***Family:*** ***Myristicaceae***

***Taxon:*** ***Myristica fragrans***

***Synonym:*** *Myristica officinalis L. f.*

***Common Name:*** Nutmeg tree
Mace
muscadier commun
nogal moscado

**Questionaire :** current 20090513 **Assessor:** Chuck Chimera **Designation:** L

**Status:** Assessor Approved **Data Entry Person:** Chuck Chimera **WRA Score -1**

| | | | |
|---|---|---|---|
| **101** | **Is the species highly domesticated?** | **y=-3, n=0** | **n** |
| **102** | **Has the species become naturalized where grown?** | **y=1, n=-1** | |
| **103** | **Does the species have weedy races?** | **y=1, n=-1** | |
| **201** | **Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"** | **(0-low; 1-intermediate; 2-high) (See Appendix 2)** | **High** |
| **202** | **Quality of climate match data** | **(0-low; 1-intermediate; 2-high) (See Appendix 2)** | **High** |
| **203** | **Broad climate suitability (environmental versatility)** | **y=1, n=0** | **n** |
| **204** | **Native or naturalized in regions with tropical or subtropical climates** | **y=1, n=0** | **y** |
| **205** | **Does the species have a history of repeated introductions outside its natural range?** | **y=-2, ?=-1, n=0** | **y** |
| **301** | **Naturalized beyond native range** | **y = 1*multiplier (see Appendix 2), n= question 205** | **y** |
| **302** | **Garden/amenity/disturbance weed** | **n=0, y = 1*multiplier (see Appendix 2)** | |
| **303** | **Agricultural/forestry/horticultural weed** | **n=0, y = 2*multiplier (see Appendix 2)** | **n** |
| **304** | **Environmental weed** | **n=0, y = 2*multiplier (see Appendix 2)** | **n** |
| **305** | **Congeneric weed** | **n=0, y = 1*multiplier (see Appendix 2)** | |
| **401** | **Produces spines, thorns or burrs** | **y=1, n=0** | **n** |
| **402** | **Allelopathic** | **y=1, n=0** | |
| **403** | **Parasitic** | **y=1, n=0** | **n** |
| **404** | **Unpalatable to grazing animals** | **y=1, n=-1** | |
| **405** | **Toxic to animals** | **y=1, n=0** | |
| **406** | **Host for recognized pests and pathogens** | **y=1, n=0** | |
| **407** | **Causes allergies or is otherwise toxic to humans** | **y=1, n=0** | |
| **408** | **Creates a fire hazard in natural ecosystems** | **y=1, n=0** | **n** |
| **409** | **Is a shade tolerant plant at some stage of its life cycle** | **y=1, n=0** | **y** |
| **410** | **Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)** | **y=1, n=0** | **y** |

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| **411** | **Climbing or smothering growth habit** | **y=1, n=0** | **n** |
| **412** | **Forms dense thickets** | **y=1, n=0** | **n** |
| **501** | **Aquatic** | **y=5, n=0** | **n** |
| **502** | **Grass** | **y=1, n=0** | **n** |
| **503** | **Nitrogen fixing woody plant** | **y=1, n=0** | **n** |
| **504** | **Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)** | **y=1, n=0** | **n** |
| **601** | **Evidence of substantial reproductive failure in native habitat** | **y=1, n=0** | |
| **602** | **Produces viable seed** | **y=1, n=-1** | **y** |
| **603** | **Hybridizes naturally** | **y=1, n=-1** | |
| **604** | **Self-compatible or apomictic** | **y=1, n=-1** | **n** |
| **605** | **Requires specialist pollinators** | **y=-1, n=0** | **n** |
| **606** | **Reproduction by vegetative fragmentation** | **y=1, n=-1** | **n** |
| **607** | **Minimum generative time (years)** | **1 year = 1, 2 or 3 years = 0, 4+ years = -1** | **>3** |
| **701** | **Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)** | **y=1, n=-1** | **n** |
| **702** | **Propagules dispersed intentionally by people** | **y=1, n=-1** | **y** |
| **703** | **Propagules likely to disperse as a produce contaminant** | **y=1, n=-1** | **n** |
| **704** | **Propagules adapted to wind dispersal** | **y=1, n=-1** | **n** |
| **705** | **Propagules water dispersed** | **y=1, n=-1** | **n** |
| **706** | **Propagules bird dispersed** | **y=1, n=-1** | **y** |
| **707** | **Propagules dispersed by other animals (externally)** | **y=1, n=-1** | **n** |
| **708** | **Propagules survive passage through the gut** | **y=1, n=-1** | **y** |
| **801** | **Prolific seed production (>1000/m2)** | **y=1, n=-1** | **n** |
| **802** | **Evidence that a persistent propagule bank is formed (>1 yr)** | **y=1, n=-1** | **n** |
| **803** | **Well controlled by herbicides** | **y=-1, n=1** | |
| **804** | **Tolerates, or benefits from, mutilation, cultivation, or fire** | **y=1, n=-1** | |
| **805** | **Effective natural enemies present locally (e.g. introduced biocontrol agents)** | **y=-1, n=1** | |

**Designation:** L **WRA Score** **-1**

**Supporting Data:**

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|---|---|---|
| 101 | 2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI | [Is the species highly domesticated? No] "…native to Ambon and the Banda Islands, and cultivated throughout the Moluccas and in Grenada, West Indies. It is the only member of the family to enjoy commercial importance." |
| 101 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Is the species highly domesticated?? No] No evidence |
| 102 | 2012. WRA Specialist. Personal Communication. | NA |
| 103 | 2012. WRA Specialist. Personal Communication. | NA |
| 201 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Species suited to tropical or subtropical climate(s) 2-High] "Cultivated. Guangdong, Taiwan, Yunnan [native to Indonesia (Moluccas); widely cultivated in the tropics]." |
| 202 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Quality of climate match data 2-High] "Cultivated. Guangdong, Taiwan, Yunnan [native to Indonesia (Moluccas); widely cultivated in the tropics]." |
| 203 | 1999. Jensen, M.. Trees Commonly Cultivated in Southeast Asia: An Illustrated Field Guide. 2nd Edition. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand | [Broad climate suitability (environmental versatility)? No] "In its native Molucca nutmegs are grown on rich volcanic soils up to 500 m altitude in a non-seasonal climate of 2,200–3,600 mm annual rain and temperatures from 24 to 33°C. Prefers some shade when young and does not tolerate waterlogging or excessive soil drying." |
| 203 | 2007. Nybe, E.V./Raj, N.M./Peter, K.V.. Spices: volume 5 horticultural science series. New India Publishing, New Delhi, India | [Broad climate suitability (environmental versatility)? No] "Nutmeg thrives well in places from sea level up to about 600 m height, with a warm humid climate, as in the west coast of India and the Niligiris. A well distributed annual rainfall of 250 cm is ideal for the crop. It can not tolerate excessively dry as well as water logged conditions. Nutmeg can be advantageously grown mixed with coconut and arecanut." |
| 203 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Broad climate suitability (environmental versatility)? No] "Grows wild on rich volcanic soils in lowland tropical rain forests. Nutmeg needs a warm and humid tropical climate." |
| 204 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Native or naturalized in regions with tropical or subtropical climates? Yes] "Cultivated. Guangdong, Taiwan, Yunnan [native to Indonesia (Moluccas); widely cultivated in the tropics]." |
| 205 | 2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI | [Does the species have a history of repeated introductions outside its natural range? Yes] "Dr. William Hillebrand apparently introduced the first nutmeg tree to Hawaii; this male tree grew for years on the grounds of his home, which later became Honolulu's Foster Botanical Garden. In 1885, a shipment of 21 nutmeg seedlings reached Honolulu from the Gordon Town botanical garden in Jamaica." |
| 205 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Does the species have a history of repeated introductions outside its natural range? Yes] "Cultivated. Guangdong, Taiwan, Yunnan [native to Indonesia (Moluccas); widely cultivated in the tropics]." |
| 301 | 1999. Jensen, M.. Trees Commonly Cultivated in Southeast Asia: An Illustrated Field Guide. 2nd Edition. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand | [Naturalized beyond native range? Probably persists from cultivated plants] "Very rarely found growing wild." … "Distribution: Originates in the Molucca Islands from where it has, more or less successfully, been introduced into Thailand, Malaysia, Singapore, elsewhere in Indonesia and outside the region." |
| 301 | 2000. Liogier, A.H./ Martorell, L.F.. Flora of Puerto Rico and adjacent islands: a systematic synopsis. La Editorial, UPR, San Juan, Puerto Rico | [Naturalized beyond native range? Persisting] "Planted for its fruits and persistent in Puerto Rico." |
| 301 | 2004. Kueffer, C./Vos, P.. Case Studies on the Status of invasive Woody Plant Species in the Western Indian Ocean: 5. Seychelles. Forest Health & Biosecurity Working Papers FBS/4-5E. FAO Forestry Dept., Rome, Italy | [Naturalized beyond native range? No evidence from Seychelles] "In 1772, Syzygium aromaticum (cloves), Myristica fragrans (nutmeg) and Cinnamomum verum (cinnamon) were planted in a small experimental garden, 'Jardin du Roi', on Mahé. The first attempts to cultivate these trees were not very successful; only C. verum survived, and it subsequently escaped and naturalized." |

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| 301 | 2005. Wagner, W.L./Herbst, D.R./Lorence, D.H.. Flora of the Hawaiian Islands website. Smithsonian Inst., Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm | [Naturalized beyond native range? No evidence from the Hawaiian Islands] |
| 301 | 2007. Nybe, E.V./Raj, N.M./Peter, K.V.. Spices: volume 5 horticultural science series. New India Publishing, New Delhi, India | [Naturalized beyond native range? Yes] "Native to Indonesia (Moluccas Islands), nutmeg tree grows there abundantly and is now naturalised in West Indies, Sri Lanka, India, Philippines, Tropical America and Pacific Islands (Varghese, 2000)." [Although listed as naturalised in this publication, nutmeg may actually be persisting from cultivated plants] |
| 302 | 1979. Holm, L. G./Pancho, J.V./Herberger, J.P./Plucknett, D.L.. A Geographical Atlas of World Weeds. John Wiley and Sons, New York, NY | [Garden/amenity/disturbance weed? Unknown] "X for present as a weed (the species is present and behaves as a weed, but its rank of importance is unknown)" [Recorded in Jamaica, but impacts unknown] |
| 303 | 2007. Randall, R.P.. Global Compendium of Weeds - Myristica fragrans [Online Database]. http://www.hear.org/gcw/species/myristica_fragrans/ | [Agricultural/forestry/horticultural weed? No] No evidence [Listed as a weed of unknown importance] |
| 304 | 2007. Randall, R.P.. Global Compendium of Weeds - Myristica fragrans [Online Database]. http://www.hear.org/gcw/species/myristica_fragrans/ | [Environmental weed? No] No evidence [Listed as a weed of unknown importance] |
| 305 | 2012. FAO. Common Weeds in Vanuatu. http://www.fao.org/ag/AGP/AGPC/doc/Publicat/FAOBUL2/B201.htm | [Congeneric weed? Potentially] "Certain large tree species can be economically controlled by frill cut application of Garlon 600 at 5% in diesel. Antiaris toxicaria (melek tree), Endospermum medullosum (whitewood), Dracontomelon vitiense (nakatambol), Samaneus saman (rain tree) and Dysoxylon spp. (stinkwoods) are very susceptible to this treatment. Deciduous species such as Garuga floribunda (namalous) and Pterocarpus indicus (blue water) should be treated when new leaves are flushing and may require follow-up treatment. Other species such as Myristica fatua (bloody wood) and Kleinhovia hospita (namatal) are best controlled by other means. As well as being cost effective, chemical tree control has the advantages that it requires no high maintenance machinery (eg. chainsaws) and because tree leaves fall over a one month period shading is progressively decreased, allowing existing pasture to steadily invade with minimal risk of erosion or serious weed infestation. For information about the frill cut technique see page 48." [Myristica fatua controlled in Vanuatu as a weed tree] |
| 401 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Produces spines, thorns or burrs? No] "Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent. Petiole 6–12 mm; leaf blade elliptic or elliptic-lanceolate, 4–8 cm, nearly leathery, both surfaces glabrous, base broadly cuneate or nearly rounded, apex shortly acuminate; lateral veins 6–10 pairs." |
| 402 | 2003. Fujii, Y./Parvez, S. S./Parvez, M.M./Ohmae, Y./Iida, O.. Screening of 239 medicinal plant species for allelopathic activity using the sandwich method. Weed Biology and Management. 3: 233–241. | [Allelopathic? Potentially] Shows some allelopathic effects on lettuce seeds, but results are not statistically significant |
| 403 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Parasitic? No] "Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent." |
| 404 | 2012. WRA Specialist. Personal Communication. | [Unpalatable to grazing animals? Unknown] |
| 405 | 2012. Vetstream. Plant poisoning: hallucinogenic toxins. http://www.vetstream.com/canis/Content/Disease/dis60215 | [Toxic to animals? Possibly] "Hallucinogenic toxins are found in a number of plants. Domestic dogs could be exposed to: Nutmeg ( Myristica fragrans)." |
| 406 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Host for recognized pests and pathogens? Potentially] "The most serious pest is the scolytid beetle Phloeosinus ribatus which bores through bark causing dieback and death. Other damaging borers are Xyleborus fornicatus and X. myristcae. The coffee bean weevil Ataecerus fasciculatus is a serious pest of stored nutmeg and mace. The only fungal disease of major importance is Stigmina myristicae, a dry rot that causes the fruits to open when still young. Consequently the arils and seeds remain underdeveloped and are worthless. Soft rot of fruits caused by Colletotrichum gloeosporioides also causes young unripe fruits to open prematurely. Root rots caused by Fomes noxius and Fomes lamaoensis may cause considerable damage." |

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|---|---|---|
| 407 | 1986. Fuller, T.C./McClintock, E.M.. Poisonous plants of California: Issue 53 of California natural history guides. University of California Press, Berkeley and Los Angeles, CA | [Causes allergies or is otherwise toxic to humans? Spice may be toxic at incorrect dose] "Nutmeg comes from the large woody brown seed; mace comes fro the thing net-like reddish covering of the seed. Large quantities of powdered nutmeg or mace affect the central nervous system, producing hallucinations and unpleasant side effects. In early stages of intoxication there may be headaches, dizziness, drowsiness and pronounced nausea, rapid pulse, delirium, com. May be followed by hangover." |
| 407 | 1993. Iwu, M.M.. Handbook of African medicinal plants. CRC Press, Boca Raton, FL | [Causes allergies or is otherwise toxic to humans? Potentially. Spice may be toxic, but unknown if trees can have similar effects] "Toxicology - High doses of nutmeg are highly hypnotic and potentially toxic. Reported adverse effects include hypothermia, giddiness, nausea, weak pulses, and general feeling of heaviness in the chest or/and lower abdomen (69). It also causes tachycardia, and the oil decreases fertility in rats (637). One of the constituents of nutmeg, safrole, has been found to be carcinogenic in mice (638)." |
| 407 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Causes allergies or is otherwise toxic to humans? Spice may be toxic at incorrect dose] "Abuse: Nutmeg has been known for its hallucinogenic properties for a long time. Adults may abuse the hallucinogenic properties of nutmeg. Children may be at high risk at home, since nutmeg may be widely available as a cooking additive. In the course of its use in traditional medicine, overdose may occur." [No evidence that foliage or sap from tree are toxic or allergenic] |
| 408 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Creates a fire hazard in natural ecosystems? No] "Grows wild on rich volcanic soils in lowland tropical rain forests. Nutmeg needs a warm and humid tropical climate." [No evidence, and unlikely in humid, rainforest habitat] |
| 409 | 2007. Nybe, E.V./Raj, N.M./Peter, K.V.. Spices: volume 5 horticultural science series. New India Publishing, New Delhi, India | [Is a shade tolerant plant at some stage of its life cycle? Yes] "Nutmeg is a shade loving plant (Kannan, 1971), young as well as grown up plants requiring a certain amount of shade. Locations with permanent natural shade will be the optimum." |
| 409 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Is a shade tolerant plant at some stage of its life cycle? Yes] "Young nutmeg plants should be planted under 50% shade, but can be reduced progressively and after 6-7 years they can grow without shade at all." |
| 410 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Tolerates a wide range of soil conditions? Yes] "Soil type: Nutmeg can grow on any kind of soil provided there is sufficient water but without any risk of waterlogging. It prefers soils of volcanic origin and those with high contents of organic matter with pH 6.5 7.5." |
| 411 | 1986. Armstrong, J.E./Drummond III, B.A.. Floral Biology of Myristica fragrans Houtt. (Myristicaceae), the Nutmeg of Commerce. Biotropica. 18(1): 32-38. | [Climbing or smothering growth habit? No] "Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent." |
| 412 | 1999. Jensen, M.. Trees Commonly Cultivated in Southeast Asia: An Illustrated Field Guide. 2nd Edition. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand | [Forms dense thickets? No] "Very rarely found growing wild." … "Distribution: Originates in the Molucca Islands from where it has, more or less successfully, been introduced into Thailand, Malaysia, Singapore, elsewhere in Indonesia and outside the region." [No evidence] |
| 412 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Forms dense thickets? No] "Grows wild on rich volcanic soils in lowland tropical rain forests. Nutmeg needs a warm and humid tropical climate." [No evidence] |
| 501 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Aquatic? No] "Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent." [Terrestrial] |
| 502 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Grass? No] "Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent." [Myristicaceae] |
| 503 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Nitrogen fixing woody plant? No] "Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent." [Myristicaceae] |

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|---|---|---|
| 504 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent." |
| 601 | 1999. Jensen, M.. Trees Commonly Cultivated in Southeast Asia: An Illustrated Field Guide. 2nd Edition. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand | [Evidence of substantial reproductive failure in native habitat? Unknown] "Very rarely found growing wild." … "Distribution: Originates in the Molucca Islands from where it has, more or less successfully, been introduced into Thailand, Malaysia, Singapore, elsewhere in Indonesia and outside the region." [More commonly found in cultivation, so reproductive success in wild unknown] |
| 602 | 2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI | [Produces viable seed? Yes] "Nutmeg is always propagated by seed since it has proved impossible to propagate vegetatively." |
| 602 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Produces viable seed? Yes] "Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base." |
| 603 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Hybridizes naturally? Unknown] No evidence |
| 603 | 2012. WRA Specialist. Personal Communication. | [Hybridizes naturally? Unknown] |
| 604 | 1986. Armstrong, J.E./Drummond III, B.A.. Floral Biology of Myristica fragrans Houtt. (Myristicaceae), the Nutmeg of Commerce. Biotropica. 18(1): 32-38. | [Self-compatible or apomictic? No] "These genera are dioecious, as are all Myristicaceae, although there are reports of monoecious species in Iryanthera (Smith 1937)." |
| 604 | 2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestree Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/) | [Self-compatible or apomictic? No] "There are both male and female type trees, both required for pollination and fruit set. The seedlings reveal their sex at first flowering." |
| 605 | 1986. Armstrong, J.E./Drummond III, B.A.. Floral Biology of Myristica fragrans Houtt. (Myristicaceae), the Nutmeg of Commerce. Biotropica. 18(1): 32-38. | [Requires specialist pollinators? No] "In most respects the floral biology of M. fragrans is a highly specialized and unusual example of a cantharophilous pollination syndrome. Myristica has small flow- ers, a pollen reward system, and no movements of floral parts, all of which have been considered relatively unspe- cialized features of beetle pollinated flowers (Gottsberger 1974). Specialized cantharophilous characteristics of My- ristica include: dioecy, protection of the pistil by the perianth, no pistillate flower reward and the use of de- ception (automimicry) to attract pollinators, exclusion of pollinators from pistillate flowers, short-lived staminate flowers, and use of the perianth opening to select polli- nator size class." [Adapted for specialized beetle pollination, but able to be pollinated by other insects] |
| 605 | 1993. Renner, S.S./Feil, J.P.. Pollinators of Tropical Dioecious Angiosperms. American Journal of Botany. 80(9): 1100-1107. | [Requires specialist pollinators? No] "Although the authors stress that these are generalist, pollen-foraging beetles, Myristica floral morphology is clearly euphilic (adapted to pollination by specific agents) rather than allophilic (available for pollination by any visitor). Drosophilids and strong- flying syrphids that pollinate Tambourissa cordifolia and T. peltata covered nearest neighbor distances at the study sites of 0.78 and 9.75 m, respectively (Lorence, 1985). These flies and also the beetles that pollinate Myristica fragrans…" |
| 606 | 2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI | [Reproduction by vegetative fragmentation? No] "Nutmeg is always propagated by seed since it has proved impossible to propagate vegetatively." |
| 607 | 2000. Liogier, A.H./ Martorell, L.F.. Flora of Puerto Rico and adjacent islands: a systematic synopsis. La Editorial, UPR, San Juan, Puerto Rico | [Minimum generative time (years)? 7+] "The tree does not flower until around 7-9 years old, when it fruits; it may produce until the 90th year. In other areas it produces fruit 15-20 years after planting and bears fruit throughout the year, but peak harvest season is from December to May." |
| 607 | 2007. Nybe, E.V./Raj, N.M./Peter, K.V.. Spices: volume 5 horticultural science series. New India Publishing, New Delhi, India | [Minimum generative time (years)? 5+] "Fruiting commences from the fifth or sixth year but may take even eight, or nine years (Verghese, 2000a). Plants which begin to fruit early are short lived. Delayed fruiting in the 9th year is best." |

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| 701 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base." [No evidence. Seeds relatively large and with no means of external attachment] |
| 702 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Propagules dispersed intentionally by people? Yes] "[native to Indonesia (Moluccas); widely cultivated in the tropics]." |
| 703 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Propagules likely to disperse as a produce contaminant? No] "Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base." [No evidence. Seeds relatively large, and they, along with the dried arils, are valued as a commercial crop] |
| 704 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Propagules adapted to wind dispersal? No] "Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base." [Arillate] |
| 705 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Propagules water dispersed? No] "Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base." [Arillate. Adapted for internal vertebrate dispersal] |
| 705 | 2011. Mangion, C.P.. Myristicaceae. In Short, P.S. & Cowie, I.D. (eds), Flora of the Darwin Region. Northern Territory Herbarium, Palmerston, Australia | [Propagules water dispersed? No] "The family includes the nutmeg tree, Myristica fragrans, from which the spices nutmeg (ground or entire seeds) and mace (the ground aril) are obtained. This, and seemingly the Australian species dealt with below, are dispersed by fruit-eating birds." |
| 706 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Propagules bird dispersed? Yes] "Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base." [Arillate] |
| 706 | 2011. Mangion, C.P.. Myristicaceae. In Short, P.S. & Cowie, I.D. (eds), Flora of the Darwin Region. Northern Territory Herbarium, Palmerston, Australia | [Propagules bird dispersed? Yes] "The family includes the nutmeg tree, Myristica fragrans, from which the spices nutmeg (ground or entire seeds) and mace (the ground aril) are obtained. This, and seemingly the Australian species dealt with below, are dispersed by fruit-eating birds." |
| 706 | 2012. Missouri Botanical Garden. Exploring the Tropics - Plant and Animal Interactions. http://www.mobot.org/education/tropics/page6.html | [Propagules bird dispersed? Yes] "The fruits of the nutmeg tree are eaten by a bird, the Magnificent Bird of Paradise. The outer fruit is digested but the inner seed (the nutmeg) is protected by a thin hard shell. It passes through the digestive tract of the bird unharmed and is dispersed throughout the forest. " |
| 707 | 2008. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 7 (Menispermaceae through Capparaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis | [Propagules dispersed by other animals (externally)? No] "Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base." [Arillate. No evidence, and no means of external attachment] |
| 708 | 1980. Skutch, A.F.. Arils as Food of Tropical American Birds. Condor. 82: 31-42. | [Propagules survive passage through the gut? Yes] "Wallace (1872) described how the Blue-tailed Imperial Pigeon (Ducula concinna) swallows the seed of the nutmeg (Myristica fragrans) and, after digesting the aril or mace, casts up the seed uninjured." |
| 708 | 2012. Missouri Botanical Garden. Exploring the Tropics - Plant and Animal Interactions. http://www.mobot.org/education/tropics/page6.html | [Propagules survive passage through the gut? Yes] "The fruits of the nutmeg tree are eaten by a bird, the Magnificent Bird of Paradise. The outer fruit is digested but the inner seed (the nutmeg) is protected by a thin hard shell. It passes through the digestive tract of the bird unharmed and is dispersed throughout the forest. " |
| 801 | 1916. Wilcox, E.V.. Tropical agriculture : the climate, soils, cultural methods, crops, live stock, commercial importance and opportunities of the tropics. D. Appleton and Company, New York and London | [Prolific seed production (>1000/m2)? Unlikely] "The nutmeg tree begins to bear at the age of 7 years and reaches its full bearing power at about 30 years of age, at which time each tree bears from 2,000 to 5,000 nuts per year. The tree lives to be 100 years old or more and bears two crops annually." [Older trees produce large numbers of seeds, which are likely to be large-statured. Seeds, which are harvested, are not likely to reach such high densities] |
| 801 | 2007. Ecocrop. Myristica fragrans. FAO, http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=1514 | [Prolific seed production (>1000/m2)? Unlikely] "One tree may produce 1000-5000 fruits per year. Yields of nutmeg vary between 0.5-1.2 t. With 250 female trees/ha and 5 g per dry shelled seed production is 1250 kg of nutmegs per ha." |
| 802 | 2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI | [Evidence that a persistent propagule bank is formed (>1 yr)? No] "The seed remains viable for only a short time and should be planted immediately once collected." |

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| 802 | 2007. Nybe, E.V./Raj, N.M./Peter, K.V.. Spices: volume 5 horticultural science series. New India Publishing, New Delhi, India | [Evidence that a persistent propagule bank is formed (>1 yr)? No] "Seeds have low viability and hence are to be sown immediately after collection. They can be preserved in moist sand for 3-4 days (Mathew, 1992)…" |
| 803 | 2012. WRA Specialist. Personal Communication. | [Well controlled by herbicides? Unknown] No evidence that this tree is being chemically controlled. No information on herbicide efficacy found. |
| 804 | 2012. WRA Specialist. Personal Communication. | [Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown] |
| 805 | 2012. WRA Specialist. Personal Communication. | [Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] |