

***Dioscorea hispida* Dennstedt (Dioscoreaceae) - a new recorded for Tripura, India**

Koushik Majumdar, Bhaskar Saikia¹ and B K Datta

Plant Taxonomy and Biodiversity Laboratory, Department of Botany, Tripura University, Suryamaninagar - 799130, Tripura (W), India

¹ Higher Plant Diversity Division, Department of Botany, Rajiv Gandhi University, Rono Hills-791112, Itanagar, Arunachal Pradesh, India

Abstract

Dioscorea hispida Dennstedt, (Dioscoreaceae), is recorded growing in the forest floor in Tripura for the first time. Its poisonous yam is medicinally important. Habitat loss is probably the main reason for its rarity.

Key words: *Dioscorea hispida* Dennstedt (Dioscoreaceae), New Record, Tripura.

INTRODUCTION

Dioscorea L. (Dioscoreaceae), a monocotyledonous crop genus with its root-stock has high nutritional value and was probably the main source of sustenance for the tribal people in many parts of tropics. It is represented by over 600 species and is widely distributed in tropical and temperate regions, especially in tropical America (Caddick *et al* 2002; Seikh *et al* 2009). Several species are widely cultivated including *D. alata*, *D. esculenta*, *D. japonica* and *D. polystachya*, while other wild species are valuable famine foods since the time immemorial. Some other species are sources of drugs both in traditional and Western medicine systems (Ting Chih-tsun *et al* 1985). Asia, South America and West Africa are the major yam growing regions in the world (Ayensu & Coursey 1972). On the other hand, *Dioscorea hispida* is a neglected species due to the presence of a poisonous alkaloid dioscorine (Leete & Michelson 1989; Banaag *et al* 1997), which is a paralyzant of the nervous system but not a protoplasmic poison. It is also known to produce a narcotic effect (Webster *et al* 1984; Rajyalakshmi & Geervani 1994). The tubers, raw or cooked, are used as an anodyne and maturate in cases of tumours and buboes, and also used against arthritic and rheumatic pains and similar afflictions. This species is considered very good medicine for lumps and cancer in Thailand (Anderson 1986). The decoction of the tuber is used as an alterative and diuretic in chronic rheumatism, often used in criminal poisoning and is an ingredient with *Antiaris toxicaria* in the preparation of arrow poisons (Burkill 1960; Leete & Michelson 1988). *Dioscorea hispida* has several colloquial names all over India. However, in Sanskrit it is referred as *Marpa shpoli* (Behera *et al* 2008). In Tripura, the Kokborok speaking tribals call this as *Thanara* (*Tha* means Yam and *nara* means poison), and the Bengali speaking people call it as *Bish-alu*.

Tripura is India's third smallest state located in the Biogeographic zone of 9B-North East Hills between 22°56' N and 24°32' N latitudes and between 90°09' E and 92°20' E longitudes with an area of 10,497.69 sq km of which 6292.681 sq km is forest covered. Temperature ranges between 10 and 36° C, and the mean annual rainfall is about 248 cm.

Deb (1983) had mentioned the occurrence of seven species of *Dioscorea* in Tripura *viz.* *D. alata* L., *D. bulbifera* var. *bulbifera* L., *D. bulbifera* var. *sativa* (Hook.f) Prain, *D. glabra* Roxburgh, *D. hamiltonii* Hook.f., *D. pentaphylla* L. and *D. puber* Blume. But, the occurrence of *D. hispida* in Tripura was unknown before its two collections during 2008 – 2009 by the first author.

MATERIALS AND METHODS

Both, twigs and tubers were collected from the field. Specimens were made into mounted herbarium sheets following Jain & Rao (1977), identified using literature, matched at ASSAM Herbarium and deposited at the Herbarium of the Department of Botany, Tripura University. The tubers were planted in the experimental garden of the Botany Department, Tripura University, for close morphological observation.

MORPHOLOGY AND TAXONOMIC STATUS

Dioscorea hispida Dennstedt, Schluss. Hort. Malab. 15: 33. 1818. *Dioscorea daemona* Roxburgh; *D. hispida* var. *daemona* (Roxburgh) Prain & Burkill; *D. mollissima* Blume [PLATE I]

Perennial climber with ovoid or irregular shaped root-stock of variable size. Stem twining to left, terete, 0.5 – 1 cm in diameter, tomentose, stout, densely prickly (more towards the base). Leaves trifoliate, pale green, membranous, pubescent; petiole terete, longer than lamina, 15 – 30 cm, prickly, villose, petiolules hairy, 0.5 – 1 cm, channeled; lateral leaflets ovate – elliptic or broadly oblong, oblique, 7 – 20 cm × 5 – 12 cm, nerves 5 – 7; middle leaflet ovate-elliptic, 10 - 22 × 7 – 15 cm, entire, acuminate, palmately reticulate veined, closed. Male spikes in axillary panicles to 50 cm with 2 levels of branching, densely tomentose. Male flowers: in dense clusters; perianth ca. 1 mm, outer lobes smaller and thinner than inner ones; stamens 6. Female spikes solitary, to 40 cm. Capsules ellipsoid, 3.5 – 7 cm, leathery, densely pubescent; wings 1.2 – 1.5 cm wide. Seeds inserted near tip of capsule; wings pointing toward the base.

Flowering: May – June; **Fruiting:** July – September

Habitat: Shady forest floor of semi evergreen to deciduous forest

Distribution: Philippines, Formosa, Thailand, Malaysia, Indonesia to New Guinea; India (Orissa, West Bengal, Sikkim, Meghalaya, Arunachal Pradesh, Tripura) to southwestern China and Bhutan.

Exsiccatus: Konabon, West Tripura, *K Majumdar 0398*, July 26, 2007 (23° 41' 48.11" N and 91° 10' 52.44" E; ±51 m); Trishna, South Tripura, *K Majumdar 0622*, April 17, 2009 (23° 17' 54.78" N and 91° 23' 05.22" E; ±41 m).

Status: Locally occasional

Notes: A local daily, *Dainik Sambad*, published a report on August 24, 2003 on the death of two young tribal girls due to the consumption of wild yam. Probably, the yam was from a plant of *D. hispida*.

Conclusion: The present collection of *Dioscorea hispida* Dennst. (Dioscoreaceae) is an addition for the flora of Tripura.

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LITERATURE CITED

- Ayensu, E.S. & Coursey, D.G. 1972. Guinea yams: the botany, ethnobotany, use and possible future of yams in West Africa. *Econ. Bot.* 26: 301 – 318.
- Banaag, A.; Honda, H. & Shono, T. 1997. Effects of alkaloids from yam, *Dioscorea hispida* Schlusel, on feeding and development of larvae of the diamondback moth, *Plutella xylostella* (Lepidoptera: Yponomeutidae). *Appl. Entom. Zool.* 32(1): 119 – 126.
- Behera, K.K.; Sahoo, S. & Prusti, A. 2008. Effect of plant growth regulator on in vitro micropropagation of 'Bitter Yam' (*Dioscorea hispida* Dennst.), *Intern. J. Intigr. Biol.* 4(1): 50 – 54.
- Burkill, I.H. 1960. The organography and the evolution of the Dioscoreaceae, the family of the yams. *J. Linn. Soc. (Bot.), London.* 56(367): 319 – 412.
- Caddick, L.R.; Rudall, P.J.; Wilkin, P.; Hedderon, T.A.J. & Chase, M.W. 2002. Phylogenetics of Dioscoreales based on combined analyses of morphological and molecular data. *J. Linn. Soc. (Bot.)* 138: 123 – 144.
- Deb, D.B. 1983. *The Flora of Tripura State*, Vol. 2, Today & Tomorrows' Printers and Publishers, New Delhi, Pp. 417 – 422.
- Jain, S.K. & Rao, R.R. 1977. *A Handbook of Field and Herbarium Methods*. Today & Tomorrow's Printers and Publishers, New Delhi.



PLATE I: *Dioscorea hispida* Denst. (Dioscoreaceae); Fig. 1. Forest floor habitat; Fig. 2. Outer surface of tuber; Fig. 3. Tuber inside; Fig. 4. Trifoliate leaf; Fig. 5. Upper leaflet; Fig. 6. One lateral leaflet; Fig. 7. Prickly stem and terete petiole

- Leete, E. & Michelson, R.H. 1988. Biosynthesis of dioscorine from trigonelline in *Dioscorea hispida*. *Phytochemistry*, 27(12): 3793 – 3798.
- Leete, E. & Michelson, R.H. 1989. The incorporation of 3-hydroxy-3-methylglutaric acid into the lactone ring of dioscorine in *Dioscorea hispida*. *Phytochemistry*, 28(12): 3325 – 3330.
- Rajyalakshmi, P. & Geervani, P. 1994. Nutritive value of the foods cultivated and consumed by the tribals of South India. *Pl. Food. Human Nutri. Dordrecht*, 46(1): 53 – 61.
- Seikh, N.; Kumar, Y.; Misra, A.K. & Pinokiyo, A. 2009. Status documentation of *Dioscorea* L. (Dioscoreaceae) in Meghalaya: an approach towards food security. *Pleione* 3(1): 74 – 82.
- Ting Chih-tsun, Chang Mei-chen & Ling Ping-ping. 1985. Dioscoreaceae. *In: Pei Chien & Ting Chih-tsun, eds., Fl. Reipubl. Popularis Sin.* 16(1): 54 – 120.
- Webster, J.; Beck, W. & Ternai, B. 1984. Toxicity and bitterness in Australian *Dioscorea bulbifera* and *Dioscorea hispida* from Thailand. *J. Agric. Food Chem.* 32(5): 1087 – 1090.