

**MYRISTICA FRAGRANS HOUTT: STUDY ON ITS PHARMACOGNOSTICAL AND PHYTOCHEMICAL PROPERTIES**Athira S<sup>1</sup>, Subramanya Padyana<sup>2</sup>

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**ABSTRACT**

The history of any drug gives insight into its morphology, properties, therapeutics, or dietary utility as conceived by various authors at different stages of history. *Jathiphala* is well known for its medicinal uses. In *Sankhaikhitha Dharmasuthra* and *Vishnu Dharmasutra*, references are available about the external uses of *Jathiphala*. *Jathiphala* is mentioned thrice by *charaka*. *Vagbhata* described *Jathikosha* as *Jathipatrika*. Even though the plant is well-known as a spice, the medicinal utilities were not much exploited until the medieval period. *Brihatrayis* did not mention the drug *Jathiphala* in any of their classifications. In *Gadanigraha* written by *Sodhala* in 12<sup>th</sup> A.D mentions the plant for the first time. Later in 13<sup>th</sup>. A.D *Acharya Sarngadhara* mentioned the plant as *Deepana*, *Pachana*, *Grahi* and *Suklasthambhaka* dravya. *Rajamarthanda* authored by *Bhoja* and *Bhavaprakasa* delineates the external use of *Jathiphala* in the form of an ointment in the management of *Vyanga*. In a later period, many *Acharyas* have classified it under different headings. In Ayurvedic classics, *Jathiphala* and *Jathipatrika* are mainly indicated in the diseases associated with the gastrointestinal tract like *Atisara*, *Grahani* etc. In the west Nutmegs, maces and their oils are largely used for flavouring and as carminatives. There are many herbal medicines explained in classical

literature of Ayurveda for the disease *Vipadika* or *Padadari* etc., *Jathiphala* is one such drug where the pericarp of the fruit is being used in *Vipadika*.

**Keywords:** *Vipadika*, *Jathiphala*, *Nutmeg*, *Myristica fragrans*.

## INTRODUCTION

*Jathiphala* botanically identified as *Myristica fragrans* Houtt<sup>1</sup>. belongs to the family Myristicaceae. It is an aromatic, small evergreen tree dioecious or monoecious. It is widely grown across the tropics including Indonesia, Malaysia, Kerala; Srilanka. It is the main source of the spices nutmeg and mace. The word Myristikose means 'Sweet smelling' from which the term Myristica is originated. In the west, the history of nutmeg begins when Arabs first introduced it into Europe during the middle of the 12<sup>th</sup> century. The English word nutmeg comes from the Latin nux, meaning nut and Muscat meaning musky. The nutmeg tree originates in Banda, the largest of the Molucca islands of Indonesia. It is now cultivated in the West Indies, South Africa, Indonesia, the Molucca Islands, and other tropical areas of the world including India. The fruit has a fleshy husk (pericarp). *Jathiphala*<sup>2</sup> is one such drug where the pericarp of the fruit is being used in *Vipadika*, Even the classical reference in *Vangasena samhitha*<sup>3</sup> supports this folklore treatment. The greater part of traditional therapy involves the use of plant extracts or their active principles. Ancient literature mentions many techniques to take care of pada as it is an important part of the body. The foot is covered by thick skin having dense sensory receptors. The Kurchshirsha and Talahrudaya marmas are present in pada and are having a lot of cosmetic value. The drug *Jathiphala* (*Myristica fragrans* Houtt.) have properties like *KatuTikta Rasa*, *Laghu Snigdha Guna*, *Ushna Veerya*, *Katu Vipaka*, *Kapha Vatah*. It has properties like *snehana*, cleansing, *Ropana* (healing), *Lekhana* (scraping) and *Varnaya* (beautification).

### Materials and Methods

- **Collection of Samples:** The botanically identified samples of *Myristica fragrans* Houtt. Were collected during March from Wayanad.

- **Place of Work:** Pharmacognostical study was carried out at Kottakkal Arya Vaidya Shala Centre for Research in Ayurveda and Allied Sciences, Kottakkal, Malappuram-dist, Kerala.
- A phytochemical study was carried out in the PG Department of *Dravyaguna Vijnana*, Alva's Ayurveda Medical College, Moodbidri.

### A. Pharmacognostical Study<sup>4,5</sup>

#### A. 1. Macroscopy of *Myristica fragrans* Houtt.

**Procedure:** The external features of the test samples – *Myristica fragrans* Houtt. Fruit pericarp was documented using Canon IXUS digital camera.

#### A. 2. Microscopy of *Myristica fragrans* Houtt.

**Procedure:** The sample was preserved in a fixative solution. The fixative used was FAA (Formalin-5ml + Acetic acid-5ml + 70% Ethyl alcohol-90ml). The materials were left in FAA for more than 48 hours. The preserved specimens were cut into a thin transverse section using a sharp blade and the sections were stained with saffranine. Transverse sections were photographed using Zeiss AXIO trinocular microscope attached with a Zeiss Axio Cam camera under bright field light. Magnifications of the figures are indicated by the scale bars.

#### A. 3. Powder microscopy of *Myristica fragrans* Houtt.

**Procedure:** The *Myristica fragrans* Houtt. Were collected, dried under shade, pounded, and sieved in mesh to get fine powder and kept separately. A pinch of the sample was mounted on a microscopic slide with a drop of glycerine water. Characters were observed using Zeiss Axio trinocular microscope attached with a Zeiss Axio camera under bright field light. Magnifications of the figures are indicated by the pre-calibrated scale bars using Zeiss Axio vision software.

### B. Physico chemical study<sup>6</sup>

The air-dried fruit of *Myristica fragrans* was powdered finely and subjected to various analyses, such as

determination of moisture content, ash value, acid insoluble ash, water-soluble ash etc. The extractive value in various solvents and ash value is important in the identification and standardization of single drugs. (Shown in Table No:1)

### **C. Preliminary Phytochemical Study<sup>7</sup>**

Freshly prepared extracts were tested for the presence of various active phytochemical compounds like carbohydrates, alkaloids, amino acids, proteins, glycosides, phenolic compounds, saponins, flavonoids, tannins, steroids etc. (shown in Table No:2)

### **D. Chromatographic Studies**

#### **D.1. Thin Layer Chromatography**

Thin-layer chromatography is a technique in which a solute undergoes distribution between two phases, a stationary phase acting through adsorption and a mobile phase in the form of a liquid. The adsorbent is a uniform layer of dry finely powdered material applied to a glass plate. Separation may also be achieved based on a partition or a combination of partition and adsorption depending on the support, its preparation, and its use with a different solvent. Identification can be affected by observation of spots of identical  $R_f$  values. A visual comparison of the size and intensity of the spots usually serves for semi-quantitative estimation.

#### **D.2 HPTLC Fingerprint Profile**

HPTLC is a planar chromatography where the separation of sample components can be achieved on high-performance layers with detection and data acquisition using an advanced workstation.

### **OBSERVATION AND RESULT**

#### **Macroscopic study:**

- Fruit is drupe type they are pyriform in shape, 6cm to 9cm long, yellowish skin with a perpendicular groove around the fruit and whitish flesh.
- The flesh is about 1.3cm thick and contributes 75% to 85% of total weight.
- It is circular in outline, showing an outer thick rind of epicarp, inner mesocarp embedded with one seed.
- In the ripe fruit, the pericarp can be differentiated into a thin epicarp which is light yellow and less than half a millimetre in thickness, second is somewhat tough fleshy but not hard mesocarp

slightly less than or about a centimetre in thickness that is light yellowish-brown in colour when freshly cut but turns brown on exposure and a thin greyish white, somewhat leathery endocarp that adheres to the mesocarp but which may be scraped or even peeled off.

- There is only a single seed that is surrounded by a brilliant red lacinate reticulate aril that is attached to the seed at its base.
- The aril has a thickness of about one mm and its divisions measure about 4.5 cm in length and width.
- Nutmeg is popular as a spice and also possesses various therapeutic properties.
- Nutmeg has a characteristic pleasant fragrance and a slightly warm taste.
- The seed with aril is easily removed from pericarp Seeds (nutmegs) are broadly ovoid (2 to 3 cm long), firm, fleshy, whitish, and transverse by red-brown veins. (As shown in fig no:2&3)

#### **Microscopic Study:**

- The T.S. of the pericarp the following tissues are seen in order from the periphery: An epidermis, one or two rows of slightly thick-walled parenchyma cells, six to seven or more rows of stone cells of irregular outline and a large amount of large-sized thick-walled parenchyma cells. (As shown in fig no: 4)
- Scattered amidst the parenchyma cells are small-sized secretory cells containing oil globules.
- Sections of a few vascular strands are also made out. The epidermis consists of a row of rectangular cells measuring 15-30 in length and 12-21 in width. Adjacent to the epidermis on its inside is one or two rows of slightly thick-walled tangentially elongated parenchyma cells which measure 30-42 in length and 15-18 in width. Underneath the epiderm, one or two layers of parenchymatous tissue are seen.
- Inner to this stone cell layer is composed of five to seven rows of cells. The stone cells vary in shape, some of them are small and rounded, a few are narrow and slightly elongated, some are rounded with

- small projections, and others are slightly broad and elongated.
- The stone cells measure 30-180 $\mu$  by 9-51 $\mu$  and have thick pitted walls with the striations quite distinct. The large parenchymatous zone is composed of thick-walled cells some of which contain starch grains.

- The cells towards the stone cell layer are small tangentially elongate and measure 60-90 $\mu$  by 36-45 $\mu$ , which those towards the interior are large measuring, 160-172 $\mu$ . The walls of the parenchyma cells appear irregularly thickened and pitted.

**Table 1:** Physio Chemical Studies

Percentage of Moisture content	4.5%
Total ash	2.2%
Acid insoluble ash	0.8%
Water-soluble ash	5.6%
PH value	6.8
Extractive values in different solvents	Ethanol (12.2%), Chloroform (.62% methanol (11.5%), Water (9.46%)

**Table 2:** Preliminary Phytochemicals

Phytochemicals Present	Phytochemicals Absent
Terpenoids	Protein
Flavonoids	Starch
Steroids	
Tannins	
Alkaloids	
Resins	
Saponins	
Carbohydrates	

## DISCUSSION

The T.S. of the pericarp the following tissues are seen in order from the periphery: An epidermis, one or two rows of slightly thick-walled parenchyma cells, six to seven or more rows of stone cells of irregular outline and a large amount of large-sized thick-walled parenchyma cells. Scattered amidst the parenchyma cells are small-sized secretory cells containing oil globules. Sections of a few vascular strands are also made out. Powder Microscopy- Showed the presence of calcium oxalate, starch grains, parenchymatous cells, glandular trichomes and endosperm. Some corresponding spots were observed which indicate the presence of myristicin.

**Physicochemical Study:** Physical analysis revealed that Total ash is 2.2%, Water soluble ash is 5.6%, Acid insoluble ash is 0.8% and Moisture content is 4.5%, the Total ash of a formulation represents the inorganic residue left after the incineration. The Preliminary phytochemical study of *Myristica fragrans* Houtt

shows the presence of Carbohydrates, Flavonoids, Terpenoids, Tannins, Resins, Alkaloids and Saponins. Ash analysis of *Myristica fragrans* Houtt. showed the presence of Sodium. HPTLC and TLC documentation of the drug had been carried out. In HPTLC documentation at 254 nm 10 peaks, at 366 nm 6 peaks were obtained respectively. (Shown in Graph No:1)

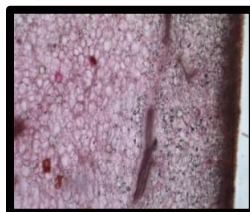
## CONCLUSION

Based on the result of the present study, it can be concluded that a preliminary phytochemical study of *Myristica fragrans* Houtt shows the presence of alkaloids, steroids, carbohydrates, tannin, flavonoids, saponins, terpenoids, and resins. The alkaloids found in Drugs possess Anti-microbial, Anti-inflammatory activities. The Flavonoids compounds provide health benefits through cell signalling pathways and activities like anti-ageing, antioxidant, anti-fungal, anti-allergic and anti-inflammatory. Tannins possess anti-inflammatory activities; The ash analysis revealed the

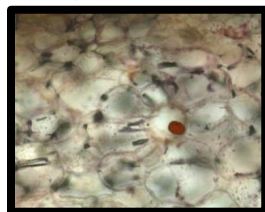
presence of sodium. The ph of the powdered drug is 6.8 which are suggestive of the acidic nature of the drug.

### Powder Microscopy

**Fig:1**



**Fig:2**



**Fig:3**



**Fig: 4**



**Fig:5**

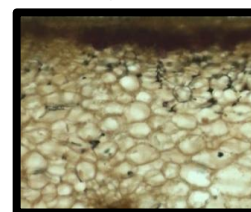
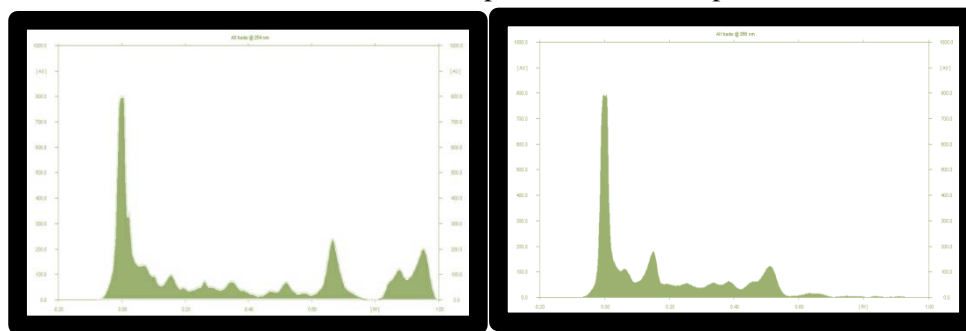


Fig:1) T.s fruit pericarp.2) Vascular bundles. 3) Epidermal cells with stomata.4) Lactiferous ducts 5) Stone cell layer.

**Graph 1:** In HPTLC documentation at 254 nm 10 peaks, at 366 nm 6 peaks were obtained respectively



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