

Taxon: <i>Millettia pinnata</i> (L.) <i>PaniGRAHI</i>	Family: Fabaceae
Common Name(s): Indian beech Indian pongamia karanja karumtree pongamia tree	Synonym(s): <i>Cytisus pinnatus</i> L. (basionym) <i>Derris indica</i> (Lam.) Bennet <i>Pongamia pinnata</i> (L.) Pierre

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 22 Jun 2017
WRA Score: 7.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Tropical Tree, Naturalized, Biofuel Feedstock, Water-Dispersed, Coppices

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
103	Does the species have weedy races?		
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
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
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	y
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
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
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
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y

Qsn #	Question	Answer Option	Answer
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed		
303	Agricultural/forestry/horticultural weed		
304	Environmental weed		
304	Environmental weed		
305	Congeneric weed		
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	n
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
402	Allelopathic		
403	Parasitic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals		
405	Toxic to animals		
406	Host for recognized pests and pathogens	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
408	Creates a fire hazard in natural ecosystems		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
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
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
502	Grass	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
503	Nitrogen fixing woody plant	y=1, n=0	y
503	Nitrogen fixing woody plant	y=1, n=0	y
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
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
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
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
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
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n

Qsn #	Question	Answer Option	Answer
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Biswas, B., Scott, P. T., & Gresshoff, P. M. (2011). Tree legumes as feedstock for sustainable biofuel production: Opportunities and challenges. <i>Journal of Plant Physiology</i> , 168(16), 1877-1884	"Pongamia has not been the subject of selection and breeding, despite a long history of human use in the Indian subcontinent. In contrast to established crop species, little domestication has occurred. It appears essential to accelerate the processes of domestication through application of modern plant science methodologies"
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	No evidence

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"P. pinnata is a leguminous, nearly evergreen medium-size tree, with short bole and spreading crown. It is indigenous to India, Myanmar, Malaysia and Indonesia. "

202	Quality of climate match data	High
	Source(s)	Notes
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Oyen, L.P.A. 1997. <i>Pongamia pinnata</i> (L.) Pierre[Internet] Record from Proseabase. Faridah Hanum, I & van der Maesen, L.J.G. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2017]	"In its natural range, Pongamia pinnata tolerates a wide temperature range. Mature trees withstand light frost and tolerate temperatures of over 50°C. Its altitudinal range is from 0—1200 m."
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"It grows along river-banks and close to the sea in tidal estuaries in Bangladesh, tolerating a wide range of climates and soils." [Elevation range may exceed 1000 m; demonstrating environmental versatility]

Qsn #	Question	Answer
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"This species grows to elevations of 1200 m, but in the Himalayan foothills is not found above 600 m (GOI 1983)." ... "The natural distribution of pongam is along coasts and river banks in India and Burma. Native to the Asian subcontinent, this species has been introduced to humid tropical lowlands in the Philippines, Malaysia, Australia, the Seychelles, the United States (Little undated), and Indonesia." [Elevation range may exceed 1000 m; demonstrating environmental versatility]
	Gilman, E.F. & Watson, D.G. 1994. <i>Pongamia pinnata</i> - Pongam. University of Florida IFAS Extension. Gainesville, FL. http://edis.ifas.ufl.edu/st498 . [Accessed 22 Jun 2017]	"USDA hardiness zones: 10B through 11" [Mostly tropical species but with a broad elevation range]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It is indigenous to India, Myanmar, Malaysia and Indonesia."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It has also been successfully introduced in many African countries, Australia and New Zealand."
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"It is planted in the humid tropical lowlands around the world, and has been introduced in Egypt and the United States (Florida and Hawaii)."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Wunderlin, R.P. & Hansen, B.F. 2003. Guide to the Vascular Plants of Florida. University Press of Florida, Gainesville, FL	"Disturbed sites. Rare; Palm Beach Co. Native to Asia. Escaped from cultivation."
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"It probably originated from India, Bangladesh, Myanmar and Thailand and is naturalized from Pakistan and Sri Lanka throughout south-east Asia China, Japan, Indonesia, Malaysia to north-eastern Australia, New Zealand, Papua New Guinea, Philippines, Samoa, Seychelles, Solomon Islands, Tonga, Mauritius and Fiji."
	Morton, J.F. 1976. Pestiferous spread of many ornamental and fruit species in South Florida. Proceedings of the Florida State Horticultural Society 89: 348-353	" <i>Pongamia pinnata</i> Merr. PONGAM. Tropical Asia, Africa, Australia, Polynesia. Locally spontaneous from seed, despite Long and Lakela's "doubtfully"."
	Sauer, J.D. 1962. Effects of Recent Tropical Cyclones on the Coastal Vegetation of Mauritius. Journal of Ecology 50(2): 275-290	"The outpost vegetation was dominated by a quite different group of species. A few were recently naturalized from artificial introductions, notably <i>Pongamia pinnata</i> , <i>Mimusops bojeri</i> and <i>Morinda citrifolia</i> " ... "Near the mouth of the Riviere des Gallets on the south coast, abundant <i>Pongamia pinnata</i> seedlings were starting in equally deep drift piled on an open grass carpet behind a cobble beach."

Qsn #	Question	Answer
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"While it has naturalised in several countries (with evidence of sporadic naturalisation in south-eastern Queensland), this study was unable to find evidence that pongamia has significant negative impacts as a weed anywhere in the world."

302	Garden/amenity/disturbance weed	Y
	Source(s)	Notes
	Setzer, K. 2013. Beware the invasive pongam tree. Sun Sentinel, December 16. http://articles.sun-sentinel.com/ . [Accessed 22 Jun 2017]	"Here's why the pongam is too good to be true: In addition to crowding out our natives, it is highly invasive. It produces hundreds of seed pods and sends up root suckers quicker than a mushroom grows after a rainstorm. In addition to the root suckers, dozens of seedlings spread out from its base. The surface roots also travel, sending up more suckers in surprising places far from the parent tree. The tree is also a bit messy. It is temporarily deciduous, defoliating for about a month in spring. Then it flowers and flowers — and drops the flowers by the thousands everywhere. Most parts of this tree are in some way toxic; the flowers are known to stun or kill fish. You could compost the leaves and flowers, which are quite oily."
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"Moreover, it produces root suckers profusely. Because of these characteristics, pongam is unsuitable for agroforestry and has the potential to become a weed if not managed carefully. "
	Low, T. & Booth, C. 2008. The Weedy Truth About Biofuels The Invasive Species Council, Melbourne	"Recommendation: Because this plant has a demonstrated capacity to spread from cultivation, it should not be grown outside its natural range close to national parks or watercourses. It should be declared a restricted plant that cannot be grown near sensitive areas. Some states have an appropriate declaration category but others do not." [Minor weedy tree with suspected potential to become invasive in agroforestry or natural areas]
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"Spontaneous seedlings and root suckers are produced and may cause serious weed problems." [Potential agroforestry or environmental weed]
	Llamas, K.A. 2003. Tropical Flowering Plants. Timber Press, Portland, OR	"Though commonly distributed by landscaping companies as a fast-growing shade tree, pongam, <i>Millettia indica</i> , is a noxious pest in the garden and invasive in wild areas. It is heavily self-seeding and young seedlings require considerable hand-pulling to control" ... "Strongly discouraged for landscaping. A controlled species in Florida."

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"While it has naturalised in several countries (with evidence of sporadic naturalisation in south-eastern Queensland), this study was unable to find evidence that pongamia has significant negative impacts as a weed anywhere in the world."

Qsn #	Question	Answer
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	[Potentially] "Moreover, it produces root suckers profusely. Because of these characteristics, pongam is unsuitable for agroforestry and has the potential to become a weed if not managed carefully. "
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	[Potentially] "Spontaneous seedlings and root suckers are produced and may cause serious weed problems." [Reference relates to agroforestry, so it has the potential to become a weed of forestry]

304	Environmental weed	
	Source(s)	Notes
	Brisbane City Council. 2017. Weed Identification Tool - pongamia - <i>Millettia pinnata</i> . http://weeds.brisbane.qld.gov.au/weeds/pongamia . [Accessed 22 Jun 2017]	"A weed of riparian vegetation, forest margins, urban bushland, roadsides, disturbed sites and waste areas."
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. <i>Pongamia</i> . <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"While it has naturalised in several countries (with evidence of sporadic naturalisation in south-eastern Queensland), this study was unable to find evidence that pongamia has significant negative impacts as a weed anywhere in the world. When combined with the fact that it is considered native to northern Australia, this study concludes that pongamia poses a low risk in Queensland."
	Setzer, K. 2013. Beware the invasive pongam tree. Sun Sentinel, December 16. http://articles.sun-sentinel.com/ . [Accessed 22 Jun 2017]	[Potentially invasive in natural areas] "Miami-Dade County lists it as a "Controlled Landscape plant," meaning it may not be planted within 500 feet of native plant communities. Pinelands are listed as especially susceptible to pongam invasion. So if you identify a pongam growing on your property, keep in mind the mess, the suckers and the running roots. You might remove it, and ideally replace it with a native."
	Kueffer, C. & Mauremootoo, J. 2004. Case studies on the status of invasive woody plant species in the Western Indian Ocean 3. Mauritius (islands of Mauritius and Rodrigues). Working Paper FBS/4-3E. FAO, Rome, Italy	[Potentially. Impacts unspecified] " <i>Pongamia pinnata</i> is naturalized in estuaries." ... "On the islands of Rodrigues and Mauritius, the natural habitats of the coastal zone have been destroyed almost completely. <i>Casuarina equisetifolia</i> has been widely planted. Two invasive woody plant species have been identified in the coastal zone: <i>Mimusops coriacea</i> and <i>Pongamia pinnata</i> " ... "Not many invasive species affect mangroves. The only abundant invasive woody plant species is <i>Pongamia pinnata</i> (J. Mauremootoo and J.-C. Sevathian, personal observations; Rouillard and Guého 1999)."
	Hunsberger, A.G.B. 2002. Invasive and Banned Plants of Miami-Dade County. University of Florida IFAS, Homestead, FL	[Potentially] "Controlled Landscape plants These plants "... may not be planted within 500 feet of native plant communities which they have been known to invade ..." [not on FLEPPC list of invasive wildland plants]
	Save Our Waterways Now. 2012. Weeds to Whack - <i>Millettia pinnata</i> (FABACEAE) Indian-beech, <i>Pongamia</i> , Pongame. http://www.saveourwaterwaysnow.com.au . [Accessed 22 Jun 2017]	[Potentially] " <i>Millettia</i> (previously <i>Pongamia</i>) <i>pinnata</i> is thought to have originated in India and is found throughout Asia. Not often naturalised, although propagates with alarming ease under the parent tree. This one may start popping up in warmer areas."

Qsn #	Question	Answer
	Low, T. & Booth, C. 2008. The Weedy Truth About Biofuels The Invasive Species Council, Melbourne	[Potentially] "Weed status: Pongamia does not pose the same threat as other plants listed here since it is native to northern Australia. But in southern Queensland, where it is grown as a street tree, it has spread into the wild on a small scale, well south of its natural range.1 It seeds prolifically and the seeds germinate readily near parent trees. The spread of this tree into new regions of Australia would be ecologically undesirable, irrespective of its native status in the north."

305	Congeneric weed	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	<i>Millettia atropurpurea</i> , <i>Millettia brandisiana</i> , <i>Millettia drastica</i> , <i>Millettia dura</i> , <i>Millettia peguensis</i> , and <i>Millettia zechiana</i> cited as naturalized and/or weeds. Impacts unspecified or uncorroborated.

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed]	"Pongam (Legununosae, subfamily Papilionoideae) is a medium sized tree that generally attains a height of about 8 m and a trunk diameter of more than 50 cm. However, Troup (GOI 1983) reports trees attaining heights of 18 m. The trunk is generally short with thick branches spreading into a dense hemispherical crown of dark green leaves. The bark is thin gray to grayish- brown, and yellow on the inside (GOI 1983). The taproot is thick and long; lateral roots are numerous and well developed. The alternate, compound pinnate leaves consist of 5 or 7 leaflets which are arranged in 2 or 3 pairs, and a single terminal leaflet. Leaflets are 5-10 cm long, 4-6 cm wide, and pointed at the tip. Flowers, borne on racemes, are pink, light purple, or white. Pods are elliptical, 3-6 cm long and 2-3 cm wide, thick walled, and usually contain a single seed. Seeds are 10-20 cm long, fig oblong, and light brown in color."

402	Allelopathic	
	Source(s)	Notes
	Latha, S., Mariamma, J., & Daniel, M. (2001). Studies on the effects of leaf leachates of <i>Pongamia pinnata</i> on certain crops and weeds and the soil mycoflora. National Academy Science Letters, 24 (5-12), 63-68	[Potentially] "The allelopathic effects of the leachates of the leaves of <i>Pongamia pinnata</i> against rice, wheat, <i>Cassia tora</i> and <i>C. occidentalis</i> were studied. The leachates inhibited the performance of both rice and wheat, but exerted no effect on the weeds. The leachates of <i>P. pinnata</i> contained allelochemicals such as vanillic acid, syringic acid, melilotic acid and derivatives of quercetin and kaempferol. The residual phenolics of the soil were more in the case of the weeds. The variety of mycoflora below <i>Pongamia</i> were less compared to control." [Potentially, but study only documents effects under controlled laboratory conditions]

403	Parasitic	n

Qsn #	Question	Answer
	Source(s)	Notes
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed]	"Pongam (Leguminosae, subfamily Papilionoideae) is a medium sized tree that generally attains a height of about 8 m and a trunk diameter of more than 50 cm."

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Descriptors: oils; medicinal products; pesticides; food; fodder; tanstuffs; green manures"
	Duke, J.A. 1983. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 22 Jun 2017]	"In wet areas of the tropics the leaves serve as green manure and as fodder."
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed]	"Opinions vary on the usefulness of this species as a fodder. Troup (GOI 1983) reports that the leaves are eaten by cattle and readily consumed by goats. However, in many areas it is not commonly eaten by farm animals. Its fodder value is greatest in arid regions. According to Singh (1982) the leaves contain 43% dry matter, 18% crude protein, 62% neutral detergent fiber, 40% acid detergent fiber, and in vitro dry matter digestibility of 50%. The presscake, remaining when oil is extracted from the seeds, is used as a poultry feed."

Qsn #	Question	Answer
405	Toxic to animals	
	Source(s)	Notes
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed]	"Fodder and feed. Opinions vary on the usefulness of this species as a fodder. Troup (GOI 1983) reports that the leaves are eaten by cattle and readily consumed by goats. However, in many areas it is not commonly eaten by farm animals. Its fodder value is greatest in arid regions. According to Singh (1982) the leaves contain 43% dry matter, 18% crude protein, 62% neutral detergent fiber, 40% acid detergent fiber, and in vitro dry matter digestibility of 50%. The presscake, remaining when oil is extracted from the seeds, is used as a poultry feed."
	Duke, J.A. 1983. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 22 Jun 2017]	"In wet areas of the tropics the leaves serve as green manure and as fodder. The black malodorous roots contain a potent fish-stupefying principle." ... "Both the oil and residues are toxic." [Roots & oil are toxic, but consumption of leaves does not result in poisoning]
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"Its leaves and seeds are toxic to herbivores." ... "Due to a propensity to produce root suckers, and the toxic nature of leaves and pods, neighbouring landholders may not want this species." ... "More recently, pongamia has been cultivated as a garden ornamental and for shade. However, it can be problematic due to its toxicity (induced vomiting if ingested) and the fact that its flowers can irritate skin."
	Setzer, K. 2013. Beware the invasive pongam tree. Sun Sentinel, December 16. http://articles.sun-sentinel.com/ . [Accessed 22 Jun 2017]	"Most parts of this tree are in some way toxic; the flowers are known to stun or kill fish. You could compost the leaves and flowers, which are quite oily."

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Pests recorded Insects: Aleurodicus dispersus (whitefly) Ascotis selenaria imparata Cameraria virgulata Coccus Cyclopelta siccifolia Megalurothrips distalis Rastrococcus iceryoides (mango mealy bug) Fungus diseases: Aspergillus fumigatus" [A web search did not show any of the above to be recognized, specific pests.]
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"Pongam attracts many pests and diseases. Some of the important pests are Parnara mathias, Gracillaria sp., Indarbela quadrinotata, Myllocerus curvicornis, and Acrocercops sp. (Anon. 1994). Attacks by these insects cause whitish streaks and the formation of galls on affected leaves."

407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	Notes
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"Its leaves and seeds are toxic to herbivores." ... "Due to a propensity to produce root suckers, and the toxic nature of leaves and pods, neighbouring landholders may not want this species." ... "More recently, pongamia has been cultivated as a garden ornamental and for shade. However, it can be problematic due to its toxicity (induced vomiting if ingested) and the fact that its flowers can irritate skin."

Qsn #	Question	Answer
	Setzer, K. 2013. Beware the invasive pongam tree. Sun Sentinel, December 16. http://articles.sun-sentinel.com/ . [Accessed 22 Jun 2017]	"Most parts of this tree are in some way toxic; the flowers are known to stun or kill fish. You could compost the leaves and flowers, which are quite oily."
	Dave's Garden. 2017. Pongam, Karum Tree, Poonga-Oil Tree, Indian Beech. <i>Pongamia pinnata</i> . http://davesgarden.com/guides/pf/go/93109/ . [Accessed 22 Jun 2017]	[Causes allergies or is otherwise toxic to humans? Potentially] "Seed is poisonous if ingested"
	Gilman, E.F. & Watson, D.G. 1994. <i>Pongamia pinnata</i> - Pongam. University of Florida IFAS Extension. Gainesville, FL. http://edis.ifas.ufl.edu/st498 . [Accessed 22 Jun 2017]	[Potentially] "However, the seeds which are contained within the oval, 1.5- inch-long, brown seedpods are poisonous, a fact which should be considered in placing the tree in the landscape, if many children are present."

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 22 Jun 2017]	[No evidence from native range] "P. pinnata is native to humid and sub-tropic environments; common along waterways or seashores, with its roots in fresh or saltwater."
	Ansari, S. 2003. WRA Specialist. Personal Communication	[Unknown] Possibly if dried - multi-branched trunk with closely spaced stems.

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"- Tolerates drought; shade; frost"
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"It is a shade bearer and can grow under the shade of other trees, it is, however, not a shade demander and grows well even with full overhead light."
	Oyen, L.P.A. 1997. <i>Pongamia pinnata</i> (L.) Pierre [Internet] Record from Proseabase. Faridah Hanum, I & van der Maesen, L.J.G. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2017]	"It is fairly tolerant of shade, at least when young."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Oyen, L.P.A. 1997. <i>Pongamia pinnata</i> (L.) Pierre [Internet] Record from Proseabase. Faridah Hanum, I & van der Maesen, L.J.G. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2017]	"Best growth is found on deep sandy loams, but it will also grow on sandy soils and heavy swelling clay soils. It is very tolerant of saline conditions and tolerant of alkalinity."

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It grows along river-banks and close to the sea in tidal estuaries in Bangladesh, tolerating a wide range of climates and soils." ..."- Soil texture: light; medium; heavy - Soil drainage: free; seasonally waterlogged - Soil reaction: neutral; alkaline - Special soil tolerances: sodic; saline; infertile"
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"Pongamia can tolerate a wide range of soil types including saline, alkaline, sandy, heavy clay and rocky soils (including oolitic limestone) and waterlogged soils. However, Orwa et al. (2009) suggest it performs best in deep, well-drained, sandy loams with adequate moisture. It does not grow well in very dry sands."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Duke, J.A. 1983. Handbook of Energy Crops - <i>Pongamia pinnata</i> . http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 22 Jun 2017]	"Fast growing, glabrous, deciduous, tree to ca 25 m tall, branches drooping; trunk diameter to 60 cm; bark smooth, gray."

412	Forms dense thickets	n
	Source(s)	Notes
	Kueffer, C. & Mauremootoo, J. 2004. Case studies on the status of invasive woody plant species in the Western Indian Ocean 3. Mauritius (islands of Mauritius and Rodrigues). Working Paper FBS/4-3E. FAO, Rome, Italy	" <i>Pongamia pinnata</i> is naturalized in estuaries." ... "On the islands of Rodrigues and Mauritius, the natural habitats of the coastal zone have been destroyed almost completely. <i>Casuarina equisetifolia</i> has been widely planted. Two invasive woody plant species have been identified in the coastal zone: <i>Mimusops coriacea</i> and <i>Pongamia pinnata</i> " ... "Not many invasive species affect mangroves. The only abundant invasive woody plant species is <i>Pongamia pinnata</i> (J. Mauremootoo and J.-C. Sevathian, personal observations; Rouillard and Guého 1999)."
	Save Our Waterways Now. 2012. Weeds to Whack - <i>Millettia pinnata</i> (FABACEAE) Indian-beech, <i>Pongamia</i> , <i>Pongame</i> . http://www.saveourwaterwaysnow.com.au . [Accessed 22 Jun 2017]	[No evidence to date] " <i>Millettia</i> (previously <i>Pongamia</i>) <i>pinnata</i> is thought to have originated in India and is found throughout Asia. Not often naturalised, although propagates with alarming ease under the parent tree. This one may start popping up in warmer areas."
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. <i>Pongamia</i> . <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	No evidence to date

501	Aquatic	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	Terrestrial

Qsn #	Question	Answer
502	Grass	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	Fabaceae

503	Nitrogen fixing woody plant	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"P. pinnata is a leguminous, nearly evergreen medium-size tree, with short bole and spreading crown. "
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"Pongamia pinnata is one of the few nitrogen fixing trees (NFTS) to produce seeds containing 30-40% oil."

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"Pongam (Legununosae, subfamily Papilionoideae) is a medium sized tree that generally attains a height of about 8 m and a trunk diameter of more than 50 cm."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	EcoPort. 2001. Pongamia pinnata. http://ecoport.org . [Accessed 22 Jun 2017]	"In India, seed ripens from February to May."
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"Natural reproduction is profuse by seed and common by root suckers"
	Oyen, L.P.A. 1997. Pongamia pinnata (L.) Pierre[Internet] Record from Proseabase. Faridah Hanum, I & van der Maesen, L.J.G. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 22 Jun 2017]	[No evidence] "Origin and geographic distribution: Pongamia pinnata probably originated from India and occurs naturally or naturalized from Pakistan, India and Sri Lanka throughout South-East Asia to north eastern Australia, Fiji and Japan. It has been introduced in Egypt and the United States (Florida, Hawaii)."

602	Produces viable seed	y
	Source(s)	Notes

Qsn #	Question	Answer
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"In India, seed ripens from February to May." ... "Spontaneous seedlings and root suckers are produced and may cause serious weed problems."
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"Natural reproduction is profuse by seed and common by root suckers"
	Duke, J.A. 1983. Handbook of Energy Crops - <i>Pongamia pinnata</i> . http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 22 Jun 2017]	"Seeds, remaining viable for sometime, require no special scarification. Direct sowing is usually successful. Seedlings transplant easily from the nursery after about a year. Root suckers are rather plentiful as well. It is a rapid-growing coppice species that can be cloned."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Raju, A. S., & Rao, S. P. (2006). Explosive pollen release and pollination as a function of nectar-feeding activity of certain bees in the biodiesel plant, <i>Pongamia pinnata</i> (L.) Pierre (Fabaceae). <i>Current Science</i> 90(7): 960-967	"Bees and wasps were found collecting floral rewards from different individuals, contributing to both self- and cross-pollination." ... "In effect, the stigma is most likely to receive cross pollen first from the bodies of the bees and it may also receive some self-pollen during keel explosion."
	Solomon Raju, A.J. 2006. Bio-Diesel: An Eco-Friendly Sustainable Fuel Source. Andhra University, Visakhapatnam	"Bees while collecting forage trip the floral mechanism causing self or cross-pollination."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Solomon Raju, A.J. 2006. Bio-Diesel: An Eco-Friendly Sustainable Fuel Source. Andhra University, Visakhapatnam	"Flowering occurs during summer season. The flowers are purplish-white, bisexual and nectariferous. They have explosive floral mechanism and bees trip the mechanism causing the release and deposition of pollen on them. This finally ends up in pollination. The bees such as Apis, Trigona, Ceratina, Pithitis, Megachile, Amegilla and Xylocopa use the flowers as pollen and nectar sources. This plant is an excellent floral source for honeybees to produce honey during summer period. Bees while collecting forage trip the floral mechanism causing self or cross pollination. Butterflies and wasps also utilize this as nectar source occasionally but have a minor role in pollination."

Qsn #	Question	Answer
	Raju, A. S., & Rao, S. P. (2006). Explosive pollen release and pollination as a function of nectar-feeding activity of certain bees in the biodiesel plant, <i>Pongamia pinnata</i> (L.) Pierre (Fabaceae). <i>Current Science</i> 90(7): 960-967	"The plant is primarily dependent on bee species such as <i>Apis dorsata</i> , <i>A. cerana indica</i> , <i>Amegilla</i> sp., <i>Megachile</i> sp., <i>Xylocopa latipes</i> and <i>X. pubescens</i> for pollination. Wasps also cause keel explosion and pollination, but they are occasional visitors only. Other bees and thrips also collect pollen and nectar droplets present on wing and keel petals; the former group acts primarily as pollen thieves and the latter also as nectar thieves. The flowers stay open only on the day of anthesis and remain closed for the other two successive days of flower-life. Unpollinated flowers fall off while pollinated ones develop into fruits."
	Abrol, D. P., & Kapil, R. P. (1987). Nectar dilution pattern of bees in semi-arid environments. <i>Current Science</i> , 56(13), 68	<i>Apis mellifera</i> and of <i>Megachile cephalotes</i> forage on the flowers

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"- Ability to sucker; coppice; pollard"
	Setzer, K. 2013. Beware the invasive pongam tree. <i>Sun Sentinel</i> , December 16. http://articles.sun-sentinel.com/ . [Accessed 22 Jun 2017]	"Here's why the pongam is too good to be true: In addition to crowding out our natives, it is highly invasive. It produces hundreds of seed pods and sends up root suckers quicker than a mushroom grows after a rainstorm. In addition to the root suckers, dozens of seedlings spread out from its base. The surface roots also travel, sending up more suckers in surprising places far from the parent tree."
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed]	"Natural reproduction is profuse by seed and common by root suckers."
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"Spontaneous seedlings and root suckers are produced and may cause serious weed problems."
	Csurhes, S. and Hankamer, C. 2016. <i>Invasive Plant Risk Assessment. Pongamia. Millettia pinnata syn. Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"Vegetative propagation can occur from cuttings and root suckers (new plants growing from lateral roots of the parent tree)."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"Pod production starts 5-7 years after sowing."
	Duke, J.A. 1983. <i>Handbook of Energy Crops - Pongamia pinnata</i> . http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 22 Jun 2017]	"Trees of ten reach adult height in 4 or 5 years, bearing at the age of 4-7 years."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	[Unlikely. Pods and seeds relatively large and lack a means of external attachment] "Fruits: Pods borne in quantities, smooth, oblique oblong to ellipsoid, 3-8 x 2-3.5 x 1 1.5 cm, flattened but slightly swollen, slightly curved with short, curved point (beaked), brown, thick-walled, thick leathery to sub woody, hard, indehiscent, 1-2 seeded, short stalked. Seeds: Seed compressed ovoid or elliptical, bean-like, 1.5-2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily."
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It is often planted as a roadside and shade tree, having handsome scented flowers, and is easily raised from seed and cuttings."
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	[Unlikely. Pods and seeds relatively large] "Fruits: Pods borne in quantities, smooth, oblique oblong to ellipsoid, 3-8 x 2-3.5 x 1 1.5 cm, flattened but slightly swollen, slightly curved with short, curved point (beaked), brown, thick walled, thick leathery to sub woody, hard, indehiscent, 1-2 seeded, short stalked. Seeds: Seed compressed ovoid or elliptical, bean-like, 1.5 2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily."

Qsn #	Question	Answer
704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Teegalapalli, K., Hiremath, A. J., & Jathanna, D. (2010). Patterns of seed rain and seedling regeneration in abandoned agricultural clearings in a seasonally dry tropical forest in India. <i>Journal of Tropical Ecology</i> , 26(01), 25-33	"Appendix 1. List of native tree species, seeds of which were collected from seeds traps in this study in Bhadra. Also given are the locations where seeds of each species were encountered (C=in clearings; F=in the adjoining forests), and the species dispersal mode (B/M=bird/mammal dispersed, W/G=wind/gravity dispersed)." [Pongamia pinnata = W/G=wind/gravity dispersed. Probably gravity]
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"Pods do not dehisce or open naturally and need to decompose before the seeds can germinate (Morton 1990; Orwa et al. 2010)."
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	[Seeds do not have any adaptation for wind dispersal] "Fruits: Pods borne in quantities, smooth, oblique oblong to ellipsoid, 3-8 x 2-3.5 x 1.5 cm, flattened but slightly swollen, slightly curved with short, curved point (beaked), brown, thick walled, thick leathery to sub woody, hard, indehiscent, 1-2 seeded, short stalked. Seeds: Seed compressed ovoid or elliptical, bean-like, 1.5 2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily." ... "Pod production starts 5-7 years after sowing. They do not open naturally, and must decay before seeds can germinate."

705	Propagules water dispersed	y
	Source(s)	Notes
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"In riverine and coastal habitats, the pods are dispersed by flowing water (T Bean, Queensland Herbarium, pers. comm. 2010; Bennett 2009)."
	Sauer, J.D. 1991. <i>Plant Migration: The Dynamics of Geographic Patterning in Seed Plant Species</i> . University of California Press, Berkeley & Los Angeles, CA	"In the late nineteenth century, <i>Pongamia pinnata</i> was imported from the Seychelles. All of these have become naturalized as volunteers in natural coastal habitats on Mauritius, probably spreading around the island by floating seeds."
	Arathi, H. S., Ganeshaiyah, K. N., Shaanker, R. U., & Hegde, S. G. (1999). Seed abortion in <i>Pongamia pinnata</i> (Fabaceae). <i>American Journal of Botany</i> , 86(5), 659-662	"There is no information about the mode of dispersal of the seeds of <i>P. pinnata</i> . However, the pod features represent the syndromes associated with water dispersal (Ridley, 1930) and the pods stay afloat in water for more than two months (personal observation). Therefore, reduced wing loading by decreasing seed number could be hypothesized as a selection towards increased dispersal efficiency."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. 1994. <i>Pongamia pinnata</i> - Pongam. University of Florida IFAS Extension. Gainesville, FL. http://edis.ifas.ufl.edu/st498 . [Accessed 22 Jun 2017]	"Fruit characteristics: does not attract wildlife"

Qsn #	Question	Answer
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	"Pods are elliptical, 3-6 cm long and 2-3 cm wide, thick walled, and usually contain a single seed. Seeds are 10-20 cm long, fig oblong, and light brown in color" [Not fleshy-fruited]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. 1994. <i>Pongamia pinnata</i> - Pongam. University of Florida IFAS Extension. Gainesville, FL. http://edis.ifas.ufl.edu/st498 . [Accessed 22 Jun 2017]	"Fruit characteristics: does not attract wildlife"
	Duke, J.A. 1983. Handbook of Energy Crops - <i>Pongamia pinnata</i> . http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 22 Jun 2017]	"Pod short stalked, oblique-oblong, flat, smooth, thickly leathery to subwoody, indehiscent, 1-seeded; seed thick, reniform (Allen and Allen, 1981)." [No evidence, and no means of external attachment]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010. Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. <i>Pongamia</i> . <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"Seeds are unpalatable to herbivores." [Unlikely to be consumed or internally dispersed]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Arathi, H. S., Ganeshaiyah, K. N., Shaanker, R. U., & Hegde, S. G. (1999). Seed abortion in <i>Pongamia pinnata</i> (Fabaceae). <i>American Journal of Botany</i> , 86(5), 659-662	"In <i>Pongamia pinnata</i> only one of the two ovules develops into a seed in most of the pods." ... "The prevalence of single-seeded pods in <i>P. pinnata</i> seems therefore to be a result of competition between the two seeds for maternal resources. The evolutionary significance of single-seeded pods in <i>P. pinnata</i> is discussed with respect to possible dispersal advantage enjoyed by such pods."
	EcoPort. 2001. <i>Pongamia pinnata</i> . http://ecoport.org . [Accessed 22 Jun 2017]	"Pods... 1-2 seeded" ... "Seed compressed ovoid or elliptical, bean like, 1.5-2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily. There are 1500-1700 seeds/kg." [Harvested seed amounts unlikely to reach such high densities as seeds are relatively large, with relatively few per pod]

802	Evidence that a persistent propagule bank is formed (>1 yr)	

Qsn #	Question	Answer
	Source(s)	Notes
	Csurhes, S. and Hankamer, C. 2016. Invasive Plant Risk Assessment. Pongamia. <i>Millettia pinnata</i> syn. <i>Pongamia pinnata</i> . The State of Queensland, Department of Agriculture and Fisheries Biosecurity Queensland	"Seed longevity has not been formally researched but may exceed 60 years (<i>Millettia</i> Plantations 2010)."
	Duke, J.A. 1983. Handbook of Energy Crops - <i>Pongamia pinnata</i> . http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 2 Apr 2012]	[Evidence that a persistent propagule bank is formed (>1 yr)? Potentially] "Seeds, remaining viable for sometime, no special scarification."
	Daniel, J.N. 1997. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. <i>Pongamia pinnata</i> - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html . [Accessed 22 Jun 2017]	[Potentially] "Seeds, which require no treatment before sowing, remain viable for about a year when stored in air-tight containers."
	Kundu, M. (2008). Prediction of viability of seeds of <i>Pongamia pinnata</i> (Karanj) under controlled conditions. <i>Seed Science and Technology</i> , 36(2), 481-485	[Potentially] "Viability equations were used to predict the longevity of seeds of <i>Pongamia pinnata</i> stored at different conditions. The viability constants for this particular species were estimated and the fitness of the equations was discussed. The storage life of 40 years was derived for seeds dried to 4.5% moisture content and stored at 5°C; this was followed by 16 years of viability with the seeds dried to 4.5% moisture content and stored at 15°C. " [Evidence from lab conditions]

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"- Ability to sucker; coppice; pollard"
	Duke, J.A. 1983. Handbook of Energy Crops - <i>Pongamia pinnata</i> . http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html . [Accessed 22 Jun 2017]	"Root suckers are rather plentiful as well. It is a rapid-growing coppice species that can be cloned."
	Williams, P.R. 2002. The effect of fire regime on tropical savannas of north-eastern Australia: interpreting floristic patterns through critical life events. PhD Dissertation. James Cook University, Townsville	[<i>Pongamia pinnata</i> = 5, sprouting from base of plant; Recovers from fire] "Appendix 2. Post fire regeneration observations from eucalypt savanna at Cape Cleveland, Castle Hill, Many Peaks Range and Mt Elliot. Regeneration codes from Gill and Bradstock (1992): 2, killed by fire & regenerates by seed germination from soil stored seedbank; 4, sprouting from roots or rhizomes; 5, sprouting from base of plant; 6, sprouting from stem or branch. Additional codes: s, post-fire seed germination observed for sprouting species or species whose ability to sprout unknown; *, exotic species."

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability. Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized in Florida, Mauritius and possibly elsewhere (native range uncertain)
- Regarded as weedy and aggressive in Florida landscapes
- A potential agricultural and environmental weed (impacts unclear)
- Leaves and seeds potentially toxic to animals and people (although leaves used as fodder)
- Shade-tolerant (could potentially invade intact forest)
- Tolerates many soil types
- N-fixing (alters soil chemistry)
- Reproduces by seeds and vegetatively by root suckers
- Self-compatible
- Seeds dispersed by water & intentionally by people
- Seeds able to be stored for extended periods; May form a persistent seed bank
- Able to coppice & resprout after cutting

Low Risk Traits

- Despite reports of invasiveness, evidence of detrimental impacts in natural or agricultural settings is not well-documented in the peer-reviewed literature
- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock (palatable despite reports of toxicity)
- Valuable as a biofuel feedstock
- Reaches maturity in 4-7 years
- Relatively large seed size may reduce risk of accidental or long-distance dispersal (especially if not grown near water or riparian areas)