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Myristica malabarica: A comprehensive review

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Abstract

The plant *Myristica malabarica* Linn belongs to the family Myristicaceae. This plant is endemic to India & found commonly in Western Ghats. It is an important medicinal plant commonly known as Malabar nutmeg, rampatri or Bombay mace. Different chemical constituents such as Malabaricones, Malabaricanal, Isoflavones and many other compounds are isolated and tested for pharmacological activity. *Myristica malabarica* is traditionally used for anti-ulcer, sedatives hypnotics, antimicrobial, nematocidal and as anti-inflammatory. This review has summarized to recent scientific findings of *Myristica malabarica*'s phytochemistry, pharmacological activities of the plant.

Keywords: *Myristica malabarica*, Malabaricones, sedative, hypnotics, anti-ulcer, antimicrobial

Introduction

Myristica malabarica is commonly called as Malabar nutmeg or kaatuhjathi. It is native to India found widely in western ghat hills. *Myristica malabarica* seed and seed aril is used as spice in Indian foods. They enhance the taste and aromatic flavor of the food. Recent scientific studies proved their biological activity according to their traditional claims. They are now known to possess Gastroprotective, Antipromastigote, Antioxidant, Antifungal, Nematocidal, Antiproliferative, Leukemic and Solid tumor.

Plant Description

Myristica malabarica Lam. (Myristicaceae) is a perennial tree about 25m tall. It is endemic to India and found widely distributed in Western Ghats forest region. Now it is a vulnerable species according to IUCN red list. Hence it must be preserved.

Plant Taxonomy

Kingdom : Plantae
Super division : Angiosperms
Phylum : Tracheophyta
Class : Magnoliopsida
Order : Mangoliales
Family : Myristicaceae
Genus : Myristica
Species : *Myristica malabarica*

Synonyms

Myristica dactyloides Wall
Myristica notha Wall
Myristica tomentosa J.Grah
Palala malabarica Kuntze

Common Names

Malabar nutmeg, false nutmeg, Bombay mace.

Vernacular Names

Hindi : Ramptri, Bambah-jayphal.
Kannada : Kanage, Doddajajikai.
Malayalam : Ponnampoo, Kottappannu, Pathiripoovu, Panampalka.
Sanskrit : Bandhukapushpa, Gostani.
Tamil : Colaivenkai, Kattujatikai.
Telugu : Adavijaikaya, Adividzajikaya.

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Habit and Habitat

It is a large 15-25 mts tall perennial tree found evergreen forests upto 800mts. It is a swamp and lowland forest habitat tree. Large trunks with greyish black color. Flowering and fruiting season starts at feb-aug month. It is vulnerable species listed according to ICUN list due to drainage of swamp forests for agricultural purposes.

Ethano Medicinal Uses

The plant *Myristica malabarica* is traditionally used as medicine and spices in food. The aril is used as febrifuge, cooling, expectorant. In Ayurveda, aril is used for many conditions related to vata such as, fever, bronchitis, cough and burning sensation. The fat extracted from seed is used to treat indolent ulcers, analgesics and for rheumatism. In Ayurveda, for disorders in vata seed fat is used for myalgia, sprains and sores. The plant is also used for anti-inflammatory, Analgesic, anti-ulcer, sedative, hypnotic, and antimicrobial actions.

Phytochemical Constituents

The plant *Myristica malabarica* was found to contain various phytoconstituents such as Isoflavones, Diarylnonoids which consists of Malabaricones A-D, Tannins and several other phytochemicals are also considered to be present in the plant. A brief study of phytoconstituents is needed for this plant.

Isoflavones

The heartwood of *Myristica malabarica* is found to have isolation of several isoflavones such as 7, 4'-dimethoxy-5-hydroxyisoflavone, biochanin A, prunetin and a rare alpha-hydroxydihydrochalcone.

Diarylnonoids

The plant is found to consist of different type of Diarylnonoids which are commonly called as Malabaricones. *Myristica malabarica* contains four Malabaricones A, B, C and D. These malabaricones proved pharmacologically for various activity.

Tannins

From the investigation of the heart wood a tannin 1, 3-diarylpropanol is extracted.

Pharmacognostical Review

Morphology

Height: 25 m tall.



Trunk & Bark: Bark greenish-black, smooth, blaze reddish.



Branches and branchlets: Branches- horizontal, Branchlets- subtree, glabrous.

Exudates: Sap red from cut end of bark, profuse.



Leaves: Leaves simple, alternate, distichous; Petiole 1-1.5cm long, caniculate above glabrous, lamina 9.5-22*3.7-10 cm, elliptic or elliptic oblong, apex acute or sub-acute, base acute or attenuate, margin entire, glossy above, glabrous and glaucous beneath, coriaceous; mid rib raised above.



Inflorescence / Flower: Flowers unisexual, uroceolate, white; male flower numerous in number and smaller than female flowers, in axillary cymes; female flowers in umbels, 5-6 flowered.



Fruit and seed: Capsule 5-7.5*1.8-3.5, oblong, pubescent; seed one, Aril covering the seed yellow and lacinate.



Pharmacological Review

Anti-cancer activity

Efficient and sensitive LC-MS/MS methods have been developed for the rapid screening and determination of bioactive compounds in fruit parts *Myristica malabarica*. Moreover, *in vitro* antiproliferative activity of these *Myristica* species was evaluated against five human cancer cell lines A549, DLD-1, DU145, FaDu and MCF-7 using SRB assay. Evaluation of *in vitro* antiproliferative activity revealed potent activity in *Myristica malabarica*.

Anti-diabetic activity

The extract of *Myristica malabarica* is assayed for *in vitro* insulin secretion studies on islets of langerhans at concentration of 1mg/ml. the results were promising and showed dose dependent insulin secretion. Regular use of these spices may prevent postprandial rise in glucose levels through inhibition of intestinal alpha-glucosidase and may maintain blood glucose level through insulin secretagogue action.

Anti-Fungal activity

Methanol extract of fruit rinds of *Myristica malabarica* exhibited potent antifungal activity against phytopathogenic fungi such as rice blast, tomato late blight, wheat leaf rust and red pepper anthracnose. The compounds exhibited antifungal activity are isolated and found out to be Malabaricones A, B and C.

Anti-Microbial activity

Aqueous and Methanolic extract of *Myristica malabarica* is assayed for their activity against multi-drug resistant *Salmonella typhi*. moderate Antimicrobial activity was shown by the methanolic extract of the plant *Myristica malabarica*.

Nematicidal activity

The fruit rinds of *Myristica malabarica* are extracted with methanol. The extract is subjected to nematicidal activity against the *Bursaphelenchus xylophilus* at a concentration of 1000 micro gram per ml and it is found to be very effective against the nematode. Studies show that malabaricones present in the plant *Myristica malabarica* is responsible for nematicidal activity.

Anti-Oxidant activity

The 1, 1-diphenyl 1-2-picrylhydrazyl (DPPH) assay of the ether, methanol, and aqueous extracts of the spice *Myristica malabarica* (rampatri) revealed the methanol extract to possess the best antioxidant activity. Column chromatography of the methanol extract led to the isolation of a new 2-acylresorcinol and four known diarylnonanoids of which the diarylnonanoid, malabaricone C, showed the maximum DPPH scavenging activity. Malabaricone C could prevent both Fe (II)- and 2,2'-azobis (2-amidinopropane) dihydrochloride-induced lipid peroxidation (LPO) of rat liver mitochondria more efficiently.

Anti-Promastigote activity

This study was undertaken to evaluate the antileishmanial activity of the fruit rind of *Myristica malabarica* that is used as a spice and is also credited with medicinal properties. The antipromastigote activity of different extracts/fractions of *M. malabarica* and its constituent diarylnonanoids were evaluated in *Leishmania donovani* promastigotes (MHOM/IN/83/AG83) using the MTS-PMS assay. Preliminary screening of the ether extract (R1) with its crude methanol fraction (R2) and two fractions (R3 and R4) revealed that R2 had potent leishmanicidal activity (IC₅₀) 31.0 microg/mL). Methanol extract of *M. malabarica*, especially its constituent compounds, Mal A and Mal B, have promising antileishmanial activity.

Anti-ulcer activity

The healing activity of the methanol extract of the spice rampatri, *Myristica malabarica*, (RM) and omeprazole against indometacin-induced stomach ulceration has been studied in a mouse model. Treatment with RM (40 mg kg⁻¹) per day and omeprazole (3 mg kg⁻¹) per day for 3 days could effectively heal the stomach ulceration, as revealed from the ulcer indices and histopathological studies. Compared with the ulcerated group, treatment with RM and omeprazole for 3 days reduced the macroscopic damage score by approximately 72% and 76%, respectively (P<0.001), establishing the efficacy of RM. The healing capacities of RM and omeprazole could be attributed to their antioxidant activity as well as the ability to enhance the mucin content of the gastric tissues. Furthermore, RM improved the mucin level beyond the normal value, while omeprazole restored it to near normal.

Conclusion

Myristica malabarica a native plant of India has many medicinal properties. This present review is concerned mainly on the description, pharmacognostic features, phytochemical constituents and pharmacological activity. The major phytochemical constituents present in this plant which is

responsible for various pharmacological activity are Malabaricones A-D, and Isoflavones. The fruits, seeds, aril, bark and other parts of the plant extractives is found out to have various pharmacological activities like anti-cancer, nematocidal, anti-fungal, anti-bacterial, anti-ulcer, anti-oxidant, anti-diabetic and anti-promastigote. *Myristica malabarica* is a resource of various phytochemical constituents which can be used for medicinal property. Hence further investigation is required for this plant to discover various medicinally potential compounds for the benefit for mankind.

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