



## An overview on *Diospyros malabarica*

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### Abstract

The medicinal uses and chemical constituents of various *Diospyros* species are now reviewed. About 300 organic chemicals have been isolated and identified. The uniqueness of the genus is the elaboration of a large number of pentacyclic triterpenes and juglone based 1, 4-naphthoquinone metabolites. These metabolites can be used as chemical markers for taxonomic studies. It is a long lived, very slow growing tree, which can reach up to 35 m in height with a black trunk up to 70 cm in diameter. It is used for the treatment of such diseases like cancer, rheumatoid arthritis, liver diseases and atherosclerosis as well as in degenerative processes associated with ageing is the consequence of various metabolic activities in our body that results in the formation of the free radicals. Antioxidant compounds play an imperative role as a health defending factor and are defined as free radical scavengers.

### INTRODUCTION

A medicinal plant is any plant which, in one or more of its organs, contains substances that can be used for therapeutic purposes, which are precursors for chemo-pharmaceutical semi-synthesis. When a plant is designated as medicinal, it is implied that the said plant is useful as a drug or therapeutic agent or an active ingredient of a medicinal preparation. Medicinal plants may therefore be defined as a group of plants that possess some special properties or virtues that qualify them as articles of drugs and therapeutic agents, and are used for medicinal purposes [1]. The WHO has estimated that up to 80 % of the population in Africa and the majority of the populations in Asia and Latin America still use TM for their primary healthcare needs. Plants can provide biologically active molecules and lead structures for the development of modified derivatives with enhanced activity and reduced toxicity. The small fraction of flowering plants that have so far been investigated have yielded about 120 therapeutic agents of known structure from about 90 species of plants. Some of the useful plant drugs include vinblastine, vincristine, taxol, podophyllotoxin, camptothecin, digitoxigenin, gitoxigenin, digoxigenin, tubocurarine, morphine, codeine, aspirin, atropine, pilocarpine, capscicine, allicin, curcumin, artemesinin and ephedrine among others. In some

cases, the crude extract of medicinal plants may be used as medicaments. About 121 major plant drugs have been identified for which no synthetic one is currently available. Plant parts are used in all branches of medicine such as Allopathy, Homeopathy, Unani and the Ayurvedic system [2]. The genus *Diospyros malabarica*. (Ebenaceae), which is distributed throughout the tropics, is characterized by its ability to produce triterpenes of the lupine series. The genus *Diospyros* consists of ca 240 species, 59 of which are distributed in India, Thailand, Japan, Nigeria, South Africa and Philippines [3]. *Diospyros malabarica* (family Ebenaceae) grows throughout India and other tropical regions of the world. The main uses of different part of plants are used for furniture and wood carvings also used as raw material for boats and constructions. Wood density at air-drying is 0.80-1.10 gram/cm, it is very durable and strong and the ripe fruits are edible [4]. Immature fruits contain tannin that can be used for dyeing. Seeds are used in medicine against diarrhea and chronic dysentery and the images of plants of *Diospyros malabarica* are shown in figure 1.

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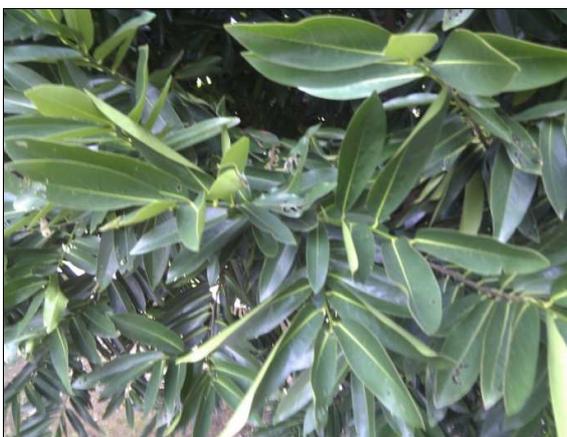
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### Morphological Characteristics of Fruit

The fruit is large in *D. decandra* and small in *D. ehretioides* and *D. confertiflora*. In many species, the young fruit is covered with dense pubescence which becomes thin or disappears as the fruit grows. However, in *D. wallichii* and *D. areolata* the density of pubescence is still high even on mature fruit. When the fruit matures the skin turns yellowish

orange in many species. The fruit of *D. decandra* and *D. malabarica* var. *siamensis* has yellow and reddish brown skin, respectively. Red appears on the brownish yellow ground color in *D. ehretioides*. The fruit of *D. mollis* becomes black when ripened on the tree or within a few days after dropping. When the fruit matures, the flesh becomes very soft but the skin is still hard in most species [5].

**Fig 1. Different Parts of *Diospyros malabarica* plant**



### Other Uses

The fruit, especially when unripe, contains a viscid pulp that is rich in tannins and is the source of a gum. It can be used to caulk boats; to paint the undersides of boats and thus act as a preservative, and as a gum and adhesive in bookbinding. Dark oil prepared from the fruit, this is probably the gum makes an excellent varnish for paper umbrellas and fans. An infusion of the fruit is used to toughen ropes and render them more durable in water. The unripe fruits and also the leaves are a source of tannins that are used for dyeing silk and other clothes black. A valuable and highly decorative hardwood that is strong, hard, dense and very

durable. It is used for items such as luxury furniture and wood carvings, and also as a raw material for boats and constructions. The flowers revealed the presence of different kind of chemical groups such as flavonoids, tannins, alkaloids, saponins and carbohydrates. The *D. malabarica* has been reported to have high antioxidant activity and thus possess hepatoprotective efficacy and various other therapeutic applications [6]. They are as follows

### Anti oxidant of *Diospyros malabarica*

Different *in vitro*, like DPPH, nitric acid, superoxide, hydroxyl radical and lipid peroxide radical model were used in the study. Oxygen reacts with the

excess nitric oxide to generate nitrite and peroxy nitrite anions, which act as free radicals. The extract competes with oxygen to react with nitric oxide and thus, inhibits the generation of anions. Chemical constituents are phenolic compounds. Its stem bark is used for the treatment of intermittent fever and fruit juices for healing of wound ulcer [7].

#### **Antibacterial activity of *Diospyros malabarica***

Active constituent of Diosquinone was isolated from *D. tricolor* inhibited against 11 gram-positive bacteria. Among the gram-positive bacteria active of diosquinone was found to be very active (8.19mm) against *Staph aureus* E<sub>3</sub><sup>+</sup> etc., except *S. faecalis* and *B. cereus*.

#### **Antimicrobial Activity of *Diospyros malabarica***

The present study was conducted in four different solvent extracts of leaves of *Diospyros malabarica* and was screened against reference cultures, clinical isolates and fungal strains under in vitro condition. Among the four solvent extracts of *D. malabarica* tested against selected reference cultures, ethyl acetate extract was found to exhibit the highest activity (24 mm) against *P. aeruginosa* followed by a second higher activity (13 mm) by ethyl acetate, methanol and aqueous extracts against *P. aeruginosa*, *Yersinia enterocolitica* and *Staphylococcus aureus* [8].

#### **Anti-inflammatory activity of *Diospyros malabarica***

Betulin, betulic acid and ursolic acid were isolated from *Diospyros malabarica*. The three triterpenoids compounds have been found to exert pronounced anti-inflammatory activity against different model of experimental inflammation.

#### **Chemical constituents of *Diospyros malabarica* and its species**

The report confirmed that the plant is having some constituents such as alkaloids, flavonoids, steroids, tannins, saponins and triterpenes were detected [9]. Different classes of compounds have been isolated from different species. They are as follows. The main components isolated from the *Diospyros*

species are triterpenes and their steroids compounds. Dichloromethane extract of *D. leucomelos* Poir leaves isolated three triterpenes betulin, betulinic acid and ursolic acid were identified by <sup>1</sup>H and <sup>13</sup>C-NMR spectra studies. The chemical composition of the root of *D. lotus* (L), the chloroform extract separated in four naphthoquinones, 7-methyljugulone, 150 diospyrin, and quinines besides the three triterpenoids, taraxerol, betulinic acid and oxallobetulin [10].

The plant extract showed the presence of different classes of secondary metabolites including alkaloids, flavonoids, phenolics, tannins, saponins, sterols and triterpenoids were confirmed using conventional phytochemical tests. The presence of gallic acid in ethanol extract of *D. malabarica* was confirmed by HPLC using catechin as the standard marker. A Shimadzu HPLC system with LC-10AT, UV detector, and Luna C18 reverse-phase column was used. The mobile phase consisted of 0.1% H<sub>3</sub>PO<sub>4</sub>: acetonitrile (85:15) mixture with flow rate 0.7 mL/min at 25°C, and the detection wavelength was set at 280 nm [11].

#### **CONCLUSION**

The traditional uses of *D. malabarica* are prolong onset of diarrhea, reduction of gastrointestinal motility and inhibition of the synthesis of prostaglandin observed [12]. The above effects of it may also be due to the presence of gallic acid and like tannins and polyphenols in the extract. The protection provided by medicinal plants against oxidative damage to body tissues has been attributed to the fact that these foods may provide an optimal mix of phytochemicals, such as natural antioxidants and other bioactive compounds [13]. Moreover there is a scope that these plants can be used as a therapeutic agent against various liver diseases as they may possess hepatoprotective activity by virtue of its antioxidative potential. Therefore it is a very important the main active ingredients which can be extracted from plants. Moreover, to clarify their role in the treatment of present diseases, and how they can be used to produce or synthesis more effective drugs [14].

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