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Beyond The Spice Rack :- The Medicinal Benefits Of Nutmeg

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- **Abstract:** Myristica fragrans, known commonly as nutmeg or mace, is a member of the Myristicaceae family. This aromatic evergreen tree features wide-spreading branches and yellow flesh. Nutmeg serves as a spice with a long-standing history in both culinary and medicinal applications. It possesses a variety of bioactive compounds that may offer health benefits, prompting growing interest within the food, pharmaceutical, and nutraceutical sectors. The essential oil derived from Myristica fragrans exhibits properties that are antimicrobial, antiseptic, antiparasitic, anti-inflammatory, and antioxidant. Many nutmeg varieties contain terpenes and phenylpropenes. Nutmeg is regarded as a vital element in numerous industrial uses, ranging from food products to cosmetics. Its pharmaceutical formulations are particularly noteworthy for their antioxidant and antimicrobial effects. Furthermore, nutmeg is rich in active components that help reduce oxidative stress, lipid peroxidation, and allergic reactions. It is incorporated into medicinal preparations for conditions such as dysentery, flatulence, stomach pain, nausea, vomiting, rheumatism, sciatica, malaria, and the initial stages of leprosy.

- **Keywords :** Health promoting ,bioactive compounds, antioxidant ,anti inflammatory, nutraceutical

• INTRODUCTION

Nutmeg (Myristica fragrans) is a member of the Myristicaceae family. This plant originates from the Maluku Islands in Indonesia but has been widely spread to regions including Grenada, India, Sri Lanka, Mauritius, South Africa, and the United States (Francis, James, Varughese, & Nair, 2019). The seed of nutmeg features a reddish outer aril known as mace and a brown inner kernel called nutmeg, both utilized as spices. In Indian Ayurvedic medicine, nutmeg has been employed to alleviate anxiety, nausea, diarrhea, cholera, stomach cramps, parasites, paralysis, and rheumatism, and it is also recognized as an aphrodisiac.

• HISTORY

Nutmeg was first found by the Portuguese in 1512 and is native to the Banda Islands in Indonesia. Subsequently, the Dutch emphasized its significance. The term Nutmeg is derived from the Latin phrase nux muscatus, which translates to “musky nut.”



nutmeg

- **Taxonomical classification :-**

<i>Sr.no</i>	<i>Scientific Category</i>	<i>Classification</i>
1.	Kingdom	Plantae
2.	Division	Tracheophyta
3.	Class	Magnoliopsida
4.	Subclass	Magnoliidae
5.	Order	Magnoliales
6.	Family	Myristicaceae
7.	Genus	<i>Myristica Gronov</i>
8.	Species	Fragrans

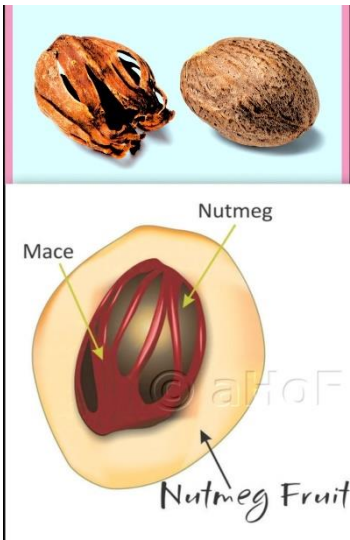
• **Vernacular names of nutmeg :-**

Sr. no.	Language	Names
1.	English	Nutmeg
2.	Hindi	Jaiphal
3.	Malayalam	Jathika
4.	Gujrat/Marathi	Jaiphal
5.	Telugu	Jajikaya
6.	Tamil	Jathikai
7.	Kannada	Jakai
8.	Bengal	Javitri

• **Plant description:-**

Myristica fragrans is a perennial tree that can reach heights of 20 to 25 feet, featuring soft, grayish-brown bark and widely spreading branches. This plant thrives in warm, humid environments, typically found at elevations of 1,000 meters above sea level and requiring 150 to 250 centimeters of rainfall.

Plant Parts	Description	Image
leaves	The leaves are fragrant, deep green, shiny on the upper side, arranged alternately, elongated, smooth, and pointed at the tip.	
Flowers	Plants typically exhibit dioecious reproductive traits, and occasionally monoecious characteristics with varying expressions of sex, featuring small axillary, sub-umbellate clusters, which can be compound or occasionally branched. The pedicels and peduncles appear smooth and hairless.	

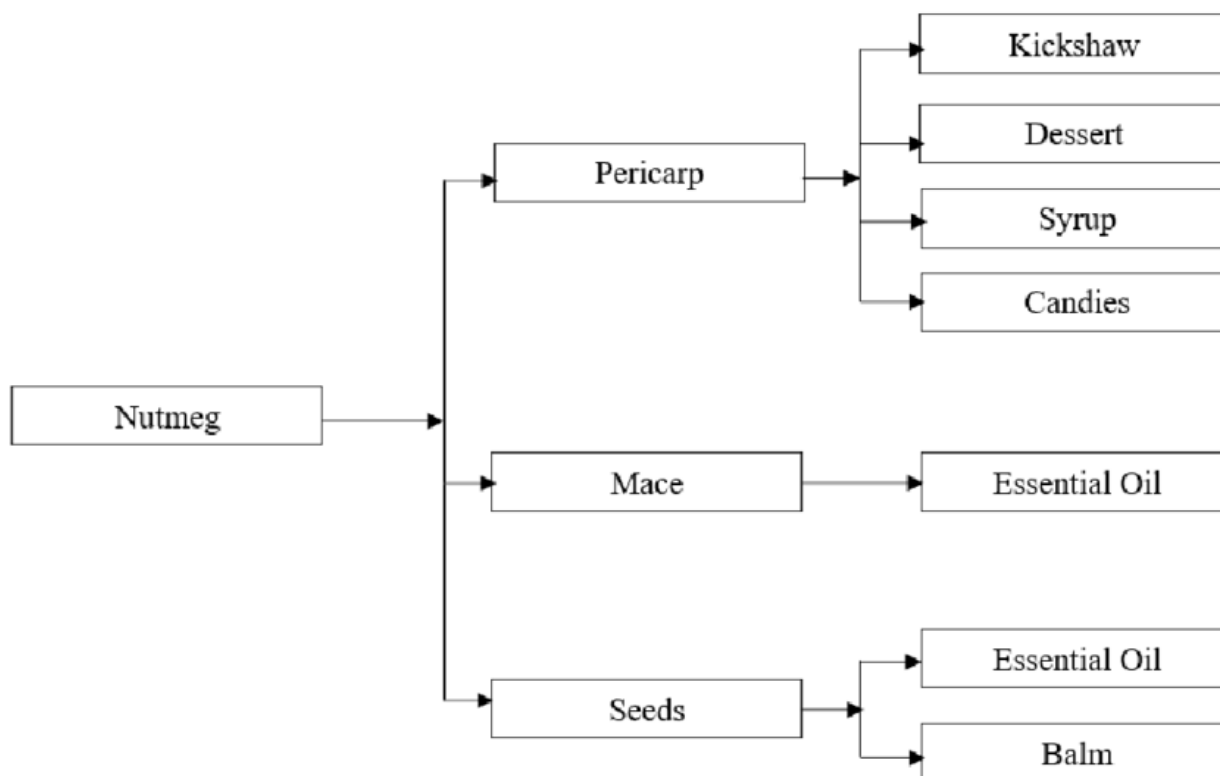
Fruit	The fruit features a fleshy outer layer and is round in shape; its skin is yellowish and divides into two lengthwise sections. The mace (aril) consists of a soft scarlet covering that is intricately folded, surrounding the nut when it is moist; upon drying, it becomes much harder.	 The diagram illustrates the structure of a nutmeg fruit. It shows a whole nutmeg fruit and a cross-section. The cross-section reveals the fleshy, yellowish outer layer (mace) and the dark, round seed (nutmeg) inside. Labels include 'Mace', 'Nutmeg', and 'Nutmeg Fruit'.
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• Varieties of Nutmeg:

sr no.	Varieties of Nutmeg	
1.	Viswasree	1. Color of mace-Dark Red 2. Size of seed- Bold 3. color of seed - Shining black 4. Special characteristics - A high yielding, High quality.
2.	keralasree	1. Shape of nut- Bolt 2. Color of ripe fruit- yellow 3. Color of seed Brownish black 4. Special characteristics-wide adaptability. 5. First nutmeg variety developed by Farmers.very bold nut with thick mace.
3.	kokan swad	1. Shape -Bold 2. Colour -yellow 3. Special character - Medium size nut, High yielding



Layers of nutmeg



Parts of nutmeg and its use

• GEOGRAPHICAL DISTRIBUTION

Nutmeg is widely grown in countries such as China, Indonesia, Taiwan, Malaysia, India, Grenada, South America, and Sri Lanka. Although obtaining exact figures for nutmeg production is challenging, it is estimated that the global annual production falls between 10,000 and 12,000 tons. In India, specific regions known for nutmeg cultivation include Tamil Nadu, Thrissur, Kanyakumari, and Kottayam.

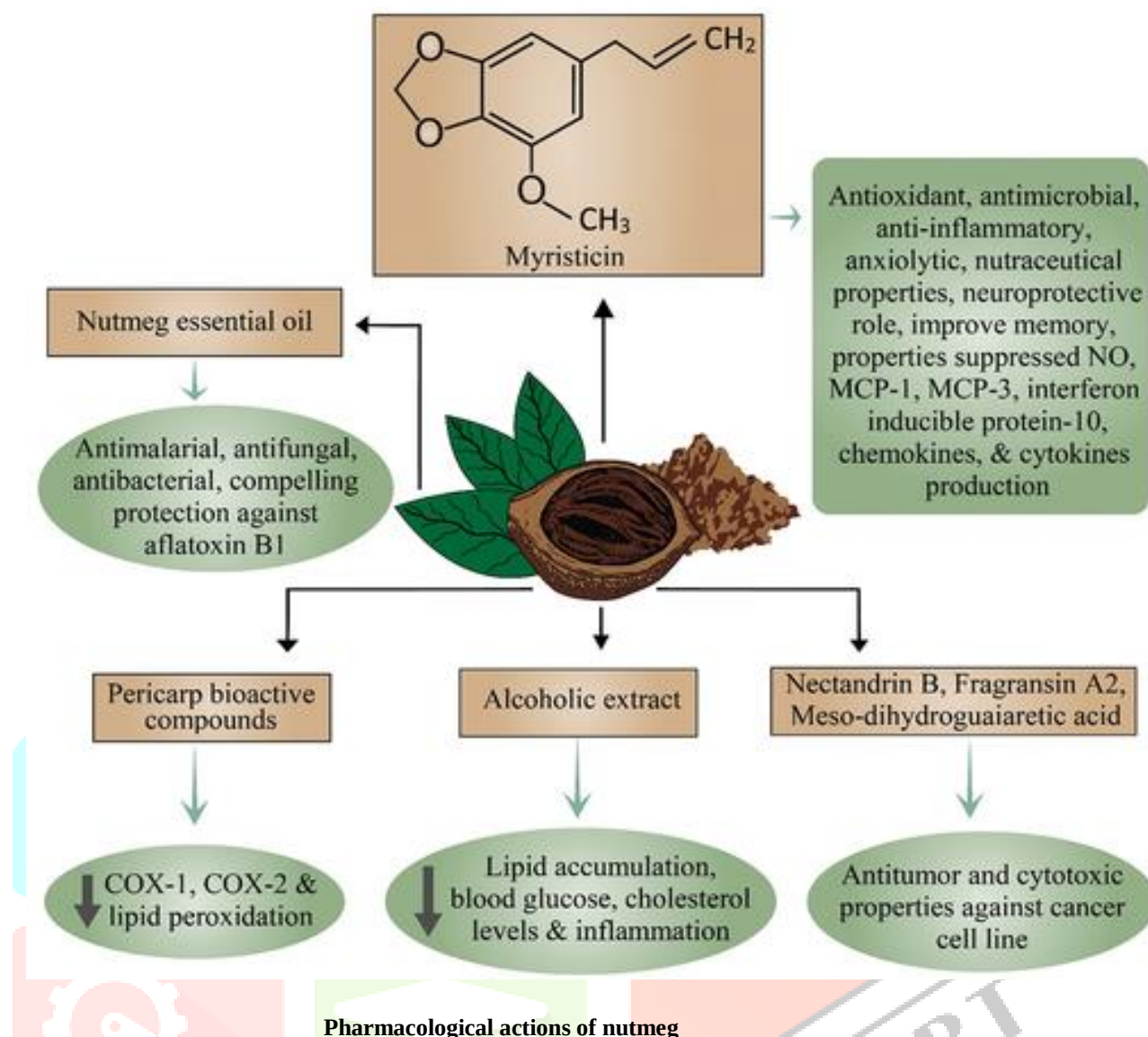
• PHARMACOLOGICAL ACTIONS

1) Anti-oxidants -

Mace and nutmeg are utilized to produce nutmeg oil, known for its antioxidant benefits. Nutmeg exhibits antioxidant characteristics due to its capacity to block lipid peroxidase. To conduct an in vitro study: nutmeg contains various elements, including eugenol and hydrogen atoms, which contribute to its antioxidant properties.

2) Anti-inflammatory-

The potent inflammatory components found in nutmeg are known as monoterpenes, which include compounds such as pinene and terpineol. The medicinal properties of nutmeg oil have been shown. Nonetheless, only the petrol-ether extract has demonstrated anti-inflammatory properties. Inflammation serves as a typical mechanism for protecting damaged tissue and eliminating dead cells.

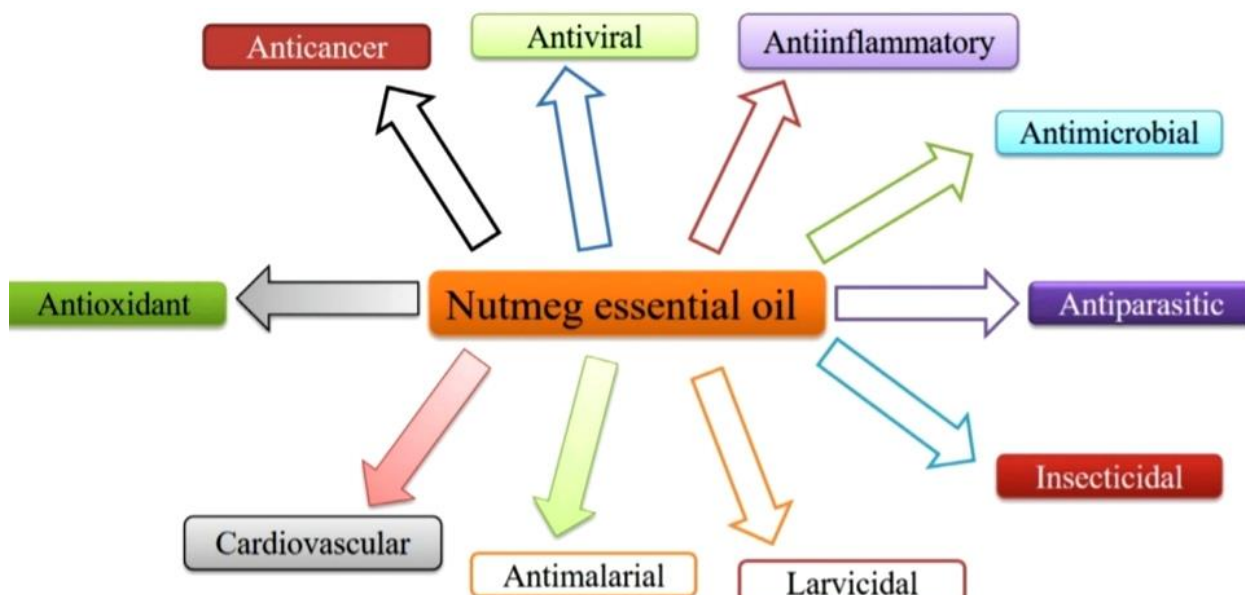


3)Antifungal activities-

One of the motivations for studying nutmeg as a plant is its ability to diminish *Candida albicans* infections and the antimicrobial resistance that is a concern for humans (Iyer et al., 2017). The findings demonstrate that nutmeg extract exhibits strong bioactivity against fungal pathogens and could serve as a viable candidate for a powerful antifungal compound. The extract from nutmeg seeds revealed noteworthy antimicrobial properties.

4)hepatoprotective activity-

Nutmeg exhibits resistance to carcinogenic substances. Hussain and Rao (1991) indicated that. Additionally, nutmeg demonstrates hepatoprotective effects. This effect is noted in rats with liver damage when nutmeg is included in their diets.



Pharmaceutical properties of nutmeg

5) **Weight loss with nutmeg-**

Nutmeg contributes to weight loss as well. Enhancing metabolism may help with weight reduction by supporting the body in eliminating toxins and enhancing its digestive functions. Nutmeg helps your body eliminate impurities.

6) **Anti-carcinogenic and hepatoprotective activity-**

Nutmeg exhibits resistance to carcinogenic substances. Hussain and Rao (1991) noted that, in the uterine cervix of Swiss albino mice, Nutmeg also demonstrates hepato-protective properties. This effect is seen in rats with liver damage when Nutmeg is included in their diet. Kyriakis et al. (1994) examined the activities of hepatic carcinogen-metabolizing enzymes, such as aryl hydrocarbon hydroxylase, cytochrome P450, along with levels of acid-soluble sulfhydryl and glutathione-S-transferase in albino mice, investigating the impact of essential oil from Nutmeg. They discovered that the essential oil inhibits the activity of the host enzymes associated with detoxification and activation of foreign substances, including mutagens and chemical carcinogens.

- **phytochemicals in nutmeg**

Nutmeg is a widely used spice known for its distinct flavor and fragrance. Through bioassay guided fractionation, six active compounds were extracted, namely eugenol, methyl eugenol, methyl isoeugenol, elemicin, myristicin, and safrole (Du et al., 2014). Myristicin, along with the active metabolites from nutmeg, exhibits psychoactive effects. Nevertheless, this property can also be investigated as a potential treatment for central nervous system (CNS) disorders. Additionally, other research has confirmed that myristicin can inhibit the inflammatory response triggered by the oxidation of low-density lipoprotein. Nutmeg hexane extracts were found to contain the highest levels of steroids, tannins, and terpenoids, as assessed through color production in phytochemical assays. Conversely, other extracts were found to reduce melanin formation at elevated concentrations; studies revealed a lack of terpenoids in those extracts. This difference is attributable to factors such as plant species, climatic conditions, geographic location, cultivation practices, harvesting time, and extraction techniques.

1) Myristicin:

Myristicin is a natural compound present in nutmeg. It is one of the main bioactive components in nutmeg that contributes to its unique flavor and scent. Myristicin belongs to the phenylpropene class, which is known for its fragrant characteristics. However, the amount of myristicin can vary between different nutmeg samples. In addition to its sensory effects, myristicin has attracted interest for its possible medicinal properties, including its function as an antioxidant, anti-inflammatory agent, and even a pain reliever. To ensure safety, it is recommended to use nutmeg in cooking within the normal ranges of spice use. Excessive intake of myristicin may lead to negative effects such as nausea, vomiting, diarrhea, and dizziness. Despite this, myristicin is an essential element of nutmeg's flavor profile, enriching a variety of sweet and savory recipes, including baked items, soups, sauces, and drinks.

2) Elemicin:

Elemicin, a natural substance present in nutmeg, is also a key element contributing to the complex flavor and aroma of the spice. Several important aspects of elemicin in nutmeg merit attention. Firstly, it is crucial in enhancing the aromatic characteristics of nutmeg, imparting unique nutty and sweet notes. Scientific research into elemicin has revealed its potential pharmacological and biological effects. This compound has garnered interest due to its known antioxidant properties and its ability to influence various physiological pathways. These qualities have generated curiosity regarding its possible health advantages and uses.

3) Safrole:

This compound is volatile and plays a significant role in the aroma and flavor of nutmeg, enhancing its overall sensory qualities and making it an essential component. However, safrole has also generated regulatory and safety concerns. As a result, when nutmeg is incorporated into cooking or baking, the levels of safrole typically remain within safe boundaries. Additionally, safrole has been used in traditional medicine for its possible therapeutic effects, particularly in treating mild pain and inflammation. It is crucial to differentiate between its traditional applications and its use as a food additive in modern culinary practices.

4) Eugenol:

The amount of eugenol found in nutmeg can differ and is affected by factors such as the variety of nutmeg, its place of origin, and the methods used in processing. Generally, eugenol accounts for a significant percentage of nutmeg essential oil, typically ranging from about 10 to 20% of its total oil content. Known for its various pharmacological benefits, eugenol is especially recognized for its antioxidant, anti-inflammatory, and analgesic properties. The presence of eugenol in nutmeg has traditionally led to its use as a remedy for dental pain and other health issues in folk medicine.

5) Flavonoids:

The chemical composition of nutmeg seeds, which includes extractive organic compounds like polyphenols, quinones, and flavonoids, contributes to their resistance against ultraviolet (UV) radiation and elevated temperatures. Nutmeg contains three specific flavonoids, one of which is quercetin.

MARKETED PHARMACEUTICAL FORMULATION

SR NO	PRODUCT	COMPANY
1.	 NUTMEG PERFUME	OSSORO
2.	 Nutmeg Pickle	KITCHEN TREASURES
3.	 NUTMEG MACE	T.R. HERBALS
4.	 NUTMEG POWDER	3V PRODUCTS

5.	 NUTMEG ESSENTIAL OIL	NATURALIS
6.	 NUTMEG MOISTURISER	NAT HABBIT

• CONCLUSION

Nutmeg (*Myristica fragrans*) is a potent ingredient that holds numerous characteristics. It can serve as a spice, a medicinal agent, and in certain contexts, as a drug. The oil derived from nutmeg exists due to its texture and aroma. Each of its chemicals plays a significant role and possesses unique properties. The complexity of nutmeg arises from its blend of many chemicals, which can be beneficial when consumed in the right amounts. Additionally, it has medicinal uses such as antibacterial, antimicrobial, anti-inflammatory, and chemopreventive properties. As a spice, nutmeg contributes a distinctive flavour to various dishes, characterized by its sweet yet pungent taste that sets it apart. However, consuming it in excessive amounts can lead to organ failure, hallucinations, and intense headaches. Further research is necessary to investigate the traditional applications of the plant and to validate its effects and mechanisms. *Myristica fragrans* is a source of clinically active compounds with various pharmacological effects, prompting researchers to delve into its potential new therapeutic applications for the benefit of humanity.

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