

Taxon: *Macaranga grandifolia* (Blanco) Merr.

Family: Euphorbiaceae

Common Name(s): abing-abing
bing-abing
coraltree

Synonym(s): *Croton grandifolius* Blanco

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 4 May 2017

WRA Score: 4.0

Designation: EVALUATE

Rating: Evaluate

Keywords: Tropical, Tree, Ornamental, Shade Tolerant, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
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
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range		
301	Naturalized beyond native range		
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n

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

Qsn #	Question	Answer Option	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat		
601	Evidence of substantial reproductive failure in native habitat		
602	Produces viable seed	y=1, n=-1	y
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)		

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

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Macaranga grandifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Macaranga+grandifolia . [Accessed 4 May 2017]	[No evidence of domestication] "The plant is gathered from the wild for local use as a medicine. It is widely grown as an ornamental in many parts of the tropics, being especially valued for its red-veined, grandiose leaves[307]."

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]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 May 2017]	"Native: Asia-Tropical Malesia: Philippines - Luzon, - Mindoro"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 May 2017]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Southeast Growers Inc. 2017. <i>Macaranga grandifolia</i> - Coral Tree. http://www.southeastgrowers.com/ZA%20Macaranga%20grandifolia.htm . [Accessed 4 May 2017]	" Zone: 10-12"
	Top Tropicals. 2017. <i>Macaranga</i> extraordinary grandiose leaves. https://toptropicals.com/html/toptropicals/plant_wk/macaranga.htm . [Accessed 4 May 2017]	"The plant is considered to be tropical species. However, experience of growing this plant in subtropical climate shows its hardiness at least to zone 9b."

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unlikely. Related taxa restricted to low elevation forests] "Macaranga mappa ... in Hawai'i naturalized in low elevation mesic to wet areas and disturbed mesic valleys, 0-220 m," ... "Macaranga tanarius ... in Hawai'i naturalized in disturbed mesic valleys, 0-220 m"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 May 2017]	"Native: Asia-Tropical Malesia: Philippines - Luzon, - Mindoro" "Naturalized: . natzd. elsewhere"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Macaranga grandifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Macaranga+grandifolia . [Accessed 4 May 2017]	"The plant is gathered from the wild for local use as a medicine. It is widely grown as an ornamental in many parts of the tropics, being especially valued for its red-veined, grandiose leaves[307]."
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 May 2017]	Naturalized: . natzd. elsewhere Cultivated: . also cult.

301	Naturalized beyond native range	
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 May 2017]	"Native: Asia-Tropical Malesia: Philippines - Luzon, - Mindoro Naturalized: . natzd. elsewhere" [May be referencing Hawaiian Islands, where this species is listed as a synonym of <i>M. mappa</i>]
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2017. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 4 May 2017]	No evidence in Hawaiian Islands, to date

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

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

305	Congeneric weed	y
	Source(s)	Notes
	CABI, 2017. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Native to southeastern Asia, through to Australia and the western Pacific islands, <i>Macaranga tanarius</i> is a medium-sized tree that is cultivated in tropical regions throughout the world for a range of uses, including the production of timber, firewood, traditional medicinal products and shade. It is also used as an ornamental and in reforestation. As a pioneer species, <i>M. tanarius</i> is favoured by disturbance and rapidly colonizes gaps or margins in well-developed rainforest. In Hawaii, given its potential for rapid colonization and its ability to form dense stands, it is considered either an environmental weed or a potentially invasive cultivated plant threatening endangered native species."
	Mascaro, J., Becklund, K. K., Hughes, R. F., & Schnitzer, S. A. (2008). Limited native plant regeneration in novel, exotic-dominated forests on Hawai'i. <i>Forest Ecology and Management</i> , 256(4), 593-606	"The highest dominance was typically attained by <i>Falcataria moluccana</i> (albizia; e.g., 98% at site 32) and <i>Casuarina equisetifolia</i> (ironwood; e.g., 95% at site 19), although several other species attained more than 50% dominance, including <i>Psidium cattleianum</i> (strawberry guava), <i>Cecropia obtusifolia</i> (trumpet tree), <i>Macaranga mappia</i> (bingabing), <i>Trema orientalis</i> (gunpowder tree), <i>Melochia umbellata</i> ,"

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	[Generic description. No evidence] "Dioecious trees and shrubs; indumentum of simple (fasciculate) and conspicuous, usually colourful glandular hairs; twigs sometimes hollow, often with reddish exudate. Leaves long-petiolate, unlobed to palmately lobed, pinnately to palmately veined, often peltate, abaxially granuloseglandular; stipules minute to large, persistent or deciduous."

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	Tseng, M. H., Kuo, Y. H., Chen, Y. M., & Chou, C. H. (2003). Allelopathic Potential of <i>Macaranga tanarius</i> (L.) Muell.-Arg. <i>Journal of Chemical Ecology</i> , 29(5), 1269-1286	[Unknown. Related taxon demonstrates exhibits properties] "We conclude that the pattern of weed exclusion underneath stands of <i>M. tanarius</i> and its invasion into its adjacent grassland vegetation results from allelopathic interactions."

403	Parasitic	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. <i>The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales</i> . Springer, New York	"Dioecious trees and shrubs; indumentum of simple (fasciculate) and conspicuous, usually colourful glandular hairs; twigs sometimes hollow, often with reddish exudate." [Euphorbiaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Calub, B.M. 2003. Indigenous fodder trees for rehabilitation. <i>Leisa Magazine</i> December: 22-23	[<i>Macaranga tanarius</i> used for fodder] "Some trees, such as <i>Leucaena</i> , <i>Gliricidia</i> , <i>Muntingia calabura</i> , <i>Erythrina orientalis</i> can start producing fodder as soon as six months after planting. Other species like <i>Trema</i> , need at least nine months, or in the case of <i>Macaranga</i> and <i>Pipturus</i> 10-12 months, before they can be cut for fodder."

405	Toxic to animals	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Macaranga grandifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Macaranga+grandifolia . [Accessed 4 May 2017]	"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	" <i>Macaranga grandifolia</i> ... Resin astringent, a gargle for ulcers in the mouth"

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Macaranga grandifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Macaranga+grandifolia . [Accessed 4 May 2017]	"Known Hazards None known" ... "The leaves, bark and fruit are added to sugar cane juice that is fermented into 'basi', a traditional alcoholic beverage in the Philippines"

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	"Macaranga grandifolia ... Resin astringent, a gargle for ulcers in the mouth"

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Mamangun, A. K., & Gonzalez, J. C. (2007). Density and Feeding Preference of the Polillo Tropic Hornbill <i>Penelopides manillae subnigra</i> in Fragmented Forests of Polillo Island. <i>Banwa</i> , 4(1), 69-82	"For the residual forest site, <i>Macaranga grandifolia</i> was the dominant tree species. This species is a member of the family Euphorbiaceae. It was dominant in the two sampling areas of the site, the secondary forest at the valley and the forest near a water body"
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unlikely. Related taxa occupy habitats that are not fire prone] "Macaranga mappia ... in Hawai'i naturalized in low elevation mesic to wet areas and disturbed mesic valleys"

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Gardino Nursery. 2017. <i>Macaranga grandifolia</i> . http://gardinonursery.com/foilage-plants/739-macaranga-grandifolia-coral-tree.html . [Accessed 4 May 2017]	"LIGHT REQUIREMENTS : full sun to shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Southeast Growers Inc. 2017. <i>Macaranga grandifolia</i> - Coral Tree. http://www.southeastgrowers.com/ZA%20Macaranga%20grandifolia.htm . [Accessed 4 May 2017]	"Soil or Habitat: moist"
	Orwa C., Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 4 May 2017]	"Soil type: Occurs on clayey, loamy and sandy soils, usually in lowlands" [Related taxa not limited by soil types]

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Dioecious trees and shrubs; indumentum of simple (fasciculate) and conspicuous, usually colourful glandular hairs; twigs sometimes hollow, often with reddish exudate."

Qsn #	Question	Answer
412	Forms dense thickets	
	Source(s)	Notes
	Starr, F., Starr, K. & Loope, L. 2003. <i>Macaranga tanarius</i> - Parasol leaf tree Euphorbiaceae. USGS Biological Resources Division, Haleakala Field Station , Maui	[Unknown. Related taxon forms dense stands] "On Maui, <i>M. tanarius</i> is widely naturalized in the Waikapu area of West Maui where it forms dense thickets in mesic valleys and streams from near sea level up to about 4,400 ft (1,341 m) elevation"

501	Aquatic	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	[Terrestrial] "Dioecious trees and shrubs; indumentum of simple (fasciculate) and conspicuous, usually colourful glandular hairs; twigs sometimes hollow, often with reddish exudate."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 May 2017]	Family: Euphorbiaceae Subfamily: Acalyphoideae Tribe: Acalypheae Subtribe: Rottlerinae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 May 2017]	Family: Euphorbiaceae Subfamily: Acalyphoideae Tribe: Acalypheae Subtribe: Rottlerinae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Dioecious trees and shrubs; indumentum of simple (fasciculate) and conspicuous, usually colourful glandular hairs; twigs sometimes hollow, often with reddish exudate."

601	Evidence of substantial reproductive failure in native habitat	
	Source(s)	Notes
	Villanueva-G, R. (1994). Nectar sources of European and Africanized honey bees (<i>Apis mellifera</i> L.) in the Yucatán peninsula, Mexico. <i>Journal of Apicultural Research</i> , 33(1): 44-58	"Table 3. List of threatened plant species in Mindoro, Philippines" [Includes <i>Macaranga grandifolia</i> classified as Vulnerable (VU) & Endangered (EN)]

602	Produces viable seed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Macaranga grandifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Macaranga+grandifolia . [Accessed 4 May 2017]	"Propagation Seed "

603	Hybridizes naturally	
	Source(s)	Notes
	Guicking D, Fiala B, Blattner FR, Slik F, Mohamed M, Weising K. (2011). Comparative chloroplast DNA phylogeography of two tropic. al pioneer trees, <i>Macaranga gigantea</i> and <i>Macaranga pearsonii</i> (Euphorbiaceae). <i>Tree Genetics & Genomes</i> 7(3): 573–585	[Possibly a rare occurrence] "Only a single individual was identified that clearly represents a recent hybrid. This refers to a <i>M. gigantea</i> specimen bearing HT 13 that is otherwise specific to <i>M. pearsonii</i> . Although morphologically unambiguously <i>M. gigantea</i> , this plant also harbored nuclear microsatellite alleles specific for <i>M. gigantea</i> as well as for <i>M. pearsonii</i> (unpublished data)." ... "In his revision, Davies (2001) noted that hybridization between <i>M. gigantea</i> and <i>M. pruinosa</i> is not unlikely. However, as the two species look very similar in the seedling and sapling stages which were analyzed in these particular cases, we cannot exclude the possibility that the specimens were simply misidentified." ... "We conclude that persistent ancient polymorphisms provide the best explanation for most of the cases of shared chloroplast haplotypes in <i>Macaranga</i> section <i>Pruinosae</i> . Hybridization between species seems to be comparatively rare. As shared alleles proved to be restricted to a few ancient polymorphisms, species-specific population genetic and phylogeographic analyses of the chloroplast haplotypes therefore seem justified."

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. <i>The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales</i> . Springer, New York	"Dioecious trees and shrubs; indumentum of simple (fasciculate) and conspicuous, usually colourful glandular hairs; twigs sometimes hollow, often with reddish exudate."

605	Requires specialist pollinators	n
	Source(s)	Notes

Qsn #	Question	Answer
	Corlett, R. T. 2014. The Ecology of Tropical East Asia. Oxford University Press, Oxford	[Thrips & wind-pollinated. Other species in Hawaii produce seeds and are presumably effectively pollinated] "Thrips are also credited with pollinating many species in a very different, but also diverse and ecologically important genus, <i>Macaranga</i> (Fiala et al. 2011). These mostly pioneer trees are dioecious, so outcrossing is obligatory. In many species, the inflorescences of many tiny flowers are enclosed in bracteoles, forming a chamber which the thrips use for reproduction. The thrips-pollinated species flower episodically, with congeneric species tending to have staggered flowering. In contrast to the evidence for dipterocarps, genetic data suggests that pollen is dispersed efficiently over long distances in these <i>Macaranga</i> species, perhaps as a result of wind-assisted long-distance dispersal in their relatively open habitats, coupled with directed short-distance flights by the larger thrips species involved (Guicking et al. 2013). A minority of <i>Macaranga</i> species are apparently pollinated by heteropteran bugs."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Macaranga grandifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Macaranga+grandifolia . [Accessed 4 May 2017]	"Propagation Seed " [No evidence]

607	Minimum generative time (years)	
	Source(s)	Notes
	Top Tropicals. 2017. <i>Macaranga</i> extraordinary grandiose leaves. https://toptropicals.com/html/toptropicals/plant_wk/macaranga.htm . [Accessed 4 May 2017]	[Unknown] "As fast growing pioneer trees, <i>Macarangas</i> are popular in Tropics also for their ability to regenerate degraded forest land."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Fruits capsular, (1)2–3(6)-locular; smooth or spiny, loculicidal; columella not persistent. Seeds globose, ecarunculate; exotesta fleshy, endotesta indurate, often rugose." [Adapted for bird dispersal]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Useful Tropical Plants Database. 2017. <i>Macaranga grandifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Macaranga+grandifolia . [Accessed 4 May 2017]	"It is widely grown as an ornamental in many parts of the tropics, being especially valued for its red-veined, grandiose leaves"

703	Propagules likely to disperse as a produce contaminant	

Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. No evidence, but related taxon has become a seed contaminant of potted plants grown on Hawaii Island

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Fruits capsular, (1)2–3(26)-locular; smooth or spiny, loculicidal; columella not persistent. Seeds globose, ecarunculate; exotesta fleshy, endotesta indurate, often rugose."

705	Propagules water dispersed	
	Source(s)	Notes
	Mamangun, A. K., & Gonzalez, J. C. (2007). Density and Feeding Preference of the Polillo Tropic Hornbill <i>Penelopides manillae subnigra</i> in Fragmented Forests of Polillo Island. <i>Banwa</i> , 4(1), 69-82	[Possibly. Occurs near water bodies] "For the residual forest site, <i>Macaranga grandifolia</i> was the dominant tree species. This species is a member of the family Euphorbiaceae. It was dominant in the two sampling areas of the site, the secondary forest at the valley and the forest near a water body"

706	Propagules bird dispersed	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit a loculicidal capsule or a schizocarp, often muricate or tuberculate. Seed coat fleshy." [Generic description]
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Fruits capsular, (1)2–3(26)-locular; smooth or spiny, loculicidal; columella not persistent. Seeds globose, ecarunculate; exotesta fleshy, endotesta indurate, often rugose."
	Corlett, R. T. 2014. The Ecology of Tropical East Asia. Oxford University Press, Oxford	"The fruit bats (Pteropodidae) in TEA appear to be considerably less important as seed-dispersal agents than those in the Neotropics which belong to the unrelated bat family Phyllostomidae. The difference is particularly striking in the early stages of woody plant succession, where bat-dispersed genera dominate in the Neotropics (e.g. <i>Cecropia</i> , <i>Muntingia</i> , <i>Piper</i> , <i>So/anum</i> , <i>Vismia</i>), while bird-dispersed species (such as <i>Macaranga</i>) dominate in TEA."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Corlett, R. T. 2014. The Ecology of Tropical East Asia. Oxford University Press, Oxford	"...bird-dispersed species (such as <i>Macaranga</i>) dominate in TEA."
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Fruits capsular, (1)2–3(26)-locular; smooth or spiny, loculicidal; columella not persistent. Seeds globose, ecarunculate; exotesta fleshy, endotesta indurate, often rugose."

Qsn #	Question	Answer
708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Corlett, R. T. 2014. The Ecology of Tropical East Asia. Oxford University Press, Oxford	"...bird-dispersed species (such as <i>Macaranga</i>) dominate in TEA." [Presumably Yes]

801	Prolific seed production (>1000/m ²)	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Seed production and densities unknown

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: http://data.kew.org/sid/ . [Accessed 4 May 2017]	Unknown. Related taxa with orthodox seeds

803	Well controlled by herbicides	
	Source(s)	Notes
	CABI, 2017. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[Possibly. Related taxon controlled effectively with some herbicides] "Chemical Control In large wild stands, Starr et al. (2003) suggested cut stump or basal bark herbicide application as a possibly effective method for the control of <i>M. tanarius</i> . Foliar spray on taller individuals, however, may not be effective and is not advised in areas where non-target plants are present, although control methods suggested for dense stands in Maui, Hawaii, include aerial applications of herbicide via spray ball or herbicide ballistic technology (Maui Invasive Species Council, 2013)."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. <i>Macaranga mappa</i> & <i>M. tanarius</i> naturalized in the Hawaiian Islands & do not appear to be limited by natural enemies.

Summary of Risk Traits:

High Risk / Undesirable Traits

- Able to grow in tropical climates
- Possibly naturalized (confirmation needed)
- Other *Macaranga* species are invasive
- Shade tolerant
- Tolerates many soil types
- Seeds dispersed by birds & intentionally by people
- Limited ecological information limits accuracy of risk prediction

Low Risk Traits

- No reports of invasiveness
- Unarmed (no spines, thorns, or burrs)
- Ornamental
- Not reported to spread vegetatively
- Dioecious (requires male & female plants to reproduce)

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Shade tolerant. Unknown if capable of forming dense stands

(B) Bird-dispersed?> Yes. Dispersed by birds

(C) Life cycle <4 years? Unknown

Outcome = Evaluate