

Critically Endangered and narrowly endemic species of *Ceropegia* L. (Apocynaceae: Ceropegieae): Conservation Measures in Andaman & Nicobar Islands, India.

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Abstract

The present study provides detailed description and relevant information on narrowly endemic and critically endangered species, *Ceropegia andamanica* Sreek., Veenak. & Prashanth which linked to extinction risk and conservation measures in great detail. Its confined population is under severe anthropogenic pressure hence the germplasm was collected from natural habitat and introduced at Dhanikhari Experimental Garden Cum Arboretum (DEGCA), South Andaman for ex-situ conservation. Detailed description, photographs, GIS map and notes on habitat ecology provided here for easy identification and management of conservation.

Key words: *Ceropegia*, *Ceropegieae*, Conservation, Endemic, Taxonomy.

Introduction

Andaman and Nicobar Islands (ANI) is a group of 572 Islands and islets (N 6° 45' to 13°41' and E 92° 12' to 93°57') and comprise a unique region of rich plant diversity in India with high endemism (Singh et al. 2014; 2020a, b, 2021a, b; Singh & Ranjan, 2021). It is located about 1200 km away from the mainland India. The ANI has a geographical area of 8,249 sq. km, constituting 0.25% of the total area of the country. The islands are rich and unique in terms of plant diversity with higher degree of endemism (ca. 10% of total island flora) and harbours many rare as well as endangered plant species. The genus *Ceropegia* L. is highly diversified with 442 species which are distributed in Africa, Southern Asia to Australia. It has highly attractive flowers owing to the intricate ornamentation with unique ecological adaptations. In India, the genus is represented by 56 species, 2 varieties and 1 forma (Karthikeyan et al. 2009). Of these, 43 taxa (40 species and 3 varieties) are endemic to the country (Singh et al. 2015; Kambale & Yadav 2019). Among these, *Ceropegia andamanica* Sreek., Veenak. & Prashanth is

narrowly endemic and critically endangered. This species was early known only from three localities of South Andaman viz. Goplakabang, Herbertabad and Mount Harriet including its first collection from South Andaman by King in 1890, and reported to have distributed in about 50 sq. km. area. (Maheshwari & Karthigeyan 2021). A preliminary account of the conservation measures has already been reported by Dhole et al. (2023).

Material and methods

During the present floristic explorations in Andaman Islands, we could collect the species from new locality i.e. Jhinga Nallah in South Andaman (Fig. 1). Morphological data were gathered from collections made during field studies conducted between 2022 and 2023. To verify the identity of species, critical analysis of morphological characters was carried out by comparing our collections with the herbarium specimens from relevant herbaria as mentioned under subheading specimen examined, online taxonomic databases and digital herbaria and relevant taxonomic literature was also consulted

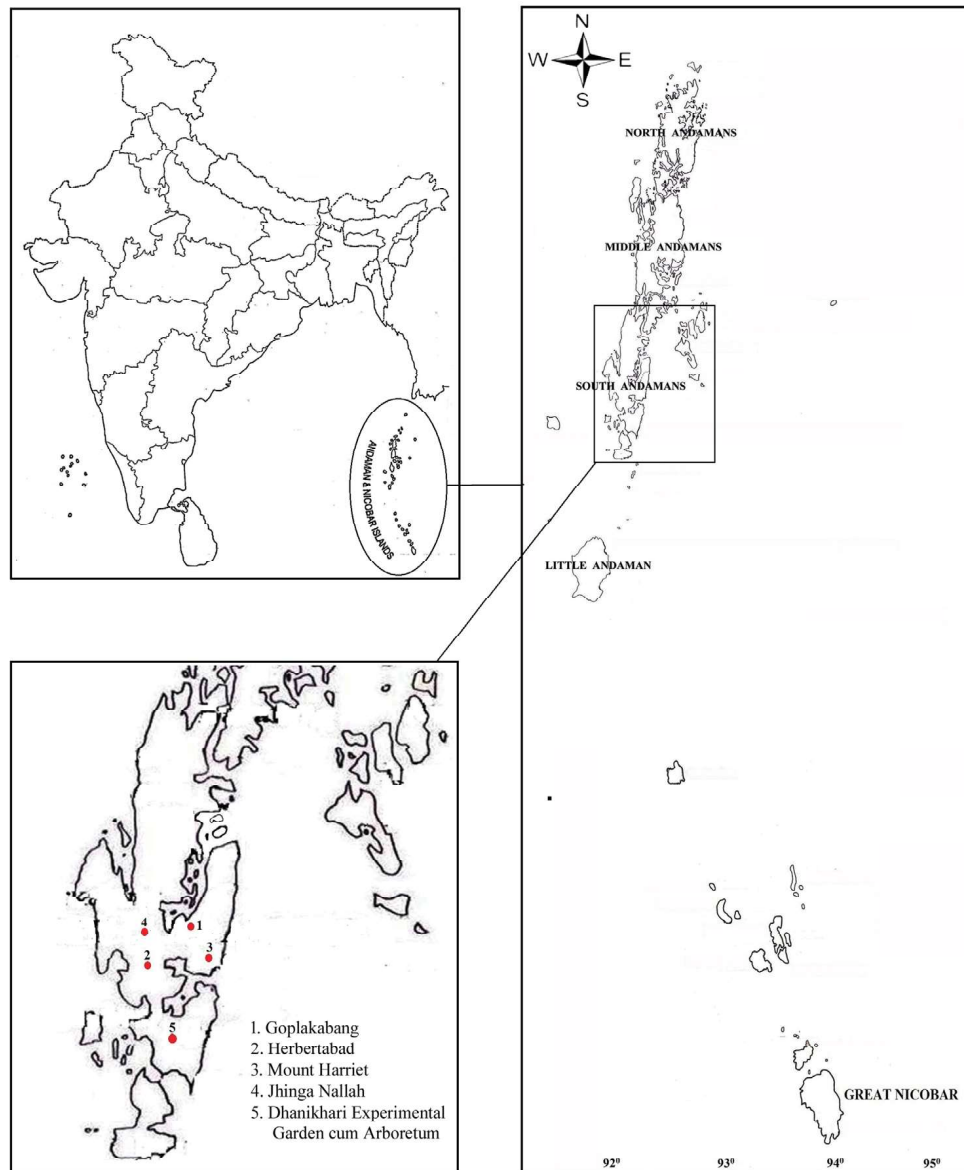


Fig. 1. *Ceropegia andamanica*: Map of Andaman and Nicobar Islands showing natural habitat and *ex-situ* conservation site.

Results

- Our study found that the species is restricted in distribution and under severe threat of habitat destruction due to anthropogenic activities in the localities.
- With an aim to conserve such a rare, Critically Endangered and narrowly endemic species

we have undertaken the conservation measure at Dhanikhari Experimental Garden cum Arboretum (DEGCA), an excellent centre for collection and *ex-situ* as well *in-situ* conservation of wild species in the ANI which is situated 16 km away from Port Blair at Nayashahar, South Andaman.

Taxonomic Account

Ceropegia andamanica Sreek., Veenak. & Prashanth in *Blumea* 43(1): 215. 1998; Karthik. et al. *Fl. Pl. India* 1: 160. 2009 (Fig. 1-2)

Perennials with fleshy roots. Stems with watery latex twining on supporting plant (*Macaranga peltata*). Leaves opposite decussate, petioles slender, 0.2–2 cm long, glabrous; lamina lanceolate to elliptic lanceolate, chartaceous, glabrous, green on upper surface, glaucous on lower surface, margins entire, rounded to sub-cordate at base, acute to acuminate at apex, 4–16 × 0.5–5 cm. Inflorescence a solitary cyme of 3–8-flowers, pedunculate, peduncle 1–2.5 cm long, glabrous. Flowers bracteate, bracts 3–4 mm long, subulate, glabrous; pedicellate, pedicels 0.5–2 cm long, glabrous. Calyx 5-lobed, lobes subulate, glabrous, 0.5–1 cm long. Corolla purplish mottled, tubular at base, lobed at apex, altogether 5–12 cm long; corolla tube sub-cylindrical, expanded at base, funnel shaped at throat, 1.5–2 cm long; corolla lobes narrow, twisted, hairy on margins, purplish, connate at apex, distinctly hairy at connate tip. Corona bi-seriate, outer whorl slightly shorter than inner, 5-partiate or lobed; lobes of outer whorl ovate-retuse, bifid, 2.8–3.2 × 1.8–2 mm, ciliate on margins and inside; lobes of inner whorl erect, spatulate, glabrous, 1.7–2.1 × c. 1 mm. Fruits and seeds have not seen.

Flowering: November–December.

Habitat and Ecology: It grows in sandy loamy soils near creeks and on hilly slopes of interior tropical rain forests in association with species of *Macaranga* Thouars., *Ficus* Tourn. ex L., *Pogostemon* Desf. and *Commelina* Plum. ex L.

Distribution: India: Andaman Islands; South Andaman

Threats: During the recent floristic explorations in the South Andaman, the authors have located *C. andamanica* from the catchment area of Jhinga Nallaha Dam. It is found that only three individuals were growing there. Further, an extensive survey was made in the nearby localities to locate more individuals but the attempts turned futile. There was a severe threat of habitat loss in future due to anthropogenic pressure which includes

developmental activities. Considering the threats severity and narrow occurrence of the species, only one specimen was collected for conservation purpose that are fully acclimatized in habitat of ex situ conservation site, DEGCA, an excellent centre for collection and ex-situ as well as in situ conservation of wild species in the Andaman and Nicobar Islands (Singh & Murugan 2014; Singh et al. 2014, 2021a,b).

Conservation status

Critically Endangered (CR). *Ceropegia andamanica* is known from four localities and AOO of 16.000 km² and EOO of 82.027 km². Google Earth imagery (Geo CAT online software) shows the CR category (Fig. 2 F) and also during the course of our floristic surveys (2022–2023), it was observed that natural habitat was under anthropogenic pressure. Hence Critically Endangered (CR) category is applied based on the IUCN categories and criteria IUCN (2019) in the present study.

Specimen examined: India, Andaman and Nicobar Islands, South Andaman: Mt. Harriet National Park, 14.12.1995. *Sreekumar & Veenakumari* 15493 CAL0000018036!, PBL 0000000121!; Jhinga Nallah 05.12.2022 *PAD & Lal Ji Singh*, 34991 (PBL).

Discussion

Plant diversity of Islands have threats from natural disaster as well as anthropogenic activities, if conservation measures are not initiated, many interesting species including important gene-pools will also get vanished. Same observation was also recorded by various workers (Singh et al. 2016, 2020a). The germ plasm conservation measures undertaken for *C. andamanica* in the BSI, Garden (DEGCA) is successful as it has been established. Apart from the localities mentioned here, there was no data on the occurrence of the species in other localities. The efforts to relocate this Critically Endangered species in ANI are underway.

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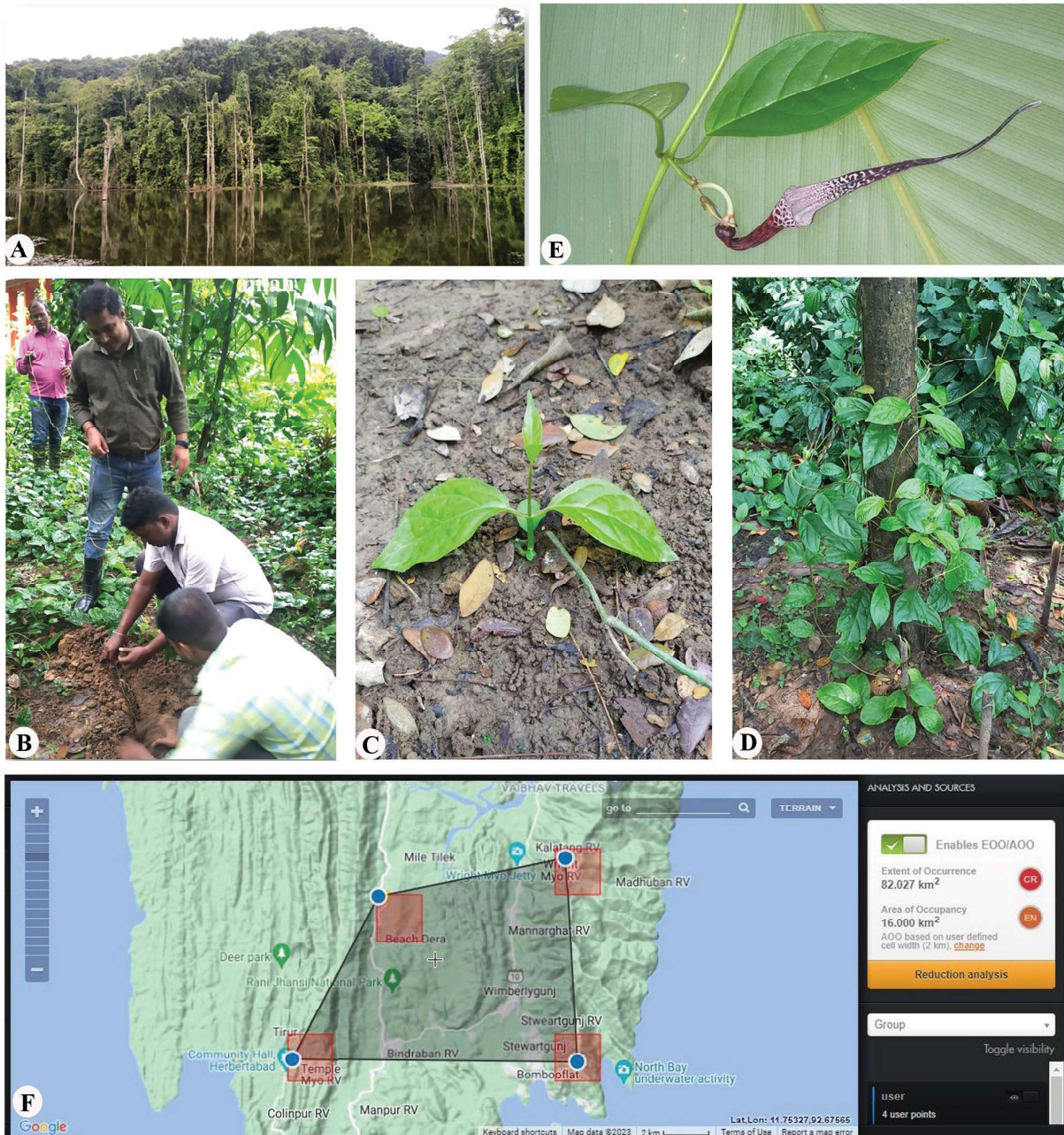


Fig. 2. *Ceropegia andamanica*: A: Habitat; B: Planting; C: Established seedling; D: Established seedling growing luxuriously; E: Magnified view of flowering twig with leaf; F: EOO and AOO.

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