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Food and medicinal values of certain species of *Dioscorea* with special reference to Assam

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Abstract

The genus *Dioscorea* belonging to the family Dioscoreaceae, commonly known as yam, comprises of about 600 species distributed throughout the world, but mostly in tropical region. Most species contain steroid saponins and also sapogenins, such as diosgenin, which is the starting material for synthesis of many steroidal hormones used as anti-inflammatory, androgenic estrogenic and contraceptive drugs. The members of the genus *Dioscorea* are one of the oldest tuber crop cultivated or harvested from wild in the tropical region throughout the world and constitute one of the major food item for many ethnic groups. The genus is considered to be among the most primitive of angiosperms and was known to occur and well diversified approximately 75 million years ago in parts of the southern hemisphere at the end of the cretaceous period. The yams are subsequently introduced in several parts of the world and the early spread appears to have been *via* Antarctic continent. The present paper deals with 16 species occurring in Assam India which have been used as a source of food and to cure certain ailments by one or the other ethnic communities of the region.

Keywords: Food, Medicinal, *Dioscorea*, Assam.

1. Introduction

Since the ancient times human beings have been using plants more particularly as a source of food. They also studied the available plant material and distinguished between poisonous and non-poisonous plants i.e. whether they are edible or non-edible through trial and error methods. By the same time by knowingly or unknowingly they also get the benefits from the plants while using them as food. Gradually knowledge of drugs developed. It is the Rig Veda where the use of medicinal plants was mentioned first. Later on, between 2,500 & 500 B.C the use of medicinal plants was incorporated in Ayurvedic system of treatment.

Importance of plants as sources of drug or medicine are due to the presence of some chemical substance or substances in their tissues. In the beginning drug plants were used as such or the drugs were prepared in the crude form as paste, decoction, etc. But with the progress of science and technology, the active principles of several plants have been isolated for use. The important chemical substances present in plants are mainly alkaloids, glycosides, corticosteroid, essential oils, C, H, O, N, etc. If these substances produce a definite physiological action on human body, then it may either be beneficial or harmful but sometimes it may even cause death.

Different ethnic groups have been using several species of *Dioscorea* in their area of habitations as a source of food due to its high starch content & calorie value and also to cure certain ailments. Most of the species of *Dioscorea* have a wide adaptability to diverse agro climatic condition.

2. Chemical Composition

Diosgenin an aglycone is a chemical substance found in *Dioscorea* and are used commercially in pharmaceutical industry. Apart from diosgenin, dioscorin, dioscin and other alkaloids are also found. Root contains phytosterols, alkaloids, tannin and rich source of starch. Other substance found are aluminium, ascorbic acid, ash, beta-carotene, calcium, chromium, cobalt, iron, magnesium, manganese, niacin, potassium, phosphorus, protein, riboflavin, selenium, silicon, sodium, thiamine, tin, zinc.

3. Materials and Methods

The present work is based both on a review of literature and first hand information gathered through field studies conducted among different ethnic groups in north-eastern India. With the

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help of local informants and through interviews from the local people, the data regarding the use of plants as food and their medicinal values were collected. The plant materials collected during the field studies were pressed, preserved and dried following the standard method of preparation of herbarium techniques (Jain & Rao 1997).

4. Ethnobotanical Findings

The present investigation is based on certain 16 species of *Dioscorea* that are found in Assam. They are enumerated below along with their botanical names; common names; habitat; brief description; biological status; parts used together with ethno botanical and ethno medicinal uses. The medicinal uses of plants listed here are indicative and some of them are accompanied by doses, therefore the readers are not encouraged to follow them without verification.

1. *Dioscorea alata* L. Common name: Kath Alu (As.), Kham Alu (Beng, TGC), Thaphukhlong (DI), Banra (HR), Bahra (HM), Ruichin (Karbi). Habitat: Climber. Brief description: Leaf cordate, dark green; stem angular. Biological status: frequent. Part used: Tuber. Ethno botanical and ethno medicinal uses: Tubers are boiled with arums, mushrooms, cooked with vegetables and mixed with rice. Tuber paste is applied on cancerous wounds, leprosy, gonorrhoea, blood pressure and in skin diseases. 2-3 gm of paste of the tuber is tied on the infected part of the body [1, 8, 12, 13, 20, 24, 25, 26].
2. *Dioscorea esculenta* (Lour.) Brukill. Common name: Moa Alu (As.), Ruipheng silu (Karbi). Habitat: Climbing shrub. Brief description: Leaves cordate with sharp stipular thorns stem ribbed; tuber white. Biological status: Not known. Ethno botanical and ethno medicinal uses: Mature tubers are boiled and eaten to increase low weight-1 tuber is taken in the morning and one in the evening for 15 days [6, 8, 12, 24].
3. *Dioscorea pentaphylla* (Linn.) Common name: Paspotia Alu (As.), Thaphin (DI), Ram bahra (HM), Baha (MI), Ruipheng (Karbi). Habitat: Climber found wild or domesticated. Brief description: Leaves digitate; stem ribbed; tubers hairy, black outside, inner fleshy and white. Biological status: Frequent. Ethno botanical and ethno medicinal uses: Tubers are boiled, eaten with salt, chilli or baked during scarcity of rice. They are used in stomach ache, constipation, indigestion, abdominal pain, dysentery, cough, cold, asthma, tuberculosis, skin wounds, boils, sunburn, cuts and injury. Raw tuber is given to cattle to cure diphtheria. Decoction of tuber is given to animals for early recovery of fractured bones. Powder of tuber is given orally in abdominal pain after delivery [1, 3, 6, 8, 10, 12, 24].
4. *Dioscorea pubera* Blume Common name: Ruichelong (Karbi). Habitat: Climber. Brief description: Leaves cordate; stem ribbed; tuber white. Biological status: Not known. Ethno botanical and ethno medicinal uses: Tubers boiled, mixed with rice, salt and eaten as famine food [6, 24].
5. *Dioscorea bulbifera* L. Common name: Gosh alu, Mas alu, Tikor alu (As.), Thaphumiyung-wablai (DI), Ruipan (Karbi). Habitat: Climber, found wild or domesticated. Brief description: Stem angled, leaf cordate, Flesh white. Biological status: Wild. Ethno botanical and ethno medicinal uses: Tubers are roasted, cooked as vegetable and as pig fodder. Used in leprosy, asthma, cough, cold, tuberculosis, contraceptive, constipation, indigestion, abdominal pain, dysentery, sore throat, Struma, wounds, boils, cuts, injury, carbuncle, tumour and also used as refrigerant to reduce body heat during summer. Root powder is used as component of local medicine for tuberculosis. It maintains kidney function. Also used in diseases of lungs, spleen, diarrhoea, improving digestion and metabolism. Bulbils cure typhoid of children. Fresh tuber decoction cures laryngitis in children, insect bite, ring worm, goitre, and fever. Tubers are also used for the treatment of purgative, deflatulent, aphrodisiac, rejuvenating and tonic anthelmintic, haemorrhoids, scrofula, worm infestations, general debility and polyuric [1, 3, 7, 8, 9, 11, 13, 14, 15, 16, 17, 18, 19, 20, 23, 27].
6. *Dioscorea villosa* Willd. Ex Kunth. Common name: Thapu-nairo (DI). Habitat: Climber found wild. Brief description: Medium tuber, Light red-purple bark and flesh. Biological status: Frequent. Ethno botanical and ethno medicinal uses: Mainly used as pig fodder. Sometimes soft tubers are cooked and eaten. Regulates female sex hormones and is considered a good herb for symptoms associated with menopause. It is a good antispasmodic and can be used for cramps, coughs, hiccoughs, muscular spasms, croup and gas. It is considered good for loosening phlegm, inducing vomiting and increasing urine flow, contraceptive manufacture, rheumatism, arthritis, digestive disorders including gall bladder inflammation, irritable bowel syndrome (IBS) & diverticulitis. Root is used to sooth dysmenorrhoea, allay uterine and overine pain. It helps women with menopausal & PMS symptoms. It is also good for labour pain and prevents early miscarriage. Root decoction relives the pain of child birth, good for nausea that can be experienced during pregnancy [1, 3, 21].
7. *Dioscorea aculeata* L. Common name: Thagdi (DI), Barhtlum (HM). Habitat: Climber semi domesticated. Brief description: Bark and flesh white. Biological status: Occasional. Ethno botanical and ethno medicinal uses: Tubers are boiled and also used as vegetable for its sweet taste [1].
8. *Dioscorea orbiculata* Hook. F. Common name: Thapurhemin (DI). Habitat: Climber found wild. Brief description: Small long slender tuber, bark and flesh light yellow. Biological status: Frequent. Ethno botanical and ethno medicinal uses: Used as pig fodder and sometimes as vegetable [1].
9. *Dioscorea hispida* Dennst. Common name: Hati-muria alu (As.), Thadangjia (DI). Habitat: Creeper/Climber. Brief description: Small tuber, leaflet three. Biological status: Rare. Ethno botanical and ethno medicinal uses: Tubers are poisonous but consumed at the time of severe food shortage by some ethnic groups. After keeping the tubers overnight in water or after boiling, it can be eaten as vegetable. They are also used in making alcohol and as refrigerant to reduce body heat during summer. Tuber paste is applied on affected parts to treat "harinad" (peeling of skin of feet) [10, 23, 31].
10. *Dioscorea deltoidea* Wall. Common name: Kukur tarul (Nepali). Habitat: Climber. Brief description: Leaves alternate, simple; stem light brown to purplish brown; rhizomes horizontal, ginger shaped. Biological status: Not known. Ethno botanical and ethno medicinal uses: 2-3 gm of rhizome is given orally to get relief from snake bite. Paste of tuber is used to kill body lice. It was also heavily

used to wash clothes before soap was available [2, 8, 21, 28,31].

11. *Dioscorea sativa* L. Common name: Kath Alu (As.). Habitat: Climber. Brief description: Leaves simple, stem with axillary bulbils, smooth. Biological status: Not known. Ethno botanical and ethno medicinal uses: Tubers are cooked and eaten as vegetable [8].
12. *Dioscorea arachnida* Prain et Bruk. Common name: Tinipotia alu (As.), Ruisanglang (DI). Habitat: Climber. Brief description: Tubers oblong with long stalk, flesh white, leaves three foliate. Biological status: Not known. Ethno botanical and ethno medicinal uses: Tubers are boiled or roasted and occasionally used in curries. Whole plant is sometimes seen under cultivation in household gardens [23, 32].
13. *Dioscorea oppositifolia* L. Common name: Not known. Habitat: Climber. Brief description: Tubers single, cylindrical, bulbils not seen, leaves alternate. Biological status: Not known. Ethno botanical and ethno medicinal uses: Not known [2].
14. *Dioscorea hamiltonii* Hk.f. Common name: Ban-tarul (Nepali), Ruikaulang (Karbi). Habitat: Climber. Brief description: Leaves simple, opposite, bulbils absent. Biological status: Not known. Ethno botanical and ethno

medicinal uses: Tubers are used to cure dysentery. They are boiled, roasted and eaten. The plant is also offered to God in religious activities [2, 20, 24, 31].

15. *Dioscorea trinervia* Roxb. Ex Prain & Burk. Common name: Thassap (DI), Jun se-pi (HR), Reucheu (ZE). Habitat: Climber. Brief description: Leaves alternate and opposite, tubers cylindrical. Biological status: Frequent. Ethno botanical and ethno medicinal uses: Tubers are edible, used for the treatment of poor appetite, chronic diarrhoea, asthma, dry coughs, and diabetes. Also used to treat snake bites and scorpion stings [22].
16. *Dioscorea bellophylla* (Prain) Voigt ex Haines. Common name: Ruiding (Karbi). Habitat: Climber. Brief description: Leaves opposite. Biological status: Not known. Ethno botanical and ethno medicinal uses: Tubers are boiled or baked in open fire and eaten. It lowers blood cholesterol by reducing heart disease [12, 24, 29, 30].

[Abbreviations used: As- Assamese, Beng- Bengali, TGC- Tea Garden Community, DI- Dimasa, HR- Hrangkhoh, ZE- Zeme Naga, HM- Hmar, MI- Mizo]

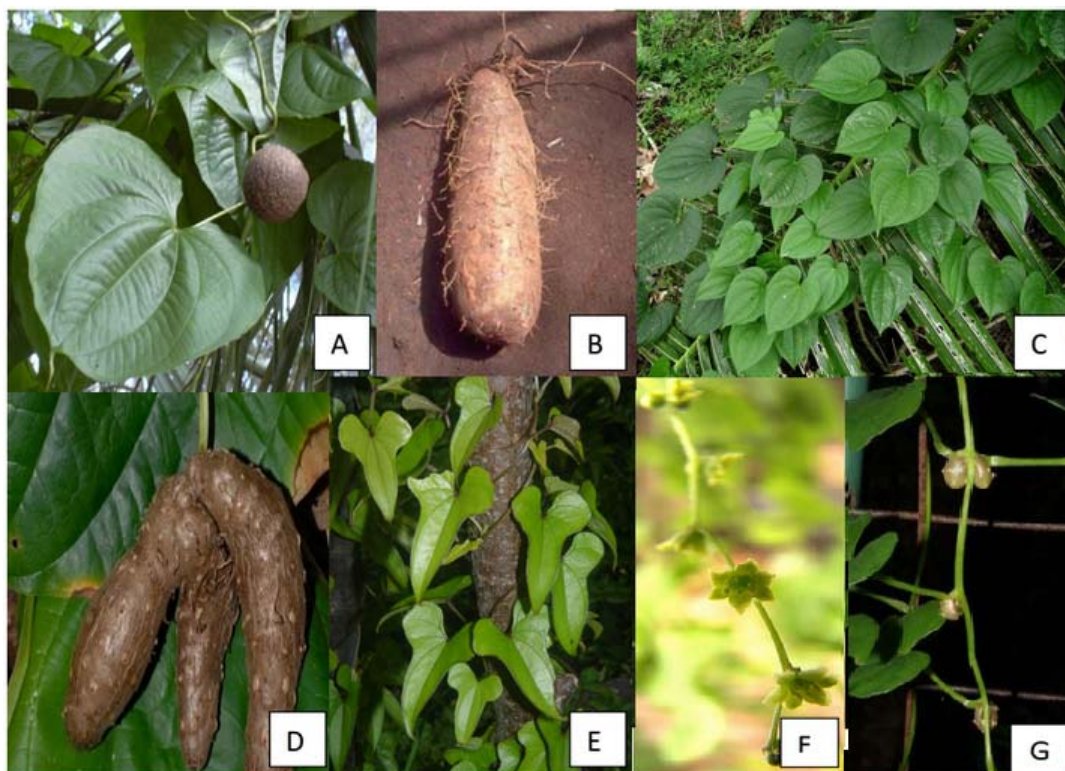


Fig: A- *Dioscorea bulbifera* with bulbil. B, D- Tuber of *Dioscorea alata*. C- The habit of *Dioscorea alata*. E- *Dioscorea trinervia*. F- Flowering twig of *Dioscorea deltoidea*. G- Bulbils of *Dioscorea oppositifolia*.

5. Discussion and Conclusion

Ethno medicinal uses of 16 species of *Dioscorea* have been documented for their therapeutic properties for curing various ailments such as cough, cold, stomach ache, leprosy, burns, fungal diseases, skin diseases, contraceptive, dysentery, arthritis, rheumatism, etc and among these species *Dioscorea alata*, *D. pentaphylla*, *D. bulbifera* and *D. villosa* showed the maximum medicinal properties. *D. deltoidea* is quite exceptional because extract of its tubers is mostly used as a detergent to wash clothes and as an insecticide. It is not used for culinary purpose because of the presence of hard and fibrous tubers and its poisonous nature. Again consumption of

D. bellophylla lowers blood cholesterol and thereby reducing the chances of heart attacks. *trinervia* can cure chronic diarrhoea, asthma and diabetes. On the other hand *D. hamiltonii* is used in religious rites. *D. arachnida* is valued for its edible tuber and seen only under cultivation in household gardens. Some species like *D. hispida* are poisonous although they are eaten after removing the toxic substances during famine. It is seen that tubers or rhizomes of almost all the species are edible. They are eaten boiled or roasted or as vegetables or cooked with mushrooms and other vegetables in curries. The most preferred and valuable edible species recorded are *D. alata*, *D. esculenta*, *D. pentaphylla*, *D. pubera*,

D. bulbifera, *D. aculeata*, *D. sativa* and *D. arachnida*.

From the study it can be inferred that although ethnic groups are dependent on plant resources for curing various ailments yet this kind of dependence has been decreasing during recent years. This may be due to the lack of confidence of young generation in the traditional medicine systems and availability of modern medicines. Proper steps must be taken to protect and conserve these plants as they are used for various medicinal purposes and household food.

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