

Original Research

Establishing continuity in distribution of
Diploknema butyracea (Roxb.) H. J. Lam in Indian subcontinent

Authors:

Koushik Majumdar¹,
BK Datta¹ and
Uma Shankar².

Institution:

1. Department of Botany,
Tripura University,
Suryamaninagar 799 130,
Tripura, India.

2. Department of Botany,
North-Eastern Hill
University, Shillong
793 022, India.

ABSTRACT:

The known distribution of Indian Butter Tree (*Diploknema butyracea* (Roxb.) H. J. Lam) is discontinuous, i.e., in the sub-Himalayan tracts in the north and Andaman and Nicobar Islands in the south. Here, we present the first record of its distribution from Tripura upholding the continuity between the north and the south.

Keywords:

Indian Butter Tree, distribution, restoration of Jhum fallows, Northeast India.

Corresponding author:

Koushik Majumdar.

Email:

majumdark80@gmail.com

Web Address:

[http://jresearchbiology.com/
documents/RA0268.pdf](http://jresearchbiology.com/documents/RA0268.pdf).

Article Citation:

Koushik Majumdar, BK Datta and Uma Shankar.

Establishing continuity in distribution of *Diploknema butyracea* (Roxb.) H. J. Lam in Indian subcontinent.

Journal of Research in Biology (2012) 2(7): 660-666

Dates:

Received: 28 Jul 2012

Accepted: 20 Aug 2012

Published: 27 Oct 2012

This article is governed by the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which gives permission for unrestricted use, non-commercial, distribution and reproduction in all medium, provided the original work is properly cited.

INTRODUCTION

D. butyracea is an economically important, but lesser-known, underutilized tree. The tree is best known for the yield of edible oil from kernels, phulwara butter, which is used in chocolate, soap and candle manufacture, as fertilizer and fish intoxicant (Mitra and Awasthi, 1962; Mukerji, 1951; Awasthi and Mitra, 1961). Hence, it is known as Indian butter tree. The bark which is rich in tannin is used in dyeing. The leaf is good for fodder, branches for fuel wood and trunk for timber. The nectar from the flowers is harvested through honeybees or directly to produce a jaggery which is highly prized in Uttarakhand (Bahar, 2011). The medicinal properties of the tree are also well recognized and various tissues are used for the treatment of rheumatic pain, ulcers, itching, haemorrhage, inflammation of tonsils, leprosy and diabetes (Awasthi and Mitra, 1968; Mishra *et al.*, 1991; Khetwal and Verma, 1986). In Nepal, *Chepang* tribes manage *D. butyracea* for their livelihood. They harvest the fruits, extract kernel butter (locally called cheuri ghee) and market the products (Shakya, 2000). The butter is used for burning in lamps, in sweetmeats, and for soap manufacture. The cake obtained after extraction of the fat contains saponins and is toxic (Mitra and Awasthi, 1962; Mukerji, 1951; Awasthi and Mitra, 1961).

Globally, the genus *Diploknema* Pierre of Sapotaceae is represented by eleven taxa, with eight accepted species and three synonyms. Only three species are found in India, viz., *Diploknema butyracea* (Roxb.) H.J. Lam, *Diploknema butyracea* var. *andamanensis* P. Royen, and *Diploknema butyraceoides* (M.B. Scott) H.J. Lam. Of these, *Diploknema butyracea*, named as 'East India Butter Tree' by William Roxburgh in 1805, is native to the sub-Himalayan tracts of Bhutan, China, India and Nepal (Brandis, 1906). In India, it occurs in subtropical forests of Himalaya spanning Garhwal and Kumaon Hills, Sikkim, Darjeeling, Arunachal Pradesh and Assam (Awasthi *et al.*, 1975; Negi *et al.*, 1988).

Recently, *Diploknema butyracea* has been reported from Andaman Islands (Kureel *et al.*, 2008; Rajkumar and Parthasarathy, 2008). Interestingly, this species has not been reported from Manipur (Singh *et al.*, 2000) Meghalaya (Balakrishnan, 1981; Joseph, 1982; Haridasan and Rao, 1985), Mizoram (Singh *et al.*, 2002), Tripura (Deb, 1981) and Bangladesh (Ahmed *et al.*, 2009) which lie between the Himalayan foothills and Andaman Islands. Here, we report the first distributional record of *Diploknema butyracea* in the State of Tripura, India (Fig 1).

MATERIALS AND METHODS

Three adult trees of *Diploknema butyracea* were found and Gps -mapped at Betlingshib (23° 48' 39.60" N and 92° 15.4' 6.40" E) in Jampui Hills of North Tripura district. This area is bordering the State of Mizoram at 940 m altitude and experiences tropical climate. The annual rainfall is high (>2,109) mm and mean daily temperature ranges between 10°C and 25°C. The habitat

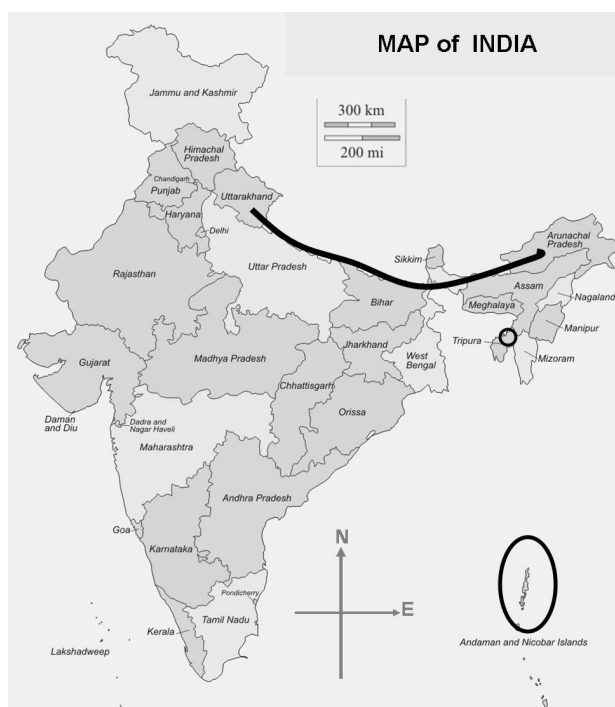


Figure 1 Distribution of *Diploknema butyracea* in Himalayan subtropical region (line) and Andaman Islands (oval) and location of this report from Tripura (circle).

Table 1 An inventory of the specimens of *Diploknema butyracea* collected by different workers from northeastern India

SI No.	BSI sheet number*	Collection Date*	Collection number*	Collector's name*	Locality*
1	17507	??.03.1875	16	Not known	Cachar, Assam
2	Not known	05.12.1913	3137	Not known	Nizamghat, Assam
3	14833	10.11.1957	10332	R. S. Rao	Badasu to Sone godam, Lohit
4	14834	15.04.1958	15630	G. Panigrahi	Chingri, Kameng
5	51280	12.03.1965	41294	N. P. Balakrishnan	Shali, Eastern Bhutan
6	53414	06.09.1965	43488	A. S. Rao	Kheri, Tawang
7	51278	19.10.1965	44067	N. P. Balakrishnan	Gumkhara, Eastern Bhutan
8	This study	02.04.2009	0700	K. Majumdar	Jampui Hills, Tripura

*Source: Botanical Survey of India, Shillong.

is characterized by semi-evergreen forest that is facing destruction for shifting cultivation by local tribes (Lusai, Reang and Mizo), horticultural expansion for orange and betel nut, and construction of new roads. Only a few remnant patches of pristine vegetation surrounded by secondary successional vegetation survive today. The associated species include *Baccaurea ramiflora*, *Bombax ceiba*, *Castanopsis armata*, *C. indica*, *Diospyros* sps, *Engelhardia spicata*, *Garcinia acuminata*, *Lithocarpus spicata*, *Saraca asoka*. The identity of collected specimens was determined by a critical isotype examination at the Botanical Survey of India, Shillong and study of taxonomic descriptions in floras. The voucher specimens were deposited in the herbarium of Tripura University.

RESULTS AND DISCUSSION

In northeastern India, *Diploknema butyracea* (Fig 2) was first collected from Cachar Valley, Assam in 1875 and then from Nizamghat in 1913 (Table 1). Subsequent collections were between 1957 and 1965 from Arunachal Pradesh and eastern Bhutan. An inventory at the herbarium of the BSI, Shillong revealed lack of any collection after 1965. The specimen collected from Jampui Hills, 45 years after the last taxonomic collection, indicates the first record of occurrence in Tripura. This record of occurrence in Tripura has significance in biogeography of *Diploknema butyracea* since its known distribution exhibited discontinuity between sub-Himalayan tracts and Andaman Islands (Fig 1).

Table 2 A chronological inventory of taxonomic identities assigned to *Diploknema butyracea*

Taxonomic identities	Source	Year
<i>Bassia butyracea</i> Roxb.	Asiat. Res. 8: 499-502	1805
	Wall. Cat. 4164	1828
	Fl. Ind. 2: 527	1832
<i>Mixandra butyracea</i> (Roxb.) Pierre ex L. Planch.	Étude Sapot. 26	1888
<i>Illipe butyracea</i> (Roxb.) Engl.	Bot. Jahrb. Syst. 12: 509	1890
<i>Vidoricum butyraceum</i> (Roxb.) Kuntze	Revis. Gen. Pl. 2: 407	1891
<i>Mixandra butyracea</i> (Roxb.) Pierre ex Dubard	Rev. Gén. Bot. 20: 196	1908
<i>Madhuca butyracea</i> (Roxb.) J.F. Macbr.	Contr. Gray Herb. n.s., 53: 18	1918
<i>Diploknema butyracea</i> (Roxb.) H.J. Lam	Bull. Jard. Bot. Buitenzorg III, 7: 186	1925
<i>Aesandra butyracea</i> (Roxb.) Baehni	Boissiera 11: 29	1965

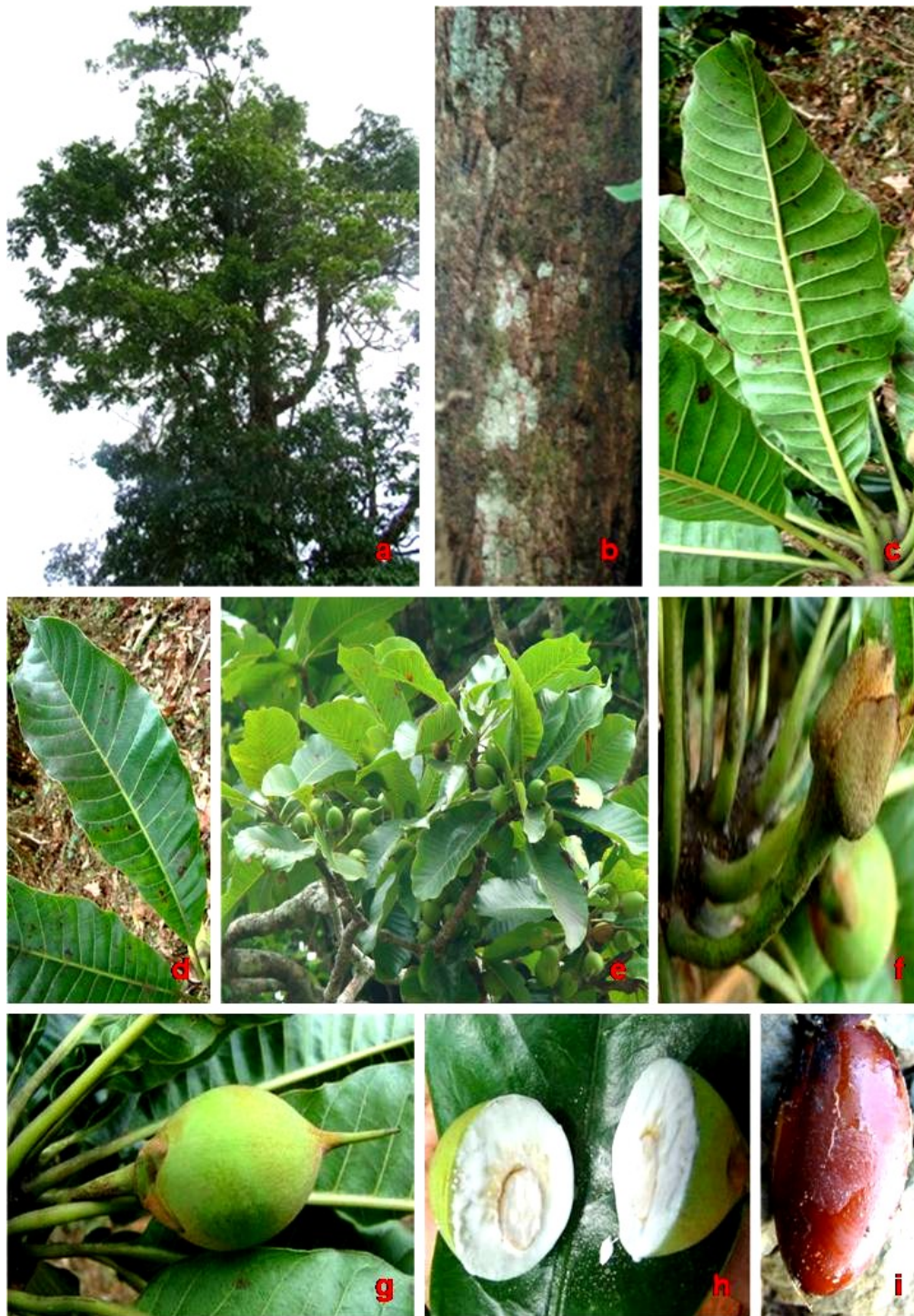


Figure 2 A photographic illustration of *Diploknema butyracea*: (a) tree; (b) bark; (c) leaf adaxial side, (d) leaf abaxial side; (e) arrangement of fruits; (f) flower; (g) a single fruit; (h) transverse section of the fruit and (i) seed.

As per the Himalayan Glaciation theory, some of the Himalayan flora pushed southwards resulting into the discontinuity in distribution of some tree species (Medlicott and Blanford, 1879). However, Puri *et al.*, (1983) suggested ten types of distribution pattern of important Indian trees; where some forest trees showing discontinuous distribution in Burma, Assam, Andaman, Eastern Ghats, Sri Lanka and Western Ghats. Furthermore, since our study site is in close proximity to the State of Mizoram (India) and Bangladesh,

occurrence in these territories is plausible. *Diploknema butyracea* has been assigned different names in the taxonomic literature and a chronology of these names indicates that the species was prominently known as *Aesandra butyracea* before and after settling down to *Diploknema butyracea* (Table 2).

The regeneration of *D. butyracea* is also poor because: 1) the seeds are recalcitrant and lose viability quickly after dispersal (Tewari and Dhar, 1996) and 2) nutritious oil-rich seeds attract sizeable predators such as rove beetles, termites and ants. Attempts have been made to regenerate the species through clonal propagation (Tewari, 1997) as well as seed germination (Sundriyal and Sundriyal, 2003).

CONCLUSION

Success in regeneration of this species has opened vistas for inducting *D. butyracea* to grow during fallow phase in shifting cultivation systems, locally known as 'jhum' in northeastern India. Of late, reclamation of fertility during fallow phase has been linked with protection of NTFP species in the fallow lands (Uma Shankar, 2003; 2005). Hence, multipurpose tree species are increasingly attracting attention of the farmers to help them with supplement income.

Although *D. butyracea* is not a redlist species, its abundance in wild is poor. It has been observed that economically important trees face the risk of destruction by the people for livelihood benefits and hence may become locally extinct (Sundriyal and Sundriyal, 2003). This threat is greater if the species is infrequent in the wild and seeds form the economic part of the plant. Domestication of such species on fallow lands, marginal lands, agroforestry systems and homegardens may be helpful for conservation.

ACKNOWLEDGEMENTS

Financial support for this work was received through grant no BT/PR7928/NDB/52/9/2006 from the Department of Biotechnology, Government of India, New Delhi. The authors are grateful to Dr. K. N. Ganeshaiah, UAS, Bangalore for encouragement. Thanks are due to the Wildlife Warden, Tripura for permission to undertake survey in forest areas; the Botanical Survey of India (BSI), Eastern Circle, Shillong for access to herbarium; and to Prof. S. Sinha, Head, Department of Botany, Tripura University for facilities.

REFERENCES

- Ahmed ZU, Hassan MA, Begum ZNT, Khondker M, Kabir SMH, Ahmad M and Ahmad ATA.** (eds). **2009.** Encyclopedia of Flora and Fauna of Bangladesh: Angiosperms: *Dicotyledons: Ranunculaceae-Zygophyllaceae*. Vol. 10, Asiatic Society of Bangladesh, Dhaka. 1-580.
- Awasthi CY, Bhatnagar SC and Mitra CR.** 1975. Chemurgy of Sapotaceous Plants: *Madhuca* species of India. Economic Botany 29:380-389.
- Awasthi YC and Mitra CR.** 1961. Flavonoids of *Madhuca butyracea* Nut-Shell. Journal of Organic Chemistry, 27:1636.
- Awasthi YC and Mitra CR.** 1968. *Madhuca latifolia*; triterpenoid constituents of the trunk bark. Phytochemistry, 7(8):1433-1434.
- Bahar N.** 2011. Cheura [*Diploknema butyracea* (Roxb.) H. J. Lam.]: an important tree for poverty alleviation. Indian Forester, 137:1344-1345.
- Balakrishnan NP.** 1981. Flora of Jowai. Vol. I, Botanical Survey of India, Howrah,

- Brandis D. 1906.** Indian Trees: An Account of Trees, Shrubs, Woody Climbers, Bamboos and Palms Indigenous or Commonly Cultivated in the British Indian Empire. Fifth impression (1971). Bishen Singh Mahendra Pal Singh: Dehradun, India.
- Deb DB. 1981.** The Flora of Tripura State, Vol. I, Today and Tomorrows' Printers and Publishers, New Delhi.
- Haridasan K and Rao RR. 1985.** Forest flora of Meghalaya. Vol. I, Bishen Singh Mahendra Pal Singh Publishers, Dehra Dun.
- Joseph J. 1982.** Flora of Nongpoh and vicinity, East Khasi Hills District Meghalaya. Forest Department, Government of Meghalaya.
- Khetwal KS and Verma DL. 1986.** Flavonoids from the flowers of *Diploknema butyracea*. *Fitoterapia* 57:128.
- Kureel RS, Gupta AK and Pandey A. 2008.** *Cheura - a wonder tree borne oilseed*. National Oilseeds and Vegetable Oils Development Board, Ministry of Agriculture, Government of India, 8.
- Medlicott HB and Blanford WT. 1879.** Manual of the Geology of India, Part 2. Calcutta, Geological Survey of India.
- Mishra G, Banerji R and Nigam SK. 1991.** Butyrpenoidal sapogenin from *Madhuca butyracea*. *Phytochemistry*, 30:2087-2088.
- Mitra CR and Awasthi YC. 1962.** Constituents of *Madhuca latifolia* and *M. butyracea* nuts. *Journal of Scientific and Industrial Research* 21(D):102-103.
- Mukerji B. 1951.** Indian Pharmaceutical Codex, C.S.I.R., New Delhi. I, 144.
- Negi KS, Tewari JK, Gaur RD and Pant KC. 1988.** Indian butter tree - *Asiandra butyracea* (Roxb.) Baehni; some ethnobotanical notes. *Indian Journal of Forestry*, 11:319-321.
- Puri GS, Meher-Homji VM, Gupta RK and Puri S. 1983.** Phytogeographical ecology. 115-210. In: Forest ecology. Second edition. Oxford and IBH Publishers, New Delhi, India.
- Rajkumar M and Parthasarathy N. 2008.** Tree diversity and structure of Andaman giant evergreen forests, India. *Taiwania*, 53:356-368.
- Shakya MR. 2000.** Chepangs and Chiuri - the use of non-timber forest products in Nepal. ITFC. http://practicalaction.org/?id=food_chain.
- Singh NP, Chauhan AS and Mondal MS. (eds.) 2000.** Flora of Manipur. Vol. I *Ranunculaceae-Asteraceae*, Botanical Survey of India, Calcutta.
- Singh NP, Singh KP and Singh DK. (eds.) 2000.** Flora of Mizoram. Vol. I *Ranunculaceae-Asteraceae*, Botanical Survey of India, Calcutta.
- Sundriyal M and Sundriyal RC. 2003.** Underutilized edible plants of the Sikkim Himalaya: need for domestication. *Current Science*, 85:731-736.
- Tewari A and Dhar U. 1996.** An investigation on seed germination on Indian butter tree-*Asiandra butyracea* (Roxb.) Baehni. *Seed Science and Technology*, 24:211-218.
- Tewari A. 1997.** Clonal propagation of Indian Butter tree (*Diploknema butyracea*) through tissue culture. Ph. D. Thesis, Kumaon University, Nainital.
- Uma Shankar. 2003.** Domestication of valuable forest resources for subsistence and trade: utilization, management and conservation. In Policies, management, utilization and conservation of non-timber forest products (NTFPs) in the South Asia region (eds. Hiremath, A., Joseph, G.C. and Uma Shaanker, R.). Ashoka Trust for Research in Ecology and the Environment, Bangalore and FAO, Bangkok, 15-17.

Uma Shankar. 2005. Indigenous agroforestry tree species for conservation and rural livelihoods. In Agroforestry in northeastern India: opportunities and challenges, (eds. Bhatt, B.P. and Bujarbaruah, K.M.). ICAR Research Complex for NE Region, Umiam, Meghalaya 149-174.

Submit your articles online at jresearchbiology.com

Advantages

- **Easy online submission**
- **Complete Peer review**
- **Affordable Charges**
- **Quick processing**
- **Extensive indexing**
- **You retain your copyright**

submit@jresearchbiology.com

www.jresearchbiology.com/Submit.php