Taxon: Cryptomeria japonica

Family: Cupressaceae

Common Name(s): Japanese cedar
Japanese red cedar
sugi

Synonym(s): Cryptomeria fortunei
Cupressus japonica

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 12 Mar 2015

WRA Score: 5.0

Designation: EVALUATE

Rating: Evaluate

Keywords: Naturalized Tree, Flammable, Shade-Tolerant, Wind-Pollinated, Wind-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	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		
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		
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		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	y
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	y=1, n=-1	n
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut		
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**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Dwarf cultivars may be less likely to cause problems within introduced range. This assessment refers to the wild type] "There are commercial/nursery varieties as it is favoured in Japan and the West as an ornamental and dwarf and rockery plant (Elwes and Henry, 1906). The identification of cultivars in USA nurseries is complicated by an inadequate inventory of selected variants, instability of names at the infraspecific level, poor descriptions, and a lack of identification aids (Rouse et al., 1997)."

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2015. 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"**	**Intermediate**
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	Native to Japan and has been introduced to several countries including Europe, South Africa, India, Malaysia, Mauritious etc.

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

203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It is tolerant of a wide range of sites and climates ... " ... "The range of latitudes in Japan has been extended by plantations (32,000 ha) established up to 43°N in Hokkaido. There are small areas in Okinawa now, where it has been considered to have adapted to a subtropical environment (Nakasone, 1975a). The altitudinal range is from about 300 m (Schober, 1977) to about 2050 m in the northern Japanese Alps in Honshu (Taira et al., 1997)." ... "The range of latitudes of natural stands is from 40°12' to 30°15'N in Japan (JFA, 1981); plantings in Japan now extend to nearly 43°N (and 46°N in Sakhalin) to 27°N in Okinawa (Japan)."
	Missouri Botanical Garden. 2015. Cryptomeria japonica. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=a158. [Accessed 10 Mar 2015]	"Zone: 5 to 9"

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	Oppenheimer, H.L. 2000. Specimen details for Cryptomeria japonica (Thunb. ex L.f.) D.Don. ID Number 662546. http://nsdb.bishopmuseum.org/63BCF13A-0FC4-4C32-92E6-844901078D68. [Accessed 10 Mar 2015]	"Elevation: 5788 ft" ... "Habitat: Originally planted at the West Maui summit by D.T. Fleming around 1928. Seedlings now naturalizing." ...
	Oppenheimer, H.L. 1999. Specimen Details for Cryptomeria japonica (Thunb. ex L.f.) D.Don. ID Number 662452. http://nsdb.bishopmuseum.org/C6A09461-F343-4BA2-B6E4-3DB37BE26AB3. [Accessed 10 Mar 2015]	"Locality: USA - Hawaii - Maui - W Maui, Lahaina District, Puu Kukui Watershed, along Puu Kukui Trail" ... "Elevation: 3100 ft" ... "Plant Description: Seedlings occasional."
	Wagner, W.L., Herbst, D.R., Khan, N.& Flynn, T. 2012. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai`i & Hawai`i's Ferns & Fern Allies. Smithsonian Institution and NTBG, Washington, DV & Lihue, HI	"newly naturalized (West Maui)"
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Adapted to a subtropical environment] "The natural distribution of C. japonica var. japonica in Japan is confused both by the extent of new plantings and the millennia of use. The range of latitudes in Japan has been extended by plantations (32,000 ha) established up to 43°N in Hokkaido. There are small areas in Okinawa now, where it has been considered to have adapted to a subtropical environment (Nakasone, 1975a). The altitudinal range is from about 300 m (Schober, 1977) to about 2050 m in the northern Japanese Alps in Honshu (Taira et al., 1997)."

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Plantations have been established in India (and in particular Darjeeling and West Bengal) (Hoenninger, 1978). It was introduced from Japan in 1844, but is no longer planted (Streets, 1962). There are trial plantations in France (Dubois, 1995). Streets (1962) also reported that C. japonica had been established in trial plantations, shelterbelts or as an ornamental/specimen tree and showed promise in Australia, Malawi, Mauritius, New Zealand, Zimbabwe, Tanzania, South Africa and the UK. In the Philippines it grows above 1500 m altitude (Hoenninger, 1978). In Brazil, C. japonica has been grown in mixture with Pinus elliottii var. elliottii in Parana province (Kon, 1973). It grows in a wide range of climates from Zanzibar to Darjeeling to Yugoslavia to Parana, and often grows relatively fast. However, the wood may be very soft, and there are doubts about the quality of the wood. C. japonica is grown in Europe and North America as an ornamental species (Vidakovic, 1991). The oldest trees in the British Isles are C. japonica var. sinensis (Elwes and Henry, 1906)."

301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**
	Richardson, D. M., & Rejmánek, M. 2004. Conifers as invasive aliens: a global survey and predictive framework. Diversity and Distributions, 10(5-6): 321-331	"Appendix List of naturalized or invasive (in bold) conifers (Pinopsida), based on hundreds of published and unpublished sources and the unpublished data and personal observation of the authors over more than a decade." ..."Cryptomeria japonica (Azores; Germany; Hawaii; New Zealand)" [Bold type suggests invasiveness in the Azores, but no details are provided]
	Howell, C. J., & Sawyer, J. W. (2006). New Zealand naturalised vascular plant checklist. New Zealand Plant Conservation Network, Wellington, NZ	"Cryptomeria japonica - Fully naturalized"
	Wagner, W.L., Herbst, D.R., Khan, N.& Flynn, T. 2012. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai`i & Hawai`i's Ferns & Fern Allies. Smithsonian Institution and NTBG, Washington, DV & Lihue, HI	"newly naturalized (West Maui)"
	Webb, C. J., Sykes, W. R., & Garnock-Jones, P. J. 1988. Flora of New Zealand Volume IV. Botany Division, DSIR, Christchurch, New Zealand	"Occasional escape from cultivation, regenerating in the vicinity of planted trees, particularly in modified forest, as well as in and around plantations."
	Oppenheimer, H. L. 2002. The Spread of Gymnosperms on Maui: A Neglected Element of the Modern Hawaiian Flora. Bishop Museum Occasional Papers 68: 19–23	Naturalized on West Maui

302	**Garden/amenity/disturbance weed**	
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	**Agricultural/forestry/horticultural weed**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	
	Source(s)	**Notes**
	Richardson, D. M., & Rejmánek, M. 2004. Conifers as invasive aliens: a global survey and predictive framework. Diversity and Distributions, 10(5-6): 321-331	"Besides the marked taxonomic bias in favour of Pinaceae, and Pinus in particular, invasiveness in conifers is associated with a syndrome of life-history traits: small seed mass (< 50 mg), short juvenile period (< 10 year), and short intervals between large seed crops. Cryptomeria japonica , Larix decidua , Picea sitchensis , Pinus contorta , Pinus strobus , and Pseudotsuga menziesii exemplify this syndrome." ... "Appendix List of naturalized or invasive (in bold) conifers (Pinopsida), based on hundreds of published and unpublished sources and the unpublished data and personal observation of the authors over more than a decade." ..."Cryptomeria japonica (Azores; Germany; Hawaii; New Zealand)" [Bold type suggests invasiveness in the Azores, but no negative impacts have been documented]]
	Costa, H., Bettencourt, M. J., Silva, C. M., Teodósio, J., Gil, A., & Silva, L. (2013). Invasive alien plants in the Azorean protected areas: invasion status and mitigation actions. Pp. 375-394 In Foxcroft, L.C. et al. (eds.). Plant invasions in protected areas. Springer, Netherlands	[Targeted for removal on one island in the Azores, but predominantly occurs in intentionally planted forests. Unknown if C. japonica is invading habitat from these plantations] "Presently, the Azorean landscape includes pastureland (65 %), Cryptomeria japonica (Japanese cedar) dominated production forest (about 20 % of the forested area), mixed woodland (dominated by alien taxa, more than 30 % of the forested area), field crops, orchards, vineyards, hedgerows and gardens (Silva and Smith 2006)." ... "Table 17.2 Interventions performed in the Azores, within the framework of the Regional Plan of Eradication and Control of Invasive Plant Species in Sensitive Areas (PRECEFIAS), for removing alien plant species" [Acacia melanoxylon; Ageratina adenophora; Ailanthus altissima; Carpobrotus edulis; Cryptomeria japonica; Hedychium gardnerianum; Hydrangea macrophylla; Metrosideros excelsa; Persicaria capitata; Pittosporum undulatum; Rubus ulmifolius targeted for removal on Pico Island]

305	Congeneric weed	n
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.	[No evidence] "Introduced aromatic evergreen tree with small awlshaped or needlelike leaves. In Hawaii, it grows to 80 ft (24 m) in height and 1.5 ft (0.5 m) in diameter. Crown cone- or pyramid-shaped or irregular, narrow. Trunk straight, tapering from enlarged base. Branches spreading horizontally. Bark reddish brown, with long fissures, smoothish to slightly shaggy, fibrous, peeling off in long shreds. Inner bark light pink within red-brown outer layer, resinous. Twigs very slender, dull green, hairless, spreading or drooping, mostly shedding with leaves after a few years. Buds minute. Leaves borne singly (afternate) and spreading on all sides of twig, awl-shaped or needlelike, 1⁄4–5⁄8 inch (6–15 mm) long, curved forward and inward, slightly stiff and blunt-pointed, slightly flattened and four-angled, dull blue green, hairless, base extending down twig. Flushes of new growth in winter bright orange."

402	**Allelopathic**	
	Source(s)	**Notes**
	Singh, H. P., Kohli, R. K., Batish, D. R., & Kaushal, P. S. (1999). Allelopathy of gymnospermous trees. Journal of Forest Research, (3), 245-254	"Table 1 Available reports on the allelopathy of gymnosperms." [Cryptomeria japonica - "Extracts of bark and saw dust inhibited seedling growth."]
	Chou, C. H., & Yang, C. M. (1982). Allelopathic research of subtropical vegetation in Taiwan II. Comparative exclusion of understory by Phyllostachys edulis and Cryptomeria japonica. Journal of Chemical Ecology, 8(12), 1489-1507	[In this study, extracts from C. japonica stimulate, rather than suppress growth] "On many hillsides of Taiwan there is a unique pattern of weed exclusion by Phyllostachys edulis (bamboo) and Cryptomeria japonica (conifer) in which the density, diversity, and dominance of understory species are very different. Although the physical conditions of light, soil moisture, and soil nutrients strongly favor the growth of understory in a bamboo community, the biomass of its undergrowth is significantly low, indicating that physical competition among the understory species in the bamboo and conifer communities does not cause the observed differences. However, the biochemical inhibition revealed by these two plants appeared to be an important factor. The growth of Pellionia scabra seedlings, transplanted from the study site into greenhouse pots, was evidently suppressed by the aqueous leachate of bamboo leaves but was stimulated by that of conifer leaves. The radicle growth of lettuce, rye grass, and rice plants was also clearly inhibited by the leachate and aqueous extracts of bamboo leaves but not by those of conifer leaves. Six phytotoxins,o-hydroxyphenylacetic,p-hydroxybenzoic,p-coumaric, vanillic, ferulic, and syringic acids were found in the aqueous leachate and extracts of leaves and alcoholic soil extracts of P. edulis, while the first three compounds were absent in the extracts of C. japonica. The phytotoxicities of extracts were correlated with the phytotoxins present in both leaves and soils. The understory species might be variously tolerant to the allelopathic compounds produced by the two plants, resulting in a differential selection of species underneath. Therefore, comparative allelopathic effects of Phyllostachys edulis and Cryptomeria japonica may play significant roles in regulating the populations of the understories."
	WRA Specialist. 2015. Personal Communication	Studies document both inhibitory and stimulatory effects of aqueous extracts

Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence] "C. japonica var. japonica is a straight-stemmed (where not affected with snow/soil creep), monopodial tree, up to 65 m tall (Vidakovic, 1991), and up to 2.5 m in diameter (at Yakushima). It is very long-lived, and possibly the longest-lived of all trees (at Yakushima)."

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Conover, M. R., & Kania, G. S. (1988). Browsing preference of white-tailed deer for different ornamental species. Wildlife Society Bulletin 16(2): 175-179	" Table 1. Shoots or leaves of ornamental plant species browsed by deer during winters of 1982 1984 at the Greenwich Landscaping Company, Greenwich, Connecticut" [No browse reported on 3 Cryptomeria japonica trees. Age of trees unknown]
	Oi, T., & Suzuki, M. (2001). Damage to sugi (Cryptomeria japonica) plantations by sika deer (Cervus nippon) in northern Honshu, Japan. Mammal Study, 26(1), 9-15	[Palatability declines with tree age] "In Japan, sika deer (Cervus nippon) feed on bark and consequently damage sugi (Cryptomeria japonica), a common plantation tree species." ... "Sugi (Cryptomeria japonica) is the most commonly used evergreen for afforestation in Japan, and bark-feeding by deer inhibits its growth and lowers the quality of timber. Oi and Itoya (1995) found that in the cool temperate zone of Iwate prefecture, sika deer consumed the leaves of sugi from December to May, the period of lowest forage availability. Deer consumed the bark and the peripheral sapwood of sugi in March and April, suggesting that the damage in this area is related to food limitations. However, factors contributing to bark-feeding by deer have not yet been directly examined." ... "previous observations (Oi, unpublished data) indicated that sika deer fed on sugi twigs and leaves until the sugi stands reached an age of two or three years, and that they fed on the bark when the stands were three to 15 years old. We did not find bark-feeding damage in the stands that were older than 15 years."
	WRA Specialist. 2015. Personal Communication	Palatability may depend on age of trees, and species of browsing animal

405	Toxic to animals	n
	Source(s)	Notes
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence
	Specialized Information Services, U.S. National Library of Medicine. 2015. TOXNET toxicology data network [online database]. http://toxnet.nlm.nih.gov/. [Accessed 11 Mar 2015]	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"In Japan no new papers (>1981) on diseases of C. japonica were found. The absence of research papers indicate that diseases are not a major problem for C. japonica." ... "The bark beetle Semanotus japonicus attacks Chamaecyparis obtusa and C. japonica (Hayashi et al., 1986). It has become a major pest in the last few years. Both sexes live in both dead and live trees (Fujita et al., 1990). Breeding for resistant varieties is underway (JFA, 1981)." ... "Xeris spectrum and Urocerus japonicus were the main Siricids on Chamaecyparis obtuse and C. japonica; the Siricids were parasitized by Rhyssa persuasoria and Megarhyssa praecellens. Pseudorhyssa sternata was a cleptoparasite, and was fairly common in logs of Chamaecyparis obtusa and C. japonica (Kananitsu, 1978)." ... "The principal defoliating insects include the sugi tussock moth (Dasychira abietis argentata), sugi web worm (Homona issikii), sugi leaf beetle (Basilepta pallidulum) and chafer beetles (Anomala spp.) (JFA, 1981)." ... "C. japonica var. sinensis is one of the main fast-grown ones used in Zhejiang Province. Insect attack on a large scale has been reported in the south of the Province. Growth has been affected and some deaths have occurred (Wang, 1997)."
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 11 Mar 2015]	"No pests or diseases are of major concern but the tree occasionally suffers from leaf blight and leaf spot. Mites sometimes infest the foliage."

407	**Causes allergies or is otherwise toxic to humans**	
	Source(s)	**Notes**
	Yokozeki, H., Satoh, T., Katayama, I., & Nishioka, K. (2007). Airborne contact dermatitis due to Japanese cedar pollen. Contact Dermatitis, 56(4), 224-228	"Contact dermatitis caused by airborne antigen is a well-recognized problem. Previously, airborne contact dermatitis after contact with Japanese cedar pollen [Japanese cedar pollen dermatitis (JCPD)] has been reported in Japan." ... "Previously, airborne contact dermatitis due to Japanese cedar pollen [Japanese cedar pollen dermatitis (JCPD)] during the Japanese cedar pollen season (January to April) has been reported (2–4)." ... "We report here that an airborne contact dermatitis was observed, which induced a chronic persistent oedematous erythema after contact with Japanese cedar pollen in the spring season."
	Kole, C. (ed.). 2011. Wild Crop Relatives: Genomic and Breeding Resources: Forest Trees. Springer, Berlin, Heidelberg	[Possibly allergenic to susceptible individuals] "Recently, allergic reaction to pollen (pollinosis) of this species has become a serious social problem. More than 10% of people living in Japan suffer reactions to C. japonica pollen between the end of February and early May (Taira et al. 2000)."
	WRA Specialist. 2015. Personal Communication	Exposure to pollen may cause allergies & contact dermatitis in susceptible individuals
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence of poisoning or toxicity

408	**Creates a fire hazard in natural ecosystems**	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	Fire Performance Plant Selector. 2015. Cryptomeria japonica. http://www.fire.sref.info/plants/cryptomeria-japonica. [Accessed 11 Mar 2015]	"Firewise Rating - NOT Firewise (4)" ... "Ladder Potential without Pruning - Yes" ... "Leaf Characteristics - Oily-dense"
	County of San Diego, Department of Planning and Land Use. 2010. Fire, Plants, Defensible Space, and You. http://www.sandiegocounty.gov/pds/docs/DPLU199.pdf. [Accessed 11 Mar 2015]	"The following species are highly flammable and should be avoided when planting within the first 50 feet adjacent to a structure. The plants listed below are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio." [List includes Cryptomeria japonica]
	Cornwell, W. K., Elvira, A., van Kempen, L., van Logtestijn, R. S. P., Aptroot, A. and Cornelissen, J. H. C. (2015), Flammability across the gymnosperm phylogeny: the importance of litter particle size. New Phytologist. doi: 10.1111/nph.13317	[Produces flammable litter, but densely packed litterbeds may actually inhibit fires] "The terpene-rich Cryptomeria burned hotter and the fire front moved faster than in Cunninghamia (Table 2; Fig. 3). The total burning time was also dependent on species: in general, the burning time for Cryptomeria litter was twice that of Cunninghamia litter." ... "Even for Cryptomeria japonica, which is particularly rich in terpenes and burned at one of the hottest temperatures in our across-species survey, there was still a profound effect of the size of the litter particles (Figs 2, 3), suggesting that litter particle size can be considered to have a first-order effect on surface fires (Scarff & Westoby, 2006), and small particles forming dense litterbeds can preclude litter fires even if the material itself is chemically highly flammable."

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	"C. japonica tolerates moderate to heavy shade, eventually developing into a climax canopy species. This ability means it can regenerate successfully where the canopy is dense enough to suppress competing vegetation. It can be used in underplanting."
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 11 Mar 2015]	"This is a shade tolerant species that can withstand frost. It occurs in mountains and hills in areas of higher rainfall in south and central Japan but is rarely spontaneous. Plants are fairly wind-tolerant. Prefers a deep rich moist alluvial soil and a sheltered position in full sun."

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"C. japonica grows best on deep, moist, clayey and well-drained soils (Vidakovic, 1991)." "Soil descriptors - Soil texture: light; medium - Soil drainage: free - Soil reaction: acid; neutral - Soil types: cambisols; fluvisols; podzols"

Qsn #	Question	Answer
	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	"Fast-growing on deep, well-drained soils in montane areas with a warm, moist climate, but intolerant of poor soils and cold, drier climates."
	Gilman, E.F. & Watson, D.G. 1993. Cryptomeria japonica - Japanese-Cedar. Fact Sheet ST-217. IFAS, University of Florida, Gainesville FL	"Soil tolerances: clay; loam; sand; acidic; well-drained"
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 11 Mar 2015]	"Soil type: The tree prefers free draining, deep, rich, moist alluvial soil. Tolerates very acid to somewhat alkaline soils, but becomes chlorotic on shallow soils over chalk."

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 to 40 m tall; trunk to at least 2 m d.b.h.;"

Qsn #	Question	Answer
412	Forms dense thickets	
	Source(s)	**Notes**
	Thomas, P., Katsuki, T. & Farjon, A. 2013. Cryptomeria japonica. The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	"Natural forests that include this species are now very rare (Tomaru et al. 1994) and those forests in which it still occurs have been greatly altered; the description is largely based on forests in Yakushima where an old growth forest still exists. The forest vegetation is mixed evergreen forest, with ca. 50% Cryptomeria, growing mixed or in groves; angiosperm evergreen trees are Trochodendron aralioides, Distylium racemosum, Camellia japonica, C. sasquana, Daphniphyllum spp., Michelia compressa, Myrica rubra, Quercus spp., Ilex spp., and Lauraceae; conifers are Abies firma, Tsuga sieboldii, Chamaecyparis obtusa, and Torreya nucifera; a few deciduous angiosperm trees, e.g. Stewartia monadelpha and Acer spp., make up less than 1% of tree cover. There is a diverse shrub-layer and some common climbers, e.g. Hydrangea petiolaris and Rhus orientalis; a rich cryptogamic flora covers the forest floor as well as trees, with abundant ferns, e.g. Hymenophyllum, mosses, and liverworts."
	Kisanuki, H., Oguro, H., Nakai, A., Setsuko, S., Nishimura, N., & Tomaru, N. 2008. The soil seed bank of the threatened plant Magnolia stellata is subordinate to the emergence of current-year seedlings. Journal of Forest Research, 13(2): 143-146	[Planted dense stands of C. japonica may suppress tree regeneration] "We studied seed bank formation of the threatened star magnolia, Magnolia stellata, to examine the early stage of regeneration." ... "Masting of M. stellata at the study site occurs every two years (Setsuko, personal observation), immediately after which the seed supply is comparatively high. Thus, the species remains well represented and is likely to play a role in the regeneration cycles of this forest if mother trees continue to produce seeds. However, planted evergreen conifers, such as Cryptomeria japonica or Chamaecyparis obtusa, and broadleaf trees (e.g., Ilex pedunculosa, Quercus serrata) are well developed within the forest and may suppress M. stellata population regeneration in the study site through shading."
	WRA Specialist. 2015. Personal Communication	Natural distribution is unclear given long history of cultivation and planting, often in dense stands or plantations

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 tree] "Forests on deep, well-drained soils subject to warm, moist conditions, also cultivated as an ornamental and planted for timber; below 1100 m to 2500 m."

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 10 Mar 2015]	"Family: Cupressaceae. Also placed in: Taxodiaceae"

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 10 Mar 2015]	"Family: Cupressaceae. Also placed in: Taxodiaceae"

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"C. japonica var. japonica is a straight-stemmed (where not affected with snow/soil creep), monopodial tree, up to 65 m tall (Vidakovic, 1991), and up to 2.5 m in diameter (at Yakushima). It is very long-lived, and possibly the longest-lived of all trees (at Yakushima). Crown pyramidal in exposed trees, but spire-like in mature forest trees."

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**
	Thomas, P., Katsuki, T. & Farjon, A. 2013. Cryptomeria japonica. The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	[May be vulnerable within original range, but complicated due to widespread planting] "Major Threat(s): Extensive logging has removed trees of this species in much of its natural range and few old growth forests with Cryptomeria remain. Plantation forestry in Japan has made extensive use of the species, bringing it back to many areas where it had been greatly depleted. The species is undoubtedly regenerating naturally from this stock in many forests, so that the distinction between its natural distribution and anthropogenic occurrences can only be ascertained by a detailed study of forest history in Japan that would distinguish between primary and secondary occurrence. Some plantations are established from clonal material or with material that is not of local provenance. The potential impacts on natural populations via genetic contamination are uncertain. Cryptomeria has also been identified as susceptible to changes in precipitation; recent declines in lowland forests have been attributed to climate change (Matsumoto et al. 2006)."

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"C. japonica regenerates well from seed. It can also be grown from cuttings and it layers readily."
	Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.	"Propagation is by cuttings which root slowly or by seed which germinates slowly."

Qsn #	Question	Answer
603	Hybridizes naturally	n
	Source(s)	Notes
	Kusumi, J., Tsumura, Y., Yoshimaru, H., & Tachida, H. (2000). Phylogenetic relationships in Taxodiaceae and Cupressaceae sensu stricto based on matK gene, chlL gene, trnL-trnF IGS region, and trnL intron sequences. American Journal of Botany, 87(10), 1480-1488	"In addition, we detected few or no differences between several other species pairs in Cunninghamia, Taiwania, Cryptomeria, and Taxodium. So, some of them may be of hybrid origin, although a lack of differences does not in itself evidence for hybridization."

Qsn #	Question	Answer
604	Self-compatible or apomictic	y
	Source(s)	Notes
	Kanekawa, T., Kanazashi, T., & Katsuta, M. (1991). Seed fertility and natural selfing under different conditions of the relative amounts of male strobili in a Cryptomeria japonica D. Don seed orchard. Bulletin of the Ibaraki Prefectural Forest Experiment Station 19: 54-69	"In tests in a Cryptomeria japonica seed orchard in Japan, the proportion of selfed viable seeds (Rs) was high in the block with abundant male strobili (due to gibberellin treatment) compared with that of a block with scarce male strobili. The proportions of natural self fertilization (Rf) were nearly equal to the estimated proportions of self-pollination, in the block with scarce male strobili. It was estimated that 54% of pollen at the test tree (the central one of nine arranged in a block pattern) was from neighbouring trees."
	Moriguchi, Y., Tani, N., Itoo, S., Kanehira, F., Tanaka, K., Yomogida, H., Taira, H. & Tsumura, Y. (2005). Gene flow and mating system in five Cryptomeria japonica D. Don seed orchards as revealed by analysis of microsatellite markers. Tree Genetics & Genomes, 1(4): 174-183	"Self-fertilization rates varied among seed orchards(1.4–4.4% on average), and there were significant positive correlations between self-fertilization rate and the number of ramets per clone in both types of seed orchard."

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Moriguchi, Y., Tani, N., Itoo, S., Kanehira, F., Tanaka, K., Yomogida, H., Taira, H. & Tsumura, Y. (2005). Gene flow and mating system in five Cryptomeria japonica D. Don seed orchards as revealed by analysis of microsatellite markers. Tree Genetics & Genomes, 1(4): 174-183	"Sugi (Cryptomeria japonica D. Don) is an allogamous, wind-pollinated conifer species that is frequently used for commercial afforestation in Japan."
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 11 Mar 2015]	"The tree is monoecious, self-fertile and wind pollinated."

Qsn #	Question	Answer
606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"C. japonica regenerates well from seed. It can also be grown from cuttings and it layers readily. In snow-damaged secondary broadleaf forest, C. japonica grew rapidly into large individual trees in canopy gaps, but could be repeatedly prostrated by snow. It would then layer and persist under low light conditions. Twigs grew from layering stems and eventually formed a colony (Taira, 1994)."

Qsn #	Question	Answer
	Taira, H., Tsumura, Y., Tomaru, Y., & Ohba, K. (1997). Regeneration system and genetic diversity of Cryptomeria japonica growing at different altitudes. Canadian Journal of Forest Research, 27(4), 447-452	[Capable of layering. Unlikely in Hawaii, but tree fall might result in a similar phenomenon] "Cryptomeria growing in the Northern Japan Alps regenerate by both layering and seedlings. The regeneration by layering is clonal separation. In the case of large Cryptomeria trees, branches from the lower part of the trunk are pulled down by the pressure of snow over the years. Finally, these branches reach the ground and roots begin to grow from them. In the case of small Cryptomeria trees, Cryptomeria themselves are pressed down on the ground by snow during winter and roots begin to grow from the parts of the stem or branches touching the ground, resulting in independent trees (Taira 1994a). Taira et al. (1993) found that the Cryptomeria forest at an altitude of 2050 m regenerates by layering only and that genetic diversity in the forests is absent. The Cryptomeria forest at 2050 m was considered to be generated from a single clone or few clones."

607	Minimum generative time (years)	>3
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Seeding is heavy and starts at 5-10 years old."
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 12 Mar 2015]	"The cones are produced from about age 10 in most areas and the crop can be heavy. Seed is usually available annually."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 12 Mar 2015]	[No evidence. Seeds relatively small, but otherwise lack means of external attachment] "Seeds 2-5 per bract-scale complex depending on space available when intercalary scale tissue develops, 4-5 by 3 mm, flattened, irregularly ovate with 2 wings of unequal (1-1.5 mm) width forming a strip around the seed."

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.	"Forest plantations have been established in moist middle altitudes of Hawaii, mostly at 2500–6000 (762– 1829 m) on Kauai, Maui, and the island of Hawaii. Trees may be seen at Kokee on Kauai, on the Kula and Waihou Spring Forest Reserves on Maui, and along the old Volcano Road at Volcano Village, Hawaii. The best stand in the state of Hawaii is on the land of Papa in South Kona, where the trees were planted in the late 1880s. About 500,000 trees were planted by the Division of Forestry at various locations on the Forest Reserves between 1910 and 1960. Grown also as an ornamental and windbreak."

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Plantations have been established in India (and in particular Darjeeling and West Bengal) (Hoenninger, 1978). It was introduced from Japan in 1844, but is no longer planted (Streets, 1962). There are trial plantations in France (Dubois, 1995). Streets (1962) also reported that C. japonica had been established in trial plantations, shelterbelts or as an ornamental/specimen tree and showed promise in Australia, Malawi, Mauritius, New Zealand, Zimbabwe, Tanzania, South Africa and the UK. In the Philippines it grows above 1500 m altitude (Hoenninger, 1978). In Brazil, C. japonica has been grown in mixture with Pinus elliottii var. elliottii in Parana province (Kon, 1973). It grows in a wide range of climates from Zanzibar to Darjeeling to Yugoslavia to Parana, and often grows relatively fast. However, the wood may be very soft, and there are doubts about the quality of the wood. C. japonica is grown in Europe and North America as an ornamental species (Vidakovic, 1991). The oldest trees in the British Isles are C. japonica var. sinensis (Elwes and Henry, 1906)."

703	**Propagules likely to disperse as a produce contaminant**	**n**
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence. Unlikely given large cone size and long time to maturity] "Cones are globose, woody, the scales 20-30, 2- to 5-seeded. Seeds narrowly winged; irregularly triangular; 6 x 3 mm (Dallimore and Jackson, 1966)." ... "Monoecious; bears cones from about age 10 in most areas."

704	**Propagules adapted to wind dispersal**	**y**
	Source(s)	**Notes**
	Taira, H., Tsumura, Y., Tomaru, Y., & Ohba, K. (1997). Regeneration system and genetic diversity of Cryptomeria japonica growing at different altitudes. Canadian Journal of Forest Research, 27(4), 447-452	"Cryptomeria seedlings are more widely dispersed by wind-dispersed seed"

705	**Propagules water dispersed**	**n**
	Source(s)	**Notes**
	Taira, H., Tsumura, Y., Tomaru, Y., & Ohba, K. (1997). Regeneration system and genetic diversity of Cryptomeria japonica growing at different altitudes. Canadian Journal of Forest Research, 27(4), 447-452	"Cryptomeria seedlings are more widely dispersed by wind-dispersed seed"

706	**Propagules bird dispersed**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Heleno, R. H., Ross, G., Everard, A. M. Y., Memmott, J., & Ramos, J. A. (2011). The role of avian 'seed predators' as seed dispersers. Ibis, 153(1), 199-203	[Cryptomeria japonica seed detected in one blackbird dropping. Limited seed dispersal by birds may be possible] "Table 1. List of all seed–seed disperser interactions quantified in terms of the number of droppings with whole seeds. Biogeographical status refers to the distribution of each species following Borges et al. (2005): (i) introduced, (n) native, (E) endemic to the Azores, (M) endemic to Macaronesia, (d) doubtfully native. Abundance and number of droppings analysed of each bird species are presented."

707	**Propagules dispersed by other animals (externally)**	**n**
	Source(s)	**Notes**
	Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.	[Unlikely. No means of external attachment] "Seeds 2–5 at base of cone-scale, slightly three-angled, less than 1⁄4 inch (6 mm) long, dark brown, with narrow wings on edges."

708	**Propagules survive passage through the gut**	
	Source(s)	**Notes**
	Heleno, R. H., Ross, G., Everard, A. M. Y., Memmott, J., & Ramos, J. A. (2011). The role of avian 'seed predators' as seed dispersers. Ibis, 153(1), 199-203	[Cryptomeria japonica seed detected in one blackbird dropping. Viability unknown] "Table 1. List of all seed–seed disperser interactions quantified in terms of the number of droppings with whole seeds."

801	**Prolific seed production (>1000/m2)**	
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 11 Mar 2015]	[Unknown] "The cones are produced from about age 10 in most areas and the crop can be heavy. Seed is usually available annually."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 11 Mar 2015]	[Potentially] "Seed storage behaviour is orthodox, viability is maintained for 4 years in cold hermetic air-dry storage. At room temperature, seeds lose viability in a year, however viability is maintained for long periods in cold hermetic air-dry storage. Complete loss in viability after 3 years hermetic storage at 0 deg. C with 6- 8 % moisture content, but no loss in viability after 6 years at –20 deg. C with these moisture contents."

Qsn #	Question	Answer
	Sakai, A., Sato, S., Sakai, T., Kuramoto, S., & Tabuchi, R. (2005). A soil seed bank in a mature conifer plantation and establishment of seedlings after clear-cutting in southwest Japan. Journal of Forest Research, 10(4), 295-304	[When produced, seeds able to persist in the soil for 1 year] "In this study, however, seeds of canopy trees (Chamaecyparis obtusa and Cryptomeria japonica) were seldom detected in the soil. It is known that seed production of Chamaecyparis obtusa and Cryptomeria japonica fluctuate annually (Asakawa et al. 1981) and that seed longevity in the soil is up to 1 year (Ozawa 1950). Previous studies have pointed out that populations of buried viable seeds fluctuate seasonally and annually, depending on the amount of seed input and seed longevity of each species (Thompson and Grime 1979; Nakagoshi 1985). Hence, seeds of Chamaecyparis obtuse and Cryptomeria japonica are assumed to be transient in the soil."

803	**Well controlled by herbicides**	
	Source(s)	**Notes**
	Oahu Army Natural Resource Program. 2014. Status Report for the Makua and Oahu Implementation Plans. PCSU, Schofield Barracks, HI	"Unrelated to IPA trials conducted with Dr. Leary, staff tested the efficacy of a similar technique involving drilling holes around the trunk of trees and filling the holes with undiluted glyphosate. A large Ficus was effectively controlled using this method, and promising results were observed on Cryptomeria japonica. This technique may be an effective complement to IPA, particularly for hard to control species. Gas- and battery-powered drills are heavy, with power restrictions; tools refinement is needed for this technique." [Cryptomeria japonica - Last reading at 8 months. GLY and IMZ most promising, with some dead trees and major defoliation, but too early for definitive results]

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	y
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"- Ability to regenerate rapidly; coppice" ... ""[It] has the unusual capacity, for a conifer, of coppicing well, and can be propagated vegetatively with ease" (Streets, 1962). One other reference found reported coppicing (Kawajiri et al., 1989). The stool shoots at Kitayama, one of the Japanese classical areas, are produced from a modified sprout and perhaps this is meant. Large numbers of stumps seen there did not coppice and neither early nor more recent accounts mention it (Sargent, 1894; Elwes and Henry, 1906; JFA, 1981). As coppice is central to hardwood management and thoroughly understood in Japan, it is thought coppicing by C. japonica is likely to be from particular strains. It is not given as an aim of tree breeding; it seems desirable."
	Orwa C,, Mutua, A., Kindt R,, Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp. [Accessed 11 Mar 2015]	"Unlike most conifers, this species can be coppiced."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Little Jr., E.L. & Skolmen, R.G. 1989. Common forest trees of Hawaii: (native and introduced). USDA Agriculture Handbook No. 679. USDA Forest Service, Washington, D.C.	[None reported in the Hawaiian Islands] "Forest plantations have been established in moist middle altitudes of Hawaii, mostly at 2500–6000 (762– 1829 m) on Kauai, Maui, and the island of Hawaii. Trees may be seen at Kokee on Kauai, on the Kula and Waihou Spring Forest Reserves on Maui, and along the old Volcano Road at Volcano Village, Hawaii. The best stand in the state of Hawaii is on the land of Papa in South Kona, where the trees were planted in the late 1880s. About 500,000 trees were planted by the Division of Forestry at various locations on the Forest Reserves between 1910 and 1960. Grown also as an ornamental and windbreak."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Grows in temperate to subtropical climates (may only grow at higher elevations in subtropical climates)
• Naturalized or naturalizing on West Maui (Hawaii), New Zealand, and possible the Azores
• May possess allelopathic properties
• Pollen may cause dermatitis or allergies in susceptible individuals
• Flammable & may increase fire risk
• Shade tolerant
• Tolerates many soil types
• Dense planted stands may limit recruitment or regeneration of desirable species
• Reproduces by seeds, and possibly by layering
• Self-compatible
• Seeds dispersed by wind & people (possibly rarely by birds)
• Seeds may persist in the soil for at least 1 year
• Able to coppice

Low Risk Traits
• Despite widespread planting, few reports of naturalization, and no documentation of serious negative environmental impacts
• Unarmed (no spines, thorns or burrs)
• Valued as an ornamental and timber tree
• Vegetative spread by layering only in rare circumstances
• Reaches maturity in 5-10 years
• Herbicides may provide effective control

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Shade tolerant.
(B) Bird or clearly wind-dispersed?> Yes. Wind-dispersed seeds
(C) Life cycle <4 years? No. Reaches maturity in 5-10+ years
Outcome = Evaluate