

Rediscovery of presumed extinct *Impatiens concinna* Hook. f. (Balsaminaceae) from the Western Ghats

Impatiens L. is phyto-geographically a unique genus which has its greatest development in the Indian region and is mainly distributed in tropical Asia (Philippines, Sri Lanka, Myanmar, India and Indonesia), Africa and Madagascar¹. In India, it is represented by more than 210 taxa, mainly distributed in the Eastern Himalaya, North East India and the Western Ghats, with each area being characterized by its own species group²⁻⁵.

While working on the floristic diversity of the Dhoni Hills in Palakkad district, Kerala, the present authors collected an interesting species of *Impatiens* from the grasslands at Palamalai. A detailed taxonomic study and perusal of relevant literature and type specimens at K and CAL confirmed that this species is *Impatiens concinna* Hook. f., a presumed extinct species of the Western Ghats, not collected after 1929 (ref. 5). A taxonomic description, distribution, ecology, phenology and IUCN status of the species has been provided along with colour photograph and illustration based on fresh specimens.

Taxonomy: *Impatiens concinna* Hook. f., *Fl. Brit. India* 1: 449.1874 & *Rec. Bot. Surv. India* 4(3): 46. 1906; Gamble, *Fl. Madras* 141.1915; Vivek *et al.* in Hajra *et al.*, *Fl. India* 4: 134. 1997; Bhaskar, *Monogr. S. Indian Balsaminaceae*. 130. 2012. Type: Nilgheries? Wight 312 (CAL, iso K).

Annual herbs, erect, 15–40 cm high; stems simple to moderately branched, glabrous, terete, nodes swollen, purple in lower parts and the colour fades towards upper part. Leaves opposite, decussate, petioled to subsessile, oblong to lanceolate, 2–4.5 × 1–1.9 cm, glabrous, light green above, horrid beneath, serratures purple, cordate to rounded at base, spiny serrate at margin, aristulate at apex; lateral veins 4–7 pairs, prominent beneath; petioles up to 2 mm long. Flowers 1 or 2 per axil, 1.2–1.5 cm across, dark pink; pedicels 1.4–2 cm long, slender, glabrous, ascending or horizontal in flower, becoming pendent in fruit. Sepals: lateral sepals 7–10 × 1–1.5 mm, linear-lanceolate, acuminate at apex, glabrous. Petals: lip navicular, 10–18 mm long, acuminate, glabrous, purple standard petal-free and lies slightly behind the remaining

whorls, 10–19 × 3–7 mm, ovate with a prominent mid-vein crest like at back, acute at apex, purple; lateral petals bilobed, 1.2–1.5 cm long, purple, distal lobes slightly longer than basal lobe; spur curved, 2–4 mm long, yellow. Stamens 5, united; filaments 3–6 mm long, flattened, membranous, glabrous; anthers 1.2–2.5 mm long, partly fused, yellow. Ovary linear-oblong, 3–7 mm long, glabrous, light green, distinctly five-grooved. Capsule ellipsoid, 1–2.4 cm long, green, glabrous, 2-seeded (Figure 1).

The exact locality of this species was not known, as evident from Gamble³ and Hooker⁶. However, in 1874, Hooker just mentioned mountains of Malabar based on Wight's collection, but interestingly Wight did not mention this species in any of his works and hence its type locality was previously not known⁷. In 1917, Fischer collected this species from Atumalai, Ayyamalai hills, Coimbatore, Tamil Nadu at an altitude of 1600 m. Therefore, there are only three collections of this species available since its

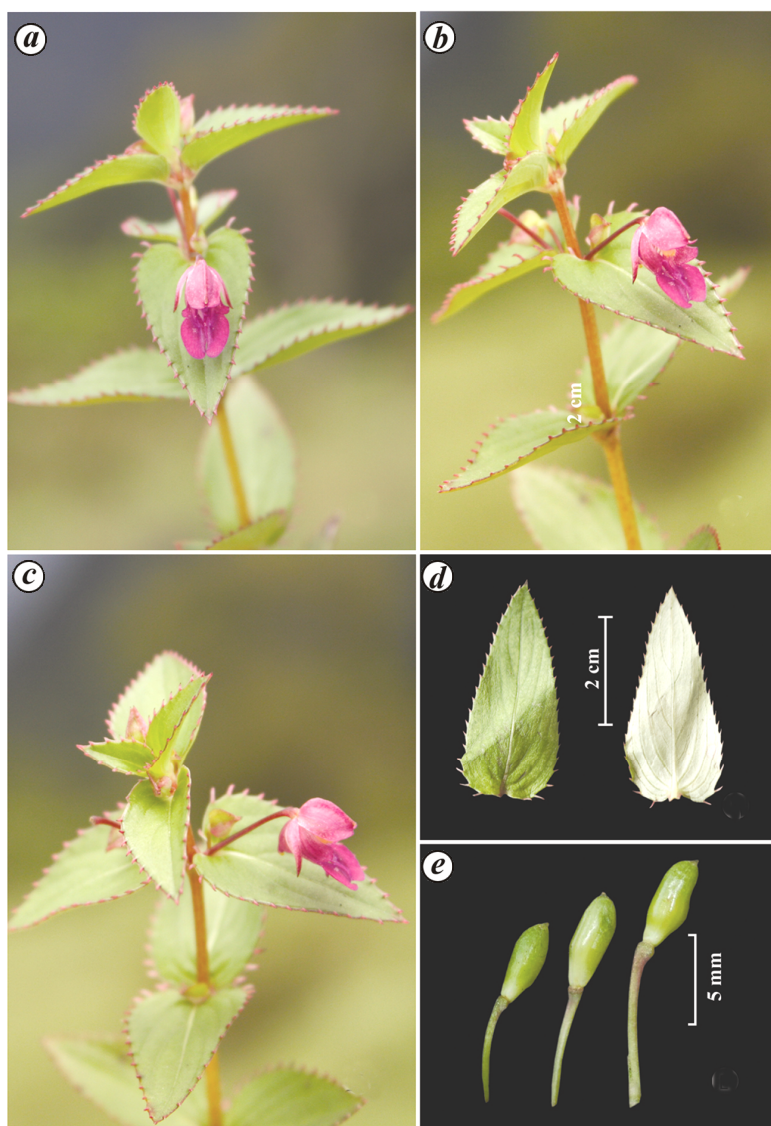


Figure 1. *Impatiens concinna* Hook f. **a–c**, Habit; **d**, Adaxial and abaxial sides of leaf; **e**, Fruits.

discovery, one by Wight, whose specimens are at CAL and K; the second by Fischer in PCH and the third by an unknown collector in MH. Among these, only Fischer mentioned the place of collection. On the evidence of a recent monographic study of the South Indian *Impatiens*⁵, this species is strictly endemic to Tamil Nadu region and there are no reports of its collection since 1917. But interestingly, few studies^{8–11} have reported the distribution of *I. concinna* in Idukki and northern Kerala regions. A detailed herbarium survey of K, CAL, MH, CALI, TBGT, KFRI, FRC and RHT revealed that there is no specimen of this species deposited in any of these herbaria from Kerala. On perusal of the data and information collected through personal communication with some of the authors of the previous reports, it is confirmed that the report of this species from Kerala is based on misidentified specimens.

I. concinna naturally grows in grasslands at an altitude of 1600 (Atumalai) to 2000 m (Palamala hills) in the Western Ghats and was considered as 'Possibly Extinct'². Based on the present collection, perusal of the literature and herbarium specimens, the threat status of this species is updated as 'Critically Endangered' (CR B1ab (i, ii, iv) and 2ab (i, ii, iv)) using IUCN Red List Categories and Criteria¹². The area of occupancy is estimated to be less than 1 sq. km and the known populations contain a maximum of 100 plants. The flowering and fruiting are observed during September–November.

Specimen collected: India. Kerala, Palakkad, Dhoni hills, Palamala, 10°54'37.7"N, 076°37'41.4"E ± 1900 m altitude 28 September 2013, K. M. Prabhukumar 103034 (CALI); K. M. Prabhukumar 7468 & 7592 (CMPR). Fischer sin. num. (PCH); exsiccatum s.n., 21 October 1929, 7481 (MH).

1. Grey-Wilson, C., In *A Revised Handbook of Flora of Ceylon* (eds Dassanayake, M. D. and Fosberg, F. R.), Oxford & IBH, New Delhi, 1985, vol. 5.
2. Cooke, T., *Flora of the Presidency of Bombay, Vol. 1*, Taylor & Francis, London, 1901, pp. 169–175.
3. Gamble, J. S., *Flora of the Presidency of Madras, Vol. 1*, West Newman & Co, Adlard & Son, London, 1915, pp. 134–145.
4. Vivekananthan, K., Rathakrishnan, N. C., Swaminathan, M. S. and Ghara, L. K., In *Flora of India 4* (eds Hajra, P. K., Nair, V. J. and Daniel, P.), Botanical Survey of India, Calcutta, 1997, pp. 95–229.
5. Bhaskar, V., Taxonomic monograph on *Impatiens* L. (Balsaminaceae) of Western Ghats, South India, Centre for Plant Taxonomic Studies, Bengaluru, 2012.
6. Hooker, J. D., *Rec. Bot. Surv. India*, 1906, 4, 37–58.
7. Hooker, J. D., In *The Flora of British India, Vol. 1*, L. Reeve & Co, London, 1874, pp. 440–464.
8. Sasidharan, N., Flowering plants of Kerala: CD-ROM. ver 2.0. Kerala Forest Research Institute, Peechi, 2013.
9. Nayar, T. S., Rasiya Beegam, A., Mohanan, N. and Rajkumar, G., *Flowering Plants of Kerala: A Handbook*, Tropical

Botanical Garden and Research Institute, Thiruvananthapuram, 2006, p. 32.

10. Ahmedullah, M. and Nayar, M. P., *Endemic Plants of Indian Region*, Botanical Survey of India, Calcutta, 1987.
11. Henry, A. N., Vivekanandan, K. and Nair, N. C., *J. Bombay Nat. Hist. Soc.*, 1979, 75, 684–697.
12. IUCN, IUCN Red List Categories and Criteria: Version 3.1, International Union for Conservation of Nature and Natural Resources, Gland, Switzerland, 2012, 2nd edn, pp. 1–32.

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Snowflake coral, *Carijoa riisei* from Grand Island, Goa: a case of invasion of an alien species or re-establishment of a native species?

Invasion is an ecological phenomenon of introduction of organisms to areas outside their native ranges. It concerns all aspects relating to their transport, establishment and spread in a new region¹. An invasive species causes imbalance to the ecosystem by monopolizing food and spatial resources and consequently disrupting the native community². Biological invasion is presently one of the major sources of stress to the coral reef habitats, which harbour 25% of total marine biodiversity and contribute to 10% of total fishery production^{3,4}. In India, the

coral reefs are located in the Gulf of Kachchh, Gulf of Mannar, Andaman & Nicobar Islands, Lakshadweep and some minor reefs are identified at Malavan (Maharashtra) and Grande Island (Goa).

A survey was conducted in the coral reefs of Grande Island, Goa, India (73°46'46.605"E, 15°21'0.636"N) in November 2014, during which the occurrence of *Carijoa riisei* (Duchassaing and Michelotti 1860) was observed from the site with colonies attached over a shipwreck (130 × 30 m) at a depth of 10–12 m (Figure 1a). Several colonies,

white and beige in colour, were observed with branches 8–10 cm long and 3.5 mm wide (Figure 1b). Percentage cover of the species was calculated using a 1 × 1 m quadrat following English *et al.*⁵.

The species was identified based on its characteristic features, viz. presence of eight tentacles in each polyp and each axial polyp having several lateral polyps (Figure 1c), following Dhivya *et al.*⁶. The other coral species observed in the reef during the survey included *Turbinaria mescenterina*, *Favites* sp., *Favites abdita* and *Dendrophyllia* sp. The