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DILLENIA INDICA (OUTENGA) AS ANTI-DIABETIC HERB FOUND IN ASSAM: A REVIEW

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ABSTRACT

Dillenia Indica, commonly known as elephant apple and locally known as outenga, is the handsome evergreen tree grows in the moist forest of sub-Himalayan region to Assam. The fruit grows in abundance and due to lack of knowledge and technical knowledge; most of these fruits are wasted. In Assam, traditionally the unripe fruits are used to make curries because of its sour taste and ripe fruits are making pickles. The fruits are generally high in fibre and due to presence of gummy substances, extraction of juice becomes difficult. The plant grows about 15 m tall. Not only the fruits have medicinal values but the leaves and the bark also showed numerous pharmacological activity. The studies showed that the plant possesses various activities like Antimicrobial, Antioxidant, Analgesic, Anti-inflammatory, dysentery, Antidiabetic etc. The fruits and the juice of the plant are traditionally used for the treatment of various diseases and one of the major diseases is Diabetes Mellitus. It was also proved from the review of literatures that this plant possesses some antidiabetic properties (Sunil kumar et.al). Thus in this review we gave some emphasise on the traditional and clinical use of *Dillenia Indica* (outenga or elephant apple) as an antidiabetic herb.

INTRODUCTION: *Dillenia Indica* (outenga or elephant apple) is the common fruit that is an integral part of grandma's recipe, which has more to it than just its bitter taste and flavour. It is also a favourable dish of Assamese cuisine**.** The jelly like pulp of the fruit is applied to scalp for curing dandruff and falling hairs. The sepals are traditionally used for stomach disorder.

The *D. Indica* is an evergreen large shrub or small to medium-sized semi deciduous, branches spreading tree growing to 15 m tall. Leaves are fascicled at the end of the branches, oblong-lanceolate, acuminate, 20-30 cm long and sharply serrate[1]. Flowers are white, large, up to 15 cm diameter, solitary, towards the end of each branchlet. The fruit are large with 7.5-10 cm diameter.

In the present review an attempt was made to focus *D. Indica* for it's as anti-diabetic use. Allopathic medicines used for treatment of diabetes have side-effects in the long run. So it is better to use indigenous traditional knowledge system to treat diabetes.

Scientific classification:

Kingdom	:	*Plantae*- Plants
Subkingdom	:	*Tracheobionta*- Vascular plants
Superdivision	:	*Spermatophyta*- Seed plants
Division	:	*Magnoliophyta*- Flowering plants
Class	:	*Magnoliopsida*- Dicotyledons

Subclass : *Dilleniidae*

Order : *Dilleniales*

Family : *Dilleniaceae* – Dillenia family

Genus : *Dillenia* L. - dillenia

Species : *Dillenia indica* L. - chulta

FIGURE 1: IMAGE OF *DILLENIA INDICA* FRUIT

Other name:

English : Elephant Apple, Indian catmon, Hondapara Tree, Ma-tad

Hindi : Chalta, Karambel

Sanskrit : Avartaki

Assamese : Outenga

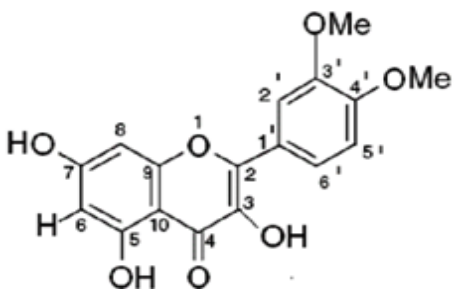
Bengali : Chalta, Chalita

Traditional and medicinal uses: *D. Indica* (Outenga) is one of the widely used herbs by the various tribes of entire North East along with Assam [2]. It is one of the evergreen plants found in wild forest. Traditionally, the jelly like content inside the fruit was used to treat dandruff and falling hairs. It was also found traditionally that in various part of Northeast India the juices of leaves, bark and leaves were mixed and given orally for the treatment of cancer and diarrhea [3, 4]. The leaves and bark are used as a laxative and astringent [5].

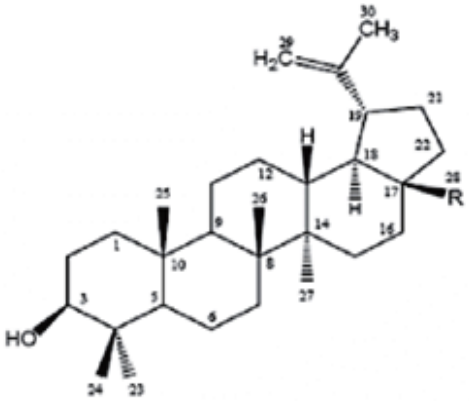
The review of various literature showed that the leaves, bark, fruits or the various part of the *D. Indica* (Outenga) have extensive medicinal values. It possesses various activities like Antimicrobial [6, 7], Antioxidant [7, 8, 9], Analgesic [10], Anti-inflammatory[11], Dysentery [12], Antidiabetic [13, 14] etc. Thus the *D. Indica* has a wide range of activity which makes the fruit or the whole plant a gift for human being.

Phytochemical Constituent: The phytochemical constituent of *Dillenia indica* Linn. crude extract include Glycoside, Steroids, Flavonoids, Saponines and reducing sugar. The investigation of the phytochemical constituent indicates that the leaves are provided a rich source of triterpenoids and flavonoids [15]. It also reported to contain various chemical constituents like 3, 5, 7-trihydroxy-3', 4'-dimethoxy flavone (dillenetin), betulinic acid, β-sitosterol and stigmasterol [15, 16].

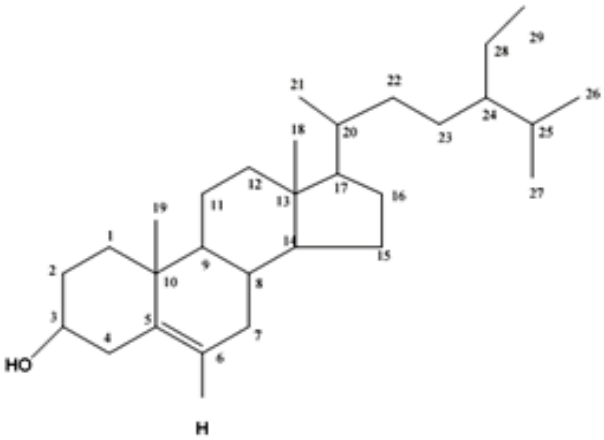
Chief contents of the fleshy sepals are tannins, malic acid, arabinogalactan and glucose. They also contain an arabinogalactan, betulin, betulinic acid and flavonoids. Bark and wood contain flavonoids, betulin, betulinic acid, betulinaldehyde, lupeol, β-sitosterol, myricetinhydroxy-lactone, dihydroisorhamneti, dillentin and glucosides. Stem bark contains betulinaldehyde, betulin, lupeol, β-sitosterol, myricetin, a new hydroxylactone, dihydro-isorrhamnetin, dillentin and glucosides**.**



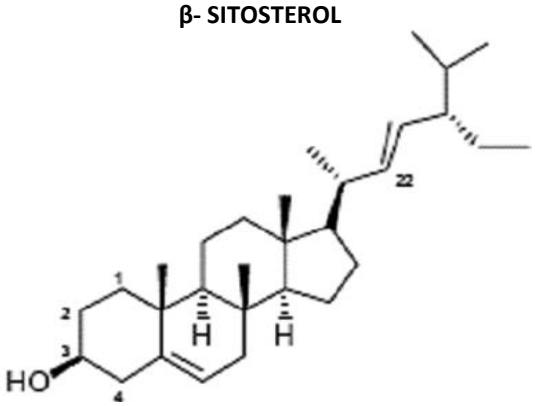
DILLENETIN



BETULINIC ACID (R=COOH)



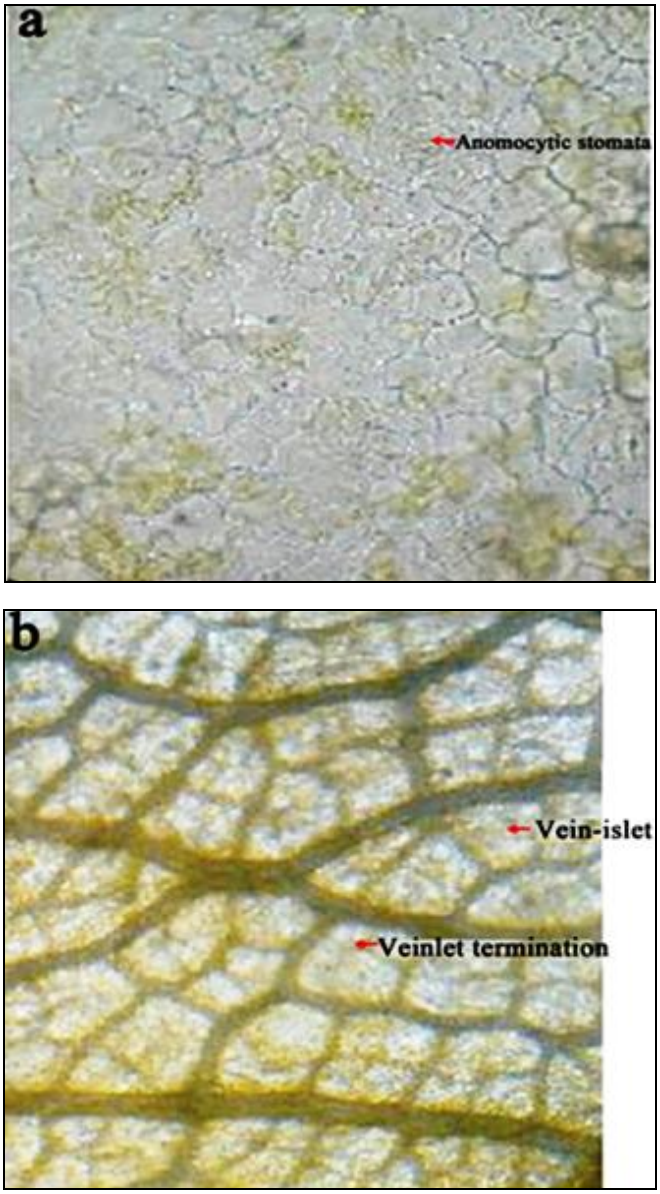
β- SITOSTEROL



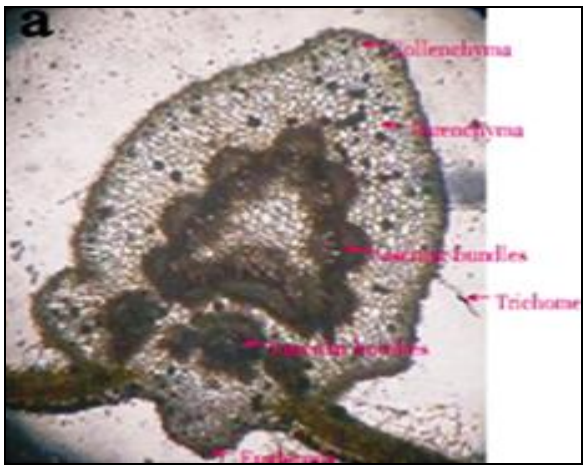
STIGMASTEROL

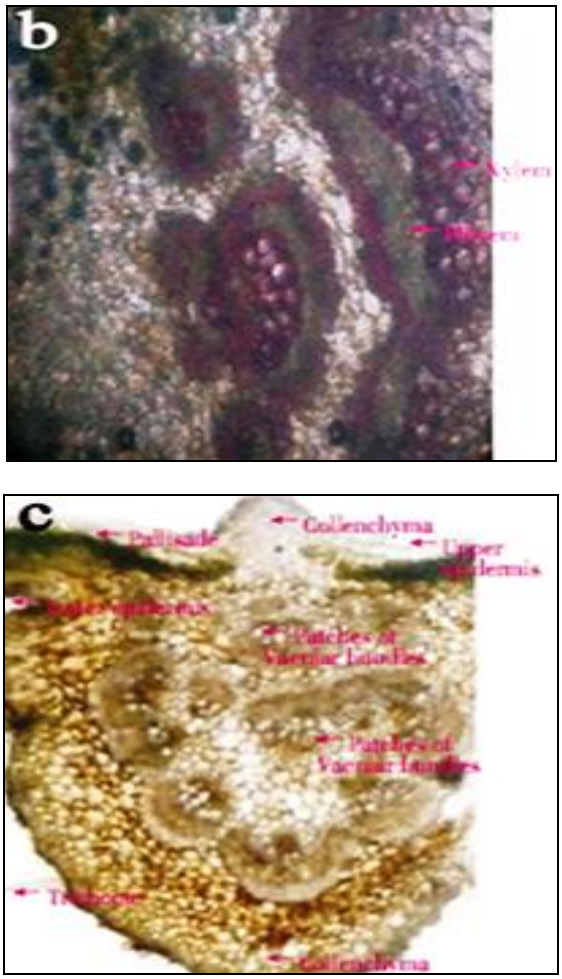
Leaf microscopy[1]: *D. indica* is an herb of Dilleniceae family which is further characterise by the presence of anomocytic types of stomata. Leaf surface also shows the presence of veins, vein-islets and vein terminations. Transverse section of leaf shows the epidermis layer, and patches vascular bundles (xylem and phloem), collenchymas, etc.

The vascular bundles were stained pink with phloroglucinol and conc. HCl. Trichomes are unicellular and lignified. Strips of collenchyma are present below and upper layer of epidermis.



a) Anomocytic stomata; b) Veins, veinlet termination & vein-islet
FIGURE 2: LEAF SURFACE OF *D. INDICA*

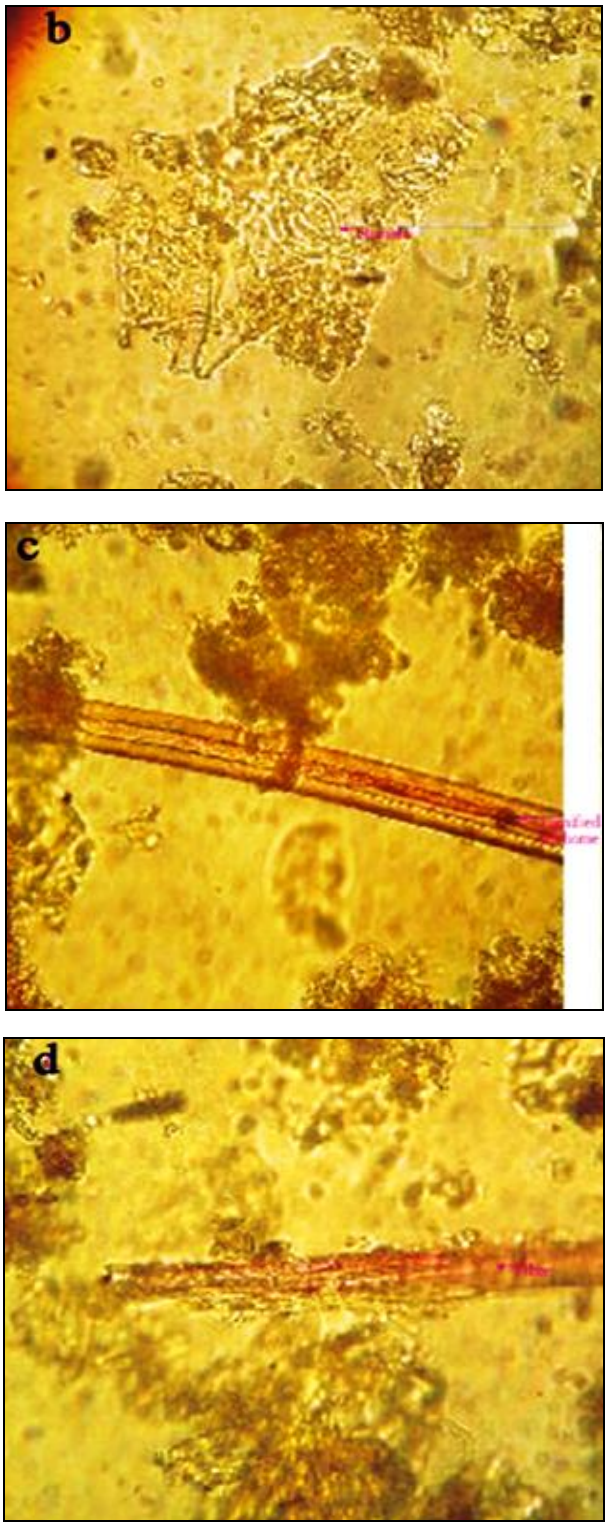




a) T.S. (stained) of *D. indica* leaf; b) Vascular bundles; c) T.S. (unstained) of *D. indica* leaf

FIGURE 3: TRANSVERSE SECTION OF *D. INDICA* LEAF

Powder Microscopy [1]**:** The characteristics of powder microscopy showed the presence of unicellular lignified trichomes, anomocytic stomata, calcium oxalate crystals, epidermal cells, xylem vessels, etc.



a) Calcium oxalate crystals; b) Stomata; c) Unicellular lignified Trichomes; d) Fibre

FIGURE 4: POWDER CHARACTERISTICS OF *D. INDICA* LEAF

Antidiabetic activity: Sunil kumar *et al.*, [13, 14, 17] carried out an investigation to know the antidiabetic activity of bioactive fraction of D. indica methanolic extract in experimental diabetic Wistar rats. They induced type-I diabetes in Wistar rats by single intraperitoneal

injection of Streptozocin (60 mg/kg body weight) and type-II diabetes was induced by single intraperitoneal injection of Streptozocin (60 mg/kg body weight) followed by intraperitoneal injection of Nicotinamide (120 mg/kg body weight) after 15 mins. The rats were treated by administering graded oral doses of isolated ethyl acetate fraction of methanolic extract of *D. indica* for 21 days. They found a significant reduction in blood glucose level for both the experimental rats.

The possible mode of action of the plant extract might be by potentiation of the insulin effect by increasing the pancreatic secretion of insulin from cell of islet of Langerhans or its release from the bound form or regeneration of the cells.

CONCLUSION: Diabetes stands as one of the foremost health troubles worldwide. Therapies developed along the principles of western medicine are often limited in efficacy, carry the risk of adverse effects, and are often too costly, especially for the developing world. Therefore, treating diabetes with plant-derived compounds and traditional medicines has always a superior advantage. In this review article, an attempt has been made to find out the use of *Dillenia Indica* (outenga or elephant apple) as an antidiabetic herb. It has exhibited significant clinical & pharmacological activity and widely found in various region of Assam.

The potency of herbal drugs is significant & they have negligible side effects than the synthetic antidiabetic drugs. There is increasing demand by patients to use the natural products with antidiabetic activity. In recent times there has been renewed interest in the plant remedies. Plants hold definite promises in the management of Diabetes mellitus. Isolation & identification of active constituents from these plants, preparation of standardized dose and dosage regimen can play a significant role in improving the hypoglycaemic action.

REFERENCES:

1. Sunil K, Vipin K and Om P: Microscopic evaluation and physiochemical analysis of *Dillenia indica* leaf. Asian Pacific Journal of Tropical Biomedicine, 2011, 337-340.
2. Sandipan D, Khan ML, Abhijit R and Bhattacharjya DK: Ethnomedicinal plants of Manas National Park, Assam, Northeast India. Indian Journal of Traditional Knowledge, 2009, 8:514-517.
3. Sunil K, Vipin K and OM P: Free Radicals scavenging effect of *Dillenia indica* leaves. Asian Journal of Pharmaceutical and Biological Research, 2011, 1:169-173.
4. Yeshwante SB, Juvekar AR, Pimprikar RB, Kakade RT, Tabrej M, Kale MK and Firke SD: Anti-Diarrheal Activity of Methanolic and Aqueous Extracts of Dillenia indica Leaves. Research Journal of Pharmacology and Pharmacodynamics, 2009, 1:140-142.
5. Sharma HK, Chhangte L and Dolui AK: Traditional medicinal plants in Mizoram, India. Fitoterapia, 2001, 72: 14-61.
6. Badrul Alam M, Sarowar HM and Ekramul HM: Evaluation of Antimicrobial and Toxicity of Different Fractions of *Dillenia Indica* Linn. Bark Extract. Journal of Global Pharma Technology, 2010, 2:37-42.
7. Nazma P, Mohammad SR, Mohammad SI and Mohammad AR: Chemical and biological investigations of *Dillenia indica* Linn. Bangladesh journal of pharmacology, 2009, 4:122-125
8. Deepa N and Jena BS: Antioxidant Fraction from Bark of *Dillenia Indica.* International Journal of Food Properties, 2011, 14:1152-1159.
9. Rita A, Tania SU, Aji K and Andre S: Comparison of Antioxidant Activity and Total Phenolic content of *Dillenia Indica* Leaves Extracts obtained using various Techniques. 14th Regional Symposium on Chemical Engineering 2007.
10. Badrul AM, Saifur RM, Hasan M, Maruf Khan M, Kamrun N and Sheema S: Antinociceptive and Antioxidant Activities of the *Dillenia indica* Bark. International Journal of Pharmacology, 2012, 1-9.
11. Yeshwante SB, Juvekar AR, Nagmoti DM, Wankhede SS, Shah AS, Pimprikar RB and Saindane: Anti-inflammatory activity of methanolic extracts of *Dillenia indica* L. leaves. Pharmacology, 2009, 1: 63-66.
12. Ajit kumar D, Dutta BK and Sharma GD: Medicinal plants used by different tribes of Cachar district, Assam. Indian Journal of Traditional Knowledge, 2008, 7:446-454.
13. Sunil K, Vipin K and Om P: Antidiabetic and hypolipidemic activities of *Dillenia Indica* extract in diabetic rats. Journal of Chinese Integrative Medicine, 2011, 9:570-574.
14. Sunil K, Vipin K and Om P: Antidiabetic and antihyperlipidemic effects of *Dillenia indica* (L.) leaves extract. Brazilian Journal of Pharmaceutical Sciences, 2011, 47:373-378.
15. Md. Abdul M, Syed Mohammed T, Apurba S, Debasish B and Mohammad SI: Isolation and Identification of compounds from the Leaf Extract of *Dillenia indica* Linn. Bangladesh Pharmaceutical Journal, 2010, 13:49-53
16. Bose U, Gunasekaran K, Bala V and Rahman AA: Evaluation of Phytochemical and Pharmacological properties of *Dillenia indica* Linn. Leaves. Journal of Pharmacology and Toxicology, 2010, 5:222-228.
17. Sunil K, Vipin K and Om P: Antidiabetic, hypolipidemic and histopathological analysis of *Dillenia indica* (L.) leaves extract on alloxan induced diabetic rats. Asian Pacific Journal of Tropical Medicine, 2011, 4: 347–352.

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