



## A REVIEW ON MYRISTICA FRAGRANCE

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### ABSTRACT-

Today, there is a huge demand for herbal medicine on the international market, but there is a dearth of information about the criteria and techniques used to evaluate the efficacy of drugs. Two spices, nutmeg (*Jaiphal*) and mace (*Javitri*), are derived from the *Myristica* fragrance, also known as the nutmeg tree, which is a member of the *Myristicaceae* family. Mace is the fleshy, crimson, net-like skin covering (aril) on the nutmeg kernel, whereas nutmeg is the seed kernel found inside the fruit. It contains a variety of chemical compounds, including eugenol (4-allyl-2-methoxyphenol), myristicin, and macelignan. Nutmeg has a wide range of pharmacological properties, including hepatoprotective, anti-oxidant, memory-improving, cytotoxic, aphrodisiac, anti-diabetic, anti-depressant, hypolipidemic and hypocholesterolemic effects, anti-microbial, antibacterial, anti-inflammatory, anti-carcinogenic, flavoring, and pesticidal effects. This article reviews many pharmacological properties of this medicinal plant.

**Keywords:** Myristica fragrance, Nutmeg, Mace, Myristicin.

## INTRODUCTION

*Myristica fragrans*, also referred to as nutmeg, is a medium-sized, evergreen aromatic tree that is a member of the Myristicaceae family. Both the fleshy aril (mace) and the seed (nutmeg) are used as seasonings. It has 4% myristicin in it, a fat made from the seed. It is used to cure rheumatism and promote digestion in medicine. Additionally used for diarrhoea, mouth sores, and sleeplessness are myristica scent seeds. Malabaricon C, which is derived from the aroma of myristica, has been shown to have inhibitory effect against a variety of anaerobic and aerobic microbes. The main fragrant component of nutmeg's volatile oil is myristicin. The use of nutmeg as a spice has endured. Numerous formulations of nutmeg (*Myristica fragrans*) are still used as aphrodisiacs, digestive aids, hypnotics, analgesics, and amenorrheal agents. Both the seeds and the fruits of these plants are used in traditional medicine to treat diseases like diarrhoea, sexual dysfunction, weakness, and skin discoloration. It is used as a treatment for cholera related nausea, stomach-aches headaches, vomiting, and diarrhoea. It significantly enhances the blood circulation, boosts up the brain functioning. The main fragrant component of nutmeg's volatile oil is myristicin. Its essential oil can help with injuries including muscular strains and sprains. *Myristica fragrans* is most frequently used as a stimulant, aphrodisiac, antiulcerogenic, analgesic, diuretic, anti-pyretic, hypolipidemic, hypnotic, hallucinogenic, antispasmodic, anti-inflammatory, and anti-oxidant drug. It improves digestion. This review's objective is to highlight the diverse pharmacological effects of *Myristica fragrans*.

### Taxonomy of *M. fragrans* and vernacular names-

#### Taxonomy -

Kingdom	Plantae
Division	tracheophytes
Class	magnolippsida
Order	Magnoliales
Family	Myristicaceae
Genus	<i>Myristica</i>
Species	<i>M. fragrance</i> houtt.

#### Vernacular names

Hindi	Jaiphal, Malatiphal
English	Nutmeg tree
Sanskrit	Jatiphalam, Malatiphalam, Majjasaram, Sugandha Puta, Madashounda
Urdu	Javit, Jauzbuwa
Bangoli	Japatri, Jotri
Gujrati	Jayapatri
Kannad	Jaapatri
Tamil	Japatri, Jatikkai, Sathiccupi, Jadhikai
Telugu	Jadipattiri, Jaji kaya
Malayalam	Jadipallioli, Jathika
Marathi and gujarati	Jaipal



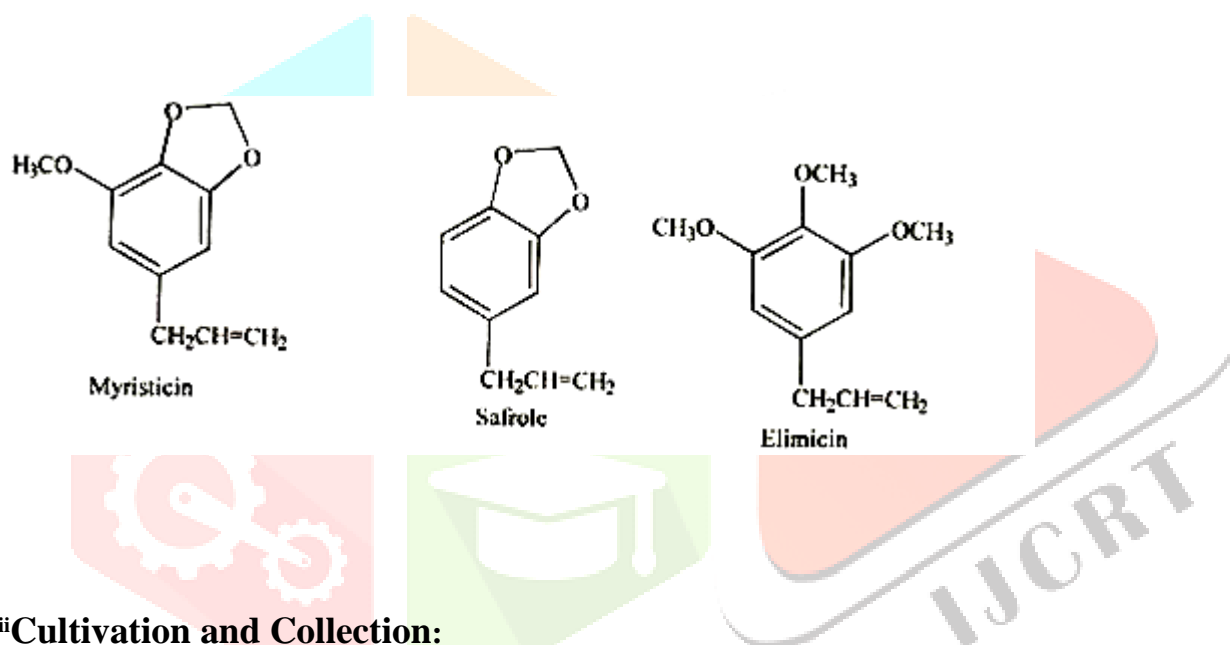
In A.H. *chikitsa sthan* 21/77, *vagbhatt* described *jatikosha* as *jatipatrika* (a.h. *uttartantra*22/93)

## Pharmacologically active parts of the plant

The most important part of the plant in terms of its pharmacological activity and also in commerce, is of course the dried kernel (seed), the nutmeg aril of the fruit (seed case), generally known as mace. The oil of nutmeg has also been used for medicinal purpose.

## Chemical Constituents:

5 to 16% volatile oil and roughly 30% fat are both present in nutmeg. About 4 to 8% of the volatile oil is made up of myristicin, elimicin, and safrole. Myristic acid, palmitic acid, oleic acid, lauric acid, and other acids make up the majority of the fixed oil's fatty acid composition (approximately 60%). Nutmeg butter is another name for the nutmeg's fat. Protein and starch are the drug's other ingredients.<sup>ii</sup>



## iii Cultivation and Collection:

The tree-like plant has separate male and female blooms. The drug is produced using the female plants. Between sea level and 900 meters above sea level, nutmeg can be grown. It thrives in humid regions. Red lateritic soil and sandy loam are the best soil types for cultivation; they both need 200 to 250 cm of rainfall. The plant is grown by sowing the seeds. Only freshly collected seeds can be used for cultivation. Nutmeg can also be grown vegetatively.

The seeds need two to three months to germinate. When seedlings are between 16 and 18 months old, they are transplanted at a distance of 8 to 9 meters. The nutmeg fundamentally needs shade to defend itself.

The plants receive fertilizers and manures on a regular basis. The plants yield fruits all year round, but from December to May they produce the most. The fruits are ready to be picked when the husk of the fully mature nut separates.

## Formulations-

*Jatiphaladi churna, Jatiphaladi vati, Ahiphenasava, kasturi bhairav ras, khadiradi gutika, Mahagandhak vati, Garbhchintamani rasa*

## Side Effects of Nutmeg:-

- The negative effects of nutmeg may resemble those of anticholinergic poisoning. It may cause neurological symptoms like tingling, hallucinations, giddiness, and euphoria when taken in large doses. Following these symptoms, delirium and excessive sleepiness may occur.
- Common unfavourable side effects include nausea, headaches, dizziness, vomiting, stomach discomfort, and tremor. Elemicin and myristicin, two narcotics that have psychotropic (affecting mental activity) properties, are found in nutmeg.
- Other side effects from nutmeg use include increased liver fat accumulation, trouble urinating, and transient constipation. Nutmeg powder can be effective as a hallucinogen, but excessive use can cause delirium and epileptic seizures.<sup>iv</sup>

## Precautions to take with Nutmeg (Jaiphal)

- Taking nutmeg is not safe to take during pregnancy and must be avoided. Pregnant women might present with agitation, palpitations, anxiety, dry mouth, blurred vision, and chest tightening when taken in large amounts.
- It is essential to not take it in high doses since it possesses narcotic effects.
- It might trigger asthma and cause allergies.
- There is not sufficient information about the safety of consuming nutmeg during breastfeeding. It is better to avoid taking nutmeg while breastfeeding.<sup>v vi</sup>

## Interactions with Other Drugs:

- Drying Medications (anticholinergic drugs)- Nutmeg might reduce the efficiency of these drugs.
- Medications Metabolized by the Liver- The liver breaks down several medications. There may be some negative consequences if nutmeg is consumed while taking such drugs. As a result, it is crucial to exercise caution when using this combination.
- Acetylcholin esterase (AChE) Inhibitors (medications for Alzheimer's disease)-  
The negative effects of the drugs used to treat Alzheimer's disease may be worse if nutmeg is consumed along with them.

- CNS Depressants or Sedative Medications- Nutmeg consumption could make you feel sleepy. Additionally, sedatives cause sleepiness. Combining these could result in serious pathological drowsiness.
- Medications used for glaucoma etc. (Cholinergic drugs) - Nutmeg consumption can increase some chemicals in the brain, heart, and other parts of the body. Few medications used in the management of glaucoma, Alzheimer's disease, and other conditions might also affect these chemicals. <sup>vii, viii</sup>

Taking these medications with nutmeg can result in the development of side effects.

## PHARMACOLOGICAL ACTIONS

*Myristica fragrans* Houtt. is associated with wide range of biological properties which are useful in treating several diseases. Some of its therapeutic properties are mentioned below-

**Aphrodisiac** It was observed that 50% ethanolic extract of the plant exhibited aphrodisiac activity <sup>ix</sup>.

**Effect on memory** *Myristica fragrans* seeds on the learning capacity and memory of the models used. The memory impairment was induced by scopolamine and diazepam. It was found that n-hexane extract significantly worked on learning capacity and memory. <sup>x</sup>

**Anti-diarrhoeal** a study conducted on Gunie pigs revealed that hexanesoluble fraction was associated with inhibition of secretory responses which were induced by *E. coli* heat labile (LT) and heat stable (ST) enterotoxins <sup>xi</sup>.

**Anti-stress-** A study was conducted on Albino rat models (two methods that are the forced swim test (FST) and the tail suspension test (TST) method) and it was observed that *M. fragrans* extract significantly reduced the immobility periods of mice in both the FST and the TST methods<sup>xii</sup>.

**Anti-diabetic-** extracts obtained from *M. fragrans* is associated with antidiabetic potential. It activates the peroxisome proliferator receptor, which helps in improving the insulin sensitivity and lipid metabolic disorders <sup>xiii</sup>

**Anti-convulsant-** nutmeg oil exhibits anti-convulsant properties. During the study nutmeg oil showed anticonvulsant activity against tonic seizures induced by pentylenetetrazole which supports its use as an anticonvulsant agent <sup>xiv</sup>

**Antithrombotic-** As per the data report of an in-vitro study it was revealed that eugenol and iso-eugenol were associated with inhibition of platelet aggregation; this attributes to its antithrombotic activity<sup>xv</sup>.

**Hepatoprotective-** the seed of *Myristica fragrans* on obesity and inflammation is associated with Nonalcoholic fatty liver disease (NAFLD). It was revealed from the study that, alcohol extract of nutmeg significantly reduced the body weight and levels of inflammation, cholesterol and lipid accumulation, blood glucose which supports its use as a hepatoprotective agent. <sup>xvi</sup>

**Anti-microbial-** The mace of *M. fragrans* has potent anti-microbial action against *Staphylococcus aureus* and *Candida albicans*. It was revealed that resorcinols malabaricon B and malabaricon C both showed significant antimicrobial potential against *Staphylococcus aureus* and *Candida albicans*. Dehydro-diisoeugenol and 5-methoxydehydrodiisogenol significantly helped in the inhibition of *Streptococcus mutans* growth.<sup>xvii xviii</sup>

**Anti-oxidant-** anti-oxidant potential of nutmeg essential oil is due to its synthetic anti-oxidants like BHA (butylated hydroxyanisole), BHT (butylated hydroxytoluene), alpha tocopherol and pyrogellol. <sup>xix</sup>

**Hypolipidemic effect-** administration of seed extract of *M. fragrans* exhibited properties like reduction in serum cholesterol and LDL cholesterol by 69.1 and 76.3%. It also lowered down the ratio of cholesterol/phospholipid by 31.2% and it significantly elevated the ratio of decreased HDL.<sup>xx xxi</sup>

### Classical therapeutic uses of myristica fragrance

**Generalised use -:** Its topical applications include its use as an anti-inflammatory and analgesic agent. It is beneficial for skin disorders, and also acts as an air freshener. It is used in treating cold and headache. It is used against joint inflammation in *lepa* form. It is useful in removing the foul smell of wound.

#### Systemic actions

*Nadi sansthan* (Nervous system): It is an analgesic and antiepileptic agent. It is used in treating insomnia, epilepsy and pain.

*Paachan sansthan* (Digestive system): It is used as an appetizer and anthelmintic agent. It enhances digestion and increases the liver metabolism. It is used in the treatment of diarrhoea, dysentery, irritable bowel syndrome, constipation, loose motion, cholera. It reduces thirst.

*Rakatwah sansthan* (Circulatory system): It is helpful in treating cardiac problems.

*Swasan sansthan* (Respiratory system): It is used as an anti-mucolytic agent. It is helpful against cold, cough, asthma and hiccups.

*Prajannan sansthan* (reproductive system): It is an aphrodisiac. It is helpful in inducing menstruation and ovulation. It is used in treating erectile dysfunctioning, amenorrhoea, and dysmenorrhoea.

*Twacha* (Skin): It is useful against various skin related disorders.

*Taapkram* (Temperature management): It is used as an anti-pyretic.

*Satmikaran* (Other uses): It is used in treating malnutrition caused by diarrhoea.<sup>xxii xxiii</sup>

## Folk view

In India it is used as a sedative to treat various disorders related to the nervous system.<sup>xxiv</sup> Tamil Nadu people use fruits to heal mouth wounds and stomach wounds<sup>xxv</sup>. The tribal people of Kurumba, Tamil Nadu, use fruits in pickle form to cure problems related to digestion while the seeds are used along with breast milk to provide immunity to the infants<sup>xxvi</sup>. Traditional healers of, Telangana, use leaves and fruits to treat nervous disorders<sup>xxvii</sup>. In Odisha, people use fruits in many home remedies<sup>xxviii</sup>. The decoction of fruit is administered orally against dysentery in Karnataka<sup>xxix</sup>. People use boiled seeds of *M. fragrans* along with *P. nigrum*, *P. longum* and *O. tenuiflorum* to treat malaria in Karnataka<sup>xxx</sup>. In Paliyan tribes of Southern India, people use seeds along with milk to enhance their digestion<sup>xxxi</sup>. In Rangamanti district, this medicinal plant is used against fever<sup>xxxii</sup>. Some tribes of Gujarat use *M. fragrans* fruit against hemorrhoid<sup>xxxiii</sup>. In Rajasthan, the fruit of this plant is used in cooking as a spice and to enhance the flavor<sup>xxxiv</sup>. The Gaddi tribes of Kangra district of Himachal Pradesh use *jaiphal* along with ajwain seeds and choti elaichi to treat diarrhoea among infants<sup>xxxv</sup>. In Assam, *jaiphal* is used in treating dysmenorrhea<sup>xxxvi</sup>. *Jaiphal* is a very common home remedy for cough and cold<sup>xxxvii</sup>.

## Conclusion

*M. fragrans* is a promising herb which is most commonly used in traditional systems of medicine for treating numerous human ailments which exhibit significant biological properties such as hepatoprotectivity, anti-microbial, anti-stress, anti-diabetic etc. Apart from its therapeutic uses, it is well known spice used in almost all types of cooking. In Ayurveda it is used to treat skin disorders, insomnia, pain, epilepsy, vomiting, stress, IBS, cardiac disorders, erectile dysfunctioning etc. This medicinal plant with multiple therapeutic uses can be a promising and reliable source of new drugs in the future. More research should be done to find its secondary metabolites which can be an aid to the healthcare system.

## REFERENCES

- <sup>i</sup> Gamble 1967, Fatty acids and leaf amino acids in *Myristica fragrans* and its wild taxa K. M. Maya, T. John Zachariah\*, K.S. Krishnamurthy, J. Rema and B. Krishnamoorthy Indian Institute of Spices Research, Marikunnu P.O, Calicut-673012, Kerala, India Hooker 1973, Parkinson 1972, Anonymous 1962).
- <sup>ii</sup> Manpreet Kaur ; Nutmeg: Sources, Cultivation and Uses (With Diagram)
- <sup>iii</sup> Manpreet Kaur ; Nutmeg: Sources, Cultivation and Uses (With Diagram)
- <sup>iv</sup> Gupta A, Rajpurohit D, et al. Chapter 98 – Antioxidant and Antimicrobial Activity of Nutmeg (*Myristica fragrans*), Editor(s): Victor R. Preedy, Ronald Ross Watson, Vinood B. Patel. Nuts and Seeds in Health and Disease Prevention, Academic Press
- <sup>v</sup> Chul-Ho Yun, Hye Suk Lee-Yong, Sung-Kun Yim, Keon-Hee kim, Keon-Hee kim, Eunhee kim, Sung-Su Yea, F Peter Guengerich. Roles of human liver cytochrome P450 3A4 and 1A2 enzymes in the oxidation of myristicin. *Elsevier*. 2003 Feb 3; 137 (3):143-150
- <sup>vi</sup> Planet Ayurveda. Jatiphala, Jaiphal (*myristica fragrans*)- Uses, benefits, Ayurvedic properties, and dosage.
- <sup>vii</sup> Chul-Ho Yun, Hye Suk Lee-Yong, Sung-Kun Yim, Keon-Hee kim, Keon-Hee kim, Eunhee kim, Sung-Su Yea, F Peter Guengerich. Roles of human liver cytochrome P450 3A4 and 1A2 enzymes in the oxidation of myristicin. *Elsevier*. 2003 Feb 3; 137 (3):143-150



- viii Abernethy MK, Becker LB. Acute nutmeg intoxication. *The American journal of emergency medicine*. 1992 Sep 1; 10(5):429-30. Available from: Planet Ayurveda. Jatiphala, Jaiphala (myristica fragrans)- Uses, benefits, Ayurvedic properties, and dosage.
- ix Ahmad, S., Latif, A., Qasmi, I. A., & Amin, K. M. Y. (2005). An experimental study of sexual function improving effect of *Myristica fragrans* Houtt.(nutmeg). *BMC Complementary and Alternative Medicine*, 5(1), 1-7.
- x Parle, M., Dhingra, D., & Kulkarni, S. K. (2004). Improvement of mouse memory by *Myristica fragrans* seeds. *Journal of medicinal food*, 7(2), 157-161
- xi Gupta, S., Yadava, J. N. S., Mehrotra, R., & Tandon, J. S. (1992). Anti-diarrhoeal profile of an extract and some fractions from *Myristica fragrans* (Nutmeg) on *Escherichia coli* enterotoxin-induced secretory response. *International journal of pharmacognosy*, 30(3), 179-183
- xii Dhingra, D., & Sharma, A. (2006). Antidepressantlike activity of n-hexane extract of nutmeg (*Myristica fragrans*) seeds in mice. *Journal of medicinal food*, 9(1), 84-89.
- xiii Han, K. L., Choi, J. S., Lee, J. Y., Song, J., Joe, M. K., Jung, M. H., & Hwang, J. K. (2008). Therapeutic potential of peroxisome proliferators-activated receptor $\alpha/\gamma$  dual agonist with alleviation of endoplasmic reticulum stress for the treatment of diabetes. *Diabetes*, 57(3), 737-745.
- xiv Wahab, A., Haq, R. U., Ahmed, A., Khan, R. A., & Raza, M. (2009). Anticonvulsant activities of nutmeg oil of *Myristica fragrans*. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*, 23(2), 153-158.
- xv Janssens, J., Laekeman, G. M., Pieters, L. A., Totte, J., Herman, A. G., & Vlietinck, A. J. (1990). Nutmeg oil: identification and quantitation of its most active constituents as inhibitors of platelet aggregation. *Journal of ethnopharmacology*, 29(2), 179- 188.
- xvi Zhao, W., Song, F., Hu, D., Chen, H., Zhai, Q., Lu, W., & Wang, G. (2020). The protective effect of *Myristica fragrans* Houtt. Extracts against obesity and inflammation by regulating free fatty acids metabolism in nonalcoholic fatty liver disease. *Nutrients*, 12(9),2507
- xvii Orabi, K. Y., Mossa, J. S., & El-Ferally, F. S. (1991). Isolation and characterization of two antimicrobial agents from mace (*Myristica fragrans*). *Journal of natural products*, 54(3), 856-859
- xviii Hattori M, Hada S, Watahiki A, Ihara H, Shu YZ, Kakiuchi N, Mizuno T, Namba T. (1986). Studies on dental caries prevention by traditional medicines. X.: antibacterial action of phenolic components from mace against *Streptococcus mutans*. *Chemical and pharmaceutical bulletin*, 34(9), 3885-93.
- xix Dorman, H. D., Surai, P., & Deans, S. G. (2000). In vitro antioxidant activity of a number of plant essential oils and phytoconstituents. *Journal of Essential Oil Research*, 12(2), 241-248.
- xx Ram, A., Lauria, P., Gupta, R., & Sharma, V. N. (1996). Hypolipidaemic effect of *Myristica fragrans* fruit extract in rabbits. *Journal of ethnopharmacology*, 55(1), 49-53.
- xxi Sharma, A. R. T. I., Mathur, R. I. T. U., & Dixit, V. P. (1995). Prevention of hypercholesterolemia and atherosclerosis in rabbits after supplementation of *Myristica fragrans* seed extract. *Indian journal of physiology and pharmacology*, 39, 407-410.
- xxii Muddgal D. (2019). *Dravyagun Vijnana*. Ayurvedic hindi pustak bhandar.
- xxiii Sharma PV. (2019). *Dravyagun Vigyan*. Chaukambha Bharti Academy, Varanasi.
- xxiv Rättsch, C. (2005). *The encyclopedia of psychoactive plants: ethnopharmacology and its applications*. Simon and Schuster.
- xxv Brinda, R., & Parvathy, S. (2003). Ethnobotanical medicines of anaimalai union pollachi taluk, Coimbatore district, tamilnadu. *Ancient Science of life*, 22(4).  
Karuppusamy S. (2007). Medicinal plants used by Paliyan tribes of Sirumalai hills of southern India, 6(5), 436-432. [111]
- xxvi Saradha M, Paulsamy S. (2017). Ethnobotanical Study of Knowledge and Medicinal Plants Use by the Kurumba Tribes in Chemmankarai, Nilgiri District, Tamil Nadu. *Kongunadu Research Journal*, 4(2), 136-146.

- <sup>xxvii</sup> Gurrapu S, Mamidala E. (2018). An ethnobotanical survey of medicinal plants used by traditional Healers of Perkapally, Karimnagar district, Telangana, India. *Int. J. of Life Sciences*, 6(3), 789-94.
- <sup>xxviii</sup> Singh HA, Dhole PA, Baske PK, Saravanan R. (2015)
- <sup>xxix</sup> Ethnobotanical observations on Deogarh district, Odisha, India. *J Econ Taxon Bot*,39(2), 223-65. [109]
- <sup>xxx</sup> Prakasha HM, Krishnappa M, Krishnamurthy YL, Poornima SV. (2010). Folk medicine of NR Pura taluk in Chikmagalur district of Karnataka, 9(1), 55-60. [110]
- <sup>xxxi</sup> Karuppusamy S. (2007). Medicinal plants used by Paliyan tribes of Sirumalai hills of southern India, 6(5), 436-432. [111]
- <sup>xxxii</sup> Prakash BN, Payyappallimanaa U. (2013). Ethnomedical survey of herbs for the management of malaria in Karnataka, India. *Ethnobotany Research and Applications*, 11, 289-98. [112]
- <sup>xxxiii</sup> Yusuf M, Wahab MA, Chowdhury JU, Begum J. (2006). Ethno-medico-botanical knowledge from Kaukhali .

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