

Taxon: <i>Nageia nagi</i> (Thunb.) Kuntze	Family: Podocarpaceae
Common Name(s): Asian bayberry broadleaf Podocarpus nagi	Synonym(s): Decussocarpus nagi (Thunb.) de Myrica nagi Thunb. Podocarpus nagi (Thunb.) Makino

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 20 Dec 2019
WRA Score: -3.0	Designation: L	Rating: Low Risk

Keywords: Subtropical Tree, Naturalized, Shade-Tolerant, Dioecious, Gravity 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)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
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)	n
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	y
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)	y=1, n=0	y
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	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal		
705	Propagules water dispersed		
706	Propagules bird dispersed	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
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
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	n
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
	Farjon, A. (2013). <i>Nageia nagi</i> . The IUCN Red List of Threatened Species 2013: e.T46347417A2848484. http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T46347417A2848484.en . [Accessed 19 Dec 2019]	[Long cultivated, but no history of domestication] "This species is widely distributed, but it is almost impossible to establish from herbarium collection data where it is truly indigenous (growing in the wild) and where it has been introduced and planted. Wilson (1916) noted that he did not meet with any trees growing in the wild whilst travelling in Japan. In the wild, it is limited to a few forest remnants in the most southern parts of that country, including the oceanic Ryukyu Islands. In Taiwan, S.Y. Lu (1996) has assessed the species as Critically Endangered (CR), with wild growing trees restricted to Taipei Co. in the north and Taitung Co. in the far south of the island. Similar inventories based on intimate knowledge of the forest flora are lacking for most of mainland China. Occurring in lowland mixed evergreen forest, the species has come under threat from habitat declines. Whole plants are also dug up for the horticultural trade."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA

Qsn #	Question	Answer
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Intermediate
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 18 Dec 2019]	"Native Asia-Temperate CHINA: China [Fujian Sheng, Guangdong Sheng, Guangxi Zhuangzu Zizhiqu, Hunan Sheng, Jiangxi Sheng, Sichuan Sheng, Zhejiang Sheng] EASTERN ASIA: Japan, [Honshu (w.), Kyushu, Ryukyu Islands, Shikoku] Taiwan"
	Farjon, A. & Filer, D. 2013. An Atlas of the World's Conifers: An Analysis of their Distribution, Biogeography, Diversity and Conservation Status. Koninklijke Brill NV, Leiden, The Netherlands	[Occurs in high elevation tropics of Hainan Island] "Nageia nagi has a very wide distribution and occurs in SE mainland China, Hainan, Taiwan and Japan. Its natural distribution is difficult to establish from herbarium collections because throughout its natural range and beyond it has been widely planted. An attempt to limit records to those in a forest or mountain environment has resulted in the map presented here, but there may still be collections included that come from planted trees near temples or villages. Nageia nagi is certainly indigenous in Hainan Island, which lies within the tropics but its mountains provide warm-temperate conditions similar to those in much of the mainland range of this species."

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 19 Dec 2019]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Evergreen broad-leaved and Quercus forests, forests on dry mountainsides, thickets, along streams; 200–1200(–1600) m."
	Gilman, E.F. & Watson, D.G. (2007). Podocarpus nagi: Nageia nagi. ENH656. Revised. Institute of Food & Agricultural Sciences, University of Florida, Gainesville FL. http://edis.ifas.ufl.edu . [Accessed 19 Dec 2019]	"USDA hardiness zones: 9A through 11"
	Missouri Botanical Garden. (2019). Nageia nagi. http://www.missouribotanicalgarden.org . [Accessed 19 Dec 2019]	"Zone: 9 to 11"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes

Qsn #	Question	Answer
	Earle, C.J. (2019). The Gymnosperm Database - <i>Nageia nagi</i> . https://www.conifers.org/po/Nageia_nagi.php . [Accessed 19 Dec 2019]	[Grows in tropical evergreen forests of Vietnam] "Japan, China and Vietnam; introduced in Taiwan. In Vietnam, it is rare in Lang Son (Trang Dinh), and in some places of the North, growing in tropical evergreen broad-leaved forest, on hills or mountains, below 1000 m elevation (FIPI 1996)."
	Farjon, A. & Filer, D. 2013. An Atlas of the World's Conifers: An Analysis of their Distribution, Biogeography, Diversity and Conservation Status. Koninklijke Brill NV, Leiden, The Netherlands	[Occurs in high elevation tropics of Hainan Island] " <i>Nageia nagi</i> has a very wide distribution and occurs in SE mainland China, Hainan, Taiwan and Japan. Its natural distribution is difficult to establish from herbarium collections because throughout its natural range and beyond it has been widely planted. An attempt to limit records to those in a forest or mountain environment has resulted in the map presented here, but there may still be collections included that come from planted trees near temples or villages. <i>Nageia nagi</i> is certainly indigenous in Hainan Island, which lies within the tropics but its mountains provide warm-temperate conditions similar to those in much of the mainland range of this species."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Farjon, A. & Filer, D. 2013. An Atlas of the World's Conifers: An Analysis of their Distribution, Biogeography, Diversity and Conservation Status. Koninklijke Brill NV, Leiden, The Netherlands	" <i>Nageia nagi</i> has a very wide distribution and occurs in SE mainland China, Hainan, Taiwan and Japan. Its natural distribution is difficult to establish from herbarium collections because throughout its natural range and beyond it has been widely planted."
	Dave's Garden. (2019). Broadleaf Podocarpus - <i>Nageia nagi</i> . https://davesgarden.com/guides/pf/go/63892/ . [Accessed 19 Dec 2019]	"This plant has been said to grow in the following regions: Anniston, Alabama Gotha, Florida Kissimmee, Florida"

301	Naturalized beyond native range	y
	Source(s)	Notes
	Maesako, Y., Nanami, S. & Kanzaki, M. (2007). Spatial distribution of two invasive alien species, <i>Podocarpus nagi</i> and <i>Sapium sebiferum</i> , spreading in a warm-temperate evergreen forest of the Kasugayama Forest Reserve, Japan. <i>Vegetation Science</i> , 24(2), 103-112	" <i>P. nagi</i> (Podocarpaceae) originally distributed in the Chugoku, Shikoku, and Kyushu districts of Japan, Taiwan, and southern China is a coniferous tree (Ohwi 1992). The species was not originally distributed in Nara; it is an alien species from other regions of Japan. The population of <i>P. nagi</i> at Nara City is believed to be derived from trees planted around Kasuga Taisha, located at the foot of Mt. Mikasa, approximately 1200 years ago (Suganuma 1975; Suganuma & Kawai 1978)." ... " <i>P. nagi</i> and <i>S. sebiferum</i> were intentionally introduced to the area nearby KFR by humans 1200 and 70 years ago, respectively. Since then, they have spread considerably in the evergreen broadleaf forest as a consequence of their unpalatability to sika deer and, in part, natural disturbance. KFR was designated a Special Natural Monument of Japan because of its rich flora and a World Heritage site because of its cultural landscape consisting of traditional buildings and protected natural forests, however, our results show that the spread of these alien canopy trees may cause dramatic changes in the vegetation and landscape in the forest (KFR)."

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Maesako, Y., Nanami, S. & Kanzaki, M. (2007). Spatial distribution of two invasive alien species, <i>Podocarpus nagi</i> and <i>Sapium sebiferum</i> , spreading in a warm-temperate evergreen forest of the Kasugayama Forest Reserve, Japan. <i>Vegetation Science</i> , 24(2), 103-112	[Lack of palatability and shade tolerance is contributing to spread outside native range within Japan. Not a disturbance or landscaping weed] "These two alien species are both unpalatable to deer, and biological disturbance such as browsing by sika deer (herbivores) may facilitate the expansion of alien species in the Kasugayama area, where over 1000 sika deer currently reside. In the KFR, shade-intolerant pioneer species can exist in the forest by depending on canopy gaps caused by typhoons (N aka 1982) . However, the regeneration of native pioneer species that are palatable to deer, e.g., <i>Zanthoxylum ailanthoides</i> , <i>Ma/lotus japonicus</i> , and <i>Aralia elata</i> , is strongly inhibited by deer browsing (Shimoda et al. 1994). The occurrence of canopy gaps in the forest allows <i>S. sebiferum</i> to regenerate, and browsing by deer on native pioneer species would enhance the dominance of <i>S. sebiferum</i> in the gaps."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

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

304	Environmental weed	
	Source(s)	Notes
	Maesako, Y., Nanami, S. & Kanzaki, M. (2007). Spatial distribution of two invasive alien species, <i>Podocarpus nagi</i> and <i>Sapium sebiferum</i> , spreading in a warm-temperate evergreen forest of the Kasugayama Forest Reserve, Japan. <i>Vegetation Science</i> , 24(2), 103-112	[Lack of palatability and shade tolerance is contributing to spread outside native range within Japan. Direct impacts to natural environment unspecified] "These two alien species are both unpalatable to deer, and biological disturbance such as browsing by sika deer (herbivores) may facilitate the expansion of alien species in the Kasugayama area, where over 1000 sika deer currently reside. In the KFR, shade-intolerant pioneer species can exist in the forest by depending on canopy gaps caused by typhoons (N aka 1982) . However, the regeneration of native pioneer species that are palatable to deer, e.g., <i>Zanthoxylum ailanthoides</i> , <i>Ma/lotus japonicus</i> , and <i>Aralia elata</i> , is strongly inhibited by deer browsing (Shimoda et al. 1994). The occurrence of canopy gaps in the forest allows <i>S. sebiferum</i> to regenerate, and browsing by deer on native pioneer species would enhance the dominance of <i>S. sebiferum</i> in the gaps."
	Gilman, E.F. & Watson, D.G. (2007). <i>Podocarpus nagi</i> : <i>Nagi Podocarpus</i> . ENH656. Revised. Institute of Food & Agricultural Sciences, University of Florida, Gainesville FL. http://edis.ifas.ufl.edu . [Accessed 19 Dec 2019]	[No evidence in Florida] "Invasive potential :has been evaluated using the IFAS Assessment of the Status of Non-Native Plants in Florida's Natural Areas (Fox et al. 2005). This species is not documented in any undisturbed natural areas in Florida. Thus, it is not considered a problem species and may be used in Florida."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. (2019). Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 19 Dec 2019]	No evidence to date

305	Congeneric weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence. <i>Nageia falcata</i> reported to be naturalized. Several <i>Podocarpus</i> species listed as naturalized and/or weedy

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Trees or shrubs to 20 m tall; trunk to 50 cm d.b.h.; bark reddish brown, dark purplish red, or light or dark gray, peeling in small, thin flakes; branches and branchlets erect, ascending, spreading, or ± pendulous, grayish to dark brown, slender, semiterete, stout; branchlets opposite, rarely alternate, compressed-tetragonal, rigid, glabrous, densely leafy. Leaves opposite, decussate; petiole strongly twisted at base, rotation continuing along whole length of internode; blade dark green and glossy adaxially, pale green abaxially, ovate-lanceolate, lanceolate, elliptic-lanceolate, or narrowly elliptic, 2–9 × 0.7–3 cm, leathery, parallel veins indistinct, stomatal lines present on abaxial surface only, sometimes scarcely visible, base cuneate or cuneate-attenuate into widened, flattened petiole, apex truncate, broadly obtuse, acute, or acuminate, sometimes blackened."

402	Allelopathic	
	Source(s)	Notes
	Singh, H. P., Kohli, R. K., Batish, D. R., & Kaushal, P. S. (1999). Allelopathy of gymnospermous trees. <i>Journal of Forest Research</i> , (3), 245-254	[Potentially. Aqueous extracts exhibit allelopathic effects] "Table 1 Available reports on the allelopathy of gymnosperms" [<i>Podocarpus nagi</i> - Target plant(s) = <i>Impatiens balsamina</i> L., <i>Luzula capitate</i> ; Effect (s) = Aqueous extracts inhibited germination and growth.]

403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees or shrubs to 20 m tall; trunk to 50 cm d.b.h.;" [<i>Podocarpaceae</i> . No evidence]

Qsn #	Question	Answer
404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Maesako, Y., Nanami, S. & Kanzaki, M. (2007). Spatial distribution of two invasive alien species, <i>Podocarpus nagi</i> and <i>Sapium sebiferum</i> , spreading in a warm-temperate evergreen forest of the Kasugayama Forest Reserve, Japan. <i>Vegetation Science</i> , 24(2), 103-112	"These two alien species are both unpalatable to deer, and biological disturbance such as browsing by sika deer (herbivores) may facilitate the expansion of alien species in the Kasugayama area, where over 1000 sika deer currently reside."

405	Toxic to animals	n
	Source(s)	Notes
	Plants for a Future. (2019). <i>Nageia nagi</i> . https://pfaf.org/ . [Accessed 19 Dec 2019]	"Known Hazards None known"
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	"Used in Ayurveda, Unani and Sidha. Bark astringent, stimulant, tonic, carminative, antiseptic, for fever, asthma, cough, catarrh, sore throat, rheumatism, given or applied with ginger in cholera; powdered bark useful in menstrual disorders; bark decoction given in diarrhea, headache, cough and asthma. Bark as a fish poison." [No evidence of toxicity from contact or consumption by humans or terrestrial vertebrates]

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Missouri Botanical Garden. (2019). <i>Nageia nagi</i> . http://www.missouribotanicalgarden.org . [Accessed 20 Dec 2019]	"No serious insect or disease problems. Root rot may occur if soils are poorly-drained. Watch for sooty mold."
	Gilman, E.F. & Watson, D.G. (2007). <i>Podocarpus nagi</i> : <i>Nagi Podocarpus</i> . ENH656. Revised. Institute of Food & Agricultural Sciences, University of Florida, Gainesville FL. http://edis.ifas.ufl.edu . [Accessed 20 Dec 2019]	"Pests - Scale and sooty mold can be found on <i>Nagi podocarpus</i> but this is usually not serious. Diseases - It is susceptible to root rot on soils with poor drainage."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Plants for a Future. (2019). <i>Nageia nagi</i> . https://pfaf.org/ . [Accessed 19 Dec 2019]	"Known Hazards None known"
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	"Used in Ayurveda, Unani and Sidha. Bark astringent, stimulant, tonic, carminative, antiseptic, for fever, asthma, cough, catarrh, sore throat, rheumatism, given or applied with ginger in cholera; powdered bark useful in menstrual disorders; bark decoction given in diarrhea, headache, cough and asthma. Bark as a fish poison." [No evidence of toxicity from contact or consumption by humans or terrestrial vertebrates]

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes

Qsn #	Question	Answer
	Dexiang, Z., & Pingliu, C. (2000). Application of AHP in the Selection for Fire-resist Trees. Journal of Beihua University (Natural Science), 5	[Unable to access full publication, but excerpt suggests trees are used to for their fire resistant properties] "After an AHP analysis on their fire resist properties, a selection for the best among nine anti fire forest zone trees, such as Castanopsis fordii Hance, Podocarpus nagi (Thunb) Zollet"

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, Podocarpus nagi and Neolitsea aciculata. Journal of Ecology, 8(4), 678-687	"Its shade tolerance is rated 'high' by Kohyama & Grubb (1994) but as 'extremely high' by Suganuma & Kawai (1978)"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. (2007). Podocarpus nagi: Nagi Podocarpus. ENH656. Revised. Institute of Food & Agricultural Sciences, University of Florida, Gainesville FL. http://edis.ifas.ufl.edu . [Accessed 19 Dec 2019]	"Soil tolerances: clay; sand; loam; acidic; alkaline; well-drained" ... "Growing well in full sun, partial or deep shade, Nagi Podocarpus tolerates a wide range of well-drained soils."
	Earle, C.J. (2019). The Gymnosperm Database - Nageia nagi. https://www.conifers.org/po/Nageia_nagi.php . [Accessed 19 Dec 2019]	"Suitable on feralitic, deep and fertile, loamy-sandy soils"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees or shrubs to 20 m tall; trunk to 50 cm d.b.h.;"

412	Forms dense thickets	
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Evergreen broad-leaved and Quercus forests, forests on dry mountainsides, thickets, along streams; 200–1200(–1600) m."
	Maesako, Y., Nanami, S. & Kanzaki, M. (2007). Spatial distribution of two invasive alien species, Podocarpus nagi and Sapium sebiferum, spreading in a warm-temperate evergreen forest of the Kasugayama Forest Reserve, Japan. Vegetation Science, 24(2), 103-112	"The population of P. nagi, which is believed to have been planted at the foot of Mt. Mikasa approximately 1200 years ago (Suganuma 1975; Suganuma & Kawai 1978) occupies Mt. Mikasa with a high density (Nanami et al. 1999, 2000) ." [Unknown if high densities result in exclusion of other species]

Qsn #	Question	Answer
501	Aquatic	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Trees or shrubs to 20 m tall"... "Evergreen broad-leaved and Quercus forests, forests on dry mountainsides, thickets, along streams; 200–1200(–1600) m."
502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 19 Dec 2019]	Podocarpaceae
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 19 Dec 2019]	Podocarpaceae
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees or shrubs to 20 m tall; trunk to 50 cm d.b.h.;"
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. Flora of China. Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Evergreen broad-leaved and Quercus forests, forests on dry mountainsides, thickets, along streams; 200–1200(–1600) m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Zhejiang; also cultivated as an ornamental [Japan (including Ryukyu Islands)]."

Qsn #	Question	Answer
	Farjon, A. (2013). <i>Nageia nagi</i> . The IUCN Red List of Threatened Species 2013: e.T46347417A2848484. http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T46347417A2848484.en . [Accessed 19 Dec 2019]	[Wide distribution, but may be threatened within parts of range] "This species is widely distributed, but it is almost impossible to establish from herbarium collection data where it is truly indigenous (growing in the wild) and where it has been introduced and planted. Wilson (1916) noted that he did not meet with any trees growing in the wild whilst travelling in Japan. In the wild, it is limited to a few forest remnants in the most southern parts of that country, including the oceanic Ryukyu Islands. In Taiwan, S.Y. Lu (1996) has assessed the species as Critically Endangered (CR), with wild growing trees restricted to Taipei Co. in the north and Taitung Co. in the far south of the island. Similar inventories based on intimate knowledge of the forest flora are lacking for most of mainland China. Occurring in lowland mixed evergreen forest, the species has come under threat from habitat declines. Whole plants are also dug up for the horticultural trade."

602	Produces viable seed	y
	Source(s)	Notes
	Chen, S. Y., Baskin, C. C., Baskin, J. M., & Chien, C. T. (2013). Underdeveloped embryos and kinds of dormancy in seeds of two gymnosperms: <i>Podocarpus costalis</i> and <i>Nageia nagi</i> (Podocarpaceae). <i>Seed Science Research</i> , 23 (1), 75-81	"Embryos in fresh seeds of <i>N. nagi</i> were 7.4 ^ 0.8mm long and they increased in length by about 39% before radicle emergence (germination) occurred, indicating that the embryo is underdeveloped at seed maturity. Seeds germinated to ,25% at 30/20 and 258C in light in 4 weeks but to .90% at the same temperatures in 12 weeks. Thus, most seeds of <i>N. nagi</i> have morphophysiological dormancy (MPD)."
	Gilman, E.F. & Watson, D.G. (2007). <i>Podocarpus nagi</i> : <i>Nagi Podocarpus</i> . ENH656. Revised. Institute of Food & Agricultural Sciences, University of Florida, Gainesville FL. http://edis.ifas.ufl.edu . [Accessed 20 Dec 2019]	"Propagation is by seeds or cuttings."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	[Unknown. Related genus capable of hybridization] " <i>Podocarpus cunninghamii</i> ... Below 600 m it can co-exist with <i>P. totara</i> and is thought to occasionally hybridize with it"

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, <i>Podocarpus nagi</i> and <i>Neolitsea aciculata</i> . <i>Journal of Ecology</i> , 8(4), 678-687	" <i>Podocarpus niagi</i> (Podocarpaceae) is a dioecious gymnosperm that is native to south-western Japan, Taiwan and southern China."

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Koike, F. (2007). Plant trait database in east and south-east Asia. http://vege1.kan.ynu.ac.jp/traits/PlantTraitAsia.pdf . [Accessed]	[Wind-pollinated] "Podocarpus nagi - Pollination mode - Anemophily"
606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Koike, F. (2007). Plant trait database in east and south-east Asia. http://vege1.kan.ynu.ac.jp/traits/PlantTraitAsia.pdf . [Accessed]	[No vegetative spread reported] "Podocarpus nagi - Vegetative spread distance (m) = 0"
607	Minimum generative time (years)	>3
	Source(s)	Notes
	Farjon, A. (2013). <i>Nageia nagi</i> . The IUCN Red List of Threatened Species 2013: e.T46347417A2848484. http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T46347417A2848484.en . [Accessed 19 Dec 2019]	"Generation length (years) 25 years"
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, <i>Podocarpus nagi</i> and <i>Neolitsea aciculata</i> . <i>Journal of Ecology</i> , 8(4), 678-687	"Podocarpus nagi (Tlnmb.) Zoll. et Moritz. (Podocarpaceae), whose seeds are dispersed by gravity alone, was compared with <i>Neolitsea aciculata</i> (Blume) Koidz. (Lauraceae), a bird-dispersed species."
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. <i>Flora of China</i> . Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Seed globose to pyriform, 1–1.5 cm in diam., with dense punctiform depressions, base pointed, apex rounded." [No evidence. No means of external attachment]
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Gilman, E.F. & Watson, D.G. (2007). <i>Podocarpus nagi</i> : <i>Nagi Podocarpus</i> . ENH656. Revised. Institute of Food & Agricultural Sciences, University of Florida, Gainesville FL. http://edis.ifas.ufl.edu . [Accessed]	[Cultivated for multiple uses] "This upright, dense evergreen has pointed, leathery, dark green leaves arranged on stiff, symmetrical branches and works very well as a screen, hedge, strong accent plant, or framing tree."
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes

Qsn #	Question	Answer
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, <i>Podocarpus nagi</i> and <i>Neolitsea aciculata</i> . <i>Journal of Ecology</i> , 8(4), 678-687	[No evidence. Limited dispersal ability and long time to maturity] " <i>Podocarpus nagi</i> (Podocarpaceae) is a dioecious gymnosperm that is native to south-western Japan, Taiwan and southern China. Its shade tolerance is rated 'high' by Kohyama & Grubb (1994) but as 'extremely high' by Suganuma & Kawai (1978), and it has round seeds, 10-15 mm in diameter, that are dispersed by gravity."

704	Propagules adapted to wind dispersal	
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.) 1999. <i>Flora of China</i> . Vol. 4 (Cycadaceae through Fagaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Genus] "Epimatium wholly enveloping seed, leathery, with bluish black bloom when ripe. Seed drupelike, globose." [Species] "Epimatium green with white bloom when young, dark purple with sparser white bloom when ripe. Seed globose to pyriform, 1–1.5 cm in diam., with dense punctiform depressions, base pointed, apex rounded."
	Maesako, Y., Nanami, S. & Kanzaki, M. (2007). Spatial distribution of two invasive alien species, <i>Podocarpus nagi</i> and <i>Sapium sebiferum</i> , spreading in a warm-temperate evergreen forest of the Kasugayama Forest Reserve, Japan. <i>Vegetation Science</i> , 24(2), 103-112	[Speculated to be aided by wind in dispersal, but lacks adaptations for wind] "Nanami et al. (1999, 2000) reported that the narrow range of seed dispersal by gravity and dioecy induced the spatial heterogeneity of individuals in the <i>P. nagi</i> stand. In contrast, Yamakura et al. (2003) examined meteorological data and suggested that wind has promoted <i>P. nagi</i> seed dispersal in this area."

705	Propagules water dispersed	
	Source(s)	Notes
	Farjon, A. (2013). <i>Nageia nagi</i> . The IUCN Red List of Threatened Species 2013: e.T46347417A2848484. http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T46347417A2848484.en . [Accessed]	"In forest or woodland on drier mountain slopes <i>N. nagi</i> tends to follow streams, but it is known to regenerate in more open thickets after forest disturbance." [Seeds might be moved by water in riparian areas]
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed]	" <i>Podocarpus nagi</i> (Podocarpaceae) is a dioecious gymnosperm that is native to south-western Japan, Taiwan and southern China. Its shade tolerance is rated 'high' by Kohyama & Grubb (1994) but as 'extremely high' by Suganuma & Kawai (1978), and it has round seeds, 10-15 mm in diameter, that are dispersed by gravity."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, <i>Podocarpus nagi</i> and <i>Neolitsea aciculata</i> . <i>Journal of Ecology</i> , 8(4), 678-687	[Despite drupe-like fruit, gravity dispersal contrasted with other bird-dispersed taxon] " <i>Podocarpus nagi</i> (Thunb.) Zoll. et Moritz. (Podocarpaceae), whose seeds are dispersed by gravity alone, was compared with <i>Neolitsea aciculata</i> (Blume) Koidz. (Lauraceae), a bird-dispersed species."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, <i>Podocarpus nagi</i> and <i>Neolitsea aciculata</i> . <i>Journal of Ecology</i> , 8(4), 678-687	[No evidence and no means of external attachment] "Seeds of <i>P. nagi</i> are dispersed by gravity around female trees. Young plants of <i>P. nagi</i> were clumped and showed significant attraction to large female trees and significant repulsion from large male trees. Dioecy therefore affected the spatial heterogeneity of plant density in the <i>P. nagi</i> population."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, <i>Podocarpus nagi</i> and <i>Neolitsea aciculata</i> . <i>Journal of Ecology</i> , 8(4), 678-687	"Seeds of <i>P. nagi</i> are dispersed by gravity around female trees. Young plants of <i>P. nagi</i> were clumped and showed significant attraction to large female trees and significant repulsion from large male trees. Dioecy therefore affected the spatial heterogeneity of plant density in the <i>P. nagi</i> population." [No evidence of consumption or internal dispersal, in spite of possessing drupe-like fruit]

801	Prolific seed production (>1000/m ²)	n
	Source(s)	Notes
	Nanami, S., Kawaguchi, H., & Yamakura, T. (1999). Dioecy-Induced Spatial Patterns of Two Codominant Tree Species, <i>Podocarpus nagi</i> and <i>Neolitsea aciculata</i> . <i>Journal of Ecology</i> , 8(4), 678-687	"There were 18 646 (mean density 11.7 m ⁻²) seeds of <i>P. nagi</i> in the 40 m x 40 m plot (Fig. 1). The highest density was within a quadrat 344 m ⁻² ."

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Chen, S. Y., Baskin, C. C., Baskin, J. M., & Chien, C. T. (2013). Underdeveloped embryos and kinds of dormancy in seeds of two gymnosperms: <i>Podocarpus costalis</i> and <i>Nageia nagi</i> (Podocarpaceae). <i>Seed Science Research</i> , 23 (1), 75-81	"Embryos in fresh seeds of <i>N. nagi</i> were 7.4 ± 0.8mm long and they increased in length by about 39% before radicle emergence (germination) occurred, indicating that the embryo is underdeveloped at seed maturity. Seeds germinated to 25% at 30/20 and 25°C in light in 4 weeks but to 90% at the same temperatures in 12 weeks. Thus, most seeds of <i>N. nagi</i> have morphophysiological dormancy (MPD)." [Longevity in soil seed bank unknown]

803	Well controlled by herbicides	n
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	Notes

Qsn #	Question	Answer
	Coomes, D. A., & Bellingham, P. J. (2011). Temperate and Tropical Podocarps: How Ecologically Alike Are They? In Ecology of the Podocarpaceae in Tropical Forests, B. L. Turner and L. A. Cernusak, eds., pp. 119–140. Smithsonian Contributions to Botany, No. 95. Smithsonian Institution Scholarly Press, Washington, D.C.	"Tall podocarp species do not, in general, resprout following damage (Martin and Ogden, 2006)." ... "Typhoon-damaged trees of the podocarp <i>Nageia nagi</i> in southern Japan were also ineffective at resprouting, in contrast to many co-occurring angiosperm trees (Bellingham et al., 1996)."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Able to grow in cooler, subtropical climates
- Naturalized within Japan, outside natural range
- Unpalatable to deer, and probably other browsing animals
- Shade-tolerant
- Tolerates many soil types
- Reproduces by seeds
- Seeds dispersed by gravity and intentionally by people

Low Risk Traits

- No reports of negative impacts where cultivated
- Unarmed (no spines, thorns, or burrs)
- Ornamental value
- Dioecious
- Not reported to spread vegetatively
- Long time to reproductive maturity
- Seed dispersal concentrated around mother trees
- Despite drupe-like fruit, not reported to be dispersed by birds or other animals
- Not reported to resprout after damage to trunk