

Taxon: Curcuma alismatifolia Gagnep.

Family: Zingiberaceae

Common Name(s): Siam pearl
Siam tulip

Synonym(s): Hitcheniopsis alismatifolia (Gagnep.)

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 7 Jun 2016

WRA Score: 1.0

Designation: L

Rating: Low Risk

Keywords: Rhizomatous, Herb, Ornamental, Self-Incompatible, Vegetatively Propagated

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

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	y
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	y
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators		
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)		
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	n
705	Propagules water dispersed		
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
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	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
	Ravindran, P. N., Babu, K. N., & Sivaraman, K. (Eds.). (2007). <i>Turmeric: the genus Curcuma</i> . CRC Press, Boca Raton, FL	"There are countless cultivars, the coma varying anywhere between white and dark pink, with streaks or patches of coloration."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. 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, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 6 Jun 2016]	"Native: Asia-Tropical Indo-China: Cambodia; Laos; Thailand"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 6 Jun 2016]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Dave's Garden. 2016. Siam Tulip - <i>Curcuma alismatifolia</i> . http://davesgarden.com/guides/pf/go/706/ . [Accessed 6 Jun 2016]	"Hardiness: USDA Zone 8a: to -12.2 °C (10 °F) USDA Zone 8b: to -9.4 °C (15 °F) USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F) USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"
	Leong-Skornickova, J., Tran, H.D., Newman, M., Lamxay, V. & Bouamanivong, S. 2012. <i>Curcuma alismatifolia</i> . The IUCN Red List of Threatened Species 2012: e.T201883A2724182. http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T201883A2724182.en . [Accessed 6 Jun 2016]	[Elevation range exceeds 1000 m, demonstrating environmental versatility] "Grows in fairly open mixed dipterocarp deciduous forests. Also found in open pine forests, shallow swamp on sandy soil, occurring from sea level up to 1,300 m asl."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 6 Jun 2016]	"Native: Asia-Tropical Indo-China: Cambodia; Laos; Thailand"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"It was introduced to the Hawaiian nursery trade in the mid-1990s."
	Ravindran, P. N., Babu, K. N., & Sivaraman, K. (Eds.). (2007). Turmeric: the genus <i>Curcuma</i> . CRC Press, Boca Raton, FL	"This species is the most utilized ornamental species of <i>Curcuma</i> . It is the mainstay of the Thai ginger horticultural industry. mass-produced via tissue culture. but it is also cultivated elsewhere. Exported to countries all over the world, it is used for mass plantings in landscapes, as a home pot plant. and as an extremely long- lasting (2 to 3 weeks) Cut flower."

Qsn #	Question	Answer
301	Naturalized beyond native range	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2016. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm . [Accessed 6 Jun 2016]	No evidence
302	Garden/amenity/disturbance 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
303	Agricultural/forestry/horticultural 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
304	Environmental 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
305	Congeneric weed	
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Included in references of weeds, but thus far, evidence of impacts have not been documented] "Curcuma longa L. Zingiberaceae See: Curcuma domestica Valeton Cultivated, Crop Refs: 10 945-N, 943-nc, 876-N, 869-W, 850-N, 839-N, 760-W, 518-N, 261-CW, 101-N"

Qsn #	Question	Answer
401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Herb 18-24" tall; rhiz white to yellowish, root tubers present. Lvs ca 4; blades narrowly elliptic, 10 14" x 2-3", glabrous."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Herb 18-24" tall; rhiz white to yellowish, root tubers present. Lvs ca 4; blades narrowly elliptic, 10 14" x 2-3", glabrous." [Zingiberaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Useful Tropical Plants Database. (2016). <i>Curcuma alismatifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Curcuma+alismatifolia . [Accessed 6 Jun 2016]	[Palatability of foliage and/or flowers to animals unknown] "The plant is harvested from the wild for its edible flowers, which are eaten locally."

405	Toxic to animals	n
	Source(s)	Notes
	Useful Tropical Plants Database. (2016). <i>Curcuma alismatifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Curcuma+alismatifolia . [Accessed 6 Jun 2016]	"Known Hazards None known"
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Missouri Botanical Garden. 2016. <i>Curcuma alismatifolia</i> 'Pink'. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=267342&isprofile=0& . [Accessed 6 Jun 2016]	"No serious insect or disease problems."
	Randy's Tropical Plants. 2016. Siam Tulip. http://www.randys-tropicalplants.com/Curcuma-alismatifolia.html . [Accessed 6 Jun 2016]	"Pests: I have not found any pests to be a problem for this plant in Florida."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Useful Tropical Plants Database. (2016). <i>Curcuma alismatifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Curcuma+alismatifolia . [Accessed 6 Jun 2016]	"Known Hazards None known"
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	No evidence. A succulent herb of tropical areas

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Randy's Tropical Plants. 2016. Siam Tulip. http://www.randys-tropicalplants.com/Curcuma-alismatifolia.html . [Accessed 6 Jun 2016]	" <i>Curcuma alismatifolia</i> grows in open grasslands in Thailand, and so they need nearly full sun to thrive. I have grown them in the shade, and they still bloom and grow quite well, but the inflorescences tend to be too weak to support themselves, and they flop over under their own weight."
	Useful Tropical Plants Database. (2016). <i>Curcuma alismatifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Curcuma+alismatifolia . [Accessed 6 Jun 2016]	"Succeeds in full sun to partial shade"

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Llamas, K.A. 2003. Tropical Flowering Plants. Timber Press, Portland, OR	"Fertile, organically rich, well-drained soil; alkaline pH."
	Useful Tropical Plants Database. (2016). <i>Curcuma alismatifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Curcuma+alismatifolia . [Accessed 6 Jun 2016]	"Prefers a humus-rich, moisture-retentive but well-drained soil[352]. Found in the wild on limestone soils[710]."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Herb 18-24" tall; rhiz white to yellowish, root tubers present. Lvs ca 4; blades narrowly elliptic, 10 14" x 2-3", glabrous."

412	Forms dense thickets	
	Source(s)	Notes
	Leong-Skornickova, J., Tran, H.D., Newman, M., Lamxay, V. & Bouamanivong, S. 2012. <i>Curcuma alismatifolia</i> . The IUCN Red List of Threatened Species 2012: e.T201883A2724182. http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T201883A2724182.en . [Accessed 6 Jun 2016]	[Unknown] "Grows in fairly open mixed dipterocarp deciduous forests. Also found in open pine forests, shallow swamp on sandy soil, occurring from sea level up to 1,300 m asl."

501	Aquatic	n
	Source(s)	Notes
	Paisooksantivatana, Y., Kako, S., & Seko, H. (2001). Genetic diversity of <i>Curcuma alismatifolia</i> Gagnep. (Zingiberaceae) in Thailand as revealed by allozyme polymorphism. <i>Genetic Resources and Crop Evolution</i> , 48(5), 459-465	[Terrestrial herb] "The species is common on the plateau of northeastern Thailand which is the western part of so-called the Indo-Chinese phytogeographical region. The distribution range extends to the lowland of southeastern coast of Thailand west of Kampuchea (Y. Paisooksantivatana et al., unpublished data)."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 27 May 2016]	Family: Zingiberaceae Subfamily: Zingiberoideae Tribe: Zingibereae

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 27 May 2016]	Family: Zingiberaceae Subfamily: Zingiberoideae Tribe: Zingibereae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"Genera with a small rhizome often develop globose or fusiform starch-filled tuberous roots, as in Globba, Siphonochilus, Kaempferia, Roscoea, or the roots are ending in tubers (Curcuma, Gagnepainia)."
	Sheela, V.L (2008). Flowers for Trade: Vol.10. Horticulture Science Series. New India Publishing, New Delhi, India	"Popular species are Curcuma alismatifolia, Curcuma parviflora, and Curcuma gracillima. They are propagated by tubers." ... "They can be stored at room temperature for a relatively long period of time, up to 3 months for shipping by air or by sea."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Leong-Skornickova, J., Tran, H.D., Newman, M., Lamxay, V. & Bouamanivong, S. 2012. <i>Curcuma alismatifolia</i> . The IUCN Red List of Threatened Species 2012: e.T201883A2724182. http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T201883A2724182.en . [Accessed 6 Jun 2016]	[Over-collecting is leading to population decline] "It is one of the commercially most exploited ginger species for cut flower industry in Thailand. Wild populations are exploited to gather new phenotypes for tissue culture propagation and introduction of new cultivars in the market. Rhizomes are sold by the thousands in flower markets all over Thailand as well as being sent abroad. Over-collecting in the wild poses a threat to the wild populations of this species."

602	Produces viable seed	y
	Source(s)	Notes
	Useful Tropical Plants Database. (2016). <i>Curcuma alismatifolia</i> . http://tropical.theferns.info/viewtropical.php?id=Curcuma+alismatifolia . [Accessed 6 Jun 2016]	"Propagation Seed - best sown as soon as it is ripe[200]. Germinates best at temperatures around 20°C[200]. Division of the rhizome when the plant is dormant."

603	Hybridizes naturally	y
	Source(s)	Notes
	Leong-Skornickova, J., Tran, H.D., Newman, M., Lamxay, V. & Bouamanivong, S. 2012. <i>Curcuma alismatifolia</i> . The IUCN Red List of Threatened Species 2012: e.T201883A2724182. http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T201883A2724182.en . [Accessed 6 Jun 2016]	"This is easily recognizable taxon without much confusion. But it may hybridize in the wild with several other species from the subgenus <i>Hitcheniopsis</i> when growing sympatrically."

Qsn #	Question	Answer
604	Self-compatible or apomictic	n
	Source(s)	Notes
	Fukai, S. & Udomdee, W. (2005). Inflorescence and flower initiation and development in <i>Curcuma alismatifolia</i> Gagnep (Zingiberaceae). Japanese Journal of Tropical Agriculture 49(1): 14-20	"C. alismatifolia is self incompatible (Fukai unpublished)."

605	Requires specialist pollinators	
	Source(s)	Notes
	Pharmacognogy. (2015). Pollination and dispersal. http://www.epharmacognosy.com/2015/03/pollination-and-dispersal.html . [Accessed 7 Jun 2016]	[Specific pollinators unknown] "In several genera e.g. <i>Curcuma</i> , <i>Roscoea</i> , and <i>Cautleya</i> , the anther is provided with basal spurs. This, combined with a versatile anther, suggests bee pollination. When a bee visits the flower, it will hit the basal spurs which force the anther to tip forward and place pollen on the back of the bee. When visiting the next flower the anther, with the stigma placed on top, will touch on the same place of the insect and pollination will occur."
	Plant Delights Nursery. (2016). <i>Curcuma</i> - Hidden Cone Gingers for the Temperate Garden. http://www.plantdelights.com/Article/Curcuma-Hidden-Cone-Ginger . [Accessed 7 Jun 2016]	[Specific pollinators unknown] "In the wild, specific <i>Curcuma</i> pollinators are also present that are not present in the temperate garden. Thus <i>Curcuma</i> will not set seed in the garden unless you hand pollinate them during the summer. If you manage to actually get seed, they are relatively easy to germinate"

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Sheela, V.L (2008). <i>Flowers for Trade: Vol.10. Horticulture Science Series</i> . New India Publishing, New Delhi, India	"Popular species are <i>Curcuma alismatifolia</i> , <i>Curcuma parviflora</i> , and <i>Curcuma gracillima</i> . They are propagated by tubers." ... "They can be stored at room temperature for a relatively long period of time, up to 3 months for shipping by air or by sea."
	Kubitzki, K. (ed.). 1998. <i>The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae)</i> . Springer-Verlag, Berlin, Heidelberg, New York	"The rhizome is sympodial, varying in size and degree of branching; in the genus <i>Curcuma</i> , among others, the rhizome is repeatedly branched."

607	Minimum generative time (years)	
	Source(s)	Notes
	Looking at Plants. (2016). <i>Curcuma alismatifolia</i> . http://looking-at-plants.com/plants_a_-_z/curcuma_alismatifolia . [Accessed 7 Jun 2016]	[Moderate growth rate. May be able to reproduce by rhizomes prior to flowering] "The Siam Tulip is a semi-evergreen herbaceous perennial that averages 1 1/2 to 2 feet in height and 1 to 1 1/2 feet width. It grows in an upright clump with the stems arising from rhizomes. It has a moderate growth rate." ... "PROPAGATION Division of rhizomes"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Looking at Plants. (2016). <i>Curcuma alismatifolia</i> . http://looking-at-plants.com/plants_a_-_z/curcuma_alismatifolia . [Accessed 7 Jun 2016]	"PROPAGATION - Division of rhizomes"
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[Seeds, if produced, lack means of external attachment. Generic description] "Capsule ellipsoid, liberating the seeds into the mucilage of the bract pouches; seeds with lacerate aril."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Llamas, K.A. 2003. Tropical Flowering Plants. Timber Press, Portland, OR	"Rare in cultivation until recently. Suitable as a container plant. Very attractive cut flowers."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Looking at Plants. (2016). <i>Curcuma alismatifolia</i> . http://looking-at-plants.com/plants_a_-_z/curcuma_alismatifolia . [Accessed 7 Jun 2016]	"PROPAGATION - Division of rhizomes" [No evidence. Propagation is mainly by rhizomes]
	Plant Delights Nursery. (2016). <i>Curcuma</i> - Hidden Cone Gingers for the Temperate Garden. http://www.plantdelights.com/Article/Curcuma-Hidden-Cone-Ginger . [Accessed 7 Jun 2016]	[Seed set may be limited in cultivation] "In the wild, specific <i>Curcuma</i> pollinators are also present that are not present in the temperate garden. Thus <i>Curcuma</i> will not set seed in the garden unless you hand pollinate them during the summer. If you manage to actually get seed, they are relatively easy to germinate"

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[Propagated by rhizomes, or seeds, if produced, which are arillate] "The rhizome is sympodial, varying in size and degree of branching; in the genus <i>Curcuma</i> , among others, the rhizome is repeatedly branched." ... "Capsule ellipsoid, liberating the seeds into the mucilage of the bract pouches; seeds with lacerate aril."

705	Propagules water dispersed	
	Source(s)	Notes
	Looking at Plants. (2016). <i>Curcuma alismatifolia</i> . http://looking-at-plants.com/plants_a_-_z/curcuma_alismatifolia . [Accessed 7 Jun 2016]	"PROPAGATION - Division of rhizomes" [Unknown. Possible that rhizome fragments could be moved by water if grown in proximity to water]

706	Propagules bird dispersed	
	Source(s)	Notes

Qsn #	Question	Answer
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[Seeds, if produced, are arillate & may be bird or ant-dispersed. However, the plant is typically propagated by rhizome division & may not produce seeds in cultivation] "The rhizome is sympodial, varying in size and degree of branching; in the genus <i>Curcuma</i> , among others, the rhizome is repeatedly branched." ... "Capsule ellipsoid, liberating the seeds into the mucilage of the bract pouches; seeds with lacerate aril."

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[Seeds, if produced, are arillate & may be bird or ant-dispersed. However, the plant is typically propagated by rhizome division & may not produce seeds in cultivation] "The rhizome is sympodial, varying in size and degree of branching; in the genus <i>Curcuma</i> , among others, the rhizome is repeatedly branched." ... "Capsule ellipsoid, liberating the seeds into the mucilage of the bract pouches; seeds with lacerate aril."

708	Propagules survive passage through the gut	
	Source(s)	Notes
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[Seeds, if produced, are arillate & may be bird or ant-dispersed. However, the plant is typically propagated by rhizome division & may not produce seeds in cultivation] "The rhizome is sympodial, varying in size and degree of branching; in the genus <i>Curcuma</i> , among others, the rhizome is repeatedly branched." ... "Capsule ellipsoid, liberating the seeds into the mucilage of the bract pouches; seeds with lacerate aril."

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Looking at Plants. (2016). <i>Curcuma alismatifolia</i> . http://looking-at-plants.com/plants_a_-_z/curcuma_alismatifolia . [Accessed 7 Jun 2016]	"PROPAGATION - Division of rhizomes" [Limited seed production in cultivation]
	Plant Delights Nursery. (2016). <i>Curcuma</i> - Hidden Cone Gingers for the Temperate Garden. http://www.plantdelights.com/Article/Curcuma-Hidden-Cone-Ginger . [Accessed 7 Jun 2016]	[Limited seed production in cultivation] "In the wild, specific <i>Curcuma</i> pollinators are also present that are not present in the temperate garden. Thus <i>Curcuma</i> will not set seed in the garden unless you hand pollinate them during the summer. If you manage to actually get seed, they are relatively easy to germinate"

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. Seeds may rarely be produced in cultivation

803	Well controlled by herbicides	

Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Looking at Plants. (2016). <i>Curcuma alismatifolia</i> . http://looking-at-plants.com/plants_a_-_z/curcuma_alismatifolia . [Accessed 7 Jun 2016]	[Presumably Yes. Able to regenerate from rhizomes] "PROPAGATION - Division of rhizomes. PRUNING - Pruning is basically limited to removal of dead leaves. When plant is finished for the season, trim or lift off dead stems and dig rhizomes if in colder climates."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Grows in tropical climates
- A geophyte capable of reproducing by rhizomes, & tubers.
- May also be propagated by seeds, if available
- Seeds have arils, and if produced, might be dispersed by birds or ants (vector unknown)
- May be able to regenerate from rhizomes

Low Risk Traits

- No reports of invasiveness or naturalization
- Unarmed (no spines, thorns or burrs)
- No reports of toxicity
- Ornamental
- Self-incompatible
- Limited or absent seed production in cultivation. Limits potential for accidental dispersal

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? No

Outcome = Accept (Low Risk)