. & Thomson [Balsaminaceae]

[Fig. 3]

Herbs 30–40 cm in height, stem green, glabrous. Leaf mostly present at the top of the stem leaving swollen scar mark below, 5–6 × 2.3–2.8 cm, ovate to obovate; petiole *ca.* 5 mm long, glabrous, base cuneate; margins serrated, acuminate. Adaxial surface comparatively dark green whereas abaxially light shining green; lateral veins 7 nos., in each side. Inflorescence with few flowers. Flower bud 2.8–2.1 cm, yellowish; mature flower 5 cm, peduncle 1.5–2.0 cm, glabrous. Bract 1, *ca.* 5 mm long, glabrous, ovate, acuminate, light green, membranous. Lateral sepals 2 nos., 1.1–1.2 × 0.6–0.7 cm, glabrous, entire, ovate, acute, membranous, adaxially with green lines. Lower sepal 3.5–3.8 cm long, yellow, inside with longitudinal red lines; spur coiled, purple, green. Dorsal petal one, 2.2 × 1.5–1.8 cm, glabrous, entire, ovate, light yellow or orange with reddish line near the ventral groove; horn *ca.* 6 mm long, green, glabrous, acute. Lateral united petals 2 nos., 3.5–4.0 cm long, orange red in colour, base pinkish, apex free, light yellow. Stamens 5 nos., *ca.* 6–7 mm long occurs at the mouth of the flower. Ovary *ca.* 9 mm long, glabrous, green. Capsules around 1.5 cm, dark green, glabrous and seeds many.

Flowering: November

Specimens examined: INDIA: Assam, Kohima (Now in Nagaland), April 1896, *Dr. King* 253 (K000694760 digital image!). Dima Hasao, Jatinga Hill, elev. 898 m, 25° 6' 41" N, 93° 2' 31.9" E, 24.11.2019, *S. Mehmud* 230.

Distribution and ecology: India (Arunachal Pradesh, Sikkim, Nagaland, West Bengal), Bhutan and Myanmar (Gogoi *et al.* 2018). The plant was observed near streams; prefer shady and black sandy soil with low water running.

Note: Impatiens pulchra was not included in Flora of Assam (Kanjilal *et al.* 1934–40). Barooah & Ahmed (2014) reported *Impatiens pulchra* from Assam with a star (*) mark to indicate the place of occurrence of the species as “unknown” or “in entire Assam” in entire Assam but without any substantial evidence of its occurrence or collection from Assam; in addition, their work was mostly based on secondary sources. Recent monographic work on ‘Balsams of Eastern Himalaya’ (Gogoi *et al.* 2018) stated the distributional record of the species from different states as mentioned above but not from Assam.

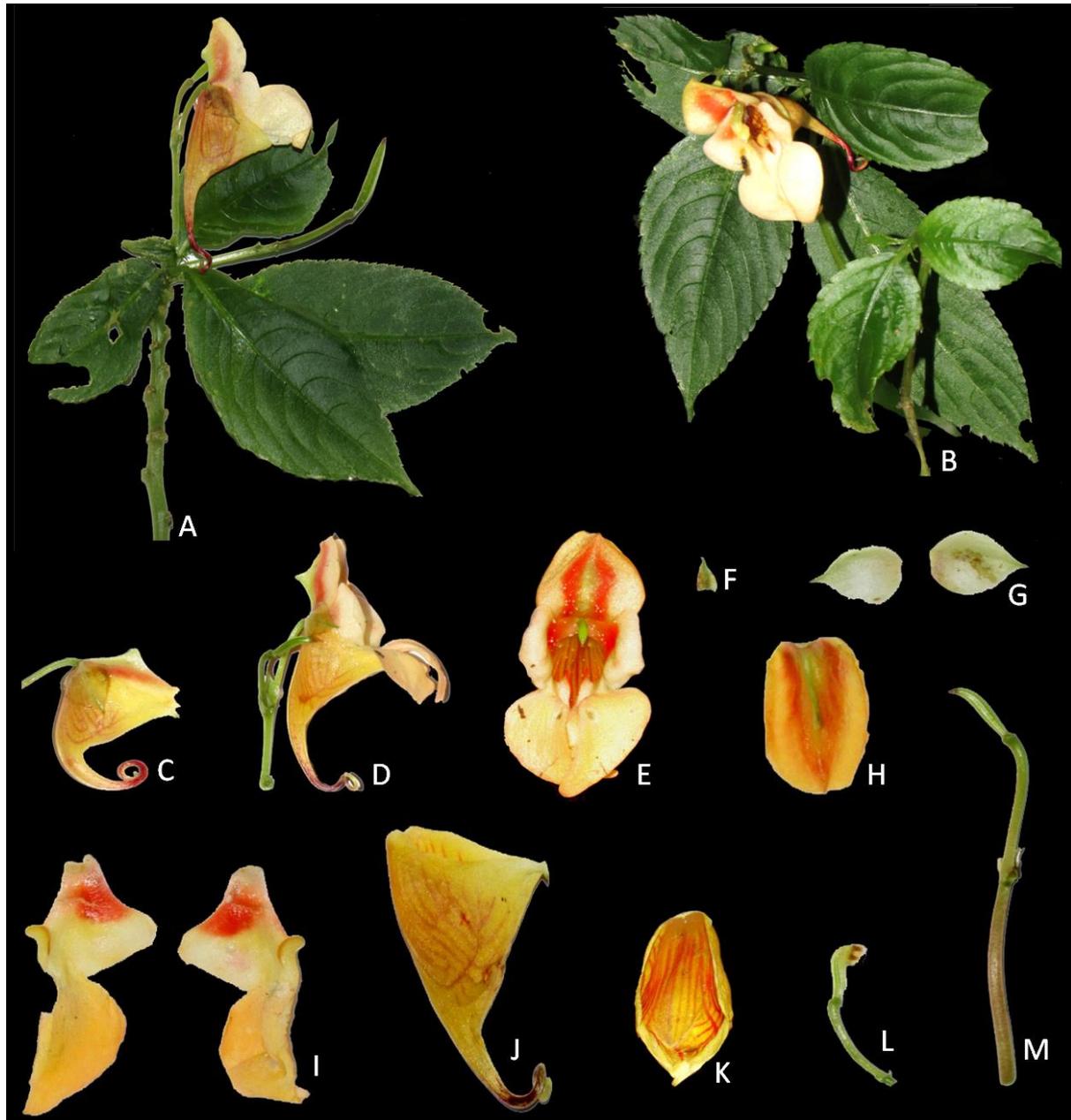


Figure 3. *Impatiens pulchra* Hook.f. & Thomson: A-B, Flowering twigs; C, Flower bud; D, Complete flower; E, Complete flower (front view); F, Bract; G, Lateral sepals (dorsal view); H, Dorsal petal (ventral view); I, Lateral united petals; J, Lower sepal (side view); K, Lower sepal (inner view); L, Androecium; M, Immature capsule with peduncle.

CONCLUSIONS

During the field surveys, *Caulokaempferia secunda* was found distributed only in the roadside hill slopes of the Nelie-Umapania roadside area of Karbi Anglong (West) district; the species was considered endemic to Meghalaya (Mir *et al.* 2019); however, present study confirms its extant of occurrence to Assam. Due to activities related to construction of road and destruction of habitat, the species is under threat locally. Similar to *C. secunda*, occurrence of *Impatiens pulchra* was also within a range of single area *i.e.* from Jatinga Hill of Dima Hasao district. Because of their showy flowers, further research may prove potential benefits, especially in horticultural sector. Both species were not included in any categories of IUCN (IUCN 2020) but due to limited occurrence in the study area, ex-situ as well as in-situ conservation is recommended in

the state.

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