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.

Schinus terebinthifolius (Brazilian pepper)			
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)	y	1
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	y	0
3.02	Garden/amenity/disturbance weed	y	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	y	0
3.05	Congeneric weed	y	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	y	1
4.1	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils)	y	1
4.11	Climbing or smothering growth habit	n	0
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	n	0
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	n	-1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative fragmentation	y	1
6.07	Minimum generative time (years)	3	0
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	?	
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)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in Florida, or east of the continental divide		
Total Score			19

Outcome	**Reject***

*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	8	yes
B	10	yes
C	19	yes
total	37	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	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	Native in Brazil; invasive in southern Africa, Australia, and Hawaii; also present in southern Europe, northern Africa, tropical Asia, New Zealand, western U.S., and the Caribbean.
2.04	1. Gioeli and Langeland (2003) Brazilian pepper-tree control. University of Florida, IFAS Extension, document SS-AGR-17 (http://edis.ifas.ufl.edu/pdffiles/AA/AA21900.pdf). 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	1. "Seedlings are flood-tolerant" 2. "Brazilian pepper is capable of surviving a broad range of hydrologic conditions, but does best in well drained sites"; "withstands flooding"; marshes are among habitats it invades.
2.05	Morton (1978) Brazilian pepper - its impact on people, animals, and the environment. Economic Botany 32: 353-359.	"...this vigorous tree has been introduced into other South American countries, parts of Central America, Bermuda, the Bahama Islands, the West Indies,…southern Arizona, California, Hawaii, Guam, Mediterranean Europe, North Africa, southern Asia, and South Africa."
3.01	1. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu. 2. Richardson, Macdonald, Hoffman, and Henderson (1997) Alien plant invasions. Pp. 535-570 in Cowling, Richardson, and Pierce (eds) Vegetation of Southern Africa, Cambridge University Press. 3. Kairo, Ali, Cheesman, Haysom, and Murphy (2003) Invasive Species Threats in the Caribbean Region. Report to the Nature Conservancy. 4. Panetta and Anderson (2001) Chemical control of broad-leaved pepper tree (Schinus terebinthifolius Raddi). Plant Protection Quarterly 16: 26-31. 5. Waterhouse	weedy in Hawaii (1), South Africa (2), the Caribbean (3), Australia (4), and the Pacific (5)

	(1997) The major invertebrate pests and weeds of agriculture and plantation forestry in the southern and western Pacific. ACIAR Monograph No. 44, 99p.	
3.02	Waterhouse (1997) The major invertebrate pests and weeds of agriculture and plantation forestry in the southern and western Pacific. ACIAR Monograph No. 44, 99p.	is a weed of waste areas and roadsides in the Pacific
3.03		no evidence
3.04	1. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu. 2. Richardson, Macdonald, Hoffman, and Henderson (1997) Alien plant invasions. Pp. 535-570 in Cowling, Richardson, and Pierce (eds) Vegetation of Southern Africa, Cambridge University Press. 3. Kairo, Ali, Cheesman, Haysom, and Murphy (2003) Invasive Species Threats in the Caribbean Region. Report to the Nature Conservancy. 4. Panetta and Anderson (2001) Chemical control of broad-leaved pepper tree (*Schinus terebinthifolius* Raddi). Plant Protection Quarterly 16: 26-31.	Environmental weed in Hawaii (1), South Africa (2), the Caribbean (3), and Australia (4).
3.05	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	*Schinus molle* considered invasive in Australia.
4.01	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	no description of these traits
4.02	Morgan and Overholt (2005) Potential allelopathic effects of Brazilian pepper (*Schinus terebinthifolius* Raddi, Anacardiaceae) aqueous extract on germination and growth of selected Florida native plants. Journal of the Torrey Botanical Society 132: 11-15.	"In laboratory bioassays and greenhouse experiments, germination and biomass accumulation in two native Florida plant species, *Bidens alba* and *Rivina humilis*, were negatively affected by irrigation with aqueous extracts of Brazilian pepper leaves."
4.03	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	no description of this
4.04		
4.05	Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 5].	"the unripe fruit if ingested can be fatal to horses"
4.06		
4.07	Horticopia 4.0	"The stems and foliage can cause irritation and inflammation of the skin when handling the plant. Flowers and crushed fruit cause respiratory inflammation. Pollen from male trees is highly allergenic…"

4.08	Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 5].	"Brazilian pepper forms dense thickets that fire rarely penetrates…Very little leaf litter builds up on the forest floor. The high moisture content of the leaves and wood also make it difficult to burn."
4.09	1. Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 5]. 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. "Brazilian pepper has a relatively high tolerance for shade. The seedlings appear to be barely surviving in dense shade but will quickly respond to altered environmental conditions." BUT 2. shade intolerant
4.1	Lorenzi (2002) Brazilian Trees, 4th edition. Instituto Plantarum de Estudos da Flora Ltda. Sao Paolo, Brazil.	"also grows in poor and dry soils"
4.11	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.	tree
4.12	1. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu. 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	1. "often forming dense thickets on steep slopes" 2. "Its branches form a nearly impenetrable tangle down to ground level…Dense monospecific stands form"
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.	Anacardiaceae
5.03	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.	does not fix nitrogen
5.04	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.	not propagated by tubers, bulbs, or corms
6.01		
6.02	Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available:	"Brazilian pepper's primary mode of reproduction is sexual."

	http://www.fs.fed.us/database/feis/ [2005, December 5].	
6.03		
6.04	Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu.	dioecious
6.05	Gioeli and Langeland (2003) Brazilian pepper-tree control. University of Florida, IFAS Extension, document SS-AGR-17 (http://edis.ifas.ufl.edu/pdffiles/AA/AA21900.pdf).	pollinated by insects
6.06	1. Coladonato, Milo. 1992. *Schinus terebinthifolius*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 5]. 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	1. "Brazilian pepper also has the ability to sprout from adventitious buds on its roots or shoots." 2. "Brazilian pepper tree's generally shallow root system also favors the production of underground root suckers. Root suckers form without evidence of damage to a tree or its root system and can develop into another plant."
6.07	Gioeli and Langeland (2003) Brazilian pepper-tree control. University of Florida, IFAS Extension, document SS-AGR-17 (http://edis.ifas.ufl.edu/pdffiles/AA/AA21900.pdf).	"Reproduction can occur 3 years after germination."
7.01		
7.02	Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 5].	used as an ornamental in Brazil and Hawaii
7.03		no evidence
7.04		produces berries
7.05	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	water is a minor dispersal agent
7.06	1. Lorenzi (2002) Brazilian Trees, 4th edition. Instituto Plantarum de Estudos da Flora Ltda. Sao Paolo, Brazil. 2. Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 5].	1. "it is widely spread by birds" 2. "the seeds pass through the digestive tract unharmed"
7.07		no evidence of any means of attachment - produces berries
7.08	1. Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).	1. "The seeds are dispersed by many mammals and birds" 2. "Mammals such as racoons and possums consume the fruits and deposit the seeds with fecal materials, giving the

	Available: http://www.fs.fed.us/database/feis/ [2005, December 5]. 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	seeds a nutrient-rich microsite in which to establish".
8.01	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"Mature female trees are prodigious seed producers, which, combined with a viability rate of 30 to 60 percent, results in a vast number of seedlings".
8.02	1. Gioeli and Langeland (2003) Brazilian pepper-tree control. University of Florida, IFAS Extension, document SS-AGR-17 (http://edis.ifas.ufl.edu/pdffiles/AA/AA21900.pdf). 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	1. "Seed viability is 30-60% and can last up to 2 months, but declines to .05% at 5 months." 2. "Seeds are generally not viable beyond five months after dispersal."
8.03	1. Panetta and Anderson (2001) Chemical control of broad-leaved pepper tree (*Schinus terebinthifolius* Raddi). Plant Protection Quarterly 16: 26-31. 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	1. "Injection of 10 mL of Tordon-75 D (1:30) with a Sidewinder stem injector resulted in 86% mortality at nine months after treatment. This last method of application shows considerable promise, given the small amounts of chemical required and the minimal risk of off-target damage in environmentally sensitive areas." 2. "Triclopyr (as Garlon 3-A), applied at 100 percent and using the frill-cut method, has been shown to kill mature trees and prevent regrowth."
8.04	1. Coladonato, Milo. 1992. Schinus terebinthifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 5]. 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	1. "It produces an abundance of large seeds, particularly after fire or mechanical disturbance." 2. "it can resprout, especially after fire"; "resprouts quickly after being cut"
8.05		