

A new report of the species *Balanophora dioica* R. Br. in Koubru Hill Range of Manipur, India.

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Abstract: *Balanophora dioica* is here reported as a new report of *Balanophora* (Balanophoraceae) from the Koubru Hill Range of Senapati District in the Indian state of Manipur. The botanical description of this species and a key to the North East Indian species of the genus are provided. *Balanophora dioica* is the rarest among the species of the genus in North East India and special attention should be given for its *in-situ* and *ex-situ* conservation. [Nature and Science 2010;8(12):8-11] (ISSN: 1545-0740).

Key words: *Balanophora dioica* R. Br., root parasite, endangered species, shifting cultivation, Koubru Hill Range, Manipur

Introduction

Balanophora species are among the most unusual of all higher plants and are known to parasitize at least 74 species in 35 families (Mabberley, 1987). The 15 species in the genus *Balanophora* are all native to the Old World Tropics. The most well known and widely distributed species *Balanophora fungosa* has at least 25 host plant species. *Balanophora* species are either dioecious or monoecious and echloro-phyllous. *Balanophora* species *B. involucrate*, *B. polyandra* and *B. harlandii* are reported from Eastern Himalayas (Chowdhery, 1997; Singh and Chauhan, 1997; Wu, 2003).

Balanophora dioica R. Br. is endemic to the Himalayas especially in the Eastern part. The species is of extreme rare occurrence and of botanical interest (Jain & Sastry, 1980). *Balanophora dioica* is listed under the App II of the CITES (Convention on International Trade in Endangered Species of wild flora and fauna) and is prohibited for export from India.

Detailed scientific studies on Balanophoraceae in Northeast India have not been done. It was previously reported to be present in the states of Assam, Mizoram, Meghalaya and Arunachal Pradesh (Kipgen and Singh, 2010). In Meghalaya, the plant's habitat is under threat from coal mining (Sarma, 2002). In other parts of India, *Balanophora ambavanense*, was reported from Poona district and an ethnobotanical studies in Madurai district has listed *Balanophora fungosa* in the treatment of skin disease (Venkatarreddi, 1969; Ignacimuthu *et al.*, 2006). In China, Japan and Thailand, studies are carried out on the various pharmacological properties of *Balanophora*.

Some of its medicinal properties include antioxidant phytochemicals and glucosides, and hypoglycemic effects (Ho *et al.*, 2010; Lau *et al.*, 2003). The evolution of parasitism in flowering plants, vis-a-vis, Balanophoraceae has not been completely understood yet. It is not known if they evolved parasitism independently of the parasitic Santaleles or is a derivative of this lineage (Westwood *et al.*, 2005).

In order to identify natural populations of *Balanophora dioica* in Manipur, a study was carried out in 2008-2009. Several field visits at different time intervals were carried out in six districts - Senapati, Ukhrul, Imphal East, Imphal West, Thoubal, Chandel and Bishenpur. Wild populations of *Balanophora dioica* in Koubru Hill Range of Senapati District were discovered for the first time. This is the first time in the state where wild populations of the species were located. Plant specimens were photographed and measurements of both the reproductive and vegetative are documented. The description of the species is described below, and a key to the species is given.

Description

Herb. Dioecious. Rhizome brown, or reddish purple in colour, unbranched or clump together in a mass. Scapes purple to pink, cylindrical, 2-10 cm. Leaves 3-10, distichous, rarely spirally arranged, imbricate, broadly ovate to ovate-oblong, apex obtuse to emarginate. Male inflorescences broadly ovoid to ellipsoid. Male flowers numerous, actinomorphic, each subtended by a single truncate bract. Pedicel 4-9 mm. Perianth lobes 4 or 5, ovate, reflexed. Synandria hemispheroidal. Female inflorescences ellipsoid to

narrowly ovoid, 2-5 cm. Spadicles ca. 1 mm, subclavate, apical 1/3 subglobose, apex truncate and papillate; Female flowers on basal stipe of spadicles and

main axis of inflorescence. Flowers in September to December.

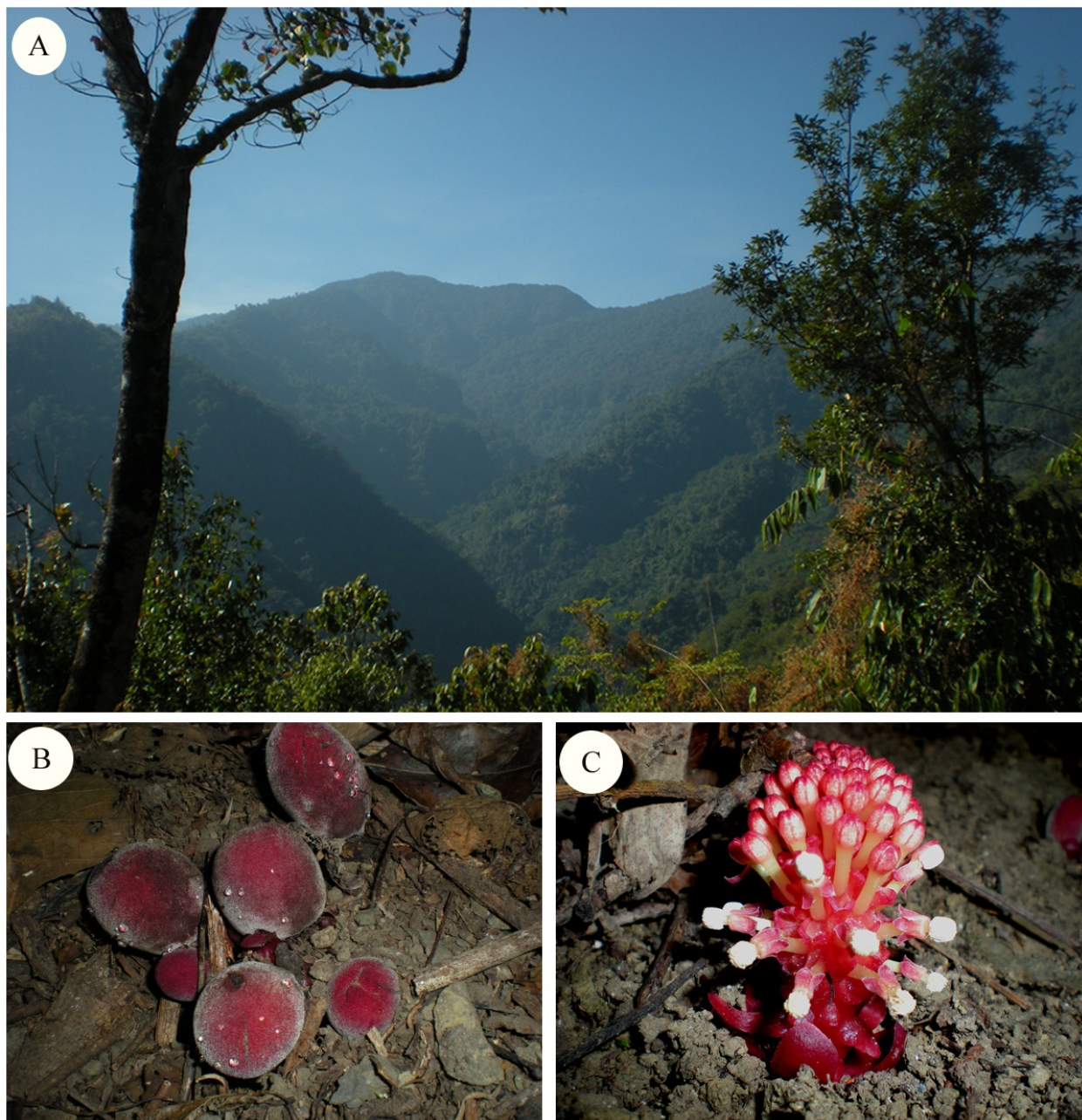


Figure 1. A. Koubru Hill Range, B-C. *Balanophora dioica*

Key to the Northeast Indian species of *Balanophora*

1. Bracts subtending flowers fused side by side into a hexagonal alveolus _____ 2
1. Bracts subtending flowers free or not developed _ 3
2. Leaves verticillate and connate into a sheathlike whorl _____ *B. involucrata*
2. Leaves subopposite or spiraled _____ *B. harlandii*
3. Flowers pedicellate; anther cells transversely divided into small locelli _____ *B. polyandra*
3. Flowers long pedicellate; anther cells usually U-shaped _____ 4
4. Perianth lobes ovate, less than 2 mm; synandria hemispheric _____ *B. dioica*

Distribution and Habitat

The Koubru Hill Range is one of the many biodiversity rich places in Manipur. Several rare and critically endangered flora and fauna are found in the dense forest of this hill range. The Hill Range is located in the Senapati District of Manipur and is also considered sacred. Though Koubru hill range is endowed with critically endangered species like *Tragopan blythii* (Mrs. Hume's Bar Pheasant), the state bird of Manipur, it is yet to be explored taxonomically. The hill range has semi-tropical evergreen forest with average rainfall of 1435 mm. The temperature ranges from 4°C-29°C. The average heights of the peaks are from 2000-2500 meters above sea level with steep terrains which are drained by many streams and brooks.



Figure 2. Map of Senapati district showing the natural populations of *Balanophora dioica*

Threats

Balanophora dioica R. Br. is under severe threat from habitat destruction and deforestation. The forest cover in Manipur decreased by 173 sq. km in the period 2002-03 to 2005; the district of Senapati alone accounted for a loss of 55 sq.km (State of forest report, FSI, 2009). Shifting cultivation is the main cause of

deforestation. Soil erosion by shifting cultivation is estimated to be 146.6 tonnes/ha/year in the first year, 170.2 tonnes/ha/year in the second year, and 30.2 tonnes/ha/year in the abandoned fields (State of environment report of Manipur, 2006-2007).

Conservation

Local people participation and transformation of the existing agriculture practice, i.e., shifting cultivation would play an important role in the *in-situ* and *ex-situ* conservation of the species. Conservation of bioresources in Manipur is hampered by an unresolved conflict of ownership of the forest between the state and the tribals. The forests in the hill districts comprising 67.3 percent of the total area which do not come under reserved forest category, and are informally controlled by the tribal chiefs. The lack of definition of ownership rights resulted in the absence of a proper institutional and legislative framework for forest management. A joint forest management (JFM) was started in the state in 1990 to address the problem. As on March 2005, 5.39% of the forest area of the state was managed by 280 JFM committees. There is a need to increase the number of such committees, involving the forest inhabitants, the tribals. There is also scope to develop more effective models of management.

References

1. Chowdhery HJ. Plant diversity in Dibang Valley District, Arunachal Pradesh. Pp 113. In Plant diversity hotspots in India: An overview. Hajra, P. K. and Mudgal, V., Botanical Survey of India, Howrah. 1997; 99-134
2. Hajra PK, Verma DM, Giri DM. Materials for the Flora of Arunachal Pradesh. Series 2. Vol. 1. Botanical Survey of India. Calcutta. 1996: 17-33
3. Ho ST, Tung YT, Cheng KC, Wu JH. Screening, determination and quantification of major antioxidants from *Balanophora laxiflora* flowers. Food Chemistry 2010; 122: 584-588
4. Hooker JD. Flora of British India. Reeve & Co. London 1875; 5: 237
5. Ignacimuthu S, Ayyanar M, Sankara Sivaraman K. Ethnobotanical investigations among tribes in Madurai district of Tamil Nadu (India). Journal of Ethnobiology and Ethnomedicine, 2006; 2:25
6. Jain SK, Sastry ARK. Threatened plants of India: A state of the art report. Botanical Survey of India, Howrah 1980; 16-17
7. Kipgen L, Singh KJ. *Balanophora*: a rare and endangered plant found in North-East India. Ecotone 2010; 2(1): 6-9
8. Lau KM, Li NH, Hu SY. A new species of *Balanophora* (Balanophoraceae) from Hong Kong. Harvard Papers in Botany 2003; 7(2): 439-441

9. Mabberley DJ. The Plant Book. Cambridge Univ. Press. Cambridge. 1987; 73
10. Sarma K. Coal mining and its impact on environment of Nokrek Biosphere Reserve, Meghalaya. Ph.D. Thesis. North Eastern Hill University, Shillong. India. 2002
11. Singh P, Chauhan AS. Plant diversity in Sikkim Himalaya. Pp 145. In Plant diversity hotspots in India: An overview. (eds Hajra, P.K. and Mudgal, V.), Botanical Survey of India, Howrah. 1997; 137-162
12. Venkatarreddi B. A new species of *Acroblastum* (Balanophoraceae) from Poona district, India. Willdenowia 1969; 389-393
13. Westwood JH, Yoder JI, Timko MP, dePamphilis CW. The evolution of parasitism in plants. Trends in Plant Science 2005; 15(4): 227-235
14. Wu ZY, Raven PH, Hong DY. Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis. 2003; 272
15. State of environment report of Manipur, 2006-2007. <http://www.manenvis.nic.in/stateprofile1.pdf>
16. State of forest report, FSI. 2009 http://www.fsi.nic.in/sfr_2009/manipur.pdf

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