

**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>Imperata cylindrica (cogon grass)</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)	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	y	0
3.04	Environmental weed	y	0
3.05	Congeneric weed	y	0
4.01	Produces spines, thorns or burrs	y	1
4.02	Allelopathic	y	1
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	y	1
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	y	1
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)	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	y	1
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	y	1
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)	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	?	
7.04	Propagules adapted to wind dispersal	y	1
7.05	Propagules water dispersed	n	-1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)	?	
7.08	Propagules dispersed by other animals (internally)	n	-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		
<b>Total Score</b>			<b>26</b>

<b>Outcome</b>	<b>Reject*</b>
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\*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	11	yes
C	20	yes
total	39	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	Bryson and Carter (1993) Cogongrass, <i>Imperata cylindrica</i> , in the United States. Weed Technology 7: 1005-1009.	"Cogongrass...is widely distributed on all continents...except Antarctica."
2.04	1. Weber (2003) Invasive Plant Species of the World. CABI Publishing. 2. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	1. "Where native, this grass is found in poorly drained, damp soils and on riverbanks." 2. "Its habitat includes the dry sand dunes of shores and deserts as well as swamps and river margins."
2.05	1. Huxley (1992) The New Royal Horticultural Society Dictionary of Gardening. The MacMillan Press, London. 2. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	Cogongrass is used horticulturally (1) and has been introduced and cultivated in many parts of the world for thatch, papermaking, forage, and erosion control (2).
3.01	Bryson and Carter (1993) Cogongrass, <i>Imperata cylindrica</i> , in the United States. Weed Technology 7: 1005-1009.	"Cogongrass...is widely distributed on all continents...except Antarctica."
3.02	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	invades disturbed sites
3.03	1. Avav (2000) Control of speargrass ( <i>Imperata cylindrica</i> ) with glyphosphate and fluzifop-butyl for soybean ( <i>Glycine max</i> ) production in savanna zone of Nigeria. Journal of the Science of Food and Agriculture 80: 193-196. 2. Brook (1989) Review of literature on <i>Imperata cylindrica</i> (L.) Raeuschel with particular reference to South East Asia. Tropical Pest Management 35: 12-25. 3. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The	1. "Speargrass ( <i>Imperata cylindrica</i> ) is the most widespread perennial weed in soybean-producing areas...of Nigeria." 2. " <i>Imperata cylindrica</i> is also considered a serious weed in plantations where the canopy has not closed" 3. "Seventy-three countries report that it is a weed in 35 crops which are as different in their cultural systems as tomatoes and coconuts."

	University Press of Hawaii, Honolulu.	
3.04	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	considered an environmental weed in tropical Asia and Hawaii
3.05	1. <a href="http://www.aphis.usda.gov/ppq/weeds/noxiousweedlist.pdf">http://www.aphis.usda.gov/ppq/weeds/noxiousweedlist.pdf</a> 2. Holm (1979) A Geographical Atlas of World Weeds. John Wiley and Sons.	1. <i>I. brasiliensis</i> is on the Federal Noxious Weed list. 2. <i>I. brasiliensis</i> is considered a principal weed of agriculture in Trinidad, and a common weed in Argentina.
4.01	Terry, Adjers, Akobundu, Anoka, Drilling, Tjitrosemito, and Utomo (1997) Herbicides and mechanical control of <i>I. cylindrica</i> as a first step in grassland rehabilitation. Agroforestry Systems 36: 151-179.	"the sharp points of emerging plants can pierce the feet of humans and livestock"
4.02	1. Bryson and Carter (1993) Cogongrass, <i>Imperata cylindrica</i> , in the United States. Weed Technology 7: 1005-1009. 2. Brook (1989) Review of literature on <i>Imperata cylindrica</i> (L.) Raeuschel with particular reference to South East Asia. Tropical Pest Management 35: 12-25.	1. "In addition to competing for light, water, and nutrients, cogongrass interference is caused by allelopathy..." 2. "Many workers have reported suspected allelopathy by <i>I. cylindrica</i> leaves and rhizomes."
4.03	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	no description of this
4.04	1. Dozier, Gaffney, McDonald, Johnson, and Shilling (1998) Cogongrass in the United States: history, ecology, impacts, and management. Weed Technology 12: 737-743. 2. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	1. "Silica bodies in the leaves contribute to its unpalatability to grazers." 2. Only young growth is eaten by livestock.
4.05	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	New growth of cogongrass is used by livestock as a fallback food. [Also, no mention of toxicity in toxicity or horticultural references.]
4.06		
4.07		no mention of toxicity in toxicity or horticultural references
4.08	1. Weber (2003) Invasive Plant Species of the World. CABI Publishing. 2. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	1. "forms dense stands...and is highly flammable" 2. "Dry <i>Imperata</i> produces a major fire hazard in cultivated plantations as well."
4.09	Brook (1989) Review of literature on <i>Imperata cylindrica</i> (L.) Raeuschel with particular reference to South East Asia. Tropical Pest Management 35: 12-25.	" <i>Imperata cylindrica</i> is intolerant of shade"
4.1	1. Garrity, Soekardi, van Noordwijk, de la Cruz, Pathak, Gunasena, van So, Huijun, and Majid (1997) The <i>Imperata</i> grasslands of tropical Asia: area, distribution, and typology. Agroforestry Systems 36: 3-29. 2. Brook (1989) Review of	1. "The species was found widely distributed on the full range of soil orders. It occupied both fertile...and infertile soils...across a wide range of climates and elevations." 2. " <i>Imperata cylindrica</i> has the ability to thrive on

	literature on <i>Imperata cylindrica</i> (L.) Raeuschel with particular reference to South East Asia. Tropical Pest Management 35: 12-25.	infertile soils."
4.11	USDA, NRCS. 2005. <i>The PLANTS Database</i> , 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.	graminoid
4.12	Weber (2003) <i>Invasive Plant Species of the World</i> . CABI Publishing.	"forms dense stands"; up to 120 cm tall
5.01		terrestrial
5.02	USDA, NRCS. 2005. <i>The PLANTS Database</i> , 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.	Poaceae
5.03	USDA, NRCS. 2005. <i>The PLANTS Database</i> , 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.	Poaceae, and herbaceous
5.04	Bryson and Carter (1993) Cogongrass, <i>Imperata cylindrica</i> , in the United States. <i>Weed Technology</i> 7: 1005-1009.	"It has an extensive fibrous root system..."
6.01		
6.02	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	"The species reproduces by seeds..."
6.03	Bryson and Carter (1993) Cogongrass, <i>Imperata cylindrica</i> , in the United States. <i>Weed Technology</i> 7: 1005-1009.	<i>I. cylindrica</i> and <i>I. brasiliensis</i> frequently hybridize.
6.04	McDonald, Shilling, Okoli, Bewick, Gordon, Hall, and Smith (1996) Population dynamics of cogongrass, <i>Imperata cylindrica</i> . <i>Proceedings of the Southern Weed Science Society</i> 49: 156.	"...self-pollination never produced seed"
6.05		most grasses wind pollinated
6.06	Dozier, Gaffney, McDonald, Johnson, and Shilling (1998) Cogongrass in the United States: history, ecology, impacts, and management. <i>Weed Technology</i> 12: 737-743.	"Vegetative reproduction is the primary mechanism for survival and local spread"
6.07	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	"The seedlings have no rhizomes for 4 weeks." [Even if not capable of reproduction as soon as rhizomes develop, most likely will be capable of reproduction within 1 year]
7.01	Matlack (2002) Exotic plant species in Mississippi, USA: critical issues in management and research. <i>Natural Areas Journal</i> 22: 241-247.	"Range expansion is probably due to seed dispersal unconsciously facilitated by human activity; highway mowing machines are particularly suspect."
7.02	1. Matlack (2002) Exotic plant species in Mississippi, USA: critical issues in management and research. <i>Natural Areas Journal</i> 22: 241-247. 2. Holm, Plucknett, Pancho, and	1. "The nursery trade is probably also responsible for spreading cogongrass: the species is sold for its attractive seed heads. A supposedly harmless

	Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	horticultural variety known as "red baron" may revert to a virile wild form when cross-bred." 2. " <i>Imperata cylindrica</i> is so highly regarded for thatching that it is planted and tended as a crop in many areas of Asia"
7.03		
7.04	Terry, Adjers, Akobundu, Anoka, Drilling, Tjitrosemito, and Utomo (1997) <i>Herbicides and mechanical control of <i>I. cylindrica</i> as a first step in grassland rehabilitation</i> . <i>Agroforestry Systems</i> 36: 151-179.	" <i>I. cylindrica</i> is a prolific producer of seeds which are dispersed by wind over long distances to colonize cleared or previously uninfested land."
7.05		no evidence
7.06		wind-dispersed grass
7.07		
7.08		wind-dispersed grass
8.01	1. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu. 2. Terry, Adjers, Akobundu, Anoka, Drilling, Tjitrosemito, and Utomo (1997) <i>Herbicides and mechanical control of <i>I. cylindrica</i> as a first step in grassland rehabilitation</i> . <i>Agroforestry Systems</i> 36: 151-179.	1. A single plant can produce 3,000 seeds. 2. " <i>I. cylindrica</i> is a prolific producer of seeds"
8.02	1. Bryson and Carter (1993) <i>Cogongrass, <i>Imperata cylindrica</i>, in the United States</i> . <i>Weed Technology</i> 7: 1005-1009. 2. FAO, <i>Grassland Index</i> ( <a href="http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/Pf000261.HTM">http://www.fao.org/ag/AGP/AGPC/doc/GBASE/data/Pf000261.HTM</a> ). 3. Brook (1989) <i>Review of literature on Imperata cylindrica (L.) Raeuschel with particular reference to South East Asia</i> . <i>Tropical Pest Management</i> 35: 12-25.	1. "Indications are that seed viability is extremely short-lived." 2. "There is no dormancy." But 3. "seeds...remain viable for over 1 year" [no mention of whether in soil or not]
8.03	Dozier, Gaffney, McDonald, Johnson, and Shilling (1998) <i>Cogongrass in the United States: history, ecology, impacts, and management</i> . <i>Weed Technology</i> 12: 737-743.	"Imazapyr and glyphosate are the most effective herbicides for cogongrass control. Younger cogongrass shoots are very susceptible to these herbicides...Some combinations of herbicide, discing, and revegetation with desirable plant species provide excellent control."
8.04	1. Avav (2000) <i>Control of speargrass (<i>Imperata cylindrica</i>) with glyphosphate and fluazifop-butyl for soybean (<i>Glycine max</i>) production in savanna zone of Nigeria</i> . <i>Journal of the Science of Food and Agriculture</i> 80: 193-196. 2. King and Grace (2000) <i>The effects of gap size and</i>	1. "The spread of <i>I. cylindrica</i> in the savanna is favoured by the annual bush fires which stimulate the weed to produce seeds, and by the mechanical cultivation that tends to

	<p>disturbance type on invasion of wet pine savanna by cogongrass, <i>Imperata cylindrica</i> (Poaceaea). American Journal of Botany 87: 1279-1286.</p>	<p>cut rhizomes into pieces which regenerate and rapidly give rise to new infestation." 2. "Tilling...significantly enhanced transplanted seedling growth"</p>
8.05		