

## Nutmeg - Origin, diversity, distribution and history

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### Abstract

Nutmeg (*Myristica fragrans* Houtt.) a small holder's crop, with 3500 years of antiquity originated in the Moluccas, Indonesia, is now grown in about 12 countries including some secondary centres of domestication. Centres of domestication overlap the centre of origin in nutmeg. Out of about 175 species in the genus, only five are economically important. Besides species diversity and cultivar diversity, ecosystem diversity is also a component of biodiversity of the genus. The genus is represented by six species including four endemic species and subspecies each in India. A comprehensive work on Indian *Myristica* is pertinent. The history of the spice is mired in bloody wars, piracies, privateers, clandestine collection trips, wanton felling of the heirloom trees besides inadvertent specimen identity, inaccurate chronology and a treaty of land swap. Though French and British colonial rulers took interest in popularising nutmeg in their colonies albeit for economic gains, the role of French was pivotal. The package of practices of nutmeg (Colonial Horticulture) in the new French colonies were a complex process of creolizing the expertise borrowed from the native people of the Moluccas with the horticultural knowledge of the colonists, traders, settlers, slaves and other local residents. Though nutmeg, a perennial tree of about 100 years of life span, has only about 300 years of domestication history in the country, the cultivar diversity is amazing as exemplified by the high frequency of farmer's varieties. The nutmeg population of the country also exhibits good phenotypic plasticity as demonstrated by leaky dioecy. While the transnational spread of nutmeg is a legacy of colonial rulers, the settlers mainly Christians, are credited with the intrastate spread of nutmeg in Kerala, the major area of production in India. History of nutmeg is still in an emerging phase and there are gaps in our understanding.

**Keywords:** cultivar diversity, colonial rulers, domestication, ecosystem diversity, *Myristica fragrans*, taxonomic cleaning, treaty of Breda

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## Introduction

Nutmeg (*Myristica fragrans* Hoult.) popular for the twin spice it produces-nutmeg seed (kernel) and mace (aril covering the seed) - is an important spice found in the kitchens and bakeries across the world as well in the traditional pharmacopoeia. Considered to be originated in the Moluccas (Spice Islands) in Indonesia, the tree is now an important small holder's plantation crop in many countries. Unlike in many other crop plants, the centres of domestication encompass the centre of origin in nutmeg. Including few secondary centres of domestication, the important nutmeg producing countries at present are Indonesia, India, Grenada, Sri Lanka, Malaysia, Mauritius, Zanzibar, Seychelles, Reunion Islands, Guatemala and Solomon Islands with Indonesia (34, 602 MT), India (15076 MT), Sri Lanka (5000 MT) and pre-hurricane Grenada (~2000MT) leading in production (IFEAT 2021).

The history of the transnational spread of nutmeg is beset with its own share of rivalry, clandestine voyages, sea piracy, biopiracy and cash transfers besides lack of cogency on the chronology (Americas) and mistaken identity of the target specimen (*Monodora myristica* Dun known as 'Tobago nutmeg' or 'Jamaica nutmeg' and Pichurim nut *Nectandra pichurim* (Kunth Mez) instead of true nutmeg) (Zumbroich 2005).

### Origin and distribution of *Myristica* spp.

The nutmegs, *Myristica*, are a genus of evergreen trees occurring in Africa, Asia, Pacific islands, and the Americas. New Guinea is considered as the centre of origin and distribution of *Myristica* genus (Ravindran 2017).

### Diversity

Species diversity, ecosystem diversity and cultivar diversity are the components of *Myristica* diversity.

### a. Species diversity

Species diversity in India is represented by five species viz., *M. andamanica* Hook. f. (1886 : 103), *M. beddomei* King (1891: 291), *M. fragrans* Hoult. (1774: 333), *M. magnifica* Beddome (1869: 268) and *M. malabarica* Lamarck (1791: 162) (Fig.1) besides the recently reported *Myristica trobogarii* Govind & M. Dan, though there are ca 175 species worldwide (Govind *et al.* 2020; Mabberley 2018). Three new subspecies of *M. beddomei* King namely *M. beddomei* subsp. *beddomei* King, *M. beddomei* subsp. *sphaerocarpa* W.J.de Wilde and *M. beddomei* subsp. *ustulata* W.J.de Wilde are also described from India (Banik *et al.* 2017) in addition to the subspecies, *M. fatua* var. *magnifica*.

However, other species such as *Myristica elliptica* Wall. ex Hook. f. et Thoms, *M. amygdalina* Wall., *Myristica glaucescens* Hook. f. Thoms, *Myristica prainii* King, *Myristica dactyloides* Gaertn etc too are reported to occur in India (Bohra *et al.* 2019; Krishnamoorthy *et al.* 2007). Some of these entities could be synonyms such as *M. amygdalina* syn. *Horsefieldia amygdalina*; *Myristica prainii* King syn. *Endocomia macrocoma* subsp. *prainii* King; *Myristica dactyloides* Gaertn syn. *M. malabarica* etc. This confusion warrants a more systematic taxonomic study of the genus especially as no comprehensive work on Myristicaceae R. Br., nom. cons. in India has been done since Sir J.D. Hooker's the Flora of British India (1817-1911) and the family was treated with confusion in several regional floras, which were devoid of updated nomenclature and citation of type specimens (Banik *et al.* 2017).

Out of the six species reported from India, *M. beddomei*, *M. magnifica*, *M. malabarica* besides *Myristica trobogarii* and the subspecies *M. fatua* var. *magnifica*, *M. beddomei* subsp. *beddomei*, *M. beddomei* subsp. *sphaerocarpa* and *M. beddomei* subsp. *ustulata* are endemic to the Western Ghats.

Apart from the nutmeg of commerce *Myristica fragrans* Hoult., *Myristica malabarica* (Bombay



**Fig. 1** Species diversity in *Myristica*:

1. *Myristica fragrans*, 2. *Myristica andamanica*, 3. *M. prainii*, 4. *M. malabarica*,  
5. *M. magnifica* var. *fatua*, 6. *M. beddomei*

mace), *M. andamanica* Hook. f, *M. beddomei* King are used in medicine and/or dye industry (Arunachalam & Subhashini 2011; Manjunatha *et al.* 2011) and Fakfak nutmeg or Papua Nutmeg (*Myristica argentea* Warb.), largely used in soap and perfume industries besides as a substitute for the common nutmeg are

the economically important species. Fakfak nutmeg or Papua Nutmeg, grown in wild or semi wild condition in Indonesia, is a main cash crop in Fakfak and Kaimana Regencies of the country (Wahyuni & Bermawie 2020). In fact, the British anthropologist Roy Ellen is of the view that the original nutmeg merchandised

was not the Bandanese nutmeg (*Myristica fragrans*), but the long Papua nutmeg (*Myristica argentea* Warb.) (<https://www.thejakartapost.com/paper/2020/12/29/a-sustainable-pathway-for-papuan-nutmeg.html>).

DNA barcoding (*rbcL*, *matK*, *psbA-trnH*, ITS) based phylogenetic studies revealed *M. fragrans* is closely related to *M. beddomei*, *M. amygdalina*, and *M. andamanica* whereas *M. fatua* is found to be distinct from *M. malabarica*. *Gymnocranthera* and *Knema* species were found to share sister relation with other *Myristica* spp. (Swetha *et al.* 2019). However, a *mat K* gene based phylogenetic analysis revealed close resemblance between *M. fragrans* and *M. fatua* (Nanlohy & Samuel 2020). Based on 18S rDNA study, Sheeja *et al.* (2014) also observed a close relationship between *M. beddomei*, *M. andamanica* and *M. amygdalina* besides between *M. malabarica* and *M. fragrans*. *Myristica trobogarii*, the recently reported species, shares morphological similarities with *M. beddomei* sub sp. *beddomei*, *M. malabarica* and *M. magnifica*, though it differs in many other attributes (Govind *et al.* 2020).

### b. Ecosystem diversity

Though majority of *Myristica* species are of non swampy habitat, *Myristica fatua* Hoult. var. *magnifica* is exclusive to the Swamps with occasional occurrence of *M. malabarica* as well as *M. beddomei* subsp. *sphaerocarpa*, *M. beddomei* subsp. *beddomei* and *M. beddomei* subsp. *ustulata* (Saji *et al.* 2019; Banik *et al.* 2017). *Gymnacranthera canarica* is the other most common companion entity in the Swamps. *Myristica* swamps are a type of evergreen freshwater swamp forest harbouring diverse flora and fauna, unique to India. It is found in valleys of Kulathupuzha, Shendurney and forest ranges of Anchal in Kerala; Uttara Kannada, Dakshina Kannada and Shivamogga in Karnataka besides Goa and Bambarde of Sindhudurga Dist, Maharashtra in the Western Ghats, India (Sreedharan & Indulkar 2018).

### c. Cultivar diversity

Nutmeg, a predominantly dioecious tree, has a domestication history of less than 300 years in India by all probability. But the degree of varietal/cultivar diversity observed in a perennial crop like nutmeg, propagated mainly vegetatively, within in a span of about 300 years of domestication is very amazing (Haldankar *et al.* 2004; Vikram *et al.* 2016; Priyanka & Mini Raj, 2016; Raj & Nybe, 2019). Selection, either germplasm or true seedling progeny selection, has lead to a host of varieties including the Institution bred ones like IISR Vishwashree, Konkan Sugandha, Konkan Swad, and Konkan Shrimanthi; farmer participatory variety IISR Keralaashree and about a dozen of farmer's varieties such as *Kadukanmackel*, *Nova*, *Kallingal*, *Punnanthanam*, *Kochukudi*, *Kinattukara*, *Kallivayal*, *Ceylon*, *Ceylon-1*, *Naveswari*, *Pullan*, *Souwriyamakkal*, *Nirappel* etc. Variants like yellow mace nutmeg and seed sterile mutant (Fig. 2) are also located and propagated from the primary genepool of the crop (Sasikumar *et al.* 2017; Saji *et al.* 2019). Recently, evolution of nutmeg towards monoecy (leaky dioecy) is also reported (Rema *et al.* 2014; Aarthi *et al.* 2018; Sasikumar & Aarthi 2016). Morphological diversity of nutmeg mother trees and true seedling progenies is recorded from Indonesia too (Hetharie *et al.* 2015).

### History

Archaeological excavations carried out during 2007 and 2009 at Pulau Ay, Banda islands in Moluccas (Spice Islands), a speck of island in the Banda atoll, indicate 3500 years of antiquity for nutmeg (Lape *et al.* 2018). Either due to the intrinsic quality of the produce or shrewd market maneuvering, the Spice Islands were frequented by Chinese, Malay, Javanese, and Arabo-Persian middlemen traders as early as 15<sup>th</sup> century, whose accounts advanced the European dreams of the Spice Islands. Moluccas being the source of nutmeg remained arcane to the Western world, until an Arab trader by name Kazwini disclosed to the world

the source of nutmeg - the elusive Moluccas, in CE 1300 (Wiess 2002). This disclosure was followed by aggressive voyages by various European explorers and traders to the nutmeg islands, in the next few centuries.

The Portuguese first succeeded to find the way to reach Moluccas after they conquered Goa (India) in 1510 and Malacca in 1511 under the commander of Afonso de Albuquerque and finally reached the Spice Islands of Banda and Penyu in two ships in the year 1512. Spices trade became the monopoly of the Portuguese till the Dutch reached the Moluccas in the year 1599 (Pakpahan *et al.* 2019). Meanwhile the British merchants with the patronage of the Queen were also sponsoring voyages to the nutmeg island, since last decades of 16<sup>th</sup> century (Milton 1999).

Fierce battles were waged between the Dutch and English as well as both with the native Bandanese to regain/retain the monopoly of nutmeg trade during 16 and 17th centuries. Horrific brutality, diabolic maneuvering, merciless slaying of the natives, mindless felling of nutmeg plantations, swapping of islets etc. were the signet of these trade wars (Aubery 2012). In 1616, the English had managed to wrench control of a Banda Island called Run from the Dutch, a tiny island less than 2 miles long and just more than half a mile wide. In fact, after many failed attempts and disasters, the English's first successful contact with the Spice Island is considered to be the Run (Milton 1999). It was here later the English claimed their first colony and established the English East India Company. However the English East India Company was able to defend Run against the Dutch only for four years – but they did not give up their claim though ousted and waited for the right opportunity to strike. The two jostled for superiority for long. In 1664, in retaliation, four English frigates were sent across the Atlantic Ocean to capture a Dutch holding called New Amsterdam (Manhattan was New Amsterdam in Dutch parlance)

and the British established themselves in this island town and both defended each other's island. However, after 3 years, in 1677, the two countries came to an agreement known as the Treaty of Breda and swapped the islands. Thus, the Dutch gained control of Run and the English got New Amsterdam – a new colony they renamed Manhattan. That is the past story of today's affluent Manhattan (Topsfield & Rompies 2017) (<http://www.bbc.com/travel/story/20171010-the-tiny-island-the-british-traded-for-manhattan>). Run, however lost its dominance and sheen as nutmeg cultivation gained momentum in other islands of Moluccas and even other parts of the world.

The French colonial powers, with the establishment of the French East India Company in 1664 (Wellington 2006), were also trying to have a finger in the nutmeg pie and were sponsoring overt and covert expeditions to Moluccas. Breaking the Dutch stranglehold, nutmeg was introduced to Isle de France (Mauritius) by Pierre Poivre, the French naturalist cum explorer who succeeded in procuring 32 numbers of nutmeg plants and transporting them to Isle de France (Mauritius) in 1753 and 1755 (Ly-Tio-Fane 1958; Drayton 2000) out of which only two nutmeg plants survived, and in 1769 Poivre embarked on another clandestine mission to the Moluccas which finally brought significant quantities of nutmeg plants and seeds to Isle de France in June 1770 (Warburg 1897a). One more successful collection trip to the Moluccas by Poivre from 1771 to 1772 brought more seeds to Isle de France (Sonnerat 1776) and Poivre sourced the help of interlocutors such as Jean Mathieu Simon Provost and others including, Chinese traders, Spanish and Portuguese allies in his mission. Pierre Poivre is also credited with introducing nutmeg to Pondicherry (Puducherry), a territory under French control in India, during one of his missions (CE 1753), as a transit station (Brixius 2015).

Evidence is also there about that one of the



Seed sterile nutmeg



Yellow mace nutmeg

**Fig. 2** Variability in nutmeg

(For interpretation of the references to colour in this figure, the reader is referred to the web version of this article.)

early 1770s French shipments of nutmeg plants falling into British pirates on its way to Isle de Cayenne (Zumbroich 2005).

Establishing nutmeg plants successfully in its new environments was a herculean task, as the commercial vision was not matching with the ground horticultural reality. Thus, nutmeg package of practices at Isle de France was a complex process of creolizing the expertise and

accounts borrowed from the local people of the Spice Island with the horticultural knowledge of colonists, traders, settlers, gardeners, labourers and slaves living in Isle de Franc (Brixius 2018). Apart from the agronomic issues, the sex problem and reproductive biology of nutmeg were a daunting task to the French masters at Isle de France. Though the native Moluccs were aware of 'Pala parampuan' (the female tree), 'Pala Lakki Parampuan' (female

and long nutmeg) and 'Pala lakki-lakki' (wild male or long nutmeg), this ethnic botanical knowledge of the natives were either ignored or misinterpreted by the French masters mainly due to linguistic barriers (Brixius 2018). It was Mr. Cere, a later governor of Mauritius, who made the important discovery that nutmeg is unisexual, sometimes during 1778 (Wiess 2002). The French mastered the technique of nutmeg farming over a period by trial and error method. The role of the two indentured gardeners namely Charles Rama and Hilaire stands out in this regard.

The manual 'Instruction sur la manière de planter et de cultiver avec succès les plantes et les graines de Géroflie et de Muscadier' (Instruction on the manner of successfully planting and cultivating plants and seeds of clove and nutmeg) to local colonists by Poivre summarises the methods (Brixius 2018).

French colonial rulers were keen to introduce the crop to their other colonies. Thus on 3rd of February 1773, nutmeg was introduced to French Guyana from Isle de France which can therefore be considered the date of the introduction of *Myristica fragrans* to the Americas (Warburg 1897 a; Ly-Tio-Fane 1958), rather than the report of the French Botanist, Jean Baptiste D'Arnault in which he claimed to have collected 'nutmeg' (Tobago nutmeg' or 'Jamaica nutmeg' and Pichurim nut as true nutmeg) and cinnamon in the Lesser Antilles or Venezuela in 1767 (Lindorf 2001 & 2002). The earliest preserved herbarium of *Myristica fragrans* from America (now in the British Museum herbarium) from a five year old tree of French Guyana too attests this record. A Prussian born naturalist Julius von Rohr prepared this herbarium specimen in 1784 (Warburg 1897 a & b; Hopkins 1998).

Nutmeg was introduced to Seychelles, Reunion Islands and Zanzibar from the Mauritius stock during the later decades of 18 or early 19<sup>th</sup> century (Weiss 2002).

About a devastating disease that wiped out the entire nutmeg plantations in Singapore during 1862 is also there in the annals of nutmeg history (Jaffrey 1860).

The British East India Company gradually gained control over nutmeg trade in the Moluccas and popularised nutmeg cultivation in their other colonies across the world. Thus by 18-19<sup>th</sup> centuries nutmeg reached many countries like India, Mauritius, French Guyana, Grenada, Sri Lanka etc.- courtesy French and British colonial rulers and French explorers.

Nutmeg was first planted in Grenada on the Belvedere Estate (in St. John's Parish) by Hon. Frank Gurney in 1843, from seeds obtained from a called in merchant ship enroute to England from the East Indies. The first commercial plantation started in 1850 and by 1865 Grenada emerged as a major nutmeg producer and exporter (Singh *et al.* 2003). However, the devastating hurricane Ivan in 2004 caused widespread damage to the nutmeg plantations of Grenada and the island nation is now slowly recuperating from the destruction, with production touching 472.6 MT in 2020 ([www.nowgrenada.com/2021/02/nutmeg-farmers-told-opportunities-despite-covid-19-challenge](http://www.nowgrenada.com/2021/02/nutmeg-farmers-told-opportunities-despite-covid-19-challenge)).

The spice has a colonial legacy in India. Though it is widely believed that nutmeg was introduced to India by the British East India Company during the 18<sup>th</sup> century, it may be the French colonial policy to popularise spice plants in their own territories such as the transit shipment by Poivre mentioned earlier, paved the way for nutmeg reaching India. It is also mentioned that in 1750 a price of twenty thousand pieces of silver was offered to the person who would bring twenty-five nutmeg plants to the southern Indian port town of Pondicherry (Puducherry), a French colony (Zumbroich 2005). Thus, the British colonial legacy of nutmeg in India is doubtful. However it is unclear whether the discovery of the nutmeg's sexuality by the Mauritius Governor in 1778 has reached other French colonies in

Indian ocean and if not how a dioecious plant like nutmeg would have survived remain a mystery but for any intersex trees.

The observation of Pickersgill (2005) that nutmeg spread to India during 6<sup>th</sup> century CE, then further west to Constantinople through Arab traders, by all probability may be referring to nutmeg as an item of kitchen spice rather than a botanical entity. In the 17<sup>th</sup> century work *Hortus Botanicus Malabaricus*, Hendrik van Rheede records that Indians learned the usage of nutmeg from the Indonesians through ancient trade routes, again the emphasis is perhaps on usage.

Nutmeg cultivation started at Kalady, in central Travancore (Kerala) around 18<sup>th</sup> century. Reference is there about a Scottish man buying a parcel of land near Kalady and planting nutmeg, a species till then unknown to the local population. However, the Scottish owner left the country after few years and the 35 acre property came under the possession of a local Christian family. Some trees, believed to be planted by the Scottish man, more than 200 years ago, are still there. One Poonolil family is the current owner of the estate. Interestingly, the contribution of the Christian community, including the settlers, in popularising nutmeg in the state or even in the country is stellar and that saga needs to be documented properly (Sasikumar 2020). This Christian legacy of nutmeg in the state is also reflected in the names of the farmer's varieties of nutmeg like *Kadukanmackel*, *Kallingal*, *Punnanthanam*, *Kochukudi*, *Kinattukara*, *Souwriyamakkal*, *Nirappel Kallivayal* etc., which are all vernacular Christian family names.

In fact, the Christian legacy is writ large on the history of the spice. The original inhabitants of Moluccas, especially in the Central and South Moluccas too were mainly Christians (Noelle 2010) so also the colonists who spread the spice to different parts of the world and the interlocutors. Religion casting its influence in the transnational spread of few other cultivated crops is also known such as turmeric and

Hinduism (Sasikumar 2005), sugarcane and Islam (Galloway 1989; Cohen 2013) etc.

Kalady subsequently emerged as the main hub of nutmeg production and trade in Kerala. Nutmeg is produced in about 23478 ha in India (Spices Board, 2021) at present, Kerala leading the list. In addition to Kerala, the spice is grown in Maharashtra, Goa, Karnataka, Tamil Nadu, Andaman Islands etc.

### Conclusion

Not many attempts are undertaken in the country to collect the species diversity of *Myristica* unlike the cultivar diversity (farmer's varieties). *Myristica trobogarii* is reported after a long gap of 124 years. Intensive surveys in the Western Ghats and North East India may yield few more endemic *Myristica* spp.

A taxonomic cleaning of the genus is also warranted to clearly discriminate the synonymous entities and evaluate the subspecies.

Many taxonomists are wary of the dioecious nature of the species and seasonal flowering besides the long juvenile phase of the trees. However, the vegetative propagation methods of the species can be exploited to circumvent these difficulties.

The relatively high frequency of the true seedling progeny derived farmer's varieties and the evolution of nutmeg towards monoecy are suggestive of the broad genetic base and phenotypic plasticity, respectively of the nutmeg population in India. The vegetative propagation method is a boon to fix any new variability.

Transnational spread of nutmeg is inseparably linked to colonialism. Though the different colonial powers strived for the nutmeg pie, the French colonial rulers were in the forefront. History reveals that nutmeg cultivation took root in the French colonial countries mainly due to the creolization of knowledge of the



different stake holders, thus synthesizing the colonial botany or colonial horticulture which further advanced over the centuries.

Literature review reveals that during the last two decades more and more reports are emerging, at a global level, on the historical aspects of nutmeg. More historical investigations are warranted to bridge the gap in the history of nutmeg such as the pre and early CE history of the spice; the fate of the trees supposed to have introduced to Puducherry, India by the French Colonial rulers besides the chances of few of these seeds/saplings landing at Mahe, a French enclave in Kerala under Puducherry; the missing written account of the oldest nutmeg plantation of Kerala (Poonolil estate) including the early package of practices and circumventing the sexual dimorphism of the tree etc.

The contribution of various Kerala communities, especially the Christian settlers, in spreading nutmeg to different parts of Kerala and India besides its impact on the socio economic status of the people too warrants documentation.

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