



FURTHER ADDITIONS TO THE SCAPIGEROUS *IMPATIENS* OF KERALA WITH NOTES ON ITS ECOLOGICAL PECULIARITIES AND CONSERVATION STATUS

Dantas K.J.\*, N. Sasidharan and P. Sujanapal

Kerala Forest Research Institute, Peechi, Thrissur 680 653, Kerala, India

\*Corresponding Author: dantusmangad@gmail.com

**ABSTRACT:** The occurrence of three scapigerous *Impatiens*, *I. dendricola*, *I. stocksii* and *I. lawsonii* are reported for the first time from Kerala. *I. dendricola* and *I. stocksii* are so far known from the Karnataka part of Western Ghats and *I. lawsonii* from Nilgiris of Tamil Nadu. Conservation Status and intraspecific variations were reassessed based on the latest information.

**Key words:** Balasaminaceae, Scapigerous, *Impatiens*, Western Ghats, Kerala

**INTRODUCTION**

*Impatiens* is the largest genus of the family Balsaminaceae with more than 1,000 species distributed in the tropical and subtropical regions of the Old World as well as in the northern temperate regions [6, 9]. The genus has higher per cent of endemics, of which most of them are restricted to narrow geographic regions. According to Bhaskar, there are 107 species and 14 infraspecific taxa in South India [3]. As many as 28 species and one variety of scapigerous *Impatiens* are reported from south India. Among them, *I. acaulis* is the only species with extended distribution pattern up to Sri Lanka. Rest of the species are endemic to the rain forests of Western Ghats [3, 13, 14].

During the floristic explorations in Kannur and Wayanad Districts of Kerala, the authors have collected several specimens of scapigerous *Impatiens* from the evergreen forests above 750 m msl. Among the collections, three were not matching with any of the species so far reported from the Kerala part of Western Ghats. On critical study, it was found that these collections were *I. dendricola*, *I. lawsonii* and *I. stocksii*. Present collections from the areas are the first record of its occurrence in Kerala. The occurrence of these microhabitat specific ephemerals in this region indicates the climatic and edaphic peculiarities of the area. Brief description based on recent collection, relevant notes and images are provided for better understanding on the species.

***Impatiens dendricola*** C.E.C. Fisch., *Bull. Misc. Inform. Kew* 1935: 157. 1935 & *Fl. Madras* 3: 1870.1936; Bhaskar and Razi, *Bull. Bot. Sur. India* 23(3-4): 191-196. 1981; Henry *et al.*, *J. Bombay Nat. Hist. Soc.* 75:686. 1979; Saldanha, *Fl. Karnataka* 2: 251. 1996; Vivek. *et al.* in Hajra *et al.*, *Fl. India* 4: 139. 1997; Ravi kumar *et al.*, *J. Econ. Taxon. Bot.* 24: 335.2000; Jyosna & Janarth., *Rheedea* 21(1): 33. 2011; Bhaskar, *Taxon. Monogr. Impatiens W. Ghats*: 64. 2012. [Images A, A1 & A2]

Epiphytic, scapigerous, tuberous herbs, to 15 cm high. Leaves radical, 4 or 5, 1-7 x 1-3 cm ovate, elliptic or lanceolate to oblong-lanceolate or obtuse at base, crenate along the margins, obtuse or retuse at apex, hairy above. Inflorescence racemose, scape 5 – 15 cm long, 2– 10-flowered. Flowers 1-2 cm across, white; bracts ovate, green; lateral sepals ovate, acute at apex; standard petal orbicular to reniform, 3-5 mm; wing petals 1-2 cm, unequally 3-lobed; basal lobe linear-oblong, retuse at apex; mid-lobe suborbicular, with a tuft of hairs at base; hairs yellow to orange; distal lobe linear-oblong, rounded at apex; lip broadly ovate, acute to acuminate at apex; spur basal, clavate. Column bent forward; filaments and anthers white. Capsule ellipsoid or oblongoid; seeds oblongoid, with tuft of hairs at ends; hairs spirally coiled.

*Flowering & Fruiting:* August – September

*Habitat:* On moss-covered tree trunks

*Distribution:* Endemic to Southern Western Ghats (Karnataka and Kerala)

Karnataka: Talacauvery and Thadiandamol of Coorg District

Kerala: Paithalmala of Kannur District

Specimens examined: India, Kerala, Kannur District, Paithalmala ± 1200 m asl, 15 August 2014, Dantas KJ and Vijith KT, 26779 [KFRI].

**Conservation Status:** This species was described by Fischer based on the collection of Barnes from Thadiandamol, Coorg, Karnataka [4]. Bhaskar relocated the species after a lapse of 40 years from its type locality, Thadiandamol [1]. Later, Ravikumar *et al.* reported this species from Talacauvery of Karnataka State [15]. Recently, Jyosna & Janarthanam also collected this species from Tadiandamol [9]. Present collections from Paithalmala, one of the important peaks in Kannur district of Kerala explicate its continuous distribution pattern in Bhrahmagiri hill ranges. It also indicates the phytogeographical peculiarities of windward Nilgiris of Western Ghats.

In Kerala, the distribution of this species is restricted to a small evergreen patch at Paithalmala region of Kannur district. Survey and analysis of data related to the distribution pattern revealed that the total Area of Occupancy (AOO) of this habitat specific species is less than 10 Km<sup>2</sup> in the entire Western Ghats. Anthropogenic disturbances due to tourism and related activities deteriorated the quality of its microhabitats in Kerala and Karnataka to a certain extent. Habitat fragmentations were also observed. Hence it is assessed that the species belongs to Critically Endangered-B2 (CR B2) category as per the criteria of IUCN (2014).

**Impatiens lawsonii** Hook. f., *Rec. Bot. Surv. India* 4: 45. 1906; Gamble, *Fl. Pres. Madras* 139(99). 1915; Vivek. *et al.* in Hajra *et al.*, *Fl. India* 4: 170. 1997; Bhaskar, *Taxon. Monogr. Impatiens W. Ghats*: 68. 2012. [Images B, B1 & B2]

Epiphytic annual scapigerous tuberous herbs, to 15 cm tall. Leaves radical, 1-3, 2 x 1.2 cm, ovate to suborbicular, crenate, obtuse or rounded, sparsely hairy above. Inflorescence racemose, scape 5 – 10 cm long, 2– 8-flowered. Flowers ca. 1 cm across, pink, in 4-6-flowered straight scapes; bracts ca 1.5 mm long, persistent; Sepals ovate, acuminate, 3-4- nerved; wing petals 3-lobed, ca 1.5 cm long, dorsal auricle short, spiniferous, pale pink with yellow tinge at centre, whitish outside, purple hairs present at mouth of throat of wing petals; standard hook-like, enclosing the stamens; lip funnel-shaped, spur conical. Column bent forward; filaments and anthers yellowish. Capsules 5-7 mm long, ellipsoid, glabrous; seeds powdery, minute, clothed with spiral hairs.

**Flowering and fruiting:** July – September, rarely to October based on regional climatic conditions.

**Habitat:** On moss covered tree trunks, also on wet rocks.

**Distribution:** Endemic to Nilgiri phytogeographical region of Southern Western Ghats (Tamil Nadu and Kerala).

Tamil Nadu: Kundalis and Bangi Tappal of Nilgiri District.

Kerala: Aralam Wildlife Sanctuary of Kannur and Hill Dale Reserve forests of Wayanad Districts.

Specimens examined: India, Kerala, Kannur District, Aralam Wildlife Sanctuary, ±1500 m asl, 25 August 2012, Dantas KJ, 25451; Wayanad District, Hill Dale Reserve, ± 1400 m asl, 27 August 13, Dantas KJ, 26701 [KFRI].

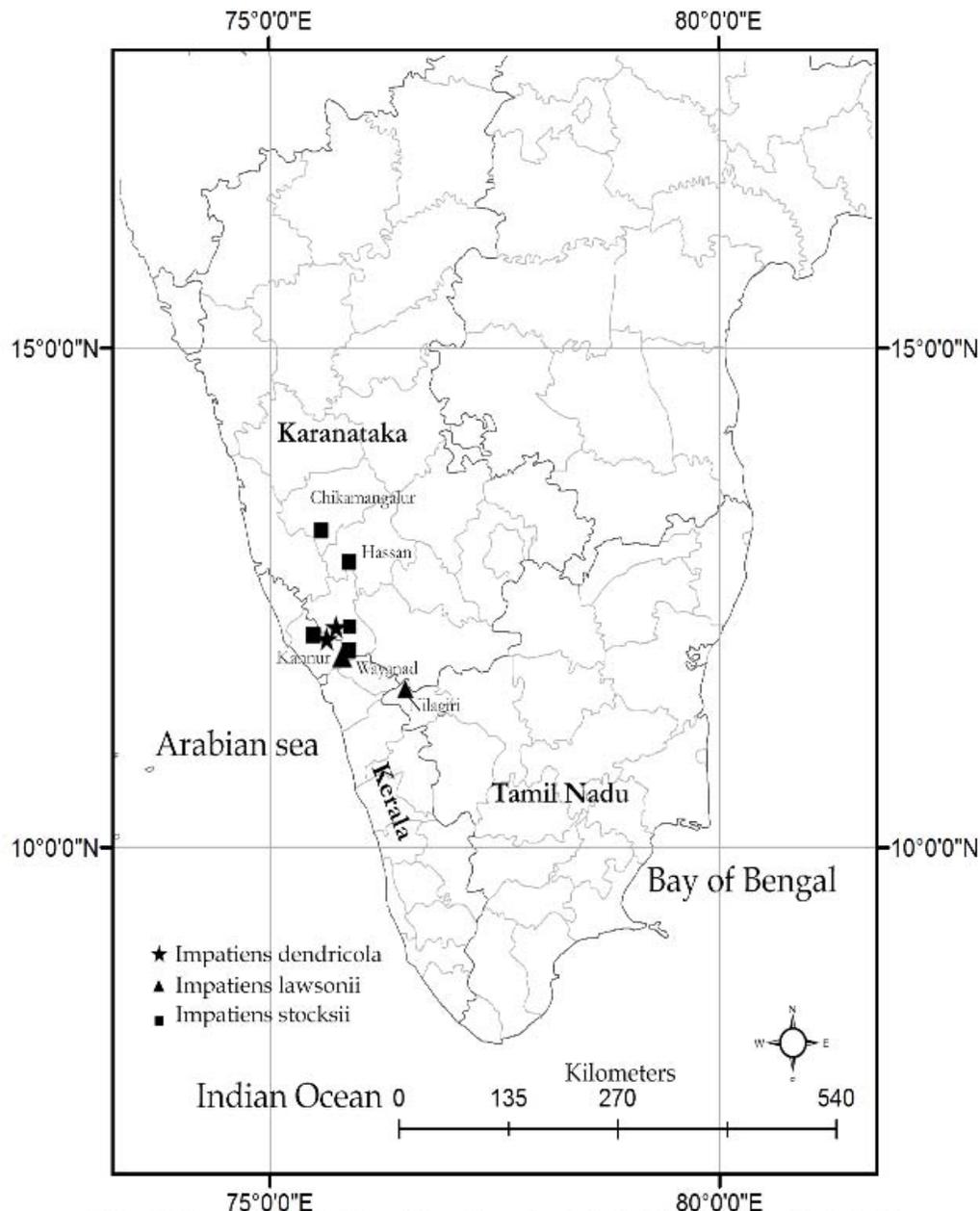
Notes: Fyson reported the occurrence of bulbils along the red veins on abaxial sides of the leaves [5]. According to Bhaskar, bulbils are gemmae bodies and are meant for vegetative reproduction. He also noted that *I. lawsonii* is the only known species with gemmae bodies [3]. However, Hooker did not mention anything about the bulbils on the leaves [7]. In the present collection, we could not find any bulbils or gemmae bodies on leaves.

**Conservation Status:** This species was described by Hooker from Nilgiris [7] without any indication on specific locality. Later, Barnes (1929) collected the species from Kundha hills ranges of Nilgiris of Tamil Nadu. In his herbarium, there is an indication of its distribution pattern in Nilgiri region. He mentioned that '*it is seen at several places between Bangi Tappal and North of 8510*'. According to Bhaskar this species is restricted to Kundalis of Tamil Nadu [3]. The present collection from Aralam Wildlife Sanctuary demonstrates its extended distribution up to Brahmagiri Hills of Kerala in the windward region of Nilgiris.

In Tamil Nadu, this species is restricted to a few shola patches in Nilgiris. In Kerala, the species is narrowly distributed in a few high altitude evergreen forests of Kannur and Wayanad districts. It is estimated that the total Area of Occupancy (AOO) of this habitat specific species is less than 10 Km<sup>2</sup> in the entire Western Ghats region. Habitat fragmentation due to various factors and anthropogenic interferences lead to habitat deterioration and population depletion. The distribution and other field data indicate that this species comes under Critically Endangered B2 (CR B2) category as per the IUCN criteria (2014).

**Impatiens stocksii** Hook.f. & Thomson, *J. Proc. Linn. Soc. Bot.* 4: 119. 1859; Hooker, *Fl. Brit. India* 1: 442.1874 & *Rec. Bot. Surv. India* 4: 45. 1906; Cooke, *Fl. Bombay* 1: 170. 1901; Blatter, *J. Bombay Nat. Hist.Soc.* 33: 310. 1933; Fischer, *Fl. Madras* 3: 1870. 1936; Henry *et al.*, *J. Bombay Nat. Hist. Soc.* 75: 686. 1979; Yoganarasimhan *et al.*, *Fl. Chikmagalur District*: 59. 1982; Murthy & Yoganarasimhan, *Fl. Coorg*: 88. 1990; Saldanha, *Fl. Karnataka* 2: 257, t. 100B. 1996; Jyosna & Janarth., *Rheede* 21(1): 37-40. 2011; Bhaskar, *Taxon. Monogr. Impatiens W. Ghats*: 85. 2012. [Images C, C1 & C2].

Epiphytic, scapigerous, tuberous herb, 5 – 10 cm high; tubers globose. Leaves radical, 2 – 5 per tuber, 1 – 8 X 0.8 – 2.5 cm, broadly ovate or elliptic to orbicular, obtuse to truncate at base, distantly apiculate-crenate at margins, notched to emarginate at apex, membranous, pubescent above. Inflorescence a racemose scape, 3 – 8.5 cm long, slender, glabrous, 2 – 10-flowered. Flowers 1 – 1.5 cm across, white; bracts ovate; Lateral sepals ovate, acute at apex, glabrous, hyaline, light green; standard petal suborbicular; wing petals with a tuft of yellow hairs at base of mid-lobe, 3-lobed; mid-lobe broader than distal and basal lobes; basal lobe oblong, acute to obtuse at apex; mid-lobe obtuse at apex; distal lobe oblong – oblanceolate, rounded to obtuse at apex; lip saccate, acute at apex, white with a yellow spot; spur absent. Column curved; filaments translucent; anthers white. Capsules broadly ellipsoid, 5 – 7 mm, glabrous; seeds oblongoid, with spirally coiled hairs.



Map. 1 Showing distribution of *Impatiens dendricola*, *I. lawsonii* and *I. stocksii* in South India

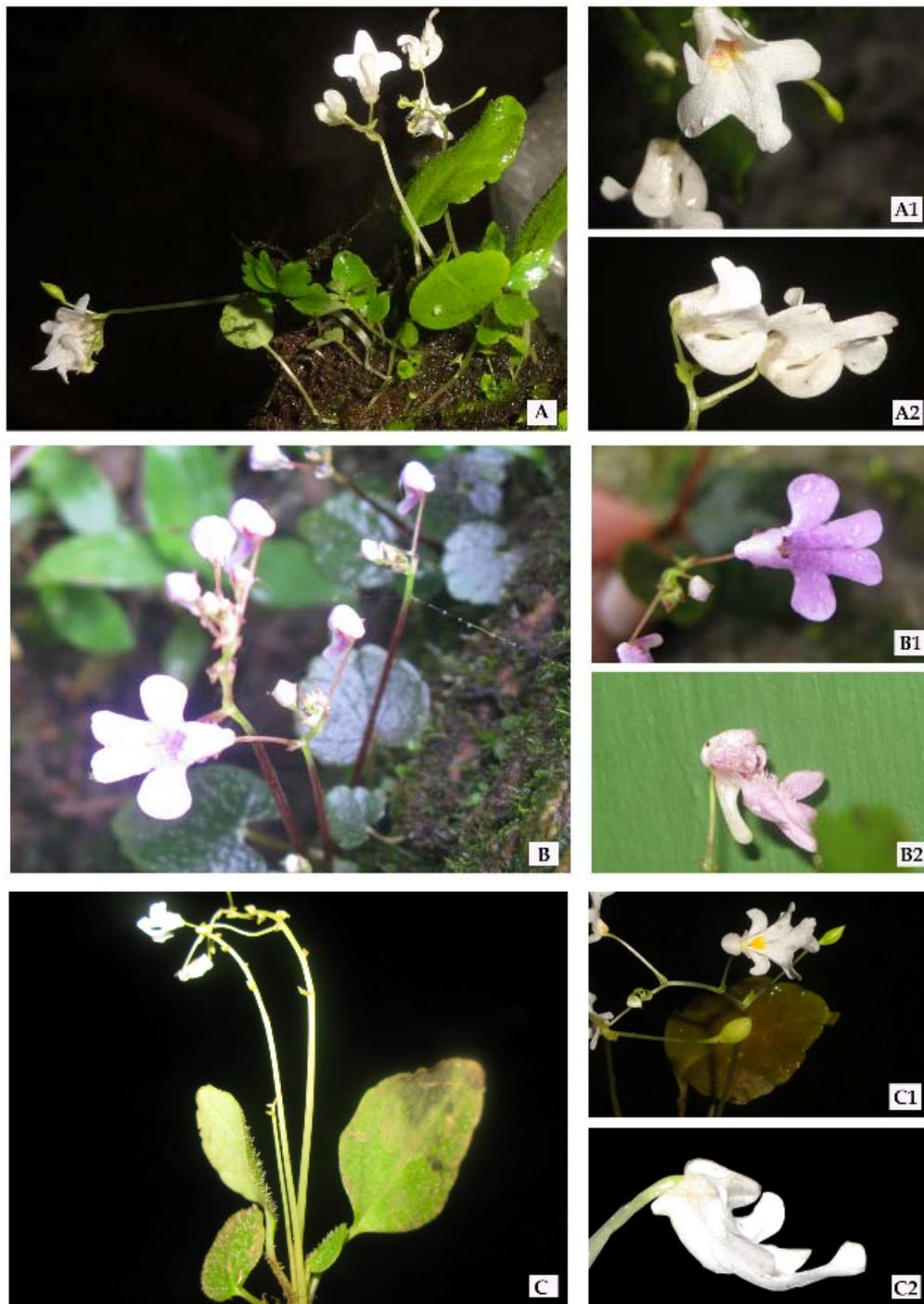


Fig. 1. A-A2 *Impatiens dendricola* C.E.C. Fisch., A. Habit, A1. flower-ventral view, A2. flower-dorsal view  
 B-B2 *Impatiens lausonii* Hook. f., B. Habit, B1. flower-ventral view, B2. flower-dorsal view  
 C-C2 *Impatiens stocksii* Hook.f. & Thomson, C. Habit, C1. flower-ventral view, C2. flower-dorsal view

**Flowering & Fruiting:** July – September

**Habitat:** Moss-covered tree trunks in evergreen forests, 700 – 1600 m.

**Distribution:** Endemic to the Western Ghats of Karnataka and Kerala

Karnataka: Bababudan and Kemmanagundi of Chikmagalur District, Mankanahalli and Bisle Ghat of Hassan District and Talacauvery of Kodagu District.

Kerala: Aralam Wildlife Sanctuary and Paithalmala of Kannur District and Hill Dale Reserve of Wayanad District.

Specimens examined: India, Kerala, Kannur District, Aralam Wildlife Sanctuary, ± 1500 m asl, 25 August 2012, *Dantas KJ*, 25452; Paithalmala, ± 1400 m asl, 15 August 2012, *Dantas KJ and Vijith KT*, 26778 [KFRI].

**Conservation Status:** This species was described by Hooker and Thomson based on the collection of Stocks and Law [8] from Cocan region of Karnataka. According to Bhaskar & Razi [2] and Ramachandran & Nair [12], *I. stocksii* is conspecific to *I. crenata* [9]. However Jyosna & Janarthanam [9] and Bhaskar [3] segregated the taxa. Dalzell & Gibson, Blatter and Cooke [9] reported this species from Maharashtra. Jyosna & Janarthanam and Bhaskar discussed about the occurrence of *I. stocksii* in Maharashtra and concluded that the distribution of these species in Maharashtra is doubtful as the specimens mentioned couldn't be traced in herbaria and relocated in specified locality [3, 9]. Ramachandran and Nair reported the occurrence of pink flowers in this species [12]. Literature and available collections shows that both the species, ie *I. stocksii* and *I. crenata* are having white flowers. Hence this report is probably an error. Panduragan and Nair reported the occurrence of *I. stocksii* in Meenmutty of Idukki district of Kerala [11]. However Jyosna & Janarthanam and Bhaskar questioned the identity of the collections from Idukki by Panduragan because the specimen was with distinct spur [3, 8], which is a prominent demarcating character of other subgroups of section scapigerae. They are of the opinion that *I. stocksii* is restricted to Western Ghats of Karnataka. The present collections confirm its occurrence in Kerala.

In Kerala, its distribution is restricted to high altitude evergreen forests at three locations ie., Aralam Wildlife Sanctuary and Paithalmala of Kannur district and Hill Dale Reserve of Wayanad district. It is estimated that, the total Area of Occupancy (AOO) is less than 100 Km<sup>2</sup>, including Kerala and Karnataka. In all the localities, population size is very small. Severe habitat fragmentation and small population size leads to population depletion. Data shows that this species comes under Critically Endangered-B1 (CR B1) category as per IUCN criteria (2014). However, compared to other two species, number of populations and Area of Occupancy is large.

#### ACKNOWLEDGEMENTS

The authors are grateful to the Director, KFRI for providing facilities and encouragement. We are thankful to the Kerala Forest Department for financial assistance and permission to conduct field studies. Thanks are also due to Mr. Vijith K T for field assistance and Mr. Robi AJ and Mr. Roy MM for assistance in preparing the manuscript and plates.

#### REFERENCES

- [1] Bhaskar, V. 1975. Studies in Balsaminaceae. Ph. D. Thesis (unpublished), submitted to University of Mysore, Manasagangotri.
- [2] Bhaskar, V, Razi, B.A. 1978a. Studies on South Indian Impatiens L. – III Further Note. Indian J. Forest. 1: 68 – 78.
- [3] Bhaskar, V. 2012. Taxonomic Monograph on Impatiens L. (Balsaminaceae) of Western Ghats, South India: The Key Genus for Endemism. Centre for plant taxonomic studies, Bangalore.
- [4] Fischer, C.E.C. 1935. New or little known plants from South India: VI. Bull. Misc. Inform. Kew 1935: 157.
- [5] Fyson, P.F. 1932. The Flora of South Indian Hill Stations. Vol. 1 Govt. Press, Madras pp 85.
- [6] Grey-Wilson, C. 1980a. Impatiens of Africa: Morphology, pollination and pollinators, ecology, phytogeography, hybridization, keys and a systematic treatment of all African species, with a note on collecting and cultivation. – Balkema, Rotterdam.
- [7] Hooker, J.D. 1906. An epitome of the British Indian species of Impatiens. Rec. Bot. Surv. India 4(3): 37 – 58.
- [8] Hooker, J.D., Thomson, T. 1859. Praecursores ad Floram Indicam – Balsamineae. J. Proc. Linn.Soc. Bot. 4: 106 – 157.
- [9] Jyosna, R. N. D., Janarthanam, M. K. 2011. The genus Impatiens (Balsaminaceae) in the northern and parts of central Western Ghats. – Rheedeia 21: 23–80.
- [10] Mabberley, D. J. 2008. The Plant Book: A portable dictionary of the vascular plants. 3rd ed. – Cambridge University Press.

- [11] Pandurangan, A.G., Nair, V.J. 1996. Three rare and threatened *Impatiens* L. (Balsaminaceae) of Kerala, India. *J. Econ. Taxon. Bot.* 20: 699 – 702.
- [12] Ramachandran, V.S., Nair, V.J. 1988. *Flora of Cannanore*. Botanical Survey of India, Calcutta. pp. 77 – 80.
- [13] Ratheesh Narayanan, M.K., Sujana, K.A., Balakrishnan, V., Meera Raj, R., Anil Kumar, N. 2012. *Impatiens mohana* (Balsaminaceae), A New Scapigerous Balsam from Wayanad, Western Ghats, India. *Edinburgh J. Bot.* 69(2): 1-5.
- [14] Ratheesh Narayanan, M. K, Jayesh, P, Joseph, Anil Kumar, N, Sivadasan, M, Ahmed, H, Alfarhan 2013. *Impatiens theuerkaufiana* (Balsaminaceae), a new scapigerous species from the Western Ghats, India. – *Phytotaxa* 83 (1): 54–60.
- [15] Ravikumar, K, Subramani, S.B, Udayan, P.S, Karnat, M. 2000. Note on a few rare and endemic plants from the Western Ghats of Coorg District, Karnataka, India. *J. Econ. Taxon. Bot.* 24: 334 – 338.

# International Journal of Plant, Animal and Environmental Sciences

