Taxon: Gloriosa superba L.

Family: Colchicaceae

Common Name(s): climbing lily
creeping lily
flame lily
glory lily

Synonym(s): Clinostylis speciosa Hochst.
Gloriosa abyssinica A. Rich.
Gloriosa homblei De Wild.
Gloriosa hybr.
Gloriosa rothschildiana O'Brien
Gloriosa simplex auct.
Gloriosa speciosa (Hochst.) Engl.
Gloriosa virescens Lindl.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 9 Mar 2017

WRA Score: 17.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Climbing Herb, Tuberous, Environmental Weed, Poisonous, Self-Fertile

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	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
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	y=1, n=0	y
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n

Qsn #	Question	Answer Option	Answer
405	Toxic to animals	y=1, n=0	y
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	y
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		
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	y=1, n=0	y
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		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
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	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water 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
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	y
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**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	[No evidence of domestication] "Several cultivars of Gloriosa superba are cultivated in the tropics and under greenhouse conditions in temperate regions, the commonest being 'Rothschildiana'. It is grown both as a cut flower and as a pot plant. " ... "The taxonomy of Gloriosa is confused, and up to 27 species have been recognized. Gloriosa superba is considered here a single highly variable species. In Zimbabwe morphologically uniform populations occur which have variable polyploidy levels, but the cytological differentiation does not reflect any precise geographical trend. The widely cultivated cultivar 'Rothschildiana' is hexaploid."

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 9 Mar 2017]	"Native: Africa East Tropical Africa: Kenya; Tanzania; Uganda Northeast Tropical Africa: Ethiopia; Somalia; Sudan South Tropical Africa: Mozambique Southern Africa: Botswana; Namibia; South Africa - Cape Province, - KwaZulu-Natal, - Transvaal; Swaziland West Tropical Africa: Senegal Western Indian Ocean: Madagascar Asia-Temperate China: China - Yunnan Asia-Tropical Indian Subcontinent: India; Nepal; Sri Lanka Indo-China: Cambodia; Laos; Myanmar; Thailand; Vietnam Malesia: Indonesia - Celebes, - Java, - Lesser Sunda Islands"

Qsn #	Question	Answer
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 9 Mar 2017]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Gloriosa superba prefers a climate with a pronounced rainy season, avoiding per-humid tropical areas." ... "It occurs from sea-level up to 2500 m altitude." [Elevation range exceeds 1000 m, demonstrating environmental versatility]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Wu, Z. Y. & Raven, P. H. (eds.). 2000. Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forests, thickets; 900–1300 m. S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; S and tropical Africa]."
	Contu, S. 2013. Gloriosa superba. The IUCN Red List of Threatened Species 2013: e.T44393073A44403733. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44393073A44403733.en. [Accessed 9 Mar 2017]	"Gloriosa superba is distributed in tropical and southern Africa and temperate and tropical Asia (China; Indian Subcontinent to Lesser Sunda Islands). It is naturalized and cultivated elsewhere (Europe, Australia) and listed as weedy in Australia and United States of America."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Gloriosa superba occurs naturally in Africa, in India, and southeastern Asia, and is nowadays distributed widely throughout the tropics, and worldwide as a pot plant."
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"It is widely cultivated for its flowers and is often planted to scramble through other plants, or is grown as a potted plant in the greenhouse in temperate climates."

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Contu, S. 2013. Gloriosa superba. The IUCN Red List of Threatened Species 2013: e.T44393073A44403733. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44393073A44403733.en. [Accessed 9 Mar 2017]	"Gloriosa superba is assessed as Least Concern. It is widespread and common in its natural range, and it is cultivated and naturalized elsewhere."
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 9 Mar 2017]	"Naturalized: . natzd. elsewhere"

Qsn #	Question	Answer
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed]	"This species is widely naturalised along the coast of eastern Australia, from northern Queensland through to central New South Wales. It is most common in northern New South Wales and south eastern Queensland. Also naturalised on Lord Howe Island and Norfolk Island, and sparingly naturalised in the Northern Territory."
	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 9 Mar 2017]	No evidence 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

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Naturalized, and in some cases, an environmental weed

304	Environmental weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Batianoff, G. N., & Franks, A. J. (1998). Environmental weed invasions on south-east Queensland foredunes. Proceedings of the Royal Society of Queensland 107: 15-34	"A study was performed in 1996 and 1997 along the subtropical southeast (SE) coast of Queensland, Australia, from Coolangatta (Gold Coast) to Noosa National Park (Sunshine Coast). Naturalized vascular alien plants comprised 157 species (59% of total SE Queensland foredune flora) belonging to 54 families and 122 genera. The most successful 'weedy' families were Poaceae, Asteraceae and Fabaceae. Herbaceous life-forms and succulents were found dominating the understorey strata. Most invasive species were either ornamental garden plants or economic agricultural plants. The most invasive seashore weeds were Asparagus aethiopicus cv. Sprengeri, Bryophyllum spp., Chrysanthemoides monilifera [C. moniliferum] subsp. rotundata, Gloriosa superba, Lantana camara, Panicum maximum, Schefflera actinophylla, Schinus terebinthifolia [S. terebinthifolius], Senna pendula var. glabrata and Wedelia trilobata. A temporal study along the Sunshine Coast, between 1982 and 1997, recorded 5 new weedy species per year naturalizing in the study area. Many of these new weed introductions may have occurred as 'sleeper' populations that existed in the area for a time before becoming pests. Species composition, species richness and vegetation structure are viewed in terms of succession. The dumping of garden waste adjacent to and in native vegetation within a distance of 500 m of housing was a major source of weed introductions. To prevent further weed invasion into native beachfront vegetation, urgent action is required, such as early detection and follow-up eradication. Education of coastal dwellers is required to discourage dumping of garden refuse into nearby native vegetation. Local authorities are responsible for the conditions of the seashore vegetation and as a result are encouraged to maintain a conservation ethic of protecting the natural environment." [Gloriosa superba considered one of the 12 most troublesome weeds in the dune community of south-east Queensland]
	Moreton Bay Regional Council. 2016. Fact Sheet. Gloriosa lily (Non Restricted Invasive Weed). https://www.moretonbay.qld.gov.au/. [Accessed 9 Mar 2017]	"Gloriosa lily is an aggressive and persistent invader of coastal sand dunes and associated bushland areas. It smothers and excludes native plants, eventually dominating the area. It is also highly poisonous. Gloriosa lily is an invasive plant which can disrupt native flora communities and ecosystems."

Qsn #	Question	Answer
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"Glory lily (Gloriosa superba) is regarded as a significant environmental weed in New South Wales and Queensland, and as a potential environmental weed or sleeper weed in other parts of Australia. It is currently of most concern in south-eastern Queensland and north-eastern New South Wales, and is listed as a priority environmental weed in three Natural Resource Management regions in these areas. Glory lily (Gloriosa superba) forms dense understorey carpets in coastal dune systems and replaces native flora in these areas. It also invades nearby areas of coastal dry sclerophyll forest and littoral rainforest and readily colonises bare soil. Its persistent tubers re-shoot even when the foliage has been removed and these tubers have been recorded in densities of 70-100 per square metre in heavily infested areas. In south-eastern Queensland, glory lily (Gloriosa superba) was first recorded as being naturalised at Caloundra in 1950. It is now a serious weed on Moreton Island and Fraser Island, and is present all along the south-east Queensland coast. It appears prominently on local environmental weed lists and during a recent study it was ranked among the top 100 most invasive plants in south-eastern Queensland. This species has also become one of the most serious environmental weeds along the north coast of New South Wales. It is mainly found along the coast north from Hat Head and also appears on several local environmental weed lists in this region (e.g. in Byron, Coffs Harbour and Lismore Shires). Glory lily (Gloriosa superba) is of most concern in this region because it is affecting the integrity of endangered littoral rainforest communities. For example, severe infestations of this species are present in littoral rainforest in Bongil Bongil National Park, south of Coffs Harbour. It is also becoming a concern on the central coast of New South Wales, and is regarded as an "alert weed" in the northern Sydney region. Glory lily (Gloriosa superba) is also regarded as being invasive on several Pacific islands (e.g. in the Cook Islands, French Polynesia, the Solomon Islands and Kiribati) and is a declared noxious weed on Lord Howe Island."

305	Congeneric weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	[No evidence] "Climbing, sometimes erect herb up to 4 m long; stem annual, glabrous and sparsely branched; tuber perennial, horizontal, abruptly bent in a V or L shape, roots fibrous. Leaves in whorls of 3–4, opposite or alternate, simple, sessile; blade ovate to lanceolate, 6–15(–20) cm × 1.5–4 cm, base obtuse, apex of upper leaves with or without 1–2 cm long tendril, parallel-veined."

402	Allelopathic	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	Sugha, S. K. (1978). Allelopathic potential of superb lily (Gloriosa superba L.). Science and Culture 44: 461-462	G. superba was found to inhibit growth of the pea.

403	Parasitic	n
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Climbing, sometimes erect herb up to 4 m long; stem annual, glabrous and sparsely branched; tuber perennial, horizontal, abruptly bent in a V or L shape, roots fibrous." [Colchicaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Simmen, B. et al. (2006). Plant species fed on by Lemur catta in gallery forests of the southern domain of Madagascar. Pp. 55-68 In Ringtailed lemur biology. Springer US	"TABLE 5.1. List of plant species and items consumed by ringtailed lemurs in Berenty, Antserananomby, and Beza-Mahafaly" [Gloriosa superba. Food items - fl, st, ml. mature leaf (ml), flower (fl), tip of stem (stem)]
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed]	[Presumably palatable if ingested by livestock & wallabies] "This species is considered poisonous to humans, native animals and livestock. Glory lily (Gloriosa superba) is responsible for large number of human poisonings, and even some deaths, in Sri Lanka. The recent deaths of several swamp wallabies (Wallabia bicolor) in northern New South Wales has also been attributed to the ingestion of this species."

405	Toxic to animals	y
	Source(s)	**Notes**
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"This species is considered poisonous to humans, native animals and livestock. Glory lily (Gloriosa superba) is responsible for large number of human poisonings, and even some deaths, in Sri Lanka. The recent deaths of several swamp wallabies (Wallabia bicolor) in northern New South Wales has also been attributed to the ingestion of this species."

406	Host for recognized pests and pathogens	n
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Leaf blight (Curvularia lunata) and tuber rot (Sclerotium spp.) are important fungal diseases of Gloriosa superba under per-humid conditions. Caterpillars of the moths Polytela gloriosa and Chrysodeixis chalcites attack foliage and flower buds. Under greenhouse conditions, lice and thrips can be a problem."

407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	"All parts of the plant, but especially the corm, are very poisonous"
	Scott, S. & Thomas, C. 2000. Poisonous Plants of Paradise: First Aid and Medical Treatment of Injuries from Hawaii's Plants. University of Hawaii Press, Honolulu, HI	"People who mistake this root for a yam or sweet potato makes a regrettable error, for it is highly poisonous." ... "All parts of gloriosa lilies contain colchicine, an alkaloid-like toxin. Colchicine's mechanism of action is not completely understood, but its toxicity may have to do with its ability to stop cell division. The roots of gloriosa lilies are particularly toxic. Less than one-tenth ounce of gloriosa root contains a potentially fatal does of colchicine."
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"The plant is poisonous and contains large amounts of a chemical called colchicine that is used in small amounts to treat gout. Contact with the tubers can cause skin irritation."
	Nelson, L., Shih, R.D. & Balick, M.J. 2007. Handbook of Poisonous and Injurious Plants, The New York Botanical Garden. Springer, New York, NY	"Toxic Part: The whole plant is poisonous, particularly the tubers." ... "Clinical Findings: May cause initial oropharyngeal pain followed in several hours by intense gastrointestinal symptoms. Abdominal pain and severe, profuse, persistent diarrhea may develop, causing extensive fluid depletion and its sequelae. Colchicine may subsequently produce peripheral neuropathy, bone marrow suppression, and cardiovascular collapse."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Gloriosa superba prefers a climate with a pronounced rainy season, avoiding per-humid tropical areas. It is most common in forest-savanna boundaries. It is locally common in thickets, hedges, open forest, grassland and bushland, where it can be seen scrambling through shrubs, and is also found in abandoned cultivated areas." [No evidence]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"Fertile, well-drained soils in sunny positions are preferred."
	Nellis, D.W. 1997. Poisonous plants and animals of Florida and the Caribbean. Pineapple Press Inc., Sarasota, FL	"These hardy perennials thrive in a variety of soil types if given full sun and a fence or other support to climb on."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Gloriosa superba grows best in well-drained, acid to neutral soil rich in organic matter."
	Nellis, D.W. 1997. Poisonous plants and animals of Florida and the Caribbean. Pineapple Press Inc., Sarasota, FL	"These hardy perennials thrive in a variety of soil types if given full sun and a fence or other support to climb on."

Qsn #	Question	Answer
411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Climbing, sometimes erect herb up to 4 m long; stem annual, glabrous and sparsely branched; tuber perennial, horizontal, abruptly bent in a V or L shape, roots fibrous."

412	Forms dense thickets	y
	Source(s)	**Notes**
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"Glory lily (Gloriosa superba) forms dense understorey carpets in coastal dune systems and replaces native flora in these areas. It also invades nearby areas of coastal dry sclerophyll forest and littoral rainforest and readily colonises bare soil. Its persistent tubers re-shoot even when the foliage has been removed and these tubers have been recorded in densities of 70-100 per square metre in heavily infested areas."

501	Aquatic	n
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	[Terrestrial vine / herb] "It is most common in forest-savanna boundaries. It is locally common in thickets, hedges, open forest, grassland and bushland, where it can be seen scrambling through shrubs, and is also found in abandoned cultivated areas."

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 9 Mar 2017]	Colchicaceae

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 9 Mar 2017]	Colchicaceae

Qsn #	Question	Answer
504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**y**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Climbing, sometimes erect herb up to 4 m long; stem annual, glabrous and sparsely branched; tuber perennial, horizontal, abruptly bent in a V or L shape, roots fibrous."
	Wu, Z. Y. & Raven, P. H. (eds.). 2000. Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Genus] "Herbs perennial, with a stout, tuberous rhizome." ... [Species] "Rhizome usually forked, ca. 1 cm in diam., fleshy. Stem scandent, 2–3 m or more, rather slender."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Contu, S. 2013. Gloriosa superba. The IUCN Red List of Threatened Species 2013: e.T44393073A44403733. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44393073A44403733.en. [Accessed 9 Mar 2017]	"Gloriosa superba is assessed as Least Concern. It is widespread and common in its natural range, and it is cultivated and naturalized elsewhere. Local depletion of the resource does occur, in India particularly, where the species has been over-collected for its medicinal properties. In these areas the harvesting level should be monitored, because natural populations might become locally threatened. Despite these localized declines the species remains widespread and common. At present it is believed to be stable and does not appear to be under any significant threat."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Growing Gloriosa superba from seed requires more time. The seeds have to be soaked overnight in warm water, and then planted in a well-drained medium. Germination is erratic and may take from 3 weeks to 3 months. Seedlings grow rapidly and mostly produce tubers by their second year; flowering starts in the fourth year. Chemical scarification (e.g. with 1% hypochlorite) or removal of the sarcotesta reduces seed dormancy from 6–9 months to about 4 months, and accelerates germination to 11–15 days. Germination rates as high as 97% have been reached for seeds incubated at 20–25°C for a period of 31 days. Higher temperatures have adverse effects."

Qsn #	Question	Answer
603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Amano, J., Kuwayama, S., Mizuta, Y., Nakano, M., Godo, T., & Okuno, H. (2008). Morphological characterization of three intergeneric hybrids among Gloriosa superba 'Lutea', Littonia modesta, and Sandersonia aurantiaca (Colchicaceae). HortScience, 43(1), 115-118	[Artificial hybrids possible] "Broad hybridization has been performed for widening the variability in horticultural traits of colchicaceous ornamentals mentioned previously. Santonia 'Golden Light', an intergeneric hybrid cultivar of S. aurantiaca · L. modesta, has already been developed through ovule culture (Clark et al., 2005; Eason et al., 2001; Morgan et al., 2001, 2003). This cultivar has long stems and leaves with an apical tendril similar to L. modesta, but leaf and flower morphologies are intermediate between the parents. Flower color of Santonia 'Golden Light' is orange like both parents, although flowers often redden under cooler environments (Clark et al., 2005; Eason et al., 2001; Morgan et al., 2003)."

604	**Self-compatible or apomictic**	**y**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Different pollination methods were studied including natural pollination, controlled selfing and cross-pollination. Although flower colour and shape seem to favour cross-pollination, self pollination provides better results. Controlled selfing between flowers on the same plant (idiogamy) gives significantly higher seed yield (9.2 g/plant), compared to naturally pollinated ones (4.3 g/plant)."
	Reddi, S. C.; Rao, C. B.; Atluri, J. B., 1998. Floral ecology of Gloriosa superba (Liliaceae). Annals of Forestry 6(2): 225-231	Autogamy resulted in production of a low percentage of viable seed, but both geitonogamy and xenogamy resulted in the production of a considerable percentage of viable seed.

605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Pollination is probably by butterflies and sunbirds. Fruits are mature 6–10 weeks after pollination."
	Reddi, S. C.; Rao, C. B.; Atluri, J. B., 1998. Floral ecology of Gloriosa superba (Liliaceae). Annals of Forestry 6(2): 225-231	Pollination is either by insects or wind

606	**Reproduction by vegetative fragmentation**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Gloriosa superba is propagated mainly during the rainy season, by bulblets, division of the tubers or from seed. V- or L-shaped tubers should be divided every third year. The tuber is delicate, and should be teased apart gently just before new growth begins, when the buds are easiest to spot. Each tuber part must contain several axillary buds that ensure the formation of adventitious stems and roots. Vegetative propagation by tubers is common practice but slow as the maximum number of daughter tubers produced per plant per year is two. Separating 2-lobed tubers produces a higher percentage of flowering plants than leaving the tubers undivided (97% versus 63%). Sprouting of the tubers is irregular and reaches about 60% in 30 days. Tuber dormancy can be overcome by soaking in continuously aerated water. Small tubers have been found to have a higher success rate than bigger ones. Tubers of 50–60 g are planted horizontally and 30–45 cm apart in well-tilled soil at a depth of 6–8 cm in furrows 45–60 cm apart. A closer spacing gives a higher percentage of cross-pollination resulting in improved fruit set. The best planting medium is a 1:1:2 mixture of soil, sand and compost."
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"This plant reproduces vegetatively by creeping underground stems (i.e. rhizomes) and also by seed."

607	Minimum generative time (years)	3
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Plants propagated from seeds take 3–4 years to bloom. Plants produced from tubers develop (1– 3–6 stems, which start flowering after 5–8 weeks and continue flowering for about another 7 weeks, after which the stems die. Development from visible flower bud to bloom takes about 2 weeks and anthesis occurs 1 day later with the stigma being receptive for 4 days; anther dehiscence is one day after anthesis. The same branch flowers at 3-day intervals."
	Contu, S. 2013. Gloriosa superba. The IUCN Red List of Threatened Species 2013: e.T44393073A44403733. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44393073A44403733.en. [Accessed 9 Mar 2017]	"Plants propagated from seeds take three to four years to bloom."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	**Notes**
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	[Dumped garden waste] "Its seeds may be dispersed by animals (e.g. birds) that eat its fruit, by water and in contaminated soil. Seeds and stem segments (i.e. rhizomes) may alsoo be spread in dumped garden waste."

Qsn #	Question	Answer
702	**Propagules dispersed intentionally by people**	**y**
	Source(s)	**Notes**
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"It is widely cultivated for its flowers and is often planted to scramble through other plants, or is grown as a potted plant in the greenhouse in temperate climates."

703	**Propagules likely to disperse as a produce contaminant**	
	Source(s)	**Notes**
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	[Soil contaminant. Could potentially contaminate soil of ornamental plants with which it is grown] "Its seeds may be dispersed by animals (e.g. birds) that eat its fruit, by water and in contaminated soil. Seeds and stem segments (i.e. rhizomes) may alsoo be spread in dumped garden waste."

704	**Propagules adapted to wind dispersal**	**n**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Fruit a loculicidal, oblong capsule 4–6 cm × 1–2 cm, containing up to 20(–40) seeds. Seeds ovoid, 4–5 mm in diameter, surrounded by a fleshy, red sarcotesta." ... "The red sarcotesta suggests seed dispersal by animals."

705	**Propagules water dispersed**	**y**
	Source(s)	**Notes**
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"Its seeds may be dispersed by animals (e.g. birds) that eat its fruit, by water and in contaminated soil. Seeds and stem segments (i.e. rhizomes) may also be spread in dumped garden waste."

706	**Propagules bird dispersed**	**y**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Fruit a loculicidal, oblong capsule 4–6 cm × 1–2 cm, containing up to 20(–40) seeds. Seeds ovoid, 4–5 mm in diameter, surrounded by a fleshy, red sarcotesta." ... "The red sarcotesta suggests seed dispersal by animals."
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"Its seeds may be dispersed by animals (e.g. birds) that eat its fruit, by water and in contaminated soil. Seeds and stem segments (i.e. rhizomes) may alsoo be spread in dumped garden waste."

707	**Propagules dispersed by other animals (externally)**	**n**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Fruit a loculicidal, oblong capsule 4–6 cm × 1–2 cm, containing up to 20(–40) seeds. Seeds ovoid, 4–5 mm in diameter, surrounded by a fleshy, red sarcotesta." ... "The red sarcotesta suggests seed dispersal by animals." [No means of external attachment]

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	**y**
	Source(s)	**Notes**
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"Its seeds may be dispersed by animals (e.g. birds) that eat its fruit, by water and in contaminated soil. Seeds and stem segments (i.e. rhizomes) may also be spread in dumped garden waste."

801	**Prolific seed production (>1000/m2)**	**n**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"In South Africa the seed production of 'wild-type' plants is positively correlated with height of the plant, and is on average 258 seeds per plant for plants 60–65 cm tall compared with about 30 seeds per plant for plants 30–40 cm tall."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**n**
	Source(s)	**Notes**
	Dounias, E., 2006. Gloriosa superba L. In: Schmelzer, G.H. & Gurib Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Chemical scarification (e.g. with 1% hypochlorite) or removal of the sarcotesta reduces seed dormancy from 6–9 months to about 4 months, and accelerates germination to 11–15 days." [implying that 6-9 months is normal]

803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	Gilles, M. & Milner, S. 2010. Final Report Gloriosa superba (Glory Lily) Control Trial Project on the Sunshine Coast Queensland. Sunshine Coast Council	"Foliar applications of Treatment 5 200 mL 2,4-D amine + 5 g Metsulfuron-methyl + 100 mL BS 1000□100 L water corresponding to the growth stages of G. superba, October – November, with a follow up spray in February – March successively in years 1 and 2 of the trial have proven to be the most effective treatment. Additionally it has been verified that the application frequency of Treatment 5 was highly effective but not considered excessive due to the evidence of successive recruitment. Thus supporting the assertion that the treatment had no residual herbicide effects in the soil."
	NSW WeedWise. 2017. Glory lily (Gloriosa superba). http://weeds.dpi.nsw.gov.au/Weeds/Details/62. [Accessed 9 Mar 2017]	Herbicide options include Glyphosate 360 g/L (Rate: 1 part glyphosate to 50 parts water), Glyphosate 360 g/L (Rate: 1 part glyphosate to 1.5 parts of water) and Glyphosate 360 g/L with Metsulfuron-methyl 600 g/kg (Rate: 200 mL glyphosate plus 1.5 g metsulfuron-methyl per 10 L of water). Efficacy unspecified

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	Queensland Government. (2017). Weeds of Australia. Gloriosa superba. http://keyserver.lucidcentral.org. [Accessed 9 Mar 2017]	"Its persistent tubers re-shoot even when the foliage has been removed and these tubers have been recorded in densities of 70-100 per square metre in heavily infested areas."

Qsn #	Question	Answer
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Thrives in tropical climates
• Naturalized in several locations (but no evidence in Hawaiian Islands to date)
• Environmental weed in Australia
• Poisonous to animals and humans
• Tolerates many soil types
• Climbing, smothering habit & forms dense stands that crowd out native vegetation (Australia)
• Geophyte
• Reproduces by seeds & vegetatively by rhizomes
• Self-fertile
• Seeds dispersed by birds, water, as a soil contaminant & intentionally by people
• Dispersed as dumped garden waste
• Able to resprout after cutting

Low Risk Traits
• Unarmed (no spines, thorns, or burrs)
• Thrives in full sun (dense shade may limit spread)
• Ornamental
• Herbicides may provide effective control