

Taxon: <i>Costus lasius</i> Loes.	Family: Costaceae
Common Name(s): costus yellow lollipop	Synonym(s):

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 17 Nov 2016
WRA Score: 1.0	Designation: L	Rating: Low Risk

Keywords: Perennial Herb, Ornamental, Shade-Tolerant, Rhizomatous, Bird-Pollinated

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		
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	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	y
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)		
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		
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
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	[No evidence of domestication] "It is distributed throughout Panama, the western part of South America, and the Brazilian states of Para and Amazonas."
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
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Panama, Colombia, Peru, and Brazil, in moist rain forests, foothill or mountain forests, terra firme, from sea-level to 1900 m."
202	Quality of climate match data	High
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Panama, Colombia, Peru, and Brazil, in moist rain forests, foothill or mountain forests, terra firme, from sea-level to 1900 m." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Skinner, D. 2014. <i>Costus lasius</i> . The IUCN Red List of Threatened Species 2014: e.T56346393A56353028. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56346393A56353028.en . [Accessed 17 Nov 2016]	"This species has an incredibly wide range from Costa Rica to Bolivia and Amazonian Brazil. This assessor has observed the plant in the wild in several locations in Costa Rica, Panama, northeastern Amazonian Peru, and southeastern Peru in the Manu National Park. The forms are quite homogenous and the species is easily recognized so there is little doubt about the identifications in the collection records. The altitude range is normally between 100 metres and 1,200 metres, but a few collections in Colombia showed altitudes up to 1,700 metres."

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Panama, Colombia, Peru, and Brazil, in moist rain forests, foothill or mountain forests, terra firme, from sea-level to 1900 m."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/ . [Accessed 17 Nov 2016]	"Locations: Harold L. Lyon Arboretum Waimea Arboretum & Botanical Garden"
	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	"Released by Lyon Arboretum in the 1980s..."
	Skinner, D. 2014. <i>Costus lasius</i> . The IUCN Red List of Threatened Species 2014: e.T56346393A56353028. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56346393A56353028.en . [Accessed 17 Nov 2016]	"This species is common in cultivation and is used as an ornamental plant."

Qsn #	Question	Answer
301	Naturalized beyond native range	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. 2016. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 17 Nov 2016]	<i>Costus woodsonii</i> is currently the only species in the genus reported as naturalized in the Hawaiian Islands [East Maui]
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence. <i>Costus cylindricus</i> , <i>Costus dubius</i> , <i>Costus guanaiensis</i> , <i>Costus pulverulentus</i> , <i>Costus sarmentosus</i> , <i>Costus scaber</i> , <i>Costus sericeus</i> , <i>Costus speciosus</i> , <i>Costus spicatus</i> , & <i>Costus woodsonii</i> included in the GCW as naturalized and/or weeds.

Qsn #	Question	Answer
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

Qsn #	Question	Answer
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

Qsn #	Question	Answer
304	Environmental 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

305	Congeneric weed	
	Source(s)	Notes
	Andrew, G. A. & John, L. 2010. National Invasive Species Strategy for Saint Lucia. http://www.ciasnet.org/ . [Accessed]	"Costus spicatus ... Present; potential threat in lower montane rainforest"
	CABI. 2014. Cheilocostus speciosus in: Invasive Species Compendium. www.cabi.org/isc	[Costus speciosus is a synonym of Cheilocostus speciosus] "Other Scientific Names: Costus speciosus (J.König) Sm." ... "C. speciosus is a perennial herb native to Malaysia. It is widely naturalized in the Pacific region, although it can be very invasive there. It is often found in disturbed areas, on roadsides and in the forest understory. In Pohnpei it is common in watersheds where the land has been disturbed by sakau growing (Englberger, 2009). Its seeds can be spread by birds and rodents, in soil and on machinery. C. speciosus can also spread via its stems and rhizomes (Englberger, 2009)."
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Costus cylindricus, Costus dubius, Costus guanaiensis, Costus pulverulentus, Costus sarmentosus, Costus scaber, Costus sericeus, Costus speciosus, Costus spicatus, & Costus woodsonii included in the GCW as naturalized and/or weeds. Impacts are unspecified

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	[No evidence] "Slender plants to 2 m tall. Sheaths, ligules and petioles densely to sparsely ferruginous-hirsute. Sheaths 3-8 mm in diam. Ligule truncate, 3-9 mm long. Petiole 3-8 mm long. Leaves narrowly elliptic, cuneate to slightly rounded at the base, shortly acuminate at the apex, 6-23 cm long, 2-6 (-8.5) cm wide, upper side glabrous to rather densely ferruginous-hirsute, lower side densely ferruginous-hirsute, rarely glabrous"

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

Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Slender plants to 2 m tall. Sheaths, ligules and petioles densely to sparsely ferruginous-hirsute. Sheaths 3-8 mm in diam. Ligule truncate, 3-9 mm long. Petiole 3-8 mm long. Leaves narrowly elliptic, cuneate to slightly rounded at the base, shortly acuminate at the apex, 6-23 cm long, 2-6 (-8.5) cm wide, upper side glabrous to rather densely ferruginous-hirsute, lower side densely ferruginous-hirsute, rarely glabrous" [No evidence. Costaceae]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

405	Toxic to animals	n
	Source(s)	Notes
	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
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Blanchett, S. 2013. Growing your <i>Costus lasius</i> plant. http://www.members.westnet.com.au/wackos/PDFs/Growing 20your%20Costus%20lasius%20plant.pdf . [Accessed 17 Nov 2016]	"The only major pests of this plant are chewing insects such as Grasshoppers and Caterpillars, these can simply be crushed or sprayed with the insecticide Carbaryl."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	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
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

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

Qsn #	Question	Answer
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	[No evidence. Unlikely given habit and habitat] "Slender plants to 2 m tall" ... "in moist rain forests, foothill or mountain forests, terra firme"

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	GingersRus. (2016). <i>Costus lasius</i> . http://www.gingersrus.com/DataSheet.php?PID=3602 . [Accessed 17 Nov 2016]	"I grow this <i>Costus</i> in about 3 hours of direct sunlight where the foliage stays fresh and vigorous and it flowers well. In nature I have seen it growing and flowering in shade."
	Black Olive East Nursery. (2016). <i>Costus lasius</i> . http://www.blackoliveeastnursery.net/index.php?main_page=product_info&products_id=559 . [Accessed 17 Nov 2016]	"Light: Light Shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	GingersRus. (2016). <i>Costus lasius</i> . http://www.gingersrus.com/DataSheet.php?PID=3602 . [Accessed 17 Nov 2016]	" <i>Costus</i> need similar soil to other gingers - rich, organic and kept moist during active growth. "
	Towen Mount Tropicals. (2016). <i>Costus lasius</i> . http://townmounttropicals.com.au/product/costus-lasius/?v=7516fd43adaa . [Accessed 17 Nov 2016]	"Prefers well-drained rich soil"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Slender plants to 2 m tall. Sheaths, ligules and petioles densely to sparsely ferruginous-hirsute. Sheaths 3-8 mm in diam. Ligule truncate, 3-9 mm long. Petiole 3-8 mm long. Leaves narrowly elliptic, cuneate to slightly rounded at the base, shortly acuminate at the apex, 6-23 cm long, 2-6 (-8.5) cm wide, upper side glabrous to rather densely ferruginous-hirsute, lower side densely ferruginous-hirsute, rarely glabrous"

412	Forms dense thickets	
	Source(s)	Notes
	Costa, F. R., Espinelli, F. P., & Figueiredo, F. O. (2011). Guia de Zingiberales dos sítios PPBio na Amazônia Ocidental brasileira. Áttema Design Editorial, Manaus, Brazil	"Habitat: Forests on granitic soils of intermediate fertility. Prefers clearings, slopes, and areas near streams."
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Panama, Colombia, Peru, and Brazil, in moist rain forests, foothill or mountain forests, terra firme, from sea-level to 1900 m."

501	Aquatic	n
	Source(s)	Notes

Qsn #	Question	Answer
	Skinner, D. 2014. <i>Costus lasius</i> . The IUCN Red List of Threatened Species 2014: e.T56346393A56353028. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56346393A56353028.en . [Accessed 17 Nov 2016]	"Habitat and Ecology: Based on this assessor's observations, this plant thrives in a number of habitats and conditions, including forest understory and open areas. It is found in both seasonally dry areas and areas with more constant rainfall. Systems: Terrestrial"

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 17 Nov 2016]	Costaceae

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 17 Nov 2016]	Costaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). <i>Flora Neotropica</i> 8: 1-139	[No evidence] "Slender plants to 2 m tall. Sheaths, ligules and petioles densely to sparsely ferruginous-hirsute. Sheaths 3-8 mm in diam. Ligule truncate, 3-9 mm long. Petiole 3-8 mm long. Leaves narrowly elliptic, cuneate to slightly rounded at the base, shortly acuminate at the apex, 6-23 cm long, 2-6 (-8.5) cm wide, upper side glabrous to rather densely ferruginous-hirsute, lower side densely ferruginous-hirsute, rarely glabrous"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Skinner, D. 2014. <i>Costus lasius</i> . The IUCN Red List of Threatened Species 2014: e.T56346393A56353028. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56346393A56353028.en . [Accessed 17 Nov 2016]	"This species is widespread and common with no specific threats to the global population."

602	Produces viable seed	y
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). <i>Flora Neotropica</i> 8: 1-139	"Capsule subglobose, 5-7 mm in diam, glabrous, seeds black."

603	Hybridizes naturally	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"In the province of Chiriquí, Panama, <i>C. lasius</i> probably hybridizes with <i>C. scaber</i> "

604	Self-compatible or apomictic	
	Source(s)	Notes
	Araújo, F. P., & Oliveira, P. E. (2007). Biologia floral de <i>Costus spiralis</i> (Jacq.) Roscoe (Costaceae) e mecanismos para evitar a autopolinização. Revista Brasileira de Botânica, 30(1), 61-70	[Related taxon self-compatible, but floral morphology prevents self-pollination] " <i>C. spiralis</i> is a self-compatible, non apomictic species, which does not present spontaneous self-pollination. It presents movement herkogamy to avoid self-pollination."
	Schemske, D. W. 1980. The evolutionary significance of extrafloral nectar production by <i>Costus woodsonii</i> (Zingiberaceae): an experimental analysis of ant protection. The Journal of Ecology, 6 (3): 959-967	[Unknown. Selfing documented in genus] "This research utilized experimental field and greenhouse approaches to assess the fitness consequences of selfing and out-crossing in three neotropical herbs of the genus <i>Costus</i> (Zingiberaceae). All species are self-compatible, and require a treefall gap for germination and establishment. Self-pollination resulted in lower seed output in all species, and this difference was significant for <i>Costus allenii</i> and <i>C. laevis</i> ."

605	Requires specialist pollinators	y
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Corolla yellow to pale orange, ca 45 mm long, glabrous, tube 20 mm long, lobes obovate, 25 mm long, 15 mm wide. Labellum ca 25 mm long. Stamen ca 25 mm long, anther 5-7 mm long."
	Costa, F. R., Espinelli, F. P., & Figueiredo, F. O. (2011). Guia de Zingiberales dos sítios PPBio na Amazônia Ocidental brasileira. Áttema Design Editorial, Manaus, Brazil	"Flowers at the end of the dry season and the start of the rainy season. Pollinated by hummingbirds."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Pacific Bulb Society. (2016). <i>Costus</i> . http://pacificbulbsociety.org/pbswiki/index.php/Costus . [Accessed 17 Nov 2016]	[Presumably yes. Spreads from rhizomes] " <i>Costus lasius</i> This species is widespread in Central and South America. It has an a more or less compact form with small pseudostems and leaves which spread out towards the top. The plant can be successfully grown in a 3-5 gallon pot or it can be planted in the ground. In both cases, the plants will grow to only about 4 feet tall. If grown in pots, they will need to be divided as dividing rhizome can break a pot. Both the bracts and flowers are yellow and creates a nice show in a large clump. "

607	Minimum generative time (years)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. Other <i>Costus</i> species reported to flower in the second year

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Capsule subglobose, 5-7 mm in diam, glabrous, seeds black." [Unlikely. Fruits & seeds, if produced, lack means of external attachment]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Skinner, D. 2014. <i>Costus lasius</i> . The IUCN Red List of Threatened Species 2014: e.T56346393A56353028. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T56346393A56353028.en . [Accessed 17 Nov 2016]	"This species is common in cultivation and is used as an ornamental plant."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Capsule subglobose, 5-7 mm in diam, glabrous, seeds black." [No evidence & unlikely. Seeds may be rare in cultivation due to pollinator limitations]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Capsule subglobose, 5-7 mm in diam, glabrous, seeds black."

705	Propagules water dispersed	
	Source(s)	Notes
	Costa, F. R., Espinelli, F. P., & Figueiredo, F. O. (2011). Guia de Zingiberales dos sítios PPBio na Amazônia Ocidental brasileira. Áttema Design Editorial, Manaus, Brazil	"Habitat: Forests on granitic soils of intermediate fertility. Prefers clearings, slopes, and areas near streams." [Unknown. Possible that rhizome fragments or seeds could be moved by water if growing in riparian areas]

706	Propagules bird dispersed	
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Capsule subglobose, 5-7 mm in diam, glabrous, seeds black."
	Lefevre, K.L. 2008. The influence of human disturbance on avian frugivory and seed dispersal in a neotropical rainforest. PhD Dissertation. University of Toronto, Toronto	[Unknown. Related taxon is bird dispersed] "Appendix 2A. Fruiting plants of the lower montane rainforest of Tobago, West Indies (2003 and 2004 dry seasons)" ... "Costus scaber - Dispersal mode = bird"
	Rother, D. C., Rodrigues, R. R., & Pizo, M. A. (2009). Effects of bamboo stands on seed rain and seed limitation in a rainforest. <i>Forest Ecology and Management</i> , 257(3), 885-892	[Unknown. Related taxon is bird dispersed] "Appendix A. Family, species, seed abundance, dispersal syndrome and plant habit for seeds collected at bamboo (B) and non-bamboo (NB) stands." [Costus spiralis - Dispersal syndrome - Z = zoochorous]

707	Propagules dispersed by other animals (externally)	
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Qsn #	Question	Answer
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	[Possibly, if seeds are produced in cultivation] "Nothing is known about the seed-dispersal of the Costoideae; they might be myrmecochores."

708	Propagules survive passage through the gut	
	Source(s)	Notes
	Lefevre, K.L. 2008. The influence of human disturbance on avian frugivory and seed dispersal in a neotropical rainforest. PhD Dissertation. University of Toronto, Toronto	[Unknown. Related taxon is bird-dispersed. Presumably yes if seeds are produced] "Appendix 2A. Fruiting plants of the lower montane rainforest of Tobago, West Indies (2003 and 2004 dry seasons)" ... "Costus scaber - Dispersal mode = bird"

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Maas, P.J.M. 1972. Costoideae (Zingiberaceae). Flora Neotropica 8: 1-139	"Capsule subglobose, 5-7 mm in diam, glabrous, seeds black." [Densities unknown]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2016) Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 17 Nov 2016]	"Storage Behaviour: No data available for species. Of 1 known taxa of genus <i>Costus</i> , 100.00% Orthodox"

803	Well controlled by herbicides	
	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	
	Source(s)	Notes
	Black Olive East Nursery. (2016). <i>Costus lasius</i> . http://www.blackoliveeastnursery.net/index.php?main_page=product_info&products_id=559 . [Accessed]	"Hand prune as needed"
	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	[Possibly Yes. Other <i>Costus</i> species can tolerate damage to and spread from rhizomes & rhizome fragments] " <i>Costus woodsonii</i> " ... "Its rhizomes are robust and invasive, and once established they are difficult to remove[easily propagated by shoots that develop on the inflorescences."

Qsn #	Question	Answer
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
- Thrives in tropical climates
- Other *Costus* species have naturalized and may be invasive
- Shade tolerant
- Reproduces by seeds & vegetatively by rhizomes
- Hybridizes with other *Costus* species
- Lack of ecological information minimizes accuracy of risk prediction

Low Risk Traits

- No evidence of naturalization or invasiveness outside native range
- Unarmed (no spines, thorns or burrs)
- Ornamental value
- Hummingbird-pollinated in native range (may limit seed set where hummingbirds are absent)
- Limited or lacking seed production may minimize longer distance 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)