

compliance approval and not related to the real EMR exposure in cockroaches.

(5) The authors have narrated increase/decrease in several tests in EMR-exposed cockroaches, but failed to correlate their significance in human health.

(6) They have extrapolated the observations made in cockroaches to warn humans, and this is far-fetched.

(7) It is impossible to replicate/confirm these observations by independent researchers using the information presented in the article.

In peer-reviewed scientific literature, there are all kinds of unrepeatable observations in animals, humans and their isolated cells exposed to EMR. Furthermore, there have been several misleading publications with unsubstantiated conclusions³. The expert groups of scientists who are reviewing the literature for international agencies like the International Commission for Non-Ionizing Radiation

Protection, Institute of Electrical and Electronics Engineers and World Health Organization, are restricting the risk assessment of EMR exposure only to good quality publications with a separate list of weaknesses in the excluded publications. Public concern about the potential adverse health effects of EMR-emitting technologies is important and must be addressed with repeatable good quality investigations. The scientific outcome must be communicated in proper context by the researchers. The statements must not create unnecessary anxiety in the general public who are already inundated with unscientific and unproven information about the EMR emitted from mobile phones and base stations.

Overall, the study on cockroaches provides no useful information for the safety evaluation of EMR exposure because of the several weaknesses mentioned above. It is not possible to draw any meaningful

conclusions related to human health and cell phone use to justify the warning.

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Impatiens pendula B. Heyne ex Wight & Arn. (Balsaminaceae), critically endangered and endemic balsam of Western Ghats – a need for conservation

Impatiens L. are the most fascinating group of plants having ornamentally desirable flowers with varying colours and are often called ‘jewel weeds’ or ‘orchid balsams’. Majority of these are annual herbs and a few are perennials. In India, the species are mainly concentrated in two biodiversity hotspots, viz. the Himalaya in the north and the Western Ghats in the south¹. About 210 species of *Impatiens* have been reported from India², among which 106 are endemic to the Western Ghats³. Karnataka has 41 species of which 19 are endemic^{3–7}.

Impatiens pendula B. Heyne ex Wight & Arn. is a narrow endemic species (section Microsepalae) confined to the Chikkamagaluru district of Karnataka (Figure 1). This species was described by Wight and Arnott⁸ based on the collections of Heyne and Rottler from Bababudangiri (B. Heyne 4744) and later in 1890 by Talbot (*Talbot* 2370) and in 1974 by Bhaskar (*Bhaskar* 363a) from the same locality. After a gap of 30 years, it has now been recollected from the temple surroundings of Mullayanagiri hilltop, an adjoining hill range of Bababudangiri³.

The population of this species is restricted to the temple surroundings of the hilltop. A brief description of the species is given for easy identification along with notes for its conservation.

Taxonomy: *Impatiens pendula* B. Heyne ex Wight & Arn., *Prodr. Fl. Ind. Orient.* 1: 136. 1834; Hook.f., *Fl. Brit. India* 1: 455. 1874; Gamble, *Fl. Madras* 1: 101. 1915; Bhaskar, *Taxon. Monogr. Impatiens W. Ghats* 207. 2012.

Dwarf herbs, 10–15 cm tall, rooting at lower nodes. Stems with short internodes. Leaves are opposite–decussate at the base and alternate or subopposite towards the middle and tip, petiolate; lamina rhomboidal, leathery, reddish-green, sharply and distantly serrate, hairy and veins impressed on upper surface. Flowers 1 or 2, axillary, white or reddish, buds reddish; pedicels 5–8 mm long, red, hairy in a line, on portion facing petiole; lateral sepals two, minute, red, c. 2 mm long, glabrous; lip boat-shaped, spur less, with an yellow eye at the centre, margin and upper surface bristly ciliate; standard prominent c.5 mm long, wing petals c.5 mm long, velvety or villous inside,

purplish-red near the mouth, white along margin or distal part, a minute dorsal auricle present. Stamens five, coherent above. Ovary c.2 mm long, hairy, green five-loculed; stigma sessile. Capsules c. 4 mm long, tomentose, two-seeded; seeds globose, rugose, brownish.

Distribution: Endemic to Chikkamagaluru district, Karnataka.

Specimen examined: India, Karnataka, Chikkamagaluru district, Mullayanagiri peak, 1875 m, 23 September 2011, A.N. Sringeswara & Sahana 212 (UASB!)

Conservation status: This species is confined to less than 1 sq. km in the temple surroundings of Mullayanagiri hilltop at 1926 m, the highest peak in Karnataka. The region receives an annual average rainfall in the 1200–2600 mm range and remains cool throughout the year, an ideal condition for the species. The species occurs in open hilltop in association with *Thalictrum dalzelli* Hook., *Impatiens inconspicua* B. Heyne ex Wight & Arn., *Swertia* spp., etc.

The number of mature individuals of species was observed for three consecutive years; they showed extreme fluctuation

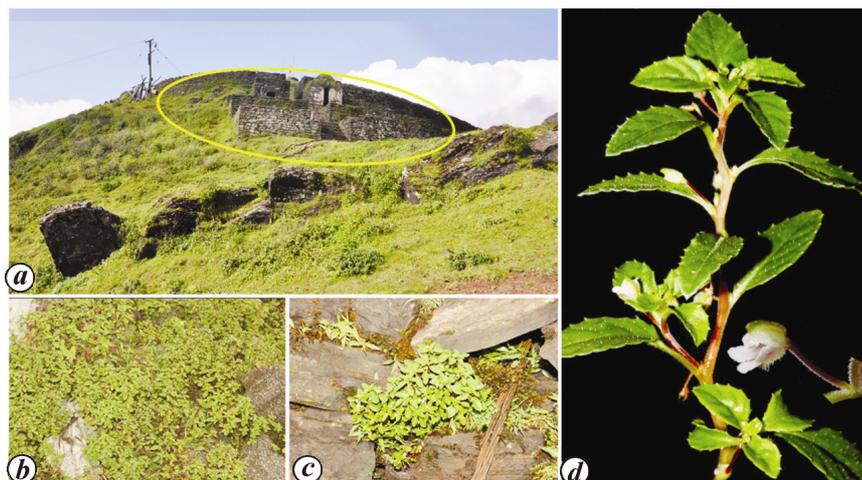


Figure 1. *Impatiens pendula* B. Heyne ex Wight & Arn. **a**, Mullayanagiri hilltop; **b**, **c**, Habitats of *I. pendula* (temple surroundings and compound walls); **d**, Photograph of a single flower enlarged.

and decreased each year. Since they are small herbs and ephemerals, assigning conservation criteria based on the number of mature individuals is difficult. Hence the extent of occurrence (EOO) of the species, which is less than 100 sq. km (Criterion B1) and area of occupancy (AOO), which is less than 10 sq. km (Criterion B2) have been considered. The species is known to occur from a single locality, i.e. Mullayanagiri peak, meeting the single location criterion and having extremely fluctuating mature individuals. Thus it fulfils the sub-criteria B2 a, c: iv. Based on EOO and AOO, the species is categorized herein as ‘Critically Endangered’ [CR B1B2a,c(iv)] according to the IUCN guidelines⁹.

The population of the species is under threat as it occurs on the compound walls and temple surroundings. Tourists visit the region and disturb the habitat by trampling on them. Fencing around the temple compound will help in preventing them from disturbing the habitat. Also, walk paths have to be developed around the temple. Cleaning of the compound walls should be avoided as far as possible as the soil near and in the crevices of these walls is the seed bank for the species. Similar situation occurred at

Chitradurga fort, wherein an endemic balsam, *Impatiens mysorensis* B. Heyne ex Roth used to grow on the fort walls, but repeated acid cleaning of the walls has resulted in complete disappearance of the species. It is now found to occur in a small patch near the rock crevices of Gopalswamy Honda, a region free from human disturbances as it is frequented by sloth bears.

I. pendula being an ephemeral of wetter months (June–November) regenerates only through seeds which have a dormancy period of six months. A display board can be erected with information on the occurrence, distribution and threat status of the species, thus educating the visitors not to pluck or trample on these plants and help save the species from extinction. The earlier loss of the species from its type locality, the Datta Peetha of Bababudangiri, is attributed to anthropogenic activities which occurred in the region, leading to habitat destruction.

Ex situ conservation measures have been taken up and the species has been propagated through seeds in the ‘balsam conservatory’ developed at Mahatma Gandhi Botanical Garden, University of Agricultural Sciences, GKVK, Bengaluru and is growing every year for the past

five years through self-sown seeds. A special technique of ‘Drip and Splash’ method has been adopted for the conservation of balsam species in the balsam conservatory.

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