

**Australia/New Zealand Weed Risk Assessment adapted for Florida.**

**Data used for analysis published in: Gordon, D.R., D.A. Onderdonk, A.M. Fox, R.K. Stocker, and C. Gantz. 2008. Predicting Invasive Plants in Florida using the Australian Weed Risk Assessment. Invasive Plant Science and Management 1: 178-195.**

<i>Gloriosa superba (flame lily)</i>			
Question number	Question	Answer	Score
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)		
2.04	Native or naturalized in habitats with periodic inundation	n	0
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	0
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	y	0
3.05	Congeneric weed	n	0
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	y	1
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals		
4.05	Toxic to animals	y	1
4.06	Host for recognised pests and pathogens		
4.07	Causes allergies or is otherwise toxic to humans	y	1
4.08	Creates a fire hazard in natural ecosystems	n	0
4.09	Is a shade tolerant plant at some stage of its life cycle	?	
4.1	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils)	n	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	y	1
5.01	Aquatic	n	0

5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	y	1
6.01	Evidence of substantial reproductive failure in native habitat		
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally		
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative fragmentation	y	1
6.07	Minimum generative time (years)	1	1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed	y	1
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)		
8.01	Prolific seed production	n	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation		
8.05	Effective natural enemies present in Florida, or east of the continental divide		
<b>Total Score</b>			<b>14</b>

<b>Outcome</b>	<b>Reject*</b>
----------------	----------------

\*Used secondary screen from: Daehler, C. C., J.L. Denslow, S. Ansari, and H. Kuo. 2004. A risk assessment system for screening out harmful invasive pest plants from Hawaii's and other Pacific islands. *Conserv. Biol.* 18: 360-368.

section	# questions answered	satisfy minimum?
A	7	yes
B	9	yes
C	19	yes
total	35	yes

Data collected 2006-2007

Question number	Reference	Source data
1.01		cultivated, but no evidence of selection for reduced weediness
1.02		
1.03		
2.01		
2.02		
2.03		
2.04	Horticopia 4.0	"Make sure the soil is well-drained or dormant tubers will rot in wet soil."
2.05	Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ).	"They are widely cultivated as garden plants around the world"
3.01	1. Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ). 2. Csurhes and Edwards (1998) Potential Environmental Weeds in Australia. Queensland Department of Natural Resources.	1. "Glory lily has subsequently become naturalised along parts of the Australian coast" 2. "Scattered naturalised populations exist in the understorey of coastal dry sclerophyll forest and sand dune vegetation throughout south-east Queensland and New South Wales."
3.02		no evidence
3.03		no evidence
3.04	1. NSW North Coast Weeds Advisory Committee (2005) Regional Weed Management Plan ( <a href="http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf">http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf</a> ). 2. Batianoff and Franks (1998) Environmental weed invasions on south-east Queensland foredunes. Proceedings of the Royal Society of Queensland 107: 15-34.	1. "Severe infestations of 100 stems/m <sup>2</sup> have been recorded in Bongil Bongil NP south of Coffs Harbour...The endangered ecological community littoral rainforest is threatened by competition from glory lily... <i>Gloriosa superba</i> is declared noxious on Lord Howe Island." 2. <i>Gloriosa superba</i> considered one of the 12 most troublesome weeds in the dune community of south-east Queensland.
3.05		no evidence

4.01	Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida.	no description of these traits
4.02	Sugha (1978) Allelopathic potential of superb lily ( <i>Gloriosa superba</i> L.). Science and Culture 44: 461-462.	<i>G. superba</i> was found to inhibit growth of the pea.
4.03	Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida.	no description of this
4.04		
4.05	1. Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ). 2. NSW North Coast Weeds Advisory Committee (2005) Regional Weed Management Plan ( <a href="http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf">http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf</a> ).	1. "All parts of the glory lily are highly toxic if eaten and the weed has been responsible for the poisoning of both humans and livestock." 2. The seed "has been suspected of poisoning wallabies".
4.06		
4.07	1. Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ). 2. Whistler (2000) Tropical Ornamentals: a Guide. Timber Press, Portland.	1. "All parts of the glory lily are highly toxic if eaten and the weed has been responsible for the poisoning of both humans and livestock." 2. "Contact with the tubers can cause skin irritation."
4.08		no evidence
4.09	1. Missouri Botanical Garden, Kemper Center for Home Gardening ( <a href="http://www.mobot.org/gardeninghelp/plantfinder/Plant.asp?code=A456">http://www.mobot.org/gardeninghelp/plantfinder/Plant.asp?code=A456</a> ). 2. Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida. 3. Hortocopia 4.0 4. Whistler (2000) Tropical Ornamentals: a Guide. Timber Press, Portland.	1. Full sun to part shade; best sited in locations with some afternoon shade. 2. full sun to partial shade 3. partial shade or partial sun to full sun BUT 4. sunny places preferred
4.1	Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida.	various moisture-retentive, fertile soils
4.11	1. Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida. 2. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 ( <a href="http://plants.usda.gov">http://plants.usda.gov</a> ). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	1. climbing (tendrill-like leaf tips) 2. growth habit: vine, forb/herb
4.12	Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ).	"glory lily can form dense understorey carpets in dune systems along the coast, competing strongly with native flora"
5.01		terrestrial
5.02	Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida.	Liliaceae
5.03	Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida.	Liliaceae
5.04	Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida.	"tuberous underground stem"
6.01		
6.02	Dehgan, B. (1998) Landscape Plants for Subtropical Climates. University Press of Florida.	propagation: seeds

6.03		
6.04	1. Reddi, Rao, and Atluri (1998) Floral ecology of <i>Gloriosa superba</i> (Liliaceae). <i>Annals of Forestry</i> 6: 225-231. 2. Padua, Bunyapraphatsara, and Lemmens, eds. (1999) <i>Plant Resources of South-East Asia</i> . No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	1. 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. 2. "Cross-pollination generally improves seed production." [so self-pollination must be possible]
6.05	1. Reddi, Rao, and Atluri (1998) Floral ecology of <i>Gloriosa superba</i> (Liliaceae). <i>Annals of Forestry</i> 6: 225-231. 2. Padua, Bunyapraphatsara, and Lemmens, eds. (1999) <i>Plant Resources of South-East Asia</i> . No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	1. Pollination is either by insects or wind. 2. "Pollination is probably by butterflies and sugar birds."
6.06	1. Dehgan, B. (1998) <i>Landscape Plants for Subtropical Climates</i> . University Press of Florida. 2. Batianoff and Franks (1998) Environmental weed invasions on south-east Queensland foredunes. <i>Proceedings of the Royal Society of Queensland</i> 107: 15-34.	1. propagation: offsets 2. <i>G. superba</i> can "also maintain active reproduction by perennial hypopodial tubers".
6.07	1. Padua, Bunyapraphatsara, and Lemmens, eds. (1999) <i>Plant Resources of South-East Asia</i> . No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden. 2. Batianoff and Franks (1998) Environmental weed invasions on south-east Queensland foredunes. <i>Proceedings of the Royal Society of Queensland</i> 107: 15-34.	1. "Plants propagated from seed take 3-4 years to bloom. Plants propagated from tubers start flowering after 5 weeks, and continue flowering for about another 7 weeks." 2. <i>G. superba</i> can have "up to three seedling generations per year from fresh seed".
7.01	Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ).	"one of the main methods of spread is by the dumping of garden refuse in bushland"
7.02	Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ).	"They are widely cultivated as garden plants around the world"
7.03		no evidence
7.04	1. Dehgan, B. (1998) <i>Landscape Plants for Subtropical Climates</i> . University Press of Florida. 2. Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ).	1. fruit is a 3-valved capsule 2. "The seed pod is shaped like a rugby ball 40-100 mm long and 10-20 mm wide."
7.05	Batianoff and Franks (1998) Environmental weed invasions on south-east Queensland foredunes. <i>Proceedings of the Royal Society of Queensland</i> 107: 15-34.	"the succulent propagules of this species [ <i>G. superba</i> ] on occasions have been dispersed by ocean currents"
7.06	NSW North Coast Weeds Advisory Committee (2005) <i>Regional Weed Management Plan</i> ( <a href="http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf">http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf</a> ).	"The seed may be eaten and spread by a wide variety of fauna" [since this is vague, will put here, but not for 7.08]
7.07	Storrie, New South Wales Agriculture, Weed Alert ( <a href="http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf">http://www.agric.nsw.gov.au/reader/weed-alerts/glorylily.pdf</a> ).	no evidence of any means of attachment - fruit is a capsule,

	alerts/glorylily.pdf).	seeds are little balls
7.08		
8.01	Padua, Bunyaphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"In South Africa the seed production...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."
8.02	Padua, Bunyaphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"Chemical scarification...or removal of the sarcotesta reduces dormancy in flame lily from 6-9 months to about 4 months" [implying that 6-9 months is normal]
8.03	NSW North Coast Weeds Advisory Committee (2005) Regional Weed Management Plan ( <a href="http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf">http://www.northcoastweeds.org.au/site-files/docs/coastal-weeds-management-plan.pdf</a> ).	"Glory lily is one of the most difficult coastal weeds to control. The most effective control in the region has been achieved using a foliar spray application in late November or December (depending on the season) when the new annual stems first appear. A follow up application in February or March (depending on the timing of summer / autumn rains which encourage growth) has also proved effective."
8.04		
8.05		