



Two new scapigerous species of *Impatiens* (Balsaminaceae) from southern Western Ghats, India

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ABSTRACT: Two scapigerous species of *Impatiens* (Balsaminaceae): *I. nidholapathra* and *I. grandispora* from Idukki district in Kerala, India are here described. *Impatiens nidholapathra* is most similar to *I. tirunelvelica* from which it differs by its membranous and silky lanuginose leaves. *Impatiens grandispora* is related to *I. stolonifera* morphologically but differs mostly by the purplish white flowers with red patches of papillae near the centre and considerably larger pollen grains. They are known from a small, fragmented population from a low range of hills. Therefore, under the IUCN Red List Categories & Criteria, they are assessed as Critically Endangered. We provide here morphological descriptions, illustrations, colour photoplates, notes on their habitats, distribution, phenology and conservation status.

KEY WORDS: Idukki district, *Impatiens grandispora*, *I. nidholapathra*, *I. stolonifera*, *I. tirunelvelica*, India, new species.

INTRODUCTION

Impatiens L., a genus of the Balsaminaceae family, has over 1000 species in the world (Grey-Wilson, 1980). They are terrestrial or occasionally epiphytic, more or less succulent annual or perennial herbs with attractive and morphologically complex flowers and dehiscent fruits. The majority of *Impatiens* species are distributed in five hotspots: Southeast Asia and Southwestern China, eastern to central Himalayas, southern India, tropical Africa and Madagascar (Grey-Wilson, 1980). The Western Ghats is one of the centers of diversity for this genus (Bhaskar, 2012). There are currently 210 accepted species of *Impatiens* known from India, of which 110 species are reported from Western Ghats, including 30 scapigerous species with greater percentage of endemism. Based on morphological and molecular data Yu *et al.* (2016) divided the genus into two subgenera: subgen. *Clavycarpa* and subgen. *Impatiens*. The subgen. *Impatiens* is further divided into seven sections: Sect. *Semeiocardium*, Sect. *Impatiens*, Sect. *Tuberosae*, Sect. *Racemosae*, Sect. *Uniflorae*, Sect. *Scorpioidae* and Sect. *Fasciculatae*.

During field trips to the floristically rich Idukki district in Kerala (southern Western Ghats), as a part of documenting the angiosperm diversity, specimens of remarkable, apparently undescribed *Impatiens* taxa were collected and are described here as *I. nidholapathra* and *I. grandispora*. These novelties belong to the section *Uniflorae* in having 5-carpellate ovary, fusiform capsules conspicuously turgid at middle and flowers produced in racemes.

MATERIALS AND METHODS

Specimens of the new taxa were collected during

field work in Idukki district. Collected materials were pressed and dried or preserved in 4% formalin and 70% ethanol. Photographs of habitat and habit were taken with a Canon 77D DSLR Camera. Colour plates were prepared using Zeiss Stemi 508 stereomicroscope attached with an Axiocam 105 color Camera. The description was prepared after examining all available specimens. Voucher specimens were deposited at CALI and K. The conservation status of these taxa were assessed using the standard IUCN Categories and Criteria (IUCN, 2012, 2017).

TAXONOMIC TREATMENT

Impatiens nidholapathra Vishnu & Nampy, *sp. nov.*

Figs. 1A, 2 & 3

Type: INDIA, Kerala, Idukki district, 50th mile-Mankulam, 10°06'96.7"N; 076°58'80.7"E, ±1023 m, 14 Sep. 2018, Vishnu Mohan & Santhosh Nampy 161903 (holotype, CALI; isotype, K).

Diagnosis: *I. nidholapathra* resembles *I. tirunelvelica*, but differs in its membranous silky lanuginose leaves, pale green veins, and pink corolla with a yellow centre surrounded by white papillae against fleshy glabrous leaves, brown veins, pink corolla uniformly white at centre in *I. tirunelvelica*.

Tuberous acaulescent, lithophytic herbs, densely pubescent, 10–25 cm tall. Tubers oblate, 2–5 × 2–4 mm. Leaves radical, pendulous, membranous, elliptic to narrowly deltoid, 5–11 × 2–5.5 cm, serrate and spinose at margins, cordate but rarely cuneate or obliquely cordate at base, acute or rarely obtuse at apex, with a tuft of uniseriate trichomes on upper surface and silky lanuginose hairs on lower surface, nerves pale green below; petioles 1.5–6 cm long, glabrous. Flowers in



Fig. 1. **A:** Habitat of *Impatiens nidholapathra* Vishnu & Nampy. **B:** Habitat of *Impatiens grandispora* Nampy & Vishnu.

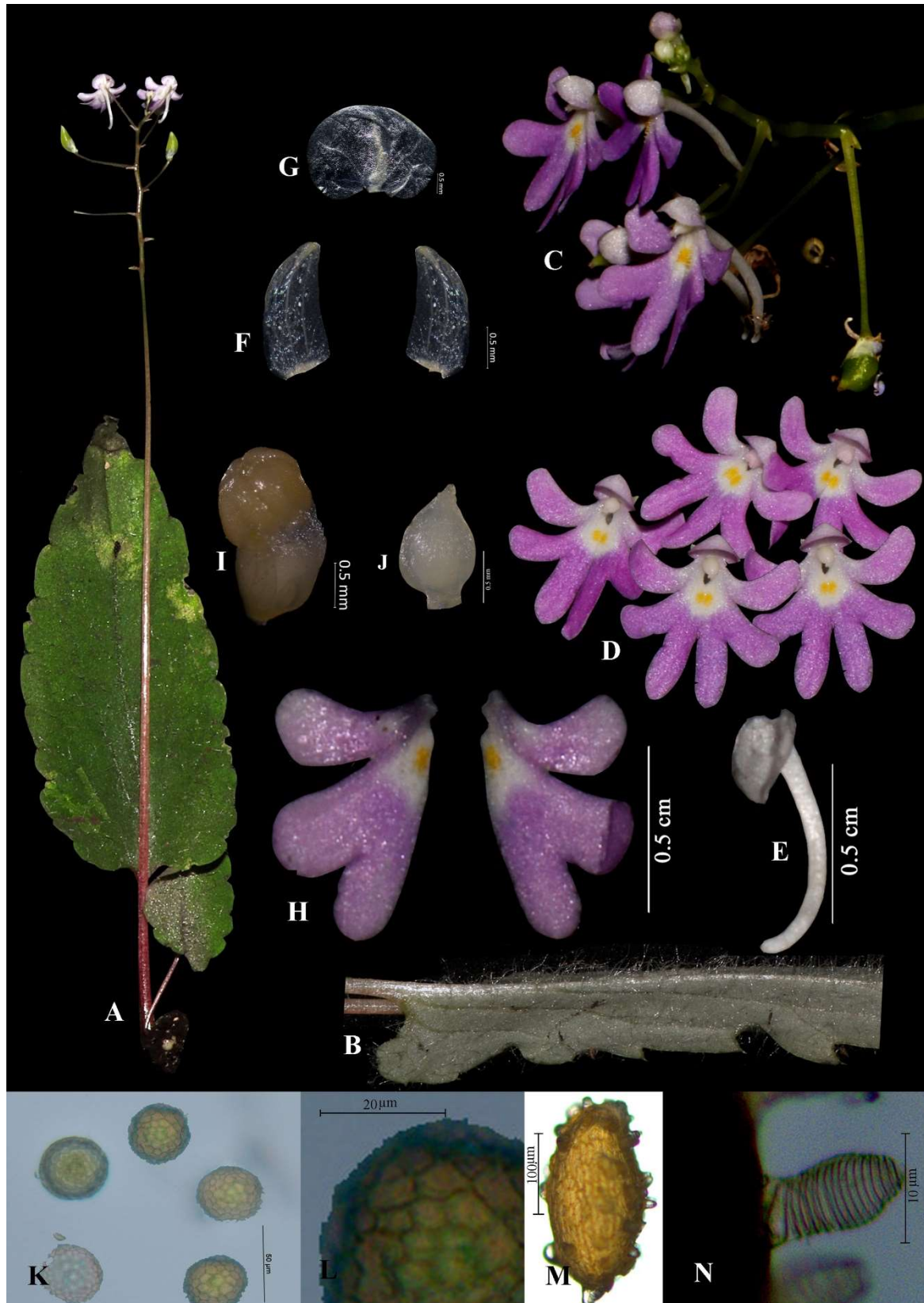


Fig. 2. *Impatiens nidholapathra* Vishnu & Nampy. **A:** Habit. **B:** Leaf abaxial side showing hairs. **C & D:** Inflorescence. **E:** Lower sepal with spur. **F:** Lateral sepals. **G:** Dorsal petal. **H:** Lateral united petals. **I:** Androecium. **J:** Ovary. **K:** Pollen grains showing reticulate exine. **L:** Pollengrain, a portion enlarged. **M:** Seed. **N:** Seed, part enlarged showing spirally coiled hairs.

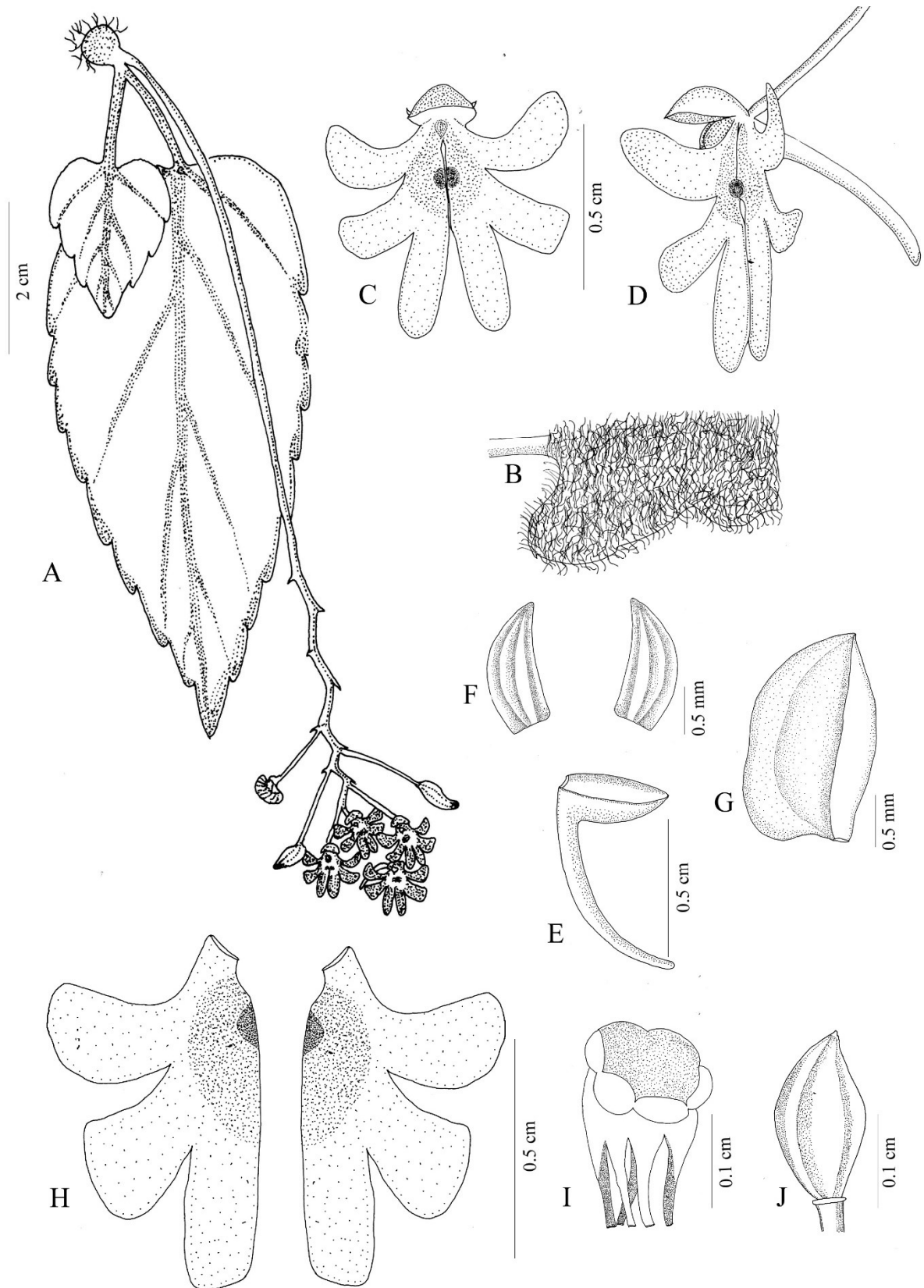


Fig. 3. *Impatiens nidholapathra* Vishnu & Nampy. **A:** Habit. **B:** Leaf abaxial side (a portion enlarged showing hairs). **C & D:** Flower (front and lateral views). **E:** Lower sepal with spur. **F:** Lateral sepals. **G:** Dorsal petal. **H:** Lateral united petals. **I:** Androecium. **J:** Ovary.



racemose scapes, scapes straight, 10–25 cm long; 4–12 flowered, pink. Pedicels glabrous, 0.8–1.5 cm long, erect, pale green. Bracts persistent, linear-lanceolate, 1–1.5 × 1 mm, pale green. Flowers 0.6–1 × 0.8–1.1 cm. Sepals free, pale green; lower sepal cymbiform, conical at apex, smooth at margins, white; spur 8–10 mm long, slightly incurved at base; lateral sepals elliptic, 1.7 × 0.7 mm, smooth at margins, rounded at base, acute at apex, glabrous. Petals pinkish, delicate; dorsal petal cordate, 2.7 × 3.3 cm, smooth at margins, rounded at base, acute at apex; lateral united petals 3-lobed, white papillae surrounds the yellow patch at base, 7 × 4.5 mm, smooth at margins, auricle absent. Stamens 5; filaments 2 × 3 mm; anthers united, ovate, 2 × 1 mm, extrose, longitudinally dehiscent; staminodes absent; pollen spheroidal, porate, golden yellow, *c.* 38±4 × 38±4 µm; exine reticulate. Ovary elliptic, 1 mm long, strigose; style 0; stigma sticky, capitate. Capsules 4 mm long, glabrous. Seeds numerous, golden brown, oval; testa reticulate with spirally coiled hairs.

Phenology: *Impatiens nidholapathra* produces flowers and fruits from August–October.

Distribution: Hitherto known only from the type locality.

Habitat: Grows on shady moist rocks in evergreen forests, in association with mosses (*Porella* L. and *Funaria* Hedw.), *Pilea microphylla* (L.) Liebm. (Urticaceae) and *Murdannia fadeniana* Nampy & Joby (Commelinaceae), at an elevation of 1023 msl.

Etymology: The epithet '*nidholapathra*' is derived from Sanskrit: 'nidholam' means pendulum and 'pathra' leaves, the whole referring to the pendulous nature of the leaves.

Notes: *Impatiens nidholapathra* is an integral component of evergreen forest found on shaded rocks and is highly sensitive to external conditions. They might be ruined by a small lack of moisture. The leaves are drooping and the flowers are pinkish with a 3-lobed lateral united petals. Even though it resembles *I. tirunelvelica* and *I. veerapazhasii*, it can be easily distinguished by its membranous and silky lanuginose leaves. Tubers on the rocks are covered with mosses and are non-stoloniferous but give rise to one or two leaves and a scape.

Specimen examined: India, Kerala, Idukki district, Kozhivilakudi-Anakulam, 18 Sep. 2018, *Vishnu Mohan & Santhosh Nampy 161987* (CALI).

Conservation status: The authors came across three small populations from the Mankulam and Anakulam forests with no more than 30 individuals. The area of occupancy of each population is reduced to 3 m² with a distance of 14 km between two populations. Because of tourism and other anthropogenic activities, the type population may become extinct. The conservation status of the species is assessed as Endangered Category (IUCN, 2017).

Impatiens grandispora* Nampy & Vishnu, *sp. nov.

Figs. 1B, 4 & 5

Diagnosis: *Impatiens grandispora* is close to *I. stolonifera* but differs by its pollen size (50 µm vs 25 µm), colour of papillae (red vs white), colour of bract (reddish brown vs pale green).

Type: INDIA, Kerala, Idukki district, Edathattu-Mankulam, 10°05'27.5"N; 076°57'29.0"E ±1395 m, 13 Sep. 2018, *Vishnu Mohan & Santhosh Nampy 159468* (holotype, CALI; isotype K).

Tuberous acaulescent, lithophytic, glabrous, herbs, 20–30 cm tall. Tubers oblate-prolate, 2–8 × 2–7 mm. Leaves radical, cordate to rounded, 6–8 × 4–6.5 cm, fleshy but leathery, serrate at margins, cordate at base, rounded or rarely mucronate at apex, with trichomes adaxially, glabrous abaxially, nerves pale green below; petioles 6–9 cm long, glabrous. Flowers in racemose scapes; scapes 20–30 cm long, reddish-brown; 4–16 flowered. Pedicels smooth, thin, erect, reddish-brown, 4–6 cm long; bract 1, persistent, ovate, 5–7 × 2 mm, acute at apex, smooth at margins, pale green-reddish brown. Flowers 2.5–3 × 1.8–2 cm. Sepals free, reddish-brown; lower sepal cymbiform, apex falcoid, 5–7 × 3–4 mm, smooth at margins, white, spurred; spur 3.8–4.3 cm long, base slightly incurved, white; lateral sepals obliquely triangular, 5–6 × 3.5–4 cm, smooth at margins, cordate at base, acute at apex, glabrous, reddish-brown. Petals purplish-white; dorsal petal cordate, 0.7–1 × 1.1–1.3 cm, smooth at margins, cordate at base, acute at apex; lateral united petals 3-lobed, 2.7 × 2 cm, smooth at margins, with a reddish patch of papillae at centre, auricle absent. Stamens 5; filaments papery, 5 × 8 mm; anthers oval, united, 5 × 2 mm, extrose, longitudinally dehiscent; pollen spheroidal, 50±8 µm diam., pantoporate with 2–4 pores, golden yellow; exine reticulate. Ovary elliptic, 4 × 1.5 mm; style 0; stigma sticky, capitate. Capsules 1.5 × 0.5 cm. Seeds numerous, golden brown, oval to elliptic with spirally coiled hairs.

Phenology: Flowering and fruiting occurs from August–October.

Distribution: Hitherto known only from the type locality.

Habitat: Grows on steep, exposed dripping rocks, in association with several grass species, at an elevation of 1425 msl.

Etymology: The epithet '*grandispora*' refers to the large pollen grains of the species.

Notes: The plants grow abundantly but are extremely sensitive to rain. They start to flower only after receiving ample rains. But any rain during their period of flowering causes the plants to decline, eventually destroying the entire population. This sudden appearance and vanishing caused the tribal people to call them "Wonder Plant". With the beginning of next rainy season, the tubers will continue to give rise to new plants.



Fig. 4. *Impatiens grandispora* Nampy & Vishnu. **A:** Habit. **B:** Stolon. **C & D:** Flowers **E:** Lower sepal with spur. **F:** Lateral sepals. **G:** Dorsal petal. **H:** Lateral united petals. **I:** Androecium. **J:** Ovary. **K:** Pollen grains. **L:** Pollen grain, a portion enlarged showing reticulate exine. **M:** Seed. **N:** Seed, part enlarged showing spirally coiled hairs.

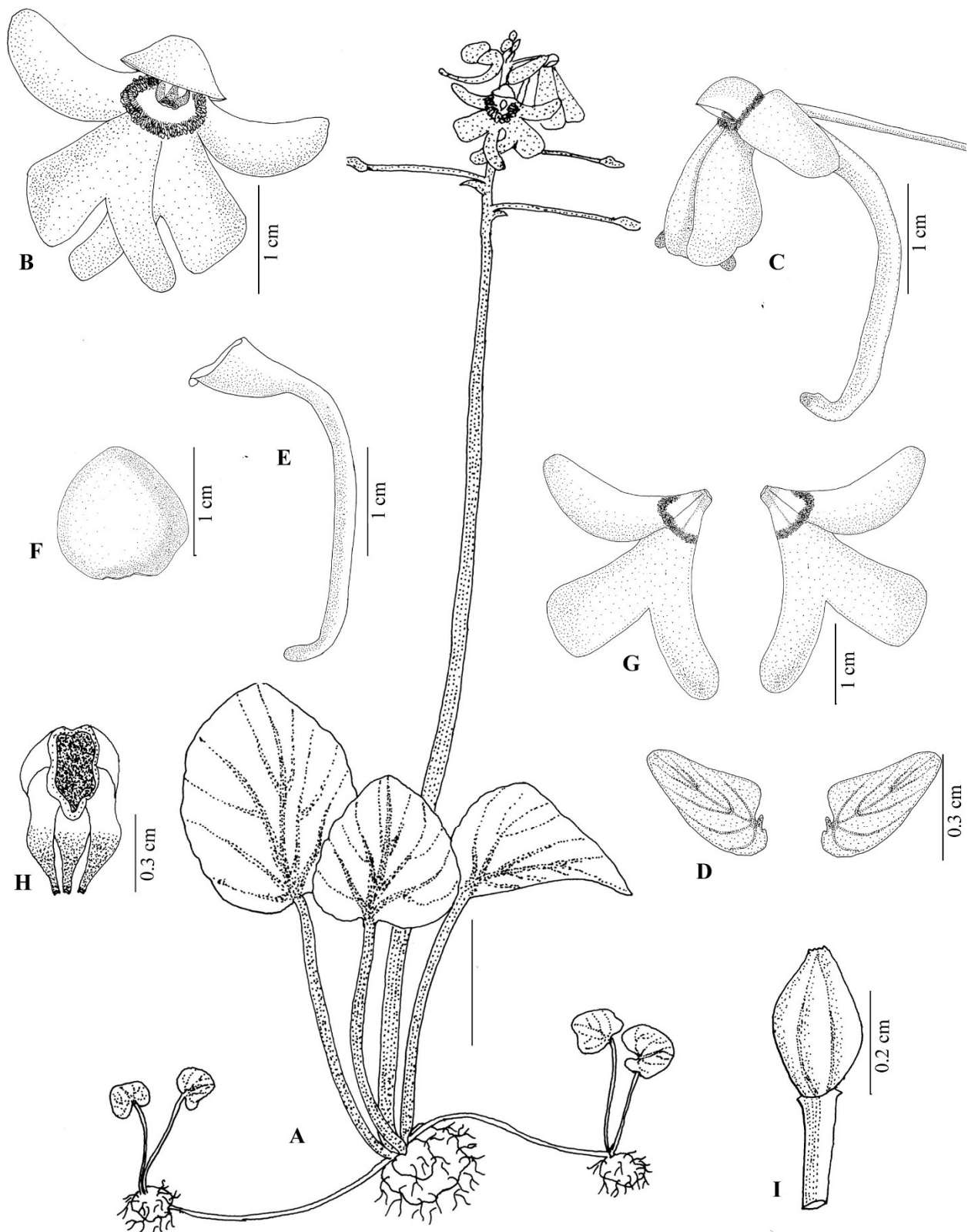


Fig. 5. *Impatiens grandispora* Nampy & Vishnu. **A:** Habit. **B & C:** Flower (front and lateral views). **D:** Lateral sepals. **E:** Lower sepal with spur. **F:** Dorsal petal. **G:** Lateral united petals. **H:** Androecium. **I:** Ovary.

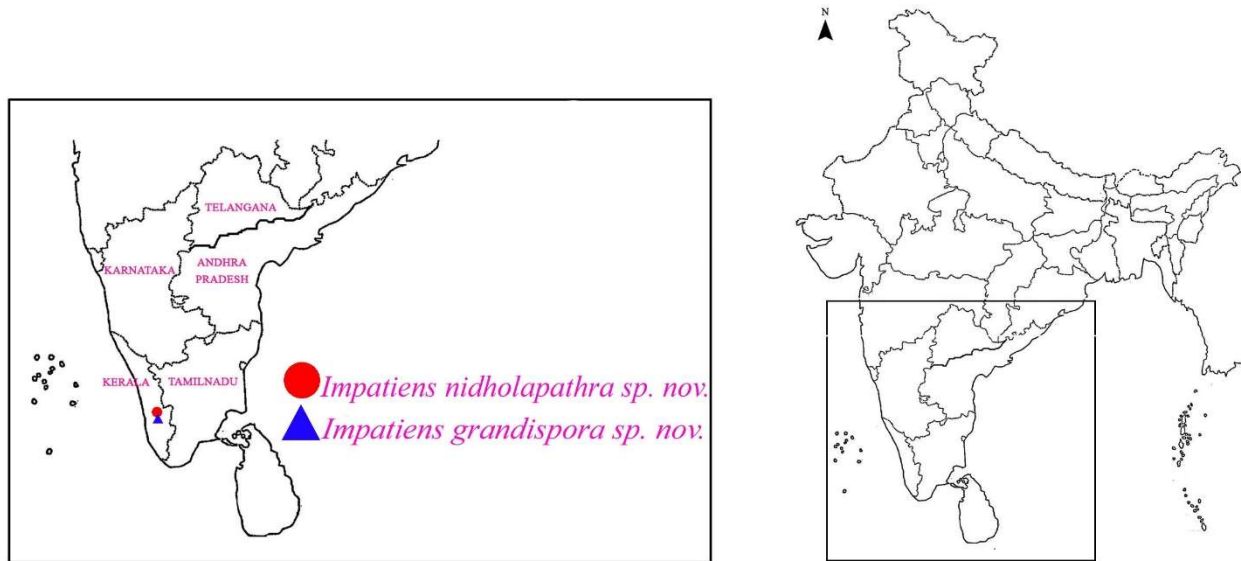


Fig. 6. Map showing distribution of *Impatiens nidholapathra* and *I. grandispora*.

Although *I. grandispora* has similarities with *I. stolonifera*, there are many striking differences as well. While the latter's stolon is stout and exposed, that of the former is weak and unexposed. The former has purple white flowers with red patches of papillae near the centre, reddish brown pedicels, lateral united petals with inwardly bending basal lobes and larger pollen (50 μm) while the latter has white flowers with white papillae near the centre, pedicels pale green, lateral united petals with straight basal lobes and smaller pollen (25 μm).

Specimen examined: India, Kerala, Idukki district, Edathattu-Mankulam, 15 Oct. 2018, *Vishnu Mohan & Santhosh Nampy 167830* (CALI).

Conservation status: The current novelty is reported only from one location with 25–30 subpopulations. The extend of occurrence is 5 m². There are no perceived threats either to the populations or its habitat as it is reported from a protected area. Based on extend of occurrence, area of occupancy and number of individuals the species falls within the Critically Endangered Category (IUCN, 2017).

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