

**Taxon:** Pittosporum pentandrum (Blanco) Merr.

**Family:** Pittosporaceae

**Common Name(s):** tai qiong hai tong  
Taiwanese cheesewood

**Synonym(s):** Aquilaria pentandra Blanco

**Assessor:** Chuck Chimera

**Status:** Assessor Approved

**End Date:** 31 Oct 2017

**WRA Score:** 9.0

**Designation:**

**Rating:**

**Keywords:** Tropical Tree, Naturalized, Disturbance-adapted, Street Tree, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
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
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
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)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
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

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
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	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
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)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
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)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence that species has been domesticated within native range] "Thickets, slopes, seashores; sea level to 300 m. S Guangxi (Hepu Xian), Hainan, S Taiwan (including Lan Yu) [Vietnam]. <i>Pittosporum pentandrum</i> var. <i>pentandrum</i> is distributed in Indonesia (N Sulawesi) and the Philippines."

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
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 31 Oct 2017]	"Native: Asia-Temperate China: China - Guangxi, - Hainan Eastern Asia: Taiwan Asia-Tropical Indo-China: Vietnam Malesia: Indonesia - Celebes; Philippines"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 31 Oct 2017]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Dave's Garden. 2017. Taiwanese Cheesewood - <i>Pittosporum pentandrum</i> . <a href="https://davesgarden.com/guides/pf/go/185947/">https://davesgarden.com/guides/pf/go/185947/</a> . [Accessed 31 Oct 2017]	"Hardiness: USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"

Qsn #	Question	Answer
	Useful Tropical Plants Database. 2017. <i>Pittosporum pentandrum</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Pittosporum+pentandrum">http://tropical.theferns.info/viewtropical.php?id=Pittosporum+pentandrum</a> . [Accessed 31 Oct 2017]	[Potential elevation range exceeds 1000 m, demonstrating some environmental versatility in tropics] "Thickets, slopes and seashores, at elevations up to 300 metres in southern China[266]. Thickets and secondary growth forest at elevations up to 1,400 metres in the Philippines[345, 701]."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Guangxi (Hepu Xian), Hainan, S Taiwan (including Lan Yu) [Vietnam]. <i>Pittosporum pentandrum</i> var. <i>pentandrum</i> is distributed in Indonesia (N Sulawesi) and the Philippines."
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 31 Oct 2017]	"Native: Asia-Temperate China: China - Guangxi, - Hainan Eastern Asia: Taiwan Asia-Tropical Indo-China: Vietnam Malesia: Indonesia - Celebes; Philippines"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. <a href="http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/">http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/</a> . [Accessed 31 Oct 2017]	"Locations: Ho'omaluhia Botanical Garden (Confirmed) Pacific Tropical Botanical Garden (now National Tropical Botanical Garden) (Confirmed) Wahiawa Botanical Garden"
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	"Native to northern Sulawesi in Indonesia, Taiwan, and throughout the Philippines (Bakker & Steenis, 1957), this species was introduced to Hawai'i as an ornamental early in the 1970s. It is listed as a recommended street tree for planting in Honolulu (Department of Parks & Recreation, undated)."
	Starr, F., Starr, K. & Loope, L. 2003. <i>Washingtonia</i> spp. - Mexican fan palm and California fan palm <i>Arecaceae</i> . USGS Biological Resources Division, Haleakala Field Station, Maui. <a href="http://www.starrenvironmental.com/">http://www.starrenvironmental.com/</a> . [Accessed 31 Oct 2017]	" <i>Pittosporum pentandrum</i> (Taiwanese cheesewood), native to China, Taiwan, Indonesia, and Philippines (PIER 2003) is cultivated in warm regions of the world as an ornamental street tree. <i>P. pentandrum</i> is known to spread from initial plantings in at least southern Florida and Hawai'i (Judd 1996, Herbarium Pacificum Staff 1999, Wagner et al. 1999). In Hawai'i, <i>P. pentandrum</i> was originally introduced to the island of O'ahu some time in the early 1970's (Herbarium Pacificum Staff 1999). It is now spreading rapidly from initial plantings via bird dispersed fruit and is no longer recommended for landscaping (Herbarium Pacificum Staff 1999). It is also known from the island of Hawai'i (Herbarium Pacificum Staff 1999)."

301	Naturalized beyond native range	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Pascarella, J. B. (1994). Additions to the flora of south Florida: four new species of naturalized tropical trees. Florida Scientist, 57(4), 173-176	"Four additional species of introduced tropical trees have naturalized in Dade County, Florida. The species are <i>Alstonia macrophylla</i> (Apocynaceae), <i>Pittosporum pentandrum</i> (Pittosporaceae), <i>Ixora arborea</i> (Rubiaceae), and <i>Harpullia arborea</i> (Sapindaceae). Brief descriptions, herbaria records, ornamental use, and potential spread are discussed."
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	"In recent years specimens have been brought in for identification from populations that are clearly growing outside of cultivation on O'ahu. The bright yellow capsules, which split open to reveal orange-red seeds, are attractive to frugivorous birds, which seem to be the dispersal vector. Given the rapidity with which <i>P. pentandrum</i> appears to be spreading out of cultivation on O'ahu, it can no longer safely be recommended for use as a street tree. Collectors are encouraged to look for it on O'ahu and the neighbor islands. It is also escaping in southern Florida (Judd, 1996). Material Examined: O'AHU: He'eia, slope of Pu'u Mä'eli'eli above He'eia State Park, many plants of different sizes, in alien forest with <i>Syzygium cumini</i> , <i>Ochna</i> , <i>Passiflora</i> , ca 100 ft, 2 Dec 1998, E. Koes & L. Pyle 1. HAWAII: Kohala Mts, vicinity of Wai'aka Gulch, Pu'u o 'Umi NAR transect #1, ca 61 m, 1 Nov 1996, B. Stevens 3."
	Starr, F., Starr, K. & Loope, L. 2003. <i>Washingtonia</i> spp. - Mexican fan palm and California fan palm <i>Arecaceae</i> . USGS Biological Resources Division, Haleakala Field Station, Maui. <a href="http://www.starrenvironmental.com/">http://www.starrenvironmental.com/</a> . [Accessed 31 Oct 2017]	" <i>P. pentandrum</i> is not currently known from Maui. However, due to sharing of plants between islands, it is likely that it either exists in limited numbers already and has not been detected, or that it will be introduced some time in the future."
	Judd, W. S. (1996). The Pittosporaceae in the southeastern United States. Harvard Papers in Botany, 1(8), 15-26	"The species naturalized in the southeastern United States, <i>Pittosporum pentandrum</i> , occurs as a native in Formosa, the Philippines, Malaysia, and North Celebes. It appears to have been introduced in the 1950's from Formosa into southern Florida, where it occasionally is used as an ornamental. The species has escaped in limited areas of Dade County, where it occurs as an understory shrub or small tree in disturbed pinelands (of <i>Pinus Elliotii</i> Engelm. var. <i>densa</i> Little & Dorman) that have been fire suppressed. It is perhaps not surprising that the species has become naturalized in this region."
	Frohlich, D. & Lau, A. 2012. New plant records for the Hawaiian islands. Bishop Museum Occasional Papers 113: 27-54	"This species has previously been documented as naturalized on O'ahu and Hawai'i is - lands, where it escapes from planted sites. it is documented here as spreading on Kaua'i as well, also escaping cultivation to become sparingly naturalized. Material examined. KAUAI: Princeville area, near mauka intersection of Kapi'olani Ip and Kamāmalu Ip. lowland residential setting. 10 ft tall tree. Sparingly naturalized in the area. Also noted as sparingly naturalized in Wailua residential roadside areas, 11 Mar 2010, D. Frohlich & A. Lau 2010031103."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Florida Exotic Pest Plant Council. (2015). FLEPPC 2015 List of Invasive Plant Species. <a href="http://www.fleppc.org/">http://www.fleppc.org/</a> . [Accessed 31 Oct 2017]	"CATEGORY II Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. These species may become ranked Category I if ecological damage is demonstrated." [ <i>Pittosporum pentandrum</i> classified as a Category II species]
	Whittemore, A.T. and McClintock, E. 2006. Pittosporaceae. Flora of North America. 13. <a href="http://floranorthamerica.org/">http://floranorthamerica.org/</a> . [Accessed 31 Oct 2017]	"Flowering Oct–Nov. Disturbed woods in urban areas; 0 m; introduced; Fla.; Pacific Islands (Philippines, n Sulawesi). Variety pentandrum is occasionally grown as a specimen tree in southern Florida. It has escaped in disturbed woods near planted trees in Coral Gables."
	Judd, W. S. (1996). The Pittosporaceae in the southeastern United States. Harvard Papers in Botany, 1(8), 15-26	[A disturbance-adapted species] "In its native range, <i>P. pentandrum</i> is a characteristic element of "parang," i.e., the thickets developing after moist forests have been disturbed by selective logging (Bakker), and is fairly common at low elevations (in contrast to most tropical species of <i>Pittosporum</i> ). Thus, the species seems to possess the ecological attributes of an invasive, early successional species, allowing its naturalization in southern Florida."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as a weed in a number of reference. Impacts generally unspecified or not yet manifested. Potential environmental weed] "References: United States of America-CE- 233, southeast Asia-W-191, United States of America-CE-617, Pacific-W-3, United States of America-E-80, United States of America-N-101, United States of America- W-112, United States of America-W-179, Pacific-E-621, United States of America-N- 301, United States of America-N-839, United States of America-N-1292, Global- W-1376, Global-I-1404, Global-CD-1611, United States of America-E-1736, United States of America-N-2092."
	Nelson, G. 2010. The Trees of Florida. A Reference and Field Guide. 2nd Edition. Pineapple Press Inc, Sarasota, FL	[Invades disturbed sites] "Distribution: Disturbed sites; southernmost peninsula, essentially Miami-Dade County."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	
	Source(s)	Notes
	Florida Exotic Pest Plant Council. (2015). FLEPPC 2015 List of Invasive Plant Species. <a href="http://www.fleppc.org/">http://www.fleppc.org/</a> . [Accessed 31 Oct 2017]	"CATEGORY II Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. These species may become ranked Category I if ecological damage is demonstrated." [ <i>Pittosporum pentandrum</i> classified as a Category II species]

Qsn #	Question	Answer
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as a weed in a number of reference. Impacts generally unspecified or not yet manifested. Potential environmental weed] "References: United States of America-CE- 233, southeast Asia-W-191, United States of America-CE-617, Pacific-W-3, United States of America-E-80, United States of America-N-101, United States of America- W-112, United States of America-W-179, Pacific-E-621, United States of America-N- 301, United States of America-N-839, United States of America-N-1292, Global- W-1376, Global-I-1404, Global-CD-1611, United States of America-E-1736, United States of America-N-2092."
	Starr, F., Starr, K. & Loope, L. 2003. Washingtonia spp. - Mexican fan palm and California fan palm Areaceae. USGS Biological Resources Division, Haleakala Field Station, Maui. <a href="http://www.starrenvironmental.com/">http://www.starrenvironmental.com/</a> . [Accessed 31 Oct 2017]	[Potentially] "P. pentandrum is not currently known from Maui. However, due to sharing of plants between islands, it is likely that it either exists in limited numbers already and has not been detected, or that it will be introduced some time in the future. The full potential threat of P. pentandrum to Maui is not yet known, however, it is probable that it will have invasive characteristics similar to other weedy Pittosporum spp., such as P. undulatum and P viridiflorum. Gaining a search image, observing the infestations on O'ahu, and keeping an eye open for P. pentandrum on Maui is suggested."

<b>305</b>	<b>Congeneric weed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Pittosporum undulatum" ... "This tree is a successful gap colonizer and eliminates native vegetation by the low and dense canopies, shading out almost all other species."

<b>401</b>	<b>Produces spines, thorns or burrs</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Trees small or shrubs, ca. 12 m tall. Young branchlets ferruginous pubescent; old branchlets glabrous, inconspicuously lenticellate. Leaves clustered at branchlet apex, appearing pseudoverticillate, biennial or perennial; petiole 512 mm; leaf blade dark green and shiny adaxially, pale green abaxially, obovate or oblong-obovate, 410 × 35 cm, papery when young, soon becoming leathery, pubescent on both surfaces, later glabrate, lateral veins 710-paired, reticulate veins prominent adaxially, base narrowly cuneate, decurrent, margin entire or rugose, apex obtuse or shortly acute, sometimes rounded."

<b>402</b>	<b>Allelopathic</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Gleadow, R. M., & Ashton, D. H. (1981). Invasion by Pittosporum undulatum of the forests of central Victoria. I. Invasion patterns and plant morphology. Australian Journal of Botany, 29(6), 705-720	[Unknown. Allelopathy may be present in other species] "The weedy nature of Pittosporum undulatum is clear from its rapid dispersal, early seed production and fast growth. Its heavy canopy casts shade intense enough to suppress the light-demanding understorey and may be allelopathic to seed germination."



Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees small or shrubs, ca. 12 m tall." [Pittosporaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	IIRR. 1992. Livestock and Poultry Production. International Institute of Rural Reconstruction, Cavite, Philippines	"The use of trees and shrubs as feeds is probably as old as the domestication of animals Through experience, the backyard farmers have determined the tree fodder, useful for their livestock. A tree species maybe used as herbage in some places but not in others. For example, mamalis ( <i>Pitiosporum pentandrum</i> ) leaves are used by farmers as animal feeds in Cebu and Bohol but not in Bicol. Sometimes, the farmer may not be aware of fodder trees but the animal would pick at them along the way as it is led to wallow or work field; or as it chanced upon the trees or shrubs as in the case of grazing animal."

405	Toxic to animals	n
	Source(s)	Notes
	IIRR. 1992. Livestock and Poultry Production. International Institute of Rural Reconstruction, Cavite, Philippines	[No evidence] "mamalis ( <i>Pitiosporum pentandrum</i> ) leaves are used by farmers as animal feeds in Cebu and Bohol but not in Bicol"
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Starr, F., Starr, K. & Loope, L. 2003. Washingtonia spp. - Mexican fan palm and California fan palm Arecaceae. USGS Biological Resources Division, Haleakala Field Station, Maui. <a href="http://www.starrenvironmental.com/">http://www.starrenvironmental.com/</a> . [Accessed 31 Oct 2017]	"Pests and diseases: According to Brickell and Zuk (1997), <i>Pittosporum</i> spp. are susceptible to aphids, spider mites, mealybugs, scale insects, leaf spots, dieback, root knot nematode, galls, and cankers."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Pittosporum pentandrum</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Pittosporum+pentandrum">http://tropical.theferns.info/viewtropical.php?id=Pittosporum+pentandrum</a> . [Accessed 31 Oct 2017]	"Known Hazards None known"



Qsn #	Question	Answer
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Used medicinally. Not reported to be toxic] "Pittosporum pentandrum ... Bark used as a febrifuge and in large amounts as a general antidote; it is also effective in bronchitis."
	Ragasa, C. Y., Rideout, J. A., Tierra, D. S., & Coll, J. C. (1997). Sesquiterpene glycosides from <i>Pittosporum pentandrum</i> . <i>Phytochemistry</i> , 45(3), 545-547	[Used medicinally] "Pittosporum pentandrum is a small, slender tree found throughout the Philippines. In small doses, the powdered bark is used as a febrifuge. In larger doses, it is used as an antidote and is effective in treating bronchitis. The leaves are used by women in their baths following childbirth"

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Balangcod, T. D., & Balangcod, A. K. (2008). Underutilized plant resources in Tinoc, Ifugao, Cordillera Administrative Region, Luzon Island, Philippines. In International Symposium on Underutilized Plants for Food Security, Nutrition, Income and Sustainable Development 806 (pp. 647-654).	[Possibly Yes. Wood reported to be highly flammable] "Two species of <i>Pittosporum</i> , <i>P. resiniferum</i> and <i>P. pentandrum</i> , locally called <i>apihang</i> , are important in starting fire." ... " <i>Pittosporum pentandrum</i> ... The residents treat this species as a gas plant because it easily burns. The fruit is used to kindle fire."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Wunderlin, R. P., B. F. Hansen, A. R. Franck, and F. B. Essig. 2017. Atlas of Florida Plants. <a href="http://florida.plantatlas.usf.edu/">http://florida.plantatlas.usf.edu/</a> . [Accessed 31 Oct 2017]	" <i>Pittosporum pentandrum</i> ... In a half-shaded border planting."
	Dave's Garden. 2017. Taiwanese Cheesewood - <i>Pittosporum pentandrum</i> . <a href="https://davesgarden.com/guides/pf/go/185947/">https://davesgarden.com/guides/pf/go/185947/</a> . [Accessed 31 Oct 2017]	"Sun Exposure: Full Sun Sun to Partial Shade"
	Kuo, Y. L., Wang, H. H., Peng, S. H., & Yang, Y. P. (2014). Composition, Structure, and Preliminary Restoration Efforts of a Tropical Coastal Forest at Siangjiaowan, Southern Taiwan. <i>Taiwan Journal of Forest Science</i> , 29(4), 267-284	"Table 1. Numbers of small (diameter at breast height (DBH) < 1 cm, S) and large (DBH ≥ 1 cm, L) individuals per hectare of woody species in the Siangjiaowan coastal forest. STC, shade tolerance class based on Kuo (2014): 1, very shade-intolerant; 2, shade-intolerant; 3, moderately shade-tolerant; 4, shade-tolerant; 5, very shade-tolerant. * A typical coastal species. § An exotic invasive species" [ <i>Pittosporum pentandrum</i> - moderately shade-tolerant]

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Dave's Garden. 2017. Taiwanese Cheesewood - <i>Pittosporum pentandrum</i> . <a href="https://davesgarden.com/guides/pf/go/185947/">https://davesgarden.com/guides/pf/go/185947/</a> . [Accessed 31 Oct 2017]	"Soil pH requirements: 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)"

411	Climbing or smothering growth habit	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees small or shrubs, ca. 12 m tall."

412	Forms dense thickets	
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[A component of thicket vegetation. Unknown if <i>P. pentandrum</i> excludes other vegetation] "Thickets, slopes, seashores; sea level to 300 m."
	Merrill, E. D. (1905). New or noteworthy Philippine plants, IV. Bureau of Printing, Manila	[A component of thicket vegetation] "This species is very common and widely distributed in the Philippines, being characteristic of those localities which by the Tagalogs are called "Parang" - that is, land which was once forested but from which the valuable timber trees have been removed, so that it is now covered with thickets of shrubs and small trees."

501	Aquatic	n
	<b>Source(s)</b>	<b>Notes</b>
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Trees small or shrubs, ca. 12 m tall." ... "Thickets, slopes, seashores; sea level to 300 m."

502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 31 Oct 2017]	Family: Pittosporaceae

503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 31 Oct 2017]	Family: Pittosporaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees small or shrubs, ca. 12 m tall. Young branchlets ferruginous pubescent; old branchlets glabrous, inconspicuously lenticellate. Leaves clustered at branchlet apex, appearing pseudovercillate, biennial or perennial; petiole 512 mm; leaf blade dark green and shiny adaxially, pale green abaxially, obovate or oblong-obovate, 410 × 35 cm, papery when young, soon becoming leathery, pubescent on both surfaces, later glabrate, lateral veins 710-paired, reticulate veins prominent adaxially, base narrowly cuneate, decurrent, margin entire or rugose, apex obtuse or shortly acute, sometimes rounded."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Merrill, E. D. (1905). New or noteworthy Philippine plants, IV. Bureau of Printing, Manila	"This species is very common and widely distributed in the Philippines, being characteristic of those localities which by the Tagalogs are called "Parang"- that is, land which was once forested but from which the valuable timber trees have been removed, so that it is now covered with thickets of shrubs and small trees."
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Thickets, slopes, seashores; sea level to 300 m. S Guangxi (Hepu Xian), Hainan, S Taiwan (including Lan Yu) [Vietnam]. <i>Pittosporum pentandrum</i> var. <i>pentandrum</i> is distributed in Indonesia (N Sulawesi) and the Philippines."

602	Produces viable seed	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Capsule compressed globose, 69 mm in diam., glabrous, dehiscent by 2 valves; pericarp thinly woody, horizontally striate adaxially. Seeds ca. 10, irregularly angular, ca. 3 mm."
	PlantUse contributors. 2017. <i>Pittosporum pentandrum</i> (PROSEA), PlantUse, <a href="http://uses.plantnet-project.org/e/index.php?title=Pittosporum_pentandrum_(PROSEA)&amp;oldid=222852">http://uses.plantnet-project.org/e/index.php?title=Pittosporum_pentandrum_(PROSEA)&amp;oldid=222852</a> . [Accessed 31 Oct 2017]	"Propagation is easy by seed and by cuttings."

603	Hybridizes naturally	
	Source(s)	Notes
	Friis, I. 1987. A Reconsideration of <i>Pittosporum</i> in Africa and Arabia. Kew Bulletin. 42(2): 319-335	[Unknown] "Partial isolation and subsequent mixing by hybridization may play an important part in the evolution of these varied taxa, but nothing certain can be stated at the moment."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Flowers bisexual, rarely polygamous" [Unknown if self-compatible]

Qsn #	Question	Answer
	Gopalakrishnan, K. K., & Thomas, T. D. (2014). Reproductive biology of <i>Pittosporum dasycaulon</i> Miq., (Family Pittosporaceae) a rare medicinal tree endemic to Western Ghats. <i>Botanical Studies</i> , 55(1), 15	[Unknown. Self-incompatibility documented in genus] "The plant is self-incompatible and an out crosser."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Floral morphology does not require specialized pollinators] "Inflorescences terminal, paniculate, with numerous corymbs, densely ferrugineous pubescent; primary peduncle and primary axis 48 cm; secondary peduncles 1.54 cm; tertiary peduncles 35 mm; bracts lanceolate, ca. 2 mm, deciduous; bracteoles ovate-lanceolate, 1.52 mm, glabrous or margin ciliate; pedicels 36 mm. Petals 56 mm. Filaments ca. 3 mm; anthers ca. 1 mm. Ovary ovoid, sparsely ferrugineous pubescent at base; placentas 2, parietal, in proximal part of ovary; ovules 1216."
	Gopalakrishnan, K. K., & Thomas, T. D. (2014). Reproductive biology of <i>Pittosporum dasycaulon</i> Miq., (Family Pittosporaceae) a rare medicinal tree endemic to Western Ghats. <i>Botanical Studies</i> , 55(1), 15	[Related taxon pollinated by insects] "The important floral visitors include bees and butterflies."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	PlantUse contributors. 2017. <i>Pittosporum pentandrum</i> (PROSEA), PlantUse, <a href="http://uses.plantnet-project.org/e/index.php?title=Pittosporum_pentandrum_(PROSEA)&amp;oldid=222852">http://uses.plantnet-project.org/e/index.php?title=Pittosporum_pentandrum_(PROSEA)&amp;oldid=222852</a> . [Accessed 31 Oct 2017]	"Propagation is easy by seed and by cuttings." [No evidence]

607	Minimum generative time (years)	n
	Source(s)	Notes
	Kuo, Y. L., Yang, Y. P., & Peng, S. H. (2017). Variations in the Predawn Leaf Water Potential and Photosynthetic Rate during the Dry Season and Drought-Tolerance Mechanisms of Coastal Tree Species. <i>Taiwan Journal of Forest Science</i> , 32(2), 131-144	[Produces seeds in juvenile stage. Age at maturity unspecified] "In addition, <i>Pit. pentandrum</i> , <i>Ehr. resinosa</i> , and <i>All. timorensis</i> can prolifically produce seeds during their juvenile stage, attracting birds and other animals to disperse seeds for natural regeneration (Lee et al. 1993),"

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. 2012. New plant records for the Hawaiian islands. Bishop Museum Occasional Papers 113: 27-54	[Grown in heavily trafficked areas. Although fruit/seeds lack means of external attachment, & are bird dispersed, possible that pulp on seeds may allow for adherence to footwear, vehicles or other equipment] "Material examined. KAUAI: Princeville area, near mauka intersection of Kapi'olani lp and Kamāmalu lp. lowland residential setting. 10 ft tall tree. Sparingly naturalized in the area. Also noted as sparingly naturalized in Wailua residential roadside areas, 11 Mar 2010, D. Frohlich & A. Lau 2010031103."

702	Propagules dispersed intentionally by people	y
	<b>Source(s)</b>	<b>Notes</b>
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	"Native to northern Sulawesi in Indonesia, Taiwan, and throughout the Philippines (Bakker & Steenis, 1957), this species was introduced to Hawai'i as an ornamental early in the 1970s. It is listed as a recommended street tree for planting in Honolulu (Department of Parks & Recreation, undated). In recent years specimens have been brought in for identification from populations that are clearly growing outside of cultivation on O'ahu."

703	Propagules likely to disperse as a produce contaminant	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2017. Personal Communication	No evidence, and, as a small tree, unlikely to become a contaminant of produce or to be grown with produce

704	Propagules adapted to wind dispersal	n
	<b>Source(s)</b>	<b>Notes</b>
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	"The bright yellow capsules, which split open to reveal orange-red seeds, are attractive to frugivorous birds, which seem to be the dispersal vector."

705	Propagules water dispersed	n
	<b>Source(s)</b>	<b>Notes</b>
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	"The bright yellow capsules, which split open to reveal orange-red seeds, are attractive to frugivorous birds, which seem to be the dispersal vector." [Bird-dispersed, but could potentially be dispersed by water if growing in riparian corridors]

706	Propagules bird dispersed	y
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Capsule compressed globose, 69 mm in diam., glabrous, dehiscent by 2 valves; pericarp thinly woody, horizontally striate adaxially. Seeds ca. 10, irregularly angular, ca. 3 mm. Fl."
	Kuo, Y. L., Yang, Y. P., & Peng, S. H. (2017). Variations in the Predawn Leaf Water Potential and Photosynthetic Rate during the Dry Season and Drought-Tolerance Mechanisms of Coastal Tree Species. Taiwan Journal of Forest Science, 32(2), 131-144	"In addition, <i>Pit. pentandrum</i> , <i>Ehr. resinosa</i> , and <i>All. timorensis</i> can prolifically produce seeds during their juvenile stage, attracting birds and other animals to disperse seeds for natural regeneration (Lee et al. 1993),"
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	"In recent years specimens have been brought in for identification from populations that are clearly growing outside of cultivation on O'ahu. The bright yellow capsules, which split open to reveal orange-red seeds, are attractive to frugivorous birds, which seem to be the dispersal vector."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	[Internally dispersed] "The bright yellow capsules, which split open to reveal orange-red seeds, are attractive to frugivorous birds, which seem to be the dispersal vector."

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Herbarium Pacificum Staff. 1999. New Hawaiian plant records for 1998. Bishop Museum Occasional Papers 58: 3-11	"In recent years specimens have been brought in for identification from populations that are clearly growing outside of cultivation on O'ahu. The bright yellow capsules, which split open to reveal orange-red seeds, are attractive to frugivorous birds, which seem to be the dispersal vector." [Presumably Yes]

801	Prolific seed production (>1000/m <sup>2</sup> )	
	Source(s)	Notes
	Kuo, Y. L., Yang, Y. P., & Peng, S. H. (2017). Variations in the Predawn Leaf Water Potential and Photosynthetic Rate during the Dry Season and Drought-Tolerance Mechanisms of Coastal Tree Species. Taiwan Journal of Forest Science, 32(2), 131-144	[Prolific seed production. Densities unknown] "In addition, <i>Pit. pentandrum</i> , <i>Ehr. resinosa</i> , and <i>All. timorensis</i> can prolifically produce seeds during their juvenile stage, attracting birds and other animals to disperse seeds for natural regeneration (Lee et al. 1993),"

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2017) Seed Information Database (SID). Version 7.1. Available from: <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 31 Oct 2017]	Unknown. Orthodox and recalcitrant seeds reported from genus

803	Well controlled by herbicides	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Starr, F., Starr, K. & Loope, L. 2003. Washingtonia spp. - Mexican fan palm and California fan palm Areaceae. USGS Biological Resources Division, Haleakala Field Station, Maui. <a href="http://www.starrenvironmental.com/">http://www.starrenvironmental.com/</a> . [Accessed 31 Oct 2017]	"Chemical control: Cut stump, frill, and basal bark methods employing herbicides are likely effective means of control for P. pentandrum.
	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	Yes
	<b>Source(s)</b>	<b>Notes</b>
	Tolentino, E. L. (2008). Restoration of Philippine native forest by smallholder tree farmers. Pp. 319-346 in Smallholder Tree Growing for Rural Development and Environmental Services, Lessons from Asia, Springer Science + Business Media, New York	[Fire resistant. Able to resprout] "However, the ensuing rainy season revealed that both <i>Polycias nodosa</i> and <i>Pittosporum pentandrum</i> have the ability to re-sprout after the fire. This impressive growth performance and fire resistance of the ITS have impressed even the farmers who are very much convinced of the superiority of <i>gmelina</i> ."
	CABI, 2017. Invasive Species Compendium. Wallingford , UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	[Other species able to resprout after cutting] " <i>Pittosporum undulatum</i> ... It supports a dense soil seed bank and dense seedling recruitment and it also has a good capacity to resprout after cutting."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<b>Source(s)</b>	<b>Notes</b>
	Starr, F., Starr, K. & Loope, L. 2003. Washingtonia spp. - Mexican fan palm and California fan palm Areaceae. USGS Biological Resources Division, Haleakala Field Station, Maui. <a href="http://www.starrenvironmental.com/">http://www.starrenvironmental.com/</a> . [Accessed 31 Oct 2017]	"Biological control: None known. With numerous endemic <i>Pittosporum</i> species in Hawai'i, any biological control should be done with extreme caution."
	WRA Specialist. 2017. Personal Communication	Unknown



**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized in Hawaiian Islands (Kauai, Oahu, Hawaii) & Florida
- A disturbance-adapted tree
- Other *Pittosporum* species are invasive
- Shade tolerant
- Reproduces by seed
- Seeds dispersed by birds & intentionally by people
- Able to resprout after fires

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock
- Ornamental & medicinal uses
- Not reported to spread vegetatively