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On the occurrence of parasitic plant *Balanophora fungosa* J.R. Forster & G. Forster (Balanophoraceae) in Andhra Pradesh, India

J. Prakasa Rao [1], K.V. Satish [2], B. Siva Sankar [3], C. Sudhakar Reddy [4] & O. Aniel Kumar [5]

[1,3,5] Department of Botany, Andhra University, Visakhapatnam, Andhra Pradesh 530003, India
[2,4] Forestry and Ecology Group, National Remote Sensing Centre, Indian Space Research Organisation, Balanagar, Hyderabad, Telangana 500037, India
[1] jprakasarao@gmail.com, [2] kvsflora@gmail.com, [3] bssankar2010@gmail.com, [4] drsudhakarreddy@gmail.com (corresponding author), [5] owkanielkumar@yahoo.com

Araku Valley is a rich biodiversity area in the Eastern Ghats, located in the northern part of Visakhapatnam District of Andhra Pradesh, India (Fig. 1). It consists of a series of hills consisting of Galikonda, Raktakonda, Sunkarimetta and Chitamogondi, and rises to an elevation of above 1000m. The average rainfall is around 1600mm, the bulk of which is received during June–October. Due to high elevation and rainfall, the Araku Valley consists of semi evergreen and moist deciduous forests (Pattanaik et al. 2009).

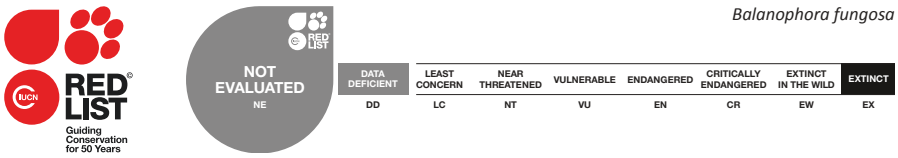
Balanophora is a genus of root holoparasites, widely distributed in the tropics and subtropics. *Balanophora* species are known to parasitize about 74 species belonging to 35 families (Mabberley 1987). Three species of *Balanophora,* namely, *B. involucrata, B. polyandra* and *B. harlandii* were reported from the Eastern Himalaya (Chowdhery 1997). *Balanophora fungosa* J.R. Forster & G. Forster is a root parasitic plant without root and chlorophyll. The distribution of this plant species depends on many factors such as host plants, pollinators, dispersers and moisture. It is being used by the tribal communities for treatment against skin infections and piles (Venkatareddi 1969).

Balanophora fungosa

J.R. Forster & G. Forster Char. Gen. Pl. 50. 1775 (Image 1).

Specimen examined: 21264, 21286AU (B.D.H.), 26.xii.2012, 09.ix.2013, 1100m, Raktakonda (18^{0}16'37.8''N & 82^{0}59'49.2''E), Araku Valley, Visakhapatnam, Andhra Pradesh, India, coll. J. Prakasa Rao & K.V. Satish.

Description: The plants are dioecious. Rhizome yellowish-brown, surface with granular warts and scattered yellow stellate lenticels; branches subglobose, depressed, up to 3cm. Scapes yellowish, up to 30. Leaves alternate, broadly ovate, 1.5×3.2. cm, apex obtuse. Male inflorescences ellipsoid, conically ovoid, up to 6cm; male flowers actinomorphic. Pedicel up to



Balanophora fungosa

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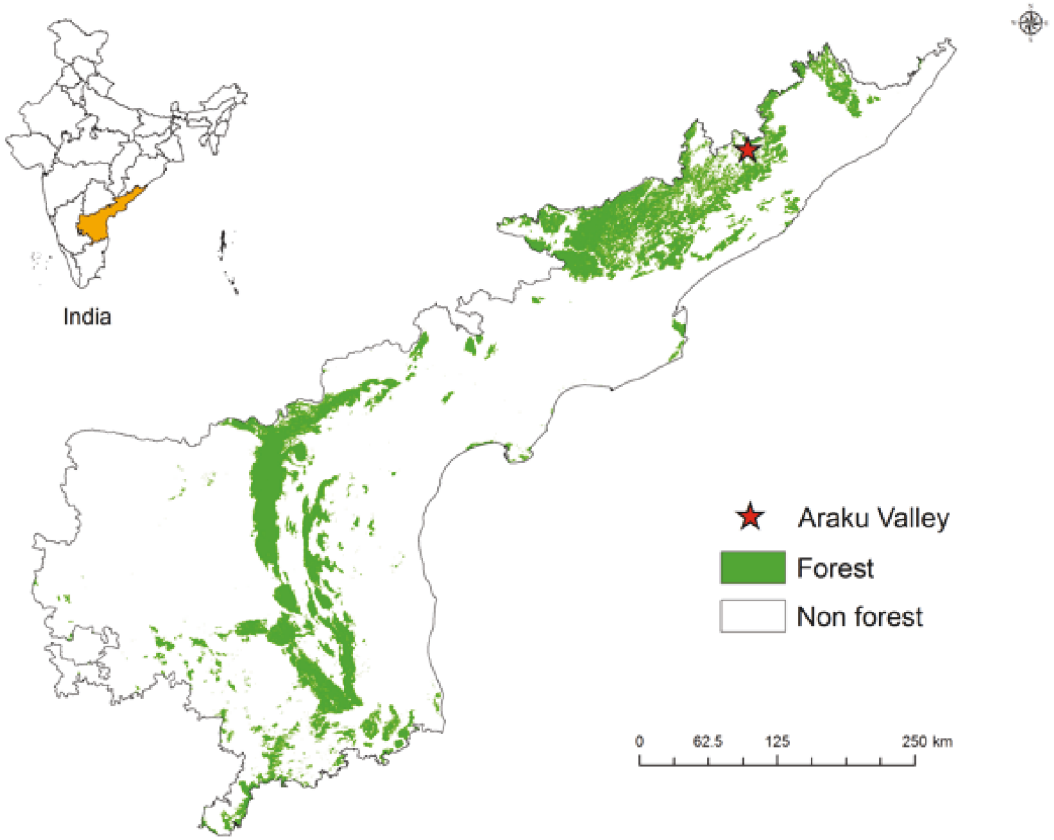

Figure 1. Occurrence of *Balanophora fungosa* J.R. Forster & G. Forster in Andhra Pradesh, India

1.2cm long. Perianth lobes 4 or 5, ovate-elliptic, apex acute. Synandria subglobose, anthers 4 or 5, U-shaped. Pollen white, powdery (Image 1).

Habitat: Rare, near perennial streams of moderately dense semi evergreen forest, at 1100 m altitude.

Flowering & Fruiting: December–April.

Floral associations: Trees: *Acer laurinum* Hassk., *Canthium dicoccum* (Gaertn.) Merr., *Glochidion ellipticum* Wight, *Litsea deccanensis* Gamble, *Litsea glutinosa* (Lour.) C.B. Rob., *Neolitsea foliolosa* A.M. Cowan & Cowan, *Garuga pinnata* Roxb., *Ficus microcarpa* L.f; Shrubs and Climbers: *Gnetum ula* Brongn., *Leea asiatica* (L.) Ridsdale, *Bauhinia vahlii* Wight &Arn., *Hoya wightii* Hook.f., *Schefflera stellata* (Gaertn.) Baill., *Lantana camara* (L.); Herbs: *Chromolaena odorata* (L.) R.M. King & H. Rob., *Ageratina adenophora* (Spreng.) R.M. King & H. Rob., *Triumfetta pilosa* Roth, *Alocasia decipiens* Schott, *Costus speciosus* (J. Konig) C. Specht, *Zingiber roseum* (Roxb.) Roseoe; Ferns: *Adiantum* sp., *Cyathea* sp.

Distribution in peninsular India: Earlier this species was reported from the Western Ghats of Tamil Nadu (Nilgiris, Palni Hills), Kerala (Travancore), Karnataka (Kodagu) and the Eastern Ghats of Tamil Nadu (Sirumalai Hills,) (Henry et al. 1987; Murthy & Yoganarasimhan 1990; Matthew 1995; Pallithanam 2001). It has not yet been reported from Andhra Pradesh (Ellis 1990; Pullaiah & Moulali 1997; Rao & Kumari 2008; Reddy et al. 2008; Chandra & Azeez 2011). The present distribution from Araku Valley forms an additional distribution record for Andhra Pradesh.

Complexity of the genus *Balanophora*: Finding the *Balanophora* itself is enormously difficult in the forest, as it usually forms underground tuberous structure, haustorium attached to the host plants and only becomes known above ground during flowering, although highly reduced and the remnant floral organs are sometimes difficult to construe the ontological organs. Due to modification and reduction in floral morphology it presents an obstacle in determining the evolutionary relationships and appropriate position in the classification of these parasitic angiosperms; and the phenology of Balanophoraceae has been controversial. The host-parasite interactions have special interest for ecologists and physiologists (Datta et al. 2014).

Threat: This species was found with a small

Image 1. *Balanophora fungosa* J.R. Forster & G. Forster
a - habit; b - whole plant with rhizome; c - male inflorescence; d - separated male flowers

Key to the species of Balanophora in the Eastern Ghats:

1. Bracts subtending flowers free or few are not developed, bracts rudimentary or not developed; inflorescences ovoid to ellipsoid; flowers actinomorphic with isomorphic perianth lobes ..... *B. fungosa*

2. Bracts developed and stout, flowers long pedicellate; anther cells usually U-shaped; perianth lobes ovate, less than 2 mm; synandria hemispheric ..... *B. dioica*

population of about 20 individuals along the perennial streams of valleys. Invasion of alien species, i.e., *Chromolaena odorata* (L.) R.M. King & H. Rob, and *Ageratina adenophora* (Sprengel) R.M. King & H. Rob. and forest degradation in the environs may cause a survival threat to this species.

Conservation: There is an urgent need to cover Araku Valley under the protected area network of Andhra Pradesh which represents high altitude subtropical ecosystem and gap conservation area. Araku Valley is an ecologically unique region of the Eastern Ghats with representation of several rare and endemic species has to be prioritized for long term conservation management.

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