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.

Bidens pilosa (Spanish needles)			
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		
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	n	0
4.02	Allelopathic	y	1
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	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	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		
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	n	-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	n	-1
7.04	Propagules adapted to wind dispersal		
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)	y	1
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)	y?	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		
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	7	yes
B	11	yes
C	18	yes
total	36	yes

Data collected 2006-2007

Question number	Reference	Source data
1.01		no evidence of cultivation
1.02		
1.03		
2.01	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"*B. pilosa* originates from tropical America but is now distributed and naturalized as a weed in most tropical and subtropical regions of the world, even sometimes extending into some temperate areas."
2.02		
2.03	1. Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys	1. "*B. pilosa* originates from tropical America but is now distributed and naturalized as a

	Publishers, Leiden. 2. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	weed in most tropical and subtropical regions of the world, even sometimes extending into some temperate areas." 2. "*Bidens pilosa* ia an annual which originated in tropical America but is now spread throughout the warm regions of the world."
2.04		
2.05	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"*B. pilosa* originates from tropical America but is now distributed and naturalized as a weed in most tropical and subtropical regions of the world".
3.01	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"*B. pilosa* originates from tropical America but is now distributed and naturalized as a weed in most tropical and subtropical regions of the world".
3.02	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"*B. pilosa* is a very common weed of sunny, often disturbed places like roadsides, fields, thickets and along watercourses".
3.03	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	*B. pilosa* "is reported to be a weed of 31 crops in more than 40 countries".
3.04	1. Weber (2003) Invasive Plant Species of the World. CABI Publishing. 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.	1. Considered an environmental weed in southern Africa and Australia - invades grassland, heathland, and forests. 2. *B. pilosa* considered one of 84 important environmental weeds in southern Africa; invades forest, grassland, and savanna.
3.05	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.	*B. bipinnata* considered one of 84 important environmental weeds in southern Africa.
4.01	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	no description of these traits
4.02	Ishimine, Nakama, and Matsumoto (1987) Allelopathic potential of *Paspalum urvillei* STEUD., *Bidens pilosa* L. var. *radiata* SCHERFF., and *Stellaria*	"In greenhouse trials, the plant height, DW and leaf number of *Phaseolus vulgaris* were

	aquatica SCOP., dominant weeds in sugarcane fields in the Ryukyu Islands. Weed Research, Japan 32: 274-281.	significantly reduced by exudates of…*Bidens pilosa*…Exudates of...*B. pilosa* significantly reduced the top DW of squash…*B. pilosa* exudates reduced top DW of radishes and root DW of tomatoes."
4.03	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	no description of this
4.04	1. Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden. 2. Swarbrick (1997) in PIER, Institute of Pacific Islands Forestry (http://www.hear.org/pier/species/bidens_pilosa.htm).	1. "*B. pilosa* is readily browsed by domestic livestock, including poultry, and is sometimes used as a fodder." [nothing about control] 2. unpalatable to stock
4.05	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"*B. pilosa* is readily browsed by domestic livestock, including poultry, and is sometimes used as a fodder." [and no evidence of toxicity]
4.06	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	*B. pilosa* is an alternate host of several fungi, nematodes, and viruses, including those that cause spotted wilt, ground rosette, and aster yellows.
4.07	1. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu. 2. Morton (1962) Spanish needles (*Bidens pilosa* L.) as a wild food resource. Economic Botany 16: 173-179.	1. "The leaves are sometimes used for human food in either fresh or dry form." 2. "Martinez states that it is nontoxic (20) to humans".
4.08		no evidence
4.09	1. Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden. 2. Swarbrick (1997) in PIER, Institute of Pacific Islands Forestry (http://www.hear.org/pier/species/bidens_pilosa.htm).	1. "They [South-East Asian *Bidens* species] prefer sunny to slightly shaded places". 2. Does best in full sun - can be controlled by competition from leafy crops.
4.1	Swarbrick (1997) in PIER, Institute of Pacific Islands Forestry (http://www.hear.org/pier/species/bidens_pilosa.htm).	Does best in relatively dry, infertile soil.
4.11	1. 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. 2. Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	1. growth habit: forb/herb 2. "*B. pilosa* is an annual, erect herb"
4.12	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	"In natural areas, it may form dense stands that cover large

		areas and eliminate native vegetation". [but is an herb]
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.	Asteraceae
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.	herbaceous Asteraceae
5.04	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	Illustration shows fibrous roots.
6.01		
6.02	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"seed viability is high"
6.03		
6.04	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"plants are self-fertile"
6.05	1. Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden. 2. Morton (1962) Spanish needles (*Bidens pilosa* L.) as a wild food resource. Economic Botany 16: 173-179.	1. "The flowers are rich in nectar which yields a high-quality, reddish honey." [so must be pollinated by bees] 2. "it has value as a source of nectar for honeybees"
6.06		annual, and no evidence of vegetative reproduction
6.07	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	annual; it is "possible to have three to four generations per year in some areas"
7.01		
7.02	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	no commercial use
7.03		no evidence
7.04	Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu.	achene wingless
7.05	PIER, Institute of Pacific Islands Forestry (http://www.hear.org/pier/species/bidens_pilosa.htm).	"Also dispersed by water."
7.06	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.	Birds not listed as a main dispersal agent of *B. pilosa*.
7.07	Padua, Bunyapraphatsara, and Lemmens, eds. (1999) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 1. Backhuys Publishers, Leiden.	"The seed is easily distributed by animals and people because of the barbed bristles of the pappus which adhere to fur or to

		clothes."
7.08		externally dispersed
8.01	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	"Single plants have yielded 3,000 to 6,000 seeds."
8.02	Holm, Plucknett, Pancho, and Herberger (1977) The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu.	"Seeds which are 3 to 5 years old may give 80-percent gemrination" [unclear whether in soil or dry storage, but very high percentage]
8.03	Swarbrick (1997) in PIER, Institute of Pacific Islands Forestry (http://www.hear.org/pier/species/bidens_pilosa.htm).	"Susceptible to: 1) residual herbicides, including diuron, bromacil, atrazine, simazine, ropazine, hexazinone, oryzalin and ametryn at standard rates; 2) translocated herbicides, including 2,4-D, glyphosate, amitrole, metribuzin and dicamba at standard rates; 3) contact herbicides including bentazone, diquat and paraquat at standard rates. Probably susceptible to most herbicides suitable for controlling broad-leaved plants."
8.04		
8.05		