

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>Genipa americana (genipap)</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	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	n	-2
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	n	0
3.05	Congeneric weed	n	0
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	n	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	?	
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens		
4.07	Causes allergies or is otherwise toxic to humans	n	0
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	n	0
4.1	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils)	n	0
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	n	0
5.01	Aquatic	n	0

5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	y	1
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		
6.07	Minimum generative time (years)	6	-1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
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)	y	1
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	?	
8.03	Well controlled by herbicides		
8.04	Tolerates, or benefits from, mutilation or cultivation		
8.05	Effective natural enemies present in Florida, or east of the continental divide		
Total Score			3

Outcome	Accept*
----------------	----------------

*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	10	yes
C	17	yes
total	34	yes

Data collected 2006-2007

Question number	Reference	Source data
1.01		cultivated, but no evidence of selection for reduced weediness (likely selection for more fruit)
1.02		
1.03		
2.01	1. Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami. 2. Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	1. "The tree is strictly tropical". 2. restricted to hot and humid habitats
2.02		
2.03	Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	Native (or long ago naturalized) throughout the American tropics.
2.04	1. Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami. 2. Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf). 3. Mielke, MS, AAF de Almeida, FP Gomes, MAG Aguilar, and PAO Mangabeira (2003) Leaf gas exchange, chlorophyll fluorescence and growth responses of <i>Genipa americana</i> seedlings to soil flooding. Environmental and Experimental Botany 50: 221-231.	1. "There is a shrubby form...that grows in swamps along the edges of rivers and lakes in Brazil." 2. does well in waterlogged areas 3. "Despite the high survival rate and wide distribution in flood-prone habitats of the neotropics, previous studies demonstrated that growth of <i>G. americana</i> is reduced under soil flooding...Throughout a 63-day flooding period, the survival rates were 100%." [so growth is reduced under flooded conditions, but it is still easily tolerated]
2.05	1. Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami. 2. Verheij and Coronel, eds. (1992) Plant Resources of South-East Asia. No. 2. Edible Fruits and Nuts. Prosea, Bogor, Indonesia.	1. Native to the Caribbean, Central and South America. "It is widely cultivated in dooryards as an ornamental tree and for its fruits". 2. occasionally

		cultivated in South-East Asia
3.01	1. Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf). 2. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	1. Some of its current distribution outside of the Amazon Basin is likely due to humans, but it was probably moved throughout tropical America in prehistoric times. [not known to be naturalized outside of tropical America] 2. considered native in Puerto Rico and the Virgin Islands
3.02		no evidence
3.03		no evidence
3.04		no evidence
3.05		no evidence
4.01	Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami.	no description of these traits
4.02		no evidence
4.03	Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami.	no description of this
4.04	1. Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami. 2. Pinto, R, H Gomez, A Hernandez, F Medina, B Martinez, VH Aguilar, I Villalobos, J Nahed, and J Carmona (2003) Sheep preference for forage trees from the center of Chiapas, Mexico. <i>Pastos y Forrajes</i> 26: 329-334.	1. "The fallen, astringent fruits are much eaten by wild and domestic animals...The foliage is readily eaten by cattle." 2. <i>G. americana</i> was among the least preferred forage trees for sheep.
4.05	Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami.	"The fallen, astringent fruits are much eaten by wild and domestic animals...The foliage is readily eaten by cattle." [and no evidence of toxicity]
4.06		
4.07	Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami.	the fruit is eaten by people [and no evidence of toxicity]
4.08		no evidence
4.09	Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	intolerant of deep shade; probably requires a reduction in vegetative cover to establish
4.1	1. Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami. 2. Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	1. "The genipap flourishes best in...deep, rich, loamy, moist soil." 2. rarely found in sands or near beaches; does well in fertile soil
4.11	Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami.	erect tree, to 30 m
4.12		no evidence
5.01		terrestrial
5.02	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	Rubiaceae
5.03	USDA, NRCS. 2005. The PLANTS Database, Version	Rubiaceae

	3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	
5.04	Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	Seedlings produce long, thin roots; large trees have deep roots.
6.01	Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	Despite producing a huge number of seeds, and the extensive dispersal of those seeds, very few seedlings are found. Apparently either germination is very low, or mortality is very high shortly after germination.
6.02	1. Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami. 2. Sautu, A, JM Baskin, CC Baskin, and R Condit (2006) Studies on the seed biology of 100 native species of trees in a seasonal moist tropical forest, Panama, Central America. Forest Ecology and Management 234: 245-263.	1. "The genipap is mostly grown from seed". 2. 85% of <i>G. americana</i> seeds germinated.
6.03		
6.04	Crestana, C de SM (1995) Pollination ecology of <i>Genipa americana</i> L. (Rubiaceae) at Moji-Gucu Ecological Station, state of Sao Paulo. Revista do Instituto Florestal 7: 169-195.	"The species was shown to present dioecy...Allogamy and apomixis were superimposed breeding systems."
6.05	Crestana, C de SM (1995) Pollination ecology of <i>Genipa americana</i> L. (Rubiaceae) at Moji-Gucu Ecological Station, state of Sao Paulo. Revista do Instituto Florestal 7: 169-195.	pollinated by large bees
6.06		
6.07	Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	Trees begin producing fruit 6 to 8 years after the seedling stage.
7.01		
7.02	1. Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami. 2. Verheij and Coronel, eds. (1992) Plant Resources of South-East Asia. No. 2. Edible Fruits and Nuts. Prosea, Bogor, Indonesia.	1. "It is widely cultivated in dooryards as an ornamental tree and for its fruits". 2. occasionally cultivated in South-East Asia
7.03		no evidence
7.04	Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami.	fleshy fruit to 15 cm long, 9 cm wide [no evidence of any adaptations for wind dispersal]
7.05	Crestana, C de SM (1996) Fruit/seed dispersal of <i>Genipa americana</i> L. (Rubiaceae) in a riparian forest of the Moji-Guacu River, SP. Revista do Instituto Florestal 8: 213-221.	"In relation to the dispersal process and the riparian environment, the results showed the coincidence between annual flooding date and ripening and fall of fruits, thus favouring dispersion." Fruits were found to float.
7.06	Ragusa-Netto, J (2006) Abundance and frugivory of the	<i>G. americana</i> was the favorite

	Toco toucan (<i>Ramphastos toco</i>) in a gallery forest in Brazil's southern Pantanal. Brazilian Journal of Biology 66: 133-142.	food source for Toco toucans. "Toucans have been assumed as important seed dispersers of many Neotropical tree species". [though post-dispersal viability not looked at in this study]
7.07	Morton (1987) Fruits of Warm Climates. Julia F. Morton, Miami.	fleshy fruit to 15 cm long, 9 cm wide [no evidence of any means of attachment]
7.08	1. Strong, JN and JMV Fragoso (2006) Seed dispersal by <i>Geochelone carbonaria</i> and <i>Geochelone denticulata</i> in northwestern Brazil. Biotropica 38: 683-686. 2. Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	1. Seeds of <i>Genipa americana</i> were found in fecal samples of red-footed and yellow-footed tortoises; 91% were still viable. 2. Seeds have been reported in the feces of monkeys and coyotes in Costa Rica.
8.01	Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	mature tree can produce 400 to 600 fruits per year; fruits have an average of 266 seeds; has a "massive production of seeds" [to meet cutoff of 500 seeds/m ² , there would only have to be 2 fruits/m ²]
8.02	Sautu, A, JM Baskin, CC Baskin, and R Condit (2006) Studies on the seed biology of 100 native species of trees in a seasonal moist tropical forest, Panama, Central America. Forest Ecology and Management 234: 245-263.	Seeds remained viable for 3 months in storage. [but viability in soil unknown]
8.03		
8.04	Francis, JK (1993) <i>Genipa americana</i> L. USDA Forest Service, International Institute of Tropical Forestry (http://www.fs.fed.us/global/iitf/Genipaamericana.pdf).	Seedlings and saplings will resprout after being cut. [adults?]
8.05		