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THE GENUS *DIOSCOREA* L. IN ANDAMAN AND NICOBAR ISLANDS, INDIA

*Asutosh Ghosh

Taxonomy and Biosystematics Lab, Department of Botany, University of Calcutta, Kolkata, WB, India

*Author for Correspondence

ABSTRACT

Dioscoreaceae is one of the most important families of flowering plants in Andaman and Nicobar Islands. The genus *Dioscorea* L. (Dioscoreaceae) is distributed mainly in the tropical and sub-tropical regions of the world. The present survey enumerates nine species and provided baseline data on distribution of different species of *Dioscorea* in Andaman and Nicobar Islands which may help in finding out the species/varieties or races for agricultural planning and other related activities in the Union territory.

Keywords: *Dioscorea*, Distribution, Andaman and Nicobar Islands

INTRODUCTION

The genus *Dioscorea* (yam) belongs to the family Dioscoreaceae. It comprises 350-400 species (Caddick *et al.*, 2002) and is distributed throughout the tropics and subtropic regions especially in West Africa, parts of Central America and the Caribbean, the Pacific islands and Southeast Asia. A few species extend into temperate regions (Caddick *et al.*, 2002; Mabberley, 2008). *Dioscorea* has been suggested to have nutritional superiority when compared with other tropical root crops. They are reported as good sources of essential dietary nutrients (Bhandari *et al.*, 2003; Shanthakumari *et al.*, 2008; Maneenoon *et al.*, 2008; Arinathan *et al.*, 2009). *Dioscorea* sp. is eaten by the Indian tribal people of Andaman Islands.

Taxonomically it is an interesting genus as it exhibits many dicotyledonous characters. It is also a part of lineage that is relatively closely related to the phylogenetically derived group containing the grasses. Therefore, it represents an important biological link between eudicots and grasses, which contain all the model flowering plants. Thus it has the potential to add to the knowledge of plant biology and evolution (Hodeba *et al.*, 2013). It is a critically important but neglected crop, which is likely to be increased in importance as climate change leads to necessary changes in global food system (Hodeba *et al.*, 2013).

In the northeastern part of India some species of *Dioscorea* are essentially a crop of subsistence agriculture especially in tribal areas (Sharma and Hore, 1995). Some of the species are with high medicinal value (Nayar *et al.*, 1989; Ghosh, 2014). During the last few decades the genus becomes one of the most important sources of diosgenin, a plant sapogenin used for the synthesis of steroidal drugs (Martin, 1969; Asolkar and Chadha, 1979). The growing demand for steroidal drugs like cortisone, corticosteroids, contraceptive pills (Ghosh, 2014a), sex hormones, etc. and the high cost of obtaining those from animal sources makes the genus commercially very important. In India the genus *Dioscorea* is represented by about 50 species (Anonymous, 1951; Karthikeyan *et al.*, 1989). However, proper documentation of the genus in Andaman Islands is yet to be accomplished. The present work deals with 9 species of *Dioscorea* belonging to their nomenclatural status, taxonomy, ecology and with their distribution within the state of Andaman and Nicobar Islands and world.

MATERIALS AND METHODS

The Andaman and Nicobar islands, a landmass of 572 islands, isles, rocks and reefs, about 1200 km from the mainland India, is located between the latitude of 6° to 14°N and longitude of 92° to 94°E, covering an area of 8249 km² and it covers South, Middle, North, Little Andaman and Nicobar Islands.

The present work is the outcome of extensive field survey during 2001-2004, carried out to document the species of *Dioscorea* L. occurring in different parts of Andaman and Nicobar Islands. The collected specimens were processed into mounted herbarium sheets following standard herbarium techniques (Jain and Rao, 1977). Collected tubers were also introduced into the Botanical Garden, Botany Department,

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Calcutta University. Specimens were identified with the help of literature (Hooker, 1872-1885; Gamble and Fisher, 1921-1935; Perkinson, 1923; Prain and Burkill, 1938; Burkill, 1951; Rao and Verma, 1973; Mathew, 1991) and subsequently confirmed by consulting the specimens deposited in the Central National Herbarium (CNH). The specimens were deposited in the Herbarium of the Department of Botany, Calcutta University (CUH).

Distributional status of the identified species in the world and India were recorded from literature. The works of Burkill (1951) and Caddick *et al.*, (2002) have been followed in delimitation and nomenclatural treatment of the recorded taxa.

RESULTS AND DISCUSSION

Taxonomy, ecology and distributional status of the genus *Dioscorea* L. in Andaman and Nicobar Islands has been described and discussed here.

Dioscorea L., Sp. Pl., ed. 1: 1032. 1753; *and* Gen. Pl. ed. 5: 456. 1754; Knuth, Enum. Pl. 5: 325. 1850; Salisbury, Gen. Pl. fragm. 12. 1866; Benth. in Benth. and J. D. Hooker, 74; Gen. pl. 3: 742. 1883; Pax in Engler, Nat. Pflanzenfam. 2. 5: 133. 1888; Uline in Engler and Prantl, Nat. Pflanzenfam. Nachtr. 2. 5:80. 1897; R. Knuth in Engler, Pflanzenr. 4. 43: 45. 1924 and in Engler and Prantl, 2. 15a: 438. 1930; Prain and Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14. 1: 1. 1936; Hutchinson, Fam. Fl. Pl., Monocot. p. 147. 1959; Burkill, J. Linn. Soc., Bot. 56: 400. 1960; Ayensu, in C.R. Metcalfe, Anatomy of the Monocotyledons 6: 7. 1972; R. Dahlgren *et al*, Families of the Monocots p. 115. 1985; Takhtajan, Syst. Magnoliophyt. p. 309. 1987.

Herbaceous climbers, twining, rarely erect. *Underground parts* rhizomatous, rhizome frequently short, subtending one to several tubers which are often rich in steroidal saponins, covered with fine roots, trichomes simple to stellate or T- shaped, most prevalent on young vegetative and reproductive shoots. *Stems* annual, usually twining to the left or to right, rarely erect or creeping, terete or winged, often armed with prickles or similar structures, especially towards base; *bulbils* present in axils of some species. *Leaves* opposite to alternate, entire, lobed, or compound, base often cordate, veins arising at the point of insertion of blade on petiole, spreading then converging towards apical forerunner tip, secondary venation reticulate; petiole usually thickened at base and apex, lateral nodal flanges (“stipules”) present at petiole bases in some species; cataphylls present towards stem base, mainly in right- twining species. Plants dioecious but vestigial male/female parts usually present. *Inflorescences* simple or compound, partial inflorescences usually pendent, spicate or racemose, male flowers solitary or paired, sometimes in cymules, female flowers usually solitary or paired. *Male flowers* pendent to patent to inflorescence axis, with 3 or 6 stamens, inner or outer whorls sometimes staminodial, pistillode often present, sometimes with sepal nectaries; anther dehiscence introrse, pollen monobisulcate, rugulatereticulate, or perforate, occasionally gemmate or striate. *Female flowers* pendent at first, later patent, frequently ascending as capsules mature, usually with 3 or 6 staminodes. *Ovary* inferior, 3-angled, and trilobular, sepal nectaries present in some species, ovules 2 per locule, styles 3, variably fused at the base and free towards the apical stigmatic surfaces. *Fruit* most commonly a 3-winged capsule, dry and dehiscent at maturity, rarely a fleshy berry or one winged samara. *Seeds* usually 6, 2 per locule, occasionally fewer if ovules abort during development; usually lenticular to ovoid-lenticular, rarely ovoid, most winged all around margin or at base or apex only, a few wingless; endotesta crystalline; endosperm thick walled.

Distribution: 350-400 species, in all tropical and subtropical world regions, with maximum diversity in seasonally wet climates, where they die back to the tuber during the dry season. A few species extend into temperate regions (Caddick *et al.*, 2002). Nine species found in Andaman and Nicobar Islands.

Key to the species of *Dioscorea* L. in Andaman and Nicobar Islands:

1. a. Stem twining to right.....2
- b. Stem twining to left.....5
2. a. Stems with spines.....3
- b. Stems with no spines.....4

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3. a. Stems narrowly winged, wings usually 4.....1. *D. alata*
b. Stems terete or with 4-8 low, longitudinal ridges.....2. *D. belophylla*
4. a. Leave base sagittate or hastate or cordate; veins 7-11; petiole 4-12 cm; male spike 2-5 cm
.....9. *D. wallichii*
b. Leave base obtuse-rounded; veins 5; petiole 2-3.5 cm; male spike 10-30 cm.....6. *D. oppositifolia*
5. a. Stems with spines.....6
b. Stems with no spines.....8
6. a. Leaves simple, heart shaped.....4. *D. esculenta*
b. Leaves compound.....7
7. a. Leaves trifoliolate; no bulbils.....5. *D. hispida*
b. Leaves 3-7 foliolate; present bulbils.....7. *D. pentaphylla*
8. a. Leaves simple, heart shaped.....3. *D. bulbifera*
b. Leaves compound; deeply trilobed.....8. *D. tomentosa*

1. *Dioscorea alata* L., Sp. Pl. 2: 1033. 1753; Hook.f., Fl. Brit. Ind. 6. 296. 1892; Burkill in FM 4: 330. 1951. *D. atropurpurea* Roxb., Fl. Ind. 3:296. 1832; Hook.f., Fl. Brit. Ind. 6. 296. 1892. *D. globosa* Roxb. Fl. Ind. 3:797. 1832; Hook.f., Fl. Brit. Ind. 6. 296. 1892.

Climber, tubers variable, usually globose or conical (when cork brown or purplish black and transverse section purplish white), or oblate or cylindric, much branched (when cork brown or grayish yellow and transverse section white). Stem twining to right, glabrous, ridged, with 4 narrow, membranous wings, prickly at base. Bulblets present, variable in shape. Leaves alternate basally on stem, opposite distally on stem, simple; leaf blade green or purplish red, broadly ovate-cordate, 6-15(-20) × 4-13 cm, papery, glabrous, base sagittate to deeply cordate, apex shortly acuminate or caudate, 5-6 secondary nerves, campylodromous, membranous, dark green, glabrous; petiole green or purplish red, 4-15 cm, glabrous. Male spikes solitary or a few together, 1.5-4 cm, sometimes forming a panicle; rachis obviously zigzagged. Male flowers: outer perianth lobes broadly ovate, 1.5--2 mm; stamens 6. Female spikes solitary or 2 or 3 together. Female flowers: staminodes 6. Capsule not reflexed, oblate, sometimes obcordate, 1.5-2.5 cm; wings 1.2-2.2 cm wide. Seeds 2, inserted near middle of capsule, winged all round.

Flower: November-January.

Fruit: December-February.

Ecology: Common, found in semi-evergreen forest, 210 mt. above, growing on black soil; it climbs on *Lagerstromia* sp, and associated climbers are *Strychnos acuminata*, *Teteracera sermentosa* and *Calamus viminalis*.

Distribution: India, Bangladesh, Pakistan, China, Thailand, Malaysia and Sri Lanka.

Andaman Island: North Andaman Islands.

Specimen examined: N. Andaman: Ramnagar (05.11.2002) A. Ghosh.672 (CHU).

2. *Dioscorea belophylla* Voigt ex Haines, For. Fl. Chota Nagpur. 530. 1910; Siddiqii, FWP 53:3. 1973. Prain and Burkill in Ann. Roy. Bot. Gard. Calcutta, 14 (2):348. 1938. *D. glabra* auct. non Roxb.; Hook.f. and Thoms, Fl. Brit. India 6: 294. 1872.

Tubers cylindric, developed from short, thick rhizome; cork deciduous; transverse section white, drying light yellow. Stem twining to right, glabrous, prickly at base. Leaves alternate basally on stem, opposite distally on stem, simple; leaf blade drying blackish, usually ovate or long elliptic-ovate to lanceolate, 5-17(-24) × 0.5-10(-13) cm, glabrous, basal veins 5-9, base cordate to truncate or rounded, rarely sagittate or hastate, apex acuminate or caudate. Male spikes solitary or 2-4 together, 1-2.5 cm, usually in narrow, axillary panicles to 14 cm; rachis straight. Male flowers: outer perianth lobes orbicular, 1 mm, inner ones obovate, smaller but thicker than outer; stamens 6, inflexed. Female spikes solitary or paired, to 25 cm. Capsule not reflexed, oblate, 1.5-2.5 cm; wings 1.2-2.2 cm wide. Seeds 2, flat, inserted near middle of capsule, winged all round.

Flower: September-December.

Fruit: December-January.

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Ecology: Not frequent, evergreen broad-leaved forests, scrub forests, mountain slopes, valley sides, roadsides and associated climber are *Argyreia* sp.

Distribution: India, Bhutan, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, and Vietnam

Andaman Island: North Andaman Islands.

Specimen examined: N. Andaman:

Saddle hill (19.10.2002) A. Ghosh.569 (CHU).

Swrajgram (13.11.2002) A. Ghosh.789 (CHU).

3. *Dioscorea bulbifera* L., Sp. Pl. 1033. 1753; Hook.f., Fl. of Brit. India 6: 296. 1892; Prain and Burkill in ARBGC 14(1): 3. 1936; Burkill in FM 4:311. 1951. *D. sativa* auct. non L., Hook.f., FBI 6:295. 1892.

Tubers usually solitary renewed annually, ovoid or pear-shaped, 4-10 cm thick; cork black; roots fibrous. Stem twining to left, glabrous, smooth. Bulblets purplish brown with orbicular spots, globose or ovoid, variable in size, weight to 300 g. Leaves alternate, simple; leaf blade broadly cordate, 8-15(-26) × 2-14(-26) cm, margin entire or slightly undulate, base deeply cordate, apex caudate-acuminate, 5-7 nerved, campylodromous, glabrous; petiole 2.5-5.5 cm. Male spikes usually clustered in leaf axils or along leafless, axillary shoots, drooping, sometimes branched. Male flowers: solitary, contiguous along rachis; bract and bracteole ovate; perianth purple, lobes lanceolate; stamens 6, inserted at base of perianth, filaments nearly as long as anthers. Female spikes often 2 or more together, similar to male ones, 20-30 cm. Female flowers: staminodes 6, 1/4 as long as perianth lobes. Capsule reflexed or drooping, straw-colored, densely purplish dotted, oblong-globose, 1.5-3 cm, glabrous, base and apex rounded; wings 0.25-0.7 cm wide. Seeds many, inserted near apex of capsule, dark brown; wing pointing toward capsule base, oblong, 1.2-1.6 × 0.5 cm.

Flower: July-October.

Fruit: August-November.

Ecology: Not frequent, deciduous forests, forest margins, river banks; near sea level to 350 m, growing on moist clay loam under shade, it also climbs on *Canarium manii*, *Artocarpus chaplasha* and associated climber is *Ipomoea* sp.

Distribution: India, Bhutan, Cambodia, Japan, Korea, Myanmar, Thailand, Vietnam; Africa, Oceania

Andaman Island: North and South Andaman Islands.

Specimen examined: N. Andaman: Hathilevel (12.11.2001) A. Ghosh.29 (CHU).

4. *Dioscorea esculenta* var. *spinosa* (Roxb. ex Prain and Burkill) R. Knuth in Engler, Pflanzenr. 87(IV. 43): 189. 1924. *Dioscorea aculeata* L. var. *spinosa* Roxb. ex Prain and Burkill, J. Proc. Asiat. Soc. Bengal 10: 20. 1914. *Dioscorea esculenta* (Lour.) Burkill in Gard. Bull. Straits Settl. 1:396. 1917; Knuth in Engl. Pflanzenr. 87(4-43):189. 1924; Brown in Use. Pl. Philip. 392,f.155.156. 1941; Burkill in Fl. Malesiana ser.1.4:307. 1954; Liu, T. S. and T. C. Huang, Bot. Bull. Acad. Sin. 3(2):139. 1962; Walker, Fl. Okinawa and South. Ryukyu Isl. 320. 1976; Edit. Comm., Fl. Hainanica 4:152. 1977; Liu, T. S. and T. C. Huang in Fl. Taiwan 5:105. 1978; Ting, C. T., M. C. Chang and P. P. Ling. in Fl. China 16(1): 78, f.22. 1985.

Tubers usually 4-10, produced from apical branches of rhizome; cork light yellow, smooth; thorny roots protecting crown of rootstock. Stem twining to left, with T-shaped, soft hairs, proximally prickly, distally so only at nodes. Leaves alternate, simple; petiole 5-8 cm; leaf blade broadly cordate, to 15 × 17 cm, with T-shaped hairs especially abaxially, basal veins 9-3, base cordate, apex acute. Male spike solitary, dense, 15 cm. Male flowers: usually solitary, rarely in cymules of 2-4, sessile or subsessile; bract ovate; perianth shallowly cupular, puberulent, outer lobes broadly lanceolate, 1.8 mm, inner ones slightly shorter than outer; stamens 6, inserted in perianth tube, slightly shorter than perianth lobes. Female spike solitary, pendent, to 40 cm. Capsule very seldom maturing, 3 cm, base truncate, apex slightly emarginate; wings 1.2 cm wide. Seeds inserted near middle of capsule, winged all round.

Flower: April onwards.

Fruit: June-onwards.

Ecology: Not frequent, forests, forest edges, river banks, open area; near sea level to 150 m, growing on moist clay loam, it also climbs on *Dinochloa scandens*.

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Distribution: India, Malaysia, Papua New Guinea, and Thailand.

Andaman Island: North and South Andaman Islands.

Specimen examined: N. Andaman: Ganeshnagar (29.12.2003) A. Ghosh.1032 (CHU).

5. *Dioscorea hispida* Dennst., Schluss. Hort. Malab. 15, 33. 1818; Prain and Burkill in ARBGC 14(1):188. 1936; Burkill in FM 4:318. 1951. *Dioscorea daemona* Roxb., Fl. Ind. 3:805. 1832; Hook.f. FBI 6: 289. 1892.

Tubers brown, ovoid or irregularly shaped, variable in size, poisonous; transverse section white. Stem twining to left, to 30 cm, terete, stout, pubescent when young, glabrescent, prickly. Leaves alternate, palmately 3-foliolate; petiole to 30 cm, hairy; middle leaflet ovate to elliptic, 6-12(-17.5) × 4-12 cm, adaxially sparsely hispid, glabrescent, abaxially hispid, palmately veined, apex acuminate; lateral leaflets ovate-elliptic or nearly broadly oblong, oblique, smaller than middle leaflet, margin entire. Male spikes in axillary panicles to 50 cm with 2 levels of branching, most parts densely tomentose. Male flowers: in dense clusters; perianth ca. 1 mm, outer lobes smaller and thinner than inner ones; stamens 6. Female spike solitary, to 40-cm. Capsule long ellipsoid, 3.5-7 cm, leathery, densely pubescent; wings 1.2-1.5 cm wide. Seeds inserted near apex of capsule; wing pointing toward capsule base.

Fruit: April-May,

Flower: July-September.

Ecology: Not frequent, scrub forests, forest margins; near sea level to 350 m, growing on moist clay loam under shade, it thrive well even under adverse environmental conditions and associated climber is *Ipomoea sp.*

Distribution: India, Native China, Bhutan, Indonesia, Sikkim, and Thailand

Andaman Island: North Andaman Islands.

Specimen examined: N. Andaman: Swrajgram (13.11.2003) A. Ghosh.789 (CHU).

6. *Dioscorea oppositifolia* L. sp. Pl. 1033. 1753; Roxb, Fl.ind. 3: 804. 1832; Wight, Icon. pl. Ind. Orient. t. 813. 1844; Hook. f. Fl. Brit. India 6: 292. 1892; C. Fischer, Fl. Madras 3: 1512(1056). 1928; Prain and Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14 (2): 392. t. 139. 1938.

Climbers, branch terete, unarmed, stem twining to right, glabrous. Leaves subopposite, simple, ovate-sub orbicular, 3-10.5 x 1.5-9.5 cm, base obtuse-rounded, apex subacute-obtuse, 5 secondary veins, campylodromous, margin entire, thin coriaceous and glabrous; petiole 2-3.5 cm long, stout, glabrous. Male spike axillary paniced, clustered, 10-30 cm; peduncle 2-3 cm, glabrous; bracteoles scarious, triangular, 0.75-1.5 cm, subequal. Male flowers: flower 0.2 cm across, bracts linear, 0.3 cm; bracteoles scarious, triangular, 0.75-1.5 cm, subequal. Perianth lobes oblanceolate; outer one 0.25 x 0.1 cm, inner ones linear, 0.15 x 0.1 cm. Stamens 6, inserted, filament 0.5 mm, incurved; anthers subequal, globose, oblong; staminodes 6; pistillode short. Female spikes simple or branched, solitary axillary, 6-9 cm; peduncle 1-2 cm, glabrous; bracts 1.5 mm; bracteoles 1 mm. Flowers distant, 5 mm, 2 mm across, outer perianth lobes ovate, 1.5 mm; inner ones 0.5-1 mm. Ovary oblong, 3-4 mm, 3-celled; ovules 2 in each cell; style 0.5; stigma capitate. Capsule obovoid, 2.5-3 x 2-2.8 cm, stipitate, glabrous. Seeds 3-4, orbicular 1 x 0.4 cm, winged throughout.

Flower and Fruit: Throughout the year.

Ecology: Few found in deciduous forest, 500 mt. above, growing on brick red soil; it climbs on *Celtis wightii*, and associated climbers are *Strychnos acuminata*, *Hiptage benghalensis* and *Calamus palustris*.

Distribution: India, Bangladesh and Sri Lanka.

Andaman Island: North Andaman Islands.

Specimen examined: N. Andaman: Radhanagar (11.11.2001) A. Ghosh.25 (CHU).

7. *Dioscorea pentaphylla* L., Sp. Pl. 2: 1032. 1753; Hook.f., FBI 6: 289.1892; Prain and Burkill Ann. Roy. Bot. Gard. (Calcutta) 14(1): 160. 1936; C. Fisher, Fl. Madras 3: 1511(1056). 1928; Burkill in FM 4:315. 1961. *D. jacquemontii* Hook.f., FBI 6:290. 1892.

Tubers irregular, usually long ovoid; transverse section white when fresh, becoming brown; roots fibrous. Stem twining to left, sparsely puberulent, glabrescent, and prickly. Bulblets present. Leaves alternate, palmately 3-5-foliolate; 5-10 cm, terminal leaflets elliptic-ovate, 4.5-8.5 x 1.5-3.5 cm, lateral ones

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inequilateral, 3.5-7.5 x 1.8-3 cm, base subacute, apex acute, margin entire, 3-5 nerved at base, acrodromous, adaxially, thin coriaceous, glabrous, abaxially appressed pubescent, sometimes glabrescent; petiole 3-5.5 cm, grooved, densely reddish brown pubescent; petiolule 0.7-1 cm, tomentose, apex acute. Male spikes in axillary panicles to 50 cm, often with long, lateral branches; sparsely prickled, 4-15 cm, axis brown pubescent; peduncle 0; pedicel 1.5-2 mm. Male flowers: sessile or subsessile; bract and bracteole reniform, forming an involucre around perianth, sparsely hairy, apex cuspidate; perianth lobes coriaceous, pubescent, outer one ovate, 1.5 mm, inner ones lanceolate, broad at base, 1 mm. Stamens 3, staminodes 3. Female spikes simple or branched, 4-15 cm; peduncle 3-4 cm, brown puberulent. Female flowers: distinct, 4-6 x 1.5-2 mm; bracts 2-2.5 mm; bracteoles 1-1.5 mm; perianth lobes ovate, 1-1.5 mm. Ovary oblong, 4 mm, tomentose, ribbed; style 1mm; stigma capitate. Capsule oblong, 2 x 1 cm deeply angled, winged, 0.5-0.6 cm wide, black at maturity, thinly leathery glabrescent-glabrous. Seeds 5-6, subquadrate, 6-8 x 4-5 mm, inserted near apex of capsule; apically winged.

Flower: August-October.

Fruit: November-February.

Ecology: Rare, 100-250 m. Scrub forests, forest margins, growing on loose swampy soil, found in near stream and also in secondary forest, it climbs up *Streblus asper* (dead logs), *Diospyrus pyrrocarpa*; associated climber is *Tinospora glabra*, *Tetracera sarmentosa* and *Dinochloa andamanica*.

Distribution: India, Bangladesh, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Vietnam; Africa, Australia and Pacific Islands.

Andaman Island: North Andaman Islands.

Specimen examined: N. Andaman:

Ganasnagar (06.12.2001) A. Ghosh.72 (CHU).

Krishorinagar (23.02.2002) A. Ghosh.479 (CHU).

8. *Dioscorea tomentosa* J. Koenig ex Sprengel, Pl. minus cognit. Pug. 2: 92. 1815; Roxb, Fl.ind. 3: 805. 1832; Hook. f. Fl. Brit. India 6: 289. 1892; C. Fischer, Fl. Madras 3: 1511(1055). 1928; Matthew, Mat. Fl. Tamilnadu Carnatic 359. 1981.

Climber, stem twining to left, stout, tomentose. Leaves alternate, compound, trifoliate, 5-15 cm; leaflets broadly elliptic-lanceolate, 4-13 x 1.5-3.5 cm, base oblique, inequilateral, obtuse-subacute, apex acute, mucronate, margin entire, secondary veins 3-5, brochodromous, coriaceous and dense tomentose; petiole 4-12 cm, tomentose; petiolule 0.5 cm, tomentose. Male spike axillary or (terminal), solitary, 5-12 cm, branches-axes alternately 2, tomentose; peduncle 2-2.5 cm, tomentose. Male flowers: 1.5 cm across, bracts linear, 2 mm; bractlets ovate, 1.5 mm, tomentose; perianth lobes coriaceous, tomentose; outer one 1.5 mm; inner ones linear, 1mm. Stamens 3, inserted, filament 1mm, incurved; anthers small, globose, oblong; staminodes 3; pistillode short. Female spikes simple or branched. Female spike axillary, paired, 5-15 cm; peduncle 3-5 cm, tomentose; bracteoles 3 mm. Flowers 3 mm. across, velvety; perianth lobes fleshy, ovate, 1.5 mm. Ovary oblong, 3-7 mm, 3-celled; ovules 2 in each cell; style 3, 0.5; stigma capitate. Capsule oblong, 2-3 x 1-2 cm, base narrow, apex broad, tomentose, glabrescent latter. Seeds 3, obovoid, 1 x 0.4 cm, epically winged.

Flower: July-October.

Fruit: August onwards.

Ecology: Not frequent, growing on hill creaks, slopes 40%, found in near stream and associated climber is *Argyrea* sp.

Distribution: India, Bangladesh, Malaysia, Myanmar, Srilanka and Malaysia.

Andaman Island: North Andaman Islands.

Specimen examined: N. Andaman: Ganeshnagar (19.11.2002) A. Ghosh.480 (CHU).

9. *Dioscorea wallichii* Hook.f., Fl. Brit. India. 6:295. 1892.

Tubers palmately branched, cylindrical. Stem twining to right, stout, glabrous. Leaves opposite or alternate, simple; leaf blade orbicular or ovate, 6-18 x 6-22 cm, glabrous, basal veins 7-11, base cordate to deeply so with narrow sinus and basal lobes rounded, margin entire, apex acute or shortly acuminate, petiole 4-12 cm. Male spike 2-5 cm, in delicate, axillary panicles 4-10 cm; rachis straight. Male flowers: bracts

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triangular-ovate; perianth purplish red dotted, outer lobes elliptic-ovate, inner ones broadly obovate; stamens 6; staminodes large, subglobose. Female spikes simple or branched. Female flowers: perianth lobes fleshy, outer ones ovate, inner ones broadly ovate. Capsule (immature) not reflexed, drying blackish, oblate, 2-2.7 cm, glabrous, base truncate, apex emarginate to truncate; wings 1.7-2 cm wide. Seeds 6, inserted near middle of capsule, winged all round, much glabrous, dotted.

Flower: July-September.

Fruit: October onwards.

Ecology: Not frequent, growing on loose swampy soil, 100-250 m, found in near stream and also in secondary forest; it climbs up *Shorea robusta* and associated climber is *Ipomoea* sp.

Distribution: India, Bangladesh, Malaysia, Myanmar, Thailand and Malaysia.

Andaman Island: North Andaman Islands.

Specimen examined: N. Andaman: Mohanpur (6.12.2002) A. Ghosh.399 (CHU).

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