

The genus *Dioscorea* Linnaeus [Dioscoreaceae] in Assam, India

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Abstract

There are about 600 species in the genus *Dioscorea* Linnaeus (Dioscoreaceae), distributed mainly in the tropical and sub-tropical regions of the world. The tubers, yams, constitute an important source of food in many tropical areas. These are rich sources of carbohydrate and essential dietary nutrients and thereby considered as an important crop of subsistence agriculture especially in tribal areas of north-eastern region of India. During last few decades the genus becomes one of the most important plants as source of diosgenin, a plant sapogenin, used for the synthesis of steroidal drugs.

The present study provided baseline data on distribution of different species of *Dioscorea* in Assam which may help in finding out the species / varieties or races for agricultural planning and other related activities in the state.

Key words: *Dioscorea*, Assam, Distribution, Diosgenin

INTRODUCTION

Dioscorea Linnaeus (Dioscoreaceae) is a large genus that contains many species with important edible tubers or as sources of bioactive substances. Species of the genus *Dioscorea* are commonly known as “Yam”. These plants are climbing herbs or shrubs; stems annual, twining either to right or to left, sometimes with auxiliary aerial bulbils, with underground tubers and rhizomes; leaves alternate, rarely opposite, simple and compound, often cordate with reticulate venation.

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, that 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). There are about 350 – 400 species of *Dioscorea* distributed mainly in the tropical and sub-tropical regions of the world 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; Mabberley 2008). There are about 100 species of *Dioscorea* those are

edible after detoxification, extended or fast cooking, or even raw. The tubers of edible species are rich sources of carbohydrates (Ayensu 1972; Prain & Burkill 1938; Degras 1983). The most important edible species are belonging to the sections Enantiophyllum, Lasiophyton, Opsophyton and Combilium. The Enantiophyllum is the largest section in terms of having the largest number of edible species. It is divided into three geobotanical groups – an Asian-Oceanian group, a Sino-Japanese group and an African group (Degras 1983).

In the northeastern part of India some species of *Dioscorea* are essentially a crop of subsistence agriculture especially in tribal areas (Sharma & Hore 1995). Some of the species are with high medicinal value (Nayar *et al* 1989). During the last few decades the genus becomes one of the most important source of diosgenin, a plant sapogenin used for the synthesis of steroidal drugs (Martin 1969; Asolkar & Chadha 1979). The growing demand for steroidal drugs like cortisone, corticosteroids, contraceptive pills, 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). Out of these, about 19 species are known to occur in Assam (undivided) alone (Rao & Verma 1973). Sharma & Hore (1995) reported 28 species and 25 cultivated varieties from northeastern region of India. Some works on the genus from northeastern states have also been published in recent years including Sheikh *et al.* (2009); Majumdar *et al.* (2009); Saikia *et al.* (2010). However, proper documentation of the genus in Assam within present political boundary is yet to be accomplished.

The present work deals with 12 species of *Dioscorea* belonging to 4 sections with their nomenclatural status and with their distribution within the state of Assam.

MATERIALS AND METHODS

The work has been initiated in 2009 and extensive field work has been carried out to document the species of *Dioscorea* Linnaeus occurring in different parts of Assam. The collected specimens were processed into mounted herbarium sheets following standard herbarium techniques (Jain & Rao 1977). Collected tubers were also introduced into the Botanical Garden, Botany Department, Gauhati University. Specimens were identified with the help of literature (Burkill 1951; Prain & Burkill 1938; Rao & Verma 1973) and subsequently confirmed by consulting the specimens deposited in the ASSAM Herbarium. The specimens were deposited in the Herbarium of the Department of Botany, Gauhati University (GUBH). 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. Uses of different species have been documented during field work from the local people. Some of the information on uses has been noted down from available literature (Prain & Burkill 1938; Degras 1983; Nayar *et al* 1989; Roy *et al* 1998). The local names of the species in the states other than Assam has been collected from literature and provided using abbreviations Ass., B, H and Sans against Assamese, Bengali, Hindi and Sanskrit respectively.

RESULT

Taxonomy and distributional status of the genus *Dioscorea* Linnaeus in Assam.

Dioscorea Linnaeus, Sp. Pl., ed. 1: 1032. 1753; & Gen. Pl. ed. 5: 456. 1754; Knuth, Enum. Pl. 5: 325. 1850; Salisbury, Gen. Pl. fragm. 12. 1866; Bentham in Bentham & J. D. Hooker,

Gen. pl. 3: 742. 1883; Pax in Engler, Nat. Pflanzenfam. 2. 5: 133. 1888; Uline in Engler & Prantl, Nat. Pflanzenfam. Nachtr. 2. 5:80. 1897; R. Knuth in Engler, Pflanzenr. 4. 43: 45. 1924 & in Engler & Prantl, 2. 15a: 438. 1930; Prain and Burkill, Ann. Roy. Bot. Gard. (Culcutta) 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.

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 cymes, 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, rugulate-reticulate, 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).

ENUMERATION

Key to the species of *Dioscorea* in Assam:

1. Stems twining to right 2
1. Stems twining to left 8
2. Male flowering spikes negatively geotropic *D. laurifolia*.
2. Male flowering spikes positively geotropic 3
3. Stem quadrangular with a wing on each angle *D. alata*
3. Stems cylindrical 4
4. Hairs present 5
4. Hairs absent 6

5. Fertile stamens three *D. decipiens*
 5. Fertile stamens six *D. pubera*
 6. Leaves long-cordate, often subsagittate at base, acuminate *D. hamiltonii*
 6. Leaves not long cordate 7
 7. Leaves commonly elliptic-ovate, rounded or slightly cordate *D. glabra*
 7. Leaves lanceolate-ovate and obtuse at the base *D. trinervia*
 8. Leaves simple 9
 8. Leaves compound 10
 9. Hairs abundant, T-shaped hairs present *D. esculenta*
 9. Hairs absent *D. bulbifera*
 10. Dry stem discoloured; flowers pedicelled, 3 fertile stamens 11
 10. Dry stem turns a bright straw colour; flowers sessile; 6 fertile stamens ...
 *D. hispida*
 11. Leaves 3 – 5 foliate *D. pentaphylla*
 11. Leaves 5 – 9 foliate *D. cumingii*

The present work records the occurrence of twelve species of *Dioscorea* from different parts of Assam (Table 1). [Plate 1]

Table 1. Division and the species of the genus *Dioscorea* and their distributional status in Assam, India

Section	Characteristics of the section	Name of Taxa	Districts of Assam where the taxa is located
Enantiophyllum	<ul style="list-style-type: none"> Usually single tuber. Twine to right. Winged stem. Occasional bulbils. leaves long petiolate 	<i>D. alata</i>	All districts of Assam
		<i>D. trinervia</i>	Kamrup, N. C. Hills
		<i>D. pubera</i>	Kamrup, Tinsukia
		<i>D. glabra</i>	Kamrup, Dhemaji
		<i>D. hamiltonii</i>	Goalpara, Kamrup, Darrang, N.C. Hills
		<i>D. decipiens</i>	Kamrup
Combilium	<ul style="list-style-type: none"> Large no. of small individual tubers. Twine to the left. T- shaped hairs on leaves 	<i>D. esculenta</i>	Nagaon, Lakhimpur, Tinsukia
Opsophyton	<ul style="list-style-type: none"> Aerial bulbils. Twine to the left. 	<i>D. bulbifera</i>	Goalpara, Kamrup, N. C. Hills, Tinsukia,
Lasiophyton	<ul style="list-style-type: none"> Cluster of medium sized tubers. Twine to the left. Large thorn on stems. Leaves compound. 	<i>D. pentaphylla</i>	Goalpara, Kamrup, N. C. Hills, Tinsukia, Dibrugarh
		<i>D. hispida</i>	Kamrup, Sibsagar, Tinsukia
		<i>D. cumingii</i>	Tinsukia

Dioscorea alata Linnaeus, Sp. Pl.: 1033.1753; Hooker *f.* Fl. Brit. India 6: 296. 1892; Rao & Verma Bull. Bot. Surv. India 15: 201. 1793.

Common name: Arrowroot giniana, Wigned yam, Greater yam, True Asiatic yam; **Local name:** *Kath alu*, *Fena alu*, *Soljukhia alu*, *Patensara alu* (Ass); *Chupri alu* (B); *Khamalu* (B & H).

Distribution: Throughout the moist tropics of the world. Cultivated all over India, wild in the Himalayas up to 2,900 m. **Assam:** Common in all the districts both in wild as well as in cultivation. Specimens are collected from Nalbari, Kamrup (Lankeswar hill near Jalukbari, Topatali of Dimoria block), Lakhimpur district (Poba Reserve Forest), Karbi Anglong district.

Exsiccata: Kamrup District, Lankeshwar hill near Jalukbari, *Nijara Goswami* 01, dated 23.08.2009.

Uses: Tubers used as vegetables, also used for the treatment of Leprosy, Piles and Gonorrhoea; bulbils used as astringent; tubers used in poultry feeds to improve eggs and meat production (Nayar *et al* 1989; Roy *et al* 1998; Paul *et al* 2011). (Figs. 1, 2, 3)

Dioscorea bulbifera Linnaeus, Sp. Pl.: 1033.1753; Hara, Fl. East Himal.: 419.1966; Hooker *f.*, Fl. Brit. India 6: 295.1892; Rao & Verma, Bull. Bot. Surv. India 15: 209. 1973.

Common name: Air Potato, Potato yam; **Local name:** *Gach alu* (Ass); *Tha phenkha* (Boro); *Bon alu* (B); *Ratalu* (H); *Varahi* (Sans); *Kaachi* (Malayalam); *Dukkar Kand* (Marathi).

Distribution: Native to Africa and Asia. It is an invasive species in many tropical areas. Throughout India.

Assam: Goalpara, Kamrup, Tinsukia, N. C. Hills.

Exsiccatae: Kamrup District, Topatali, *Nijara Goswami* 42 dated 11.11.2011; Lakhimpur District, Dur pam, *Nijara Goswami* 39, dated 01.09.2011; Karbi Anglong District, Samparidia, *Nijara Goswami* 13, dated 10.10.2009.

Uses: Medicinally used against piles, dysentery and syphilis. Aerial bulbs consumed as food (Nayar *et al.* 1989). (Fig. 12)

Dioscorea cumingii Prain & Burkill, J. As. Soc. Beng. new ser. 4: 449. 1908; *ibid.* 10: 25. 1914; R. Knuth, Pfl. R. 87: 148. 1924; Prain & Burkill, Ann. Roy Bot. Gard. Calc. 14: 182. 1936, pl. 73. *D. inaequitifolia* Elmer *ex* Prain & Burkill, J. As. Soc. Beng. N.S. 10: 24. 1914; R. Knuth *op. cit.* 146; Prain & Burkill, Ann. Roy Bot. Gard. Calc. 14: 181. 1936. *D. polyphylla* R. Knuth, Pfl. R. 87: 148. 1924; Prain & Burkill, Ann. Roy Bot. Gard. Calc. 14: 184. 1936. *D. echinata* R. Knuth, Pfl. R. 87: 148. 1924.

Common name: Not known; **Local name:** Not known.

Distribution: Philippines, Taiwan, China, India.

Assam: Dibru Choikhowa Reserve Forest in Tinsukia District

Exsiccata: Lica Pomowa village of Tinsukia District, *Nijara Goswami* 55, dated 03.03.2013.

Use: Lower part of the tuber eaten as food (Burkill 1951). (Fig. 15)

Dioscorea decipiens Hooker *f.*, Fl. Brit. India, 6: 293. 1892; Gage in Rec. Bot. Surv. India, 3: 108. 1904; Craib in Kew Bull., p. 407. 1912; Prain & Burkill in J. As. Soc. Bengal, N.S.,

10: 31. 1941; R. Knuth in Engler, Pflanzenreich, iv-43: 287. 1924; Prain & Burkill in Kew Bull., p. 245. 1927.

Common name: Not known; **Local name:** Not known.

Distribution: South-central China, Myanmar, Thailand, India.

Assam: Topatali of Kamrup District.

Exsiccata: Kamrup (Topatali), *Nijara Goswami* 40, dated 11.11.2011.

Uses: Softer parts of the tuber used as food (Prain & Burkill 1938). (Fig. 10)

Dioscorea esculenta (Loureiro) Burkill, Gard. Bull. Str. Settl. 1: 396. 1917; Rao & Verma, Bull. Bot. Surv. India 15: 196. 1973.

Common name: Lesser yam, Karen yam; **Local name:** *Moa alu* (Ass); *Suthni* (B & H).

Distribution: Native to Thailand and Indo-China. It grows wild in northern India, Burma (Myanmar) and New Guinea. At present its cultivation is mostly in Southeast Asia (especially in New Guinea), Oceania, the Caribbean and China.

Assam: Located in Nagaon (Puranigudam), Lakhimpur (Dur pam situated near Assam and Arunachal border) and Tinsukia District.

Exsiccata: Nagaon District, Puranigudam, *Nijara Goswami* 06, dated 10.10.2009.

Uses: Tubers are eaten baked, boiled or fried like potatoes (Degras 1883; Peter 2007). (Fig. 11)

Dioscorea glabra Roxburgh Fl. Ind. 3: 803. 1832; Hooker f., Fl. Brit. India 6: 294. 1892; Rao & Verma, Bull. Surv. India 15: 199. 1973.

Common name: Not known; **Local name:** Tha (Boro); *Kanta alu* (Oriya), *Nara tega* (Telegu)

Distribution: India and Myanmar to the centre of Malaya Peninsula.

Assam: Kamrup (hilly areas of Khetri of Dimoria Block); Dhemaji district (Poba Reserve Forest).

Exsiccatae: Dhemaji District (Poba Reserve forest) *Nijara Goswami* 21, dated 24.09.2010.

Uses: Aerial bulbs and underground tubers are eaten (Roy *et al* 1998; Boro *et al* 2011). (Fig. 6)

Dioscorea hamiltonii Hooker f., Fl. Brit. India 6: 294. 1892; Rao & Verma, Bull. Bot. Surv. India 15: 200. 1973.

Common name: Not known; **Local name:** *Bon alu* (Ass).

Distribution: Western Indo China; Malaysia. Tropical and sub-tropical regions of India.

Assam: Goalpara, Kamrup, Darrang, North Cachar Hill District and in low lying forest close to the southern border of the Nagaon District.

Exsiccata: Goalpara, *Nijara Goswami* 38, dated 11.10.2011.

Uses: The tubers are very tasty to eat, but it lies so deep in the soil that it is very difficult to dig it out. (Fig. 7)

Dioscorea hispida Dennstedt, Schluss. Hort. Malab. 15:33. 1818; Prain & Burkill Kew

Bull. 237, 1927; Ochse, *Veget. D. E. I.* 250, 1931; Prain & Burkill, *Ann. Roy. Bot. Gard. Calc.* 14: 188. 1936; & *J. Asiat. Soc. Beng. new ser.* 10: 25. 1914; R. Knuth, *Pfl.* 87: 131. 1924. *D. daemonia* Roxburgh, *Fl. Ind.* 3: 805. 1832; Hooker *f.*, *Fl. Br. India* 6: 289. 1892; Ridley, *Mat. Fl. Mal. Pen.* 2: 80. 1907.

Common name: Asiatic bitter yam, Intoxicating yam; **Local name:** *Tin patia alu* (Ass), *Hasyaluka* (Sans), *Podava Kelengu* (Malayalam), *Baichandi*, *Dukar kand* (Marathi), *Kavalakodi* (Tamil), *Puli dumpa* (Telegu).

Distribution: Occurs naturally from India and southern China, through southeast Asia to New Guinea.

Assam: Kamrup, Sibsagar and Tinsukia District.

Exsiccata: Sarania hillsise, Ulubari, Guwahati, *Nijara Goswami* 50, dated 30.09.2012.

Use: Tuber anti-infectious, hemostatic, anthelmintic, antioxidant, anti-inflammatory, analgesic and antitumorous. Tubers consumed after removal of toxins (Degras 1983; Roy *et al.* 1998). (Fig. 14)

Dioscoria laurifolia Wallich (Cat. lith. 5111, 1830) *ex* Hooker *f.* *Fl. Brit. Ind.* 6 : 293, 1892; Ridley *Mat. Fl. Mal. Pen. Monocot.* 2: 83. 1907; Prain & Burkill, *J. Asiat. Soc. Beng. II.*, 10: 39, 1914; Knuth, *Pfl. R.* 87: 289. 1924; Ridley, *Fl. Mal. Pen.* 4 : 319, 1924; Prain & Burkill, *Ann. Roy Bot. Gard. Calc.* 14: 222. 1938.

Common name: Not known; **Local name:** Not known

Distribution: Malaya Peninsula; India: Arunachal Pradesh; **Assam:** Kamrup

Exsiccatae: New record for Assam. Kamrup Metro (Ulubari, Sarania Hill) *Nijara Goswami* 46, 47 & 48, dated 30.09. 2012.

Uses: Not known (Fig. 8, 9).

Dioscorea pentaphylla Linnaeus, Hooker *f.*, *Fl. Brit. India* 6: 289.1892; Rao & Verma, *Bull. Bot. Surv. India* 15:193. 1973.

Local name: *Punch patia alu* (Ass.), *Tha ganda* (Boro), *Suaralu* (B), *Bhusa*, *Gazaria*, *Kanta alu* (H).

Distribution: Malaysia, China, India, Andaman & Nicobar Islands. **Assam:** Goalpara, Kamrup, N. C. Hills, Lakhimpur, Tinsukia, Dibrugarh.

Exsiccatae: Kamrup District, Baihata Chariali, Lankeshwar hill of Jalukbari, Topatali Village of Dimoria Block; Lakhimpur District; Karbi Anglong, Samparidia. *Nijara Goswami* 08, dated 25.09.2009.

Uses: Tubers consumed after repeated boiling and washing. Leaves eaten in time of scarcity. Flowers consumed as vegetables (Roy *et al.* 1998). (Fig. 13)

Dioscorea pubera Blume, *Enum. Pl. Java* 1: 21.1927; Rao & Verma, *Bull. Bot. Surv. India* 15:199. 1973; *D. anguina* Roxburgh, *Fl. India* 3: 803. 1832; Hooker *f.*, *Fl. Brit. India* 6: 293. 1892.

Common name: Not Known; **Local name:** *Haldia alu* (Ass); *Kukur alu* (B); *Kasalu* (H); *Tha ja* (Garo); *Ta shap* (Cacharis); *Rui re* (Mikir).

Distribution: South East Asia and Malaysia. Tropical and sub-tropical regions of India.

Assam: Chandrapur and Topatali hillside of Kamrup (Metro) District; Tinsukia District.

Exsiccatae: Kamrup District (Kamalajari hillside near Sonapur of Dimoria block), *Nijara Goswami* 26 & 27, dated 24.09.2010.

Uses: Tubers and bulbils washed properly and cooked as vegetables by local tribes. Tuberous rhizome and bulbils are used as medicine for the relief of colic pain (Roy *et al* 1998; Degras 1983). (Fig. 5)

Dioscorea trinervia Roxburgh *ex* Prain & Burkill, J. Asiatic Soc. Beng. n.s. 10: 32. 1914; Rao & Verma, Bull. Bot. Surv. India 15: 197. 1973; *D. oppsitifolia*, Hooker *f.* in Fl. Brit. India 6: 292. 1892.

Common name: Not known; **Local name:** *Phan um* (Khasi); *tha-nairang* (Cacharis); *rui-ring* (Mikir).

Distribution: Western Indo-China; North-Eastern India. **Assam:** Along the Brahmaputra valley, Kamrup District (Rani, Topatali of Dimoria Block); N.C. Hill District (Samparidia).

Exsiccatae: Kamrup (Topatali) *Nijara Goswami* 43, dated 11.11.2011; Kamrup (Rani) *Nijara Goswami* 48, dated 10.10.2011.

Uses: Tubers edible among the tribes like Khasis, Cacharis and Mikir. (Fig. 4)

DISCUSSION

In the present work, twelve species has been recorded from different parts of Assam. Out of these, seven species belongs to the section Enantiophyllum, three to Lasiophyton and only one species each to the sections Combilium and Opsophyton. *D. alata* is the highest tuber yielding and most commonly edible species of *Dioscorea* found in this region. By trial and error the common people has selected several varieties/land races of this species that yield larger starch rich tubers for cultivation. In most of the tribal areas of Assam this species is considered as one of the important supplementary food sources and probably for which the tuber of this species is also associated with the harvesting festivals of most of the ethnic groups of Assam including the ritual “Agni-puja” observed during the occasion of “Magh or Bhogali Bihu” by the Assamese community. The most commonly used species in the section Lasiophyton is *D. pentaphylla*. In Assam this species is frequently found in thick forests or forest edges as it abundantly produce globular and small bulbils which are non-toxic. In *D. hispida* dioscorine is present in the entire plant (Degras 1983). In spite of its high toxicity, the tubers, that are developed at a very superficial level in the soil (protected from the predators due to high toxicity), are consumed by the ethnic groups of Assam after repeated detoxification processes. *D. esculenta* is grown to a large extent in South East Asia and ranks third in the production and use of yams after *D. rotunda*, *D. cayenansis* and *D. alata* (Peter 2007). In Assam also it is widely distributed and cultivated in different parts and popularly and locally known as “Moa alu”.

The study reveals that species of *Dioscorea* are very important from food security point of view at least in North-East India. Many species, especially *D. alata*, *D. esculenta* and *D. pentaphylla* are widely used as food and also marketed. Further explorations might result in addition of some more useful species / varieties from this region.

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PLATE - I: Recorded species of *Dioscorea* Linnaeus from Assam. **1.** Female inflorescence of *D. alata*; **2.** Male inflorescence of *D. alata*; **3.** Tuber of *D. alata*; **4.** *D. trinervia*; **5.** *D. pubera* with bulbils; **6.** *D. glabra*; **7.** *D. hamiltonii*; **8.** Male inflorescence of *D. laurifolia*; **9.** Fruits of *D. laurifolia*; **10.** *D. decipiens*; **11.** *D. esculenta* [tubers in inset]; **12.** *D. bulbifera* with bulbil; **13.** *D. pentaphylla*; **14.** *D. hispida*; **15.** *D. cumingii*

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