

**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>Commelina benghalensis (tropical spiderwort)</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	?	
3.03	Weed of agriculture	y	0
3.04	Environmental weed	n	0
3.05	Congeneric weed	y	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	y	1
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	y	1
4.1	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils)	y	1
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	?	

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	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)		
7.02	Propagules dispersed intentionally by people	n	-1
7.03	Propagules likely to disperse as a produce contaminant	y	1
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	n	-1
7.06	Propagules bird dispersed		
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)		
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	y?	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>17</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	7	yes
B	10	yes
C	18	yes
total	35	yes

Data collected 2006-2007

Question number	Reference	Source data
1.01		no evidence of cultivation
1.02		
1.03		
2.01	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	a weed of the tropics and subtropics
2.02		
2.03	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	very broad distribution throughout Africa, India, Japan, SE Asia, and Australia
2.04	1. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu. 2. Wilson (1981) <i>Commelinaceae - a review of the distribution, biology and control of the important weeds belonging to this family</i> . <i>Tropical Pest Management</i> 27: 405-418.	1. Can be classified as a wetland hydrophyte and grows best with high soil moisture, but can persist in dry soils. 2. " <i>Commelina</i> species are well adapted to moist, perhaps swampy and even water-logged conditions"
2.05	Wagner, Herbst, and Sohmer (1999) <i>Manual of the flowering plants of Hawai'i</i> . University of Hawai'i Press/Bishop Museum Press, Honolulu.	"Native to tropical Asia and Africa, widely naturalized"
3.01	Wagner, Herbst, and Sohmer (1999) <i>Manual of the flowering plants of Hawai'i</i> . University of Hawai'i Press/Bishop Museum Press, Honolulu.	"Native to tropical Asia and Africa, widely naturalized; in Hawaii naturalized in shaded, dry to mesic disturbed sites"
3.02	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	"They are present in...gardens, roadsides, and in waste places." [unclear whether it is intrusive in disturbed areas]
3.03	1. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu. 2. Waterhouse (1997) <i>The major invertebrate pests and weeds of agriculture and plantation forestry in the southern and western Pacific</i> . ACIAR Monograph No. 44, 99p.	1. " <i>Commelina benghalensis</i> is reported as a weed in 25 crops in 28 countries"; "They can become the dominant species in pastures." 2. Considered a major weed of agriculture (vegetables and field crops) in the Pacific.
3.04		no evidence

3.05	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	<i>C. diffusa</i> is reported as a weed in 17 crops in 26 countries.
4.01	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	no description of these traits
4.02		no evidence
4.03	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	no description of this
4.04	1. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu. 2. Kavana, Kizima, and Msanga (2005) Evaluation of grazing pattern and sustainability of feed resources in pastoral areas of eastern zone of Tanzania. <i>Livestock Research for Rural Development</i> 17: article 5.	1. "Although livestock will eat them, these plants have too high a moisture content to be of much forage value." 2. "Other pasture species valued by pastoralists for dry season feeding were <i>Commelina benghalensis</i> , which is considered as water supplier to ruminants..."
4.05	1. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu. 2. Kavana, Kizima, and Msanga (2005) Evaluation of grazing pattern and sustainability of feed resources in pastoral areas of eastern zone of Tanzania. <i>Livestock Research for Rural Development</i> 17: article 5.	1. "Although livestock will eat them, these plants have too high a moisture content to be of much forage value." 2. "Other pasture species valued by pastoralists for dry season feeding were <i>Commelina benghalensis</i> , which is considered as water supplier to ruminants..." [and no evidence of toxicity]
4.06	Wilson (1981) <i>Commelinaceae - a review of the distribution, biology and control of the important weeds belonging to this family</i> . <i>Tropical Pest Management</i> 27: 405-418.	" <i>C. benghalensis</i> is an alternate host of the nematode <i>Meloidogyne incognita</i> and of the groundnut mosaic virus."
4.07	Sankhala et al. (2005) Nutrient composition of less familiar leaves consumed by the tribals of Udaipur region. <i>Journal of Food Science and Technology</i> 42: 446-448.	<i>C. benghalensis</i> is consumed by rural people in India. [and no evidence of toxicity]
4.08		no evidence
4.09	1. Wagner, Herbst, and Sohmer (1999) <i>Manual of the flowering plants of Hawai'i</i> . University of Hawai'i Press/Bishop Museum Press, Honolulu. 2. PIER, Institute of Pacific Islands Forestry ( <a href="http://www.hear.org/pier/species/commelina_benghalensis.htm">http://www.hear.org/pier/species/commelina_benghalensis.htm</a> ).	1. "in Hawaii naturalized in shaded, dry to mesic disturbed sites" 2. "fairly tolerant of shade"
4.1	Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds: Distribution and Biology</i> . The University Press of Hawaii, Honolulu.	<i>C. benghalensis</i> grows "best under conditions of high soil moisture and fertility", but "can persist in sandy or rocky soils - even under fairly dry conditions".
4.11	1. Holm, Plucknett, Pancho, and Herberger (1977) <i>The World's Worst Weeds:</i>	1. "sprawling, creeping habit"; "smothering out other plants" 2.

	Distribution and Biology. The University Press of Hawaii, Honolulu. 2. Walker and Evenson (1985) Biology of <i>Commelina benghalensis</i> L. in south-eastern Queensland. 1. Growth, development and seed production. Weed Research 25: 239-244.	"climbing and sprawling weed"
4.12	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	"The plants form dense, pure stands, smothering out other plants"; stems up to 40 cm long [climbing, but low?]
5.01		terrestrial
5.02	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.	Commelinaceae
5.03	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.	Commelinaceae
5.04	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	no description of bulbs, corms, or tubers, and no depiction of them in drawing
6.01		
6.02	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	reproduces "both by seeds and by stolons"
6.03		
6.04	Walker and Evenson (1985) Biology of <i>Commelina benghalensis</i> L. in south-eastern Queensland. 1. Growth, development and seed production. Weed Research 25: 239-244.	"Although aerial flowers are chasmogamous and underground flowers cleistogamous, both types are bisexual and self-pollinated"
6.05	Hafliiger et al. (1982) Monocot Weeds 3. Monocot Weeds Excluding Grasses. CIBA-GEIGY Ltd., Basel, Switzerland.	"Flowers of Commelinaceae are insect- or self-pollinated, never wind-pollinated."
6.06	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	"rooting at the nodes"; "the plant has white, burrowing rhizomes"; reproduces "both by seeds and by stolons"
6.07	Walker and Evenson (1985) Biology of <i>Commelina benghalensis</i> L. in south-eastern Queensland. 1. Growth, development and seed production. Weed Research 25: 239-244.	Mature aerial fruits developed between 64 and 70 days after emergence, and rhizomes developed by 6 weeks after emergence.
7.01		
7.02		no evidence

7.03	Wilson (1981) Commelinaceae - a review of the distribution, biology and control of the important weeds belonging to this family. Tropical Pest Management 27: 405-418.	"the presence of <i>Commelina</i> seed at a rate of 20 seeds/kg rice reduced the market price of rough rice"
7.04	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	fruit a small capsule
7.05		no evidence
7.06		
7.07	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	no evidence of any means of attachment
7.08		
8.01	Walker and Evenson (1985) Biology of <i>Commelina benghalensis</i> L. in south-eastern Queensland. 1. Growth, development and seed production. Weed Research 25: 239-244.	"Seed production in the field was 8000 m <sup>-2</sup> for plants grown from underground seeds and 12000 m <sup>-2</sup> for plants grown from aerial seeds."
8.02	Walker and Evenson (1985) Biology of <i>Commelina benghalensis</i> L. in south-eastern Queensland. 2. Seed dormancy, germination and emergence. Weed Research 25: 245-250.	Small aerial seeds exhibited very strong dormancy, while large aerial and small underground seeds showed strong dormancy. Dormancy probably due to a hard seed coat. [no numbers on seed germination after a year in the soil]
8.03	Wilson (1981) Commelinaceae - a review of the distribution, biology and control of the important weeds belonging to this family. Tropical Pest Management 27: 405-418.	"Bentazone applied as an early post-emergence treatment, either alone or in mixtures is one of the most successful herbicides in controlling <i>Commelina</i> species."
8.04	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	"Cultivation may cut or injure these weeds, but stem cuttings may lie for several days to several weeks on the soil surface, finally to revive, take root, and grow again."
8.05		