

Taxon: <i>Sida spinosa</i> L.	Family: Malvaceae
Common Name(s): prickly mallow prickly sida spiny sida	Synonym(s): <i>Sida alba</i> L.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 3 May 2019
WRA Score: 15.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Annual Herb, Crop Weed, Shade Tolerant, Self-Compatible, Externally Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed		
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	y
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	n
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Native to tropical America, a morphologically variable species of disturbed areas, now widely naturalized in tropical and warm temperate regions worldwide"

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to tropical America, a morphologically variable species of disturbed areas, now widely naturalized in tropical and warm temperate regions worldwide"

202	Quality of climate match data	High
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Flora of North America. (2019). <i>Sida spinosa</i> . http://www.efloras.org . [Accessed 2 May 2019]	[Broad distribution and elevation range] "Flowering year-round in warmer areas, summer elsewhere. Roadsides, pastures, disturbed ground; 0–1500 m; Ont.; Ala., Ariz., Ark., D.C., Fla., Ga., Ill., Ind., Iowa, Kans., Ky., La., Md., Mass., Mich., Miss., Mo., Nebr., N.J., N.C., Ohio, Okla., Pa., S.C., Tenn., Tex., Va., W.Va.; Mexico; West Indies; Central America; South America."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to tropical America, a morphologically variable species of disturbed areas, now widely naturalized in tropical and warm temperate regions worldwide; in Hawai'i naturalized in Honolulu and vicinity as well as in the Wai'anae Mountains, O'ahu, Kohala District, Hawai'i, and possibly other of the main islands."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to tropical America, a morphologically variable species of disturbed areas, now widely naturalized in tropical and warm temperate regions worldwide"

301	Naturalized beyond native range	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to tropical America, a morphologically variable species of disturbed areas, now widely naturalized in tropical and warm temperate regions worldwide; in Hawai'i naturalized in Honolulu and vicinity as well as in the Wai'anae Mountains, O'ahu, Kohala District, Hawai'i, and possibly other of the main islands. Naturalized prior to 1871 (Hillebrand, 1888), and detected first by Hillebrand on O'ahu."
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 1 May 2019]	"Naturalized Africa NORTHERN AFRICA: Egypt Asia-Temperate ARABIAN PENINSULA: Oman, Saudi Arabia, United Arab Emirates, Yemen WESTERN ASIA: Iran CAUCASUS: Georgia EASTERN ASIA: Japan Asia-Tropical INDIAN SUBCONTINENT: Bhutan, India, Pakistan INDO-CHINA: Myanmar Europe MIDDLE EUROPE: Czech Republic EASTERN EUROPE: Lithuania, Moldova Northern America EASTERN CANADA: Canada [Ontario] NORTH-CENTRAL U.S.A.: United States [Missouri] Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii] NORTHWESTERN PACIFIC: Micronesia, United States [Northern Mariana Islands] SOUTH-CENTRAL PACIFIC: French Polynesia SOUTHWESTERN PACIFIC: Nauru, New Caledonia, Tonga"
	Staples, G.W., Imada, C.T., & Herbst, D.R. 2002. New Hawaiian plant records for 2000. Bishop Museum Occasional Papers 68: 3-18	"Previously reported to be naturalized on O'ahu and the Big Island (Wagner et al., 1990) and subsequently discovered on Kaua'i (Lorence et al., 1995) and Maui (Oppenheimer et al., 1999), this is the first documentation for <i>S. spinosa</i> on Lāna'i. Material examined. LĀNA'I: a weed at the airport, 7 Jul 1986, R. Hobby 2577."

Qsn #	Question	Answer
	Oppenheimer, H.. 2007. New plant records from Moloka'i, Lāna'i, Maui, and Hawai'i for 2006. Bishop Museum Occasional Papers 96:17-34	"Prickly sida was previously known from the islands of Kaua'i, O'ahu, Lāna'i, Maui, and Hawai'i (Wagner et al. 1999: 899; Lorence & Flynn 1997: 10–11; Oppenheimer et al. 1999: 8–9; Staples et al. 2002: 12–13). It was recently collected on Moloka'i, where it is widespread. Material examined. MOLOKA'I: Moloka'i FR, in yard of barracks, 640 m, 17 May 2006, Oppenheimer, Tangalin, & Perlman H50640; Pūniu'ōhua 1, 30 m, occasional to locally common in dry pastures, roadsides, and waste areas, 10 Aug 2006, Oppenheimer H80612 (BISH); Keāina Gulch, 80 m, locally common in pasture, 9 Dec 2006, Oppenheimer H120628."
	Lorence, D. & Flynn, T. 1997. New Naturalized Plant Records for Kaua'i. Bishop Museum Occasional Papers 49: 9-13	"The following collections represent a new island record for Kaua'i. <i>Sida spinosa</i> is also naturalized on Hawai'i and O'ahu. Material examined. KAUA'I: Waimea District, Public Hunting Area #1 above Waimea; along road just off of Waimea Canyon Drive, 1 Apr 1985, Flynn 1047 (PTBG); Mana, Lio Road at boundary of the Pacific Missile Range Facility (Barking Sands), elev. ca 30 ft [9 m]; weedy roadside vegetation with <i>Boerhavia coccinea</i> and <i>Cenchrus ciliaris</i> , 23 Mar 1996, Flynn & Fosberg 3296 (PTBG); Hanapepe, Port Allen, just north of Burns Field [airport] at junction of Lokokai Road and Lele Road; secondary vegetation dominated by <i>Cenchrus ciliaris</i> , with <i>Eragrostis</i> , <i>Eleusine</i> , and <i>Echinochloa</i> , ca. 35 ft [11 m], 11 Jan 1996, Flynn 5927 (PTBG)."
	Oppenheimer, H. L., Meidell, J. S., Bartlett, R. T. 1999. New plant records for Maui and Moloka'i. Bishop Museum Occasional Papers. 59: 7-11	"Wagner et al. (1990: 899) reported this species from O'ahu, Hawai'i and possibly other islands. Lorence & Flynn (in Evenhuis & Miller, 1997b: 10–11) later reported it from Kaua'i. The following collections document its occurrence on Maui. Material examined. MAUI: West Maui, Lahaina District, in an open field at Alaeloa, north of Ka'ōpala Gulch, 67 m, 15 Jul 1998, Oppenheimer H79809; North of Honokowai Valley, along a dirt road near pineapple fields, 244 m, 5 Aug 1998, Oppenheimer H89804."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Habitat: Thrives in hot, dry regions at lower elevations. A weed in pastures, cultivated areas, and wastelands."
	Queensland Government. (2019). Weeds of Australia. <i>Sida spinosa</i> . http://keyserver.lucidcentral.org . [Accessed 2 May 2019]	"Spiny sida (<i>Sida spinosa</i>) is a widespread weed of crops, pastures, roadsides, disturbed sites and waste areas in northern Australia, but also grows in grasslands, open woodlands and in riparian areas."

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Vanangamudi, K., Bhaskaran, M., Balavidhya, S. & Arthanari, M. (2013). Weed Seed Biology. Scientific Publishers, Jodhpur	"Effects on crop production : All agricultural cultivated land may be infested by <i>Sida spinosa</i> , especially cotton and soybean fields, as well as pastures, meadows and uncultivated land. <i>Sida spinosa</i> is an annual weed, reproducing by seeds, which strongly competes with crops for water and nutrients. It can seriously reduce the yield and quality of harvested cereals and other field crops. In pastures, the weed replaces other herbaceous plants, reducing the quality of pasturage."

Qsn #	Question	Answer
	Grichar, W. J., Lemon, R. G., Dotray, P. A., & Besler, B. A. (2004). Control of problem weeds and net returns with herbicide programs in peanut (<i>Arachis hypogaea</i> L.). In <i>Weed Biology and Management</i> (pp. 485-515). Springer, Dordrecht	"Prickly sida (<i>Sida spinosa</i> L.) is mainly a problem in the southeastern peanut growing region. Prickly sida is listed as a troublesome weed in five peanut-producing states of the U.S. (Dowler, 1998). Bentazon and imazethapyr POST will control prickly sida when applied to small sized plants (Wilcut et al., 1994b; York et al., 1995), but if larger than two-leaf, imazethapyr POST is ineffective (Wilcut et al., 1991a, 1994b). Wilcut et al. (1991a) noted that imazapic controlled at least 95% five-leaf prickly sida."
	Queensland Government. (2019). Weeds of Australia. <i>Sida spinosa</i> . http://keyserver.lucidcentral.org . [Accessed 2 May 2019]	"Spiny sida (<i>Sida spinosa</i>) is a widespread weed of crops, pastures, roadsides, disturbed sites and waste areas in northern Australia, but also grows in grasslands, open woodlands and in riparian areas. It is often regarded as an environmental weed in Queensland, particularly in the rangeland areas of central and northern Queensland."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. <i>Handbook of Hawaiian Weeds</i> . University of Hawaii Press, Honolulu, HI	"Thrives in hot, dry regions at lower elevations. A weed in pastures, cultivated areas, and waste lands."

304	Environmental weed	
	Source(s)	Notes
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. <i>Handbook of Hawaiian Weeds</i> . University of Hawaii Press, Honolulu, HI	"Habitat: Thrives in hot, dry regions at lower elevations. A weed in pastures, cultivated areas, and wastelands." [Primarily a weed of low elevation, disturbed habitats]
	Queensland Government. (2019). Weeds of Australia. <i>Sida spinosa</i> . http://keyserver.lucidcentral.org . [Accessed 2 May 2019]	"Spiny sida (<i>Sida spinosa</i>) is a widespread weed of crops, pastures, roadsides, disturbed sites and waste areas in northern Australia, but also grows in grasslands, open woodlands and in riparian areas. It is often regarded as an environmental weed in Queensland, particularly in the rangeland areas of central and northern Queensland."

305	Congeneric weed	y
	Source(s)	Notes
	Parsons, W.T. & Cuthbertson, E.G. 2001. <i>Noxious Weeds of Australia</i> . Second Edition. CSIRO Publishing, Collingwood, Australia	"This deep-rooted plant competes strongly with crops and pastures for light and nutrients. It is a serious weed of several crops, ranging from onions and beans in Brazil to coffee in Colombia, coconuts in Trinidad, rubber in Malaysia, pastures in the Markham Valley of Papua New Guinea, and sugarcane and pastures in Australia. Together with flannel weed (see page 511), spinyhead sida has become one of the most serious weeds of crops and pastures in the Top End of the Northern Territory. Although it is grazed occasionally, infested areas are usually ignored by stock. In consequence, the animals eating more of the remaining species, reduce their competitiveness and favour the spread and persistence of the weed."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	A number of <i>Sida</i> species are listed as invasive weeds

401	Produces spines, thorns or burrs	n
-----	----------------------------------	---

Qsn #	Question	Answer
	Source(s)	Notes
	Flora of North America. (2019). <i>Sida spinosa</i> . http://www.efloras.org . [Accessed 1 May 2019]	"A small spur sometimes is present on the abaxial side of the petiole at the juncture with the stem, to which the specific epithet refers. It is not a spine and occasionally is absent."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Erect annual or perennial herbs 0.5-0.8 m tall, copiously but minutely stellate puberulent, eventually glabrate. Leaf blades linear to narrowly oblong or ovate, 1-5 cm long, margins serrate to crenate, base obtuse to truncate, petioles usually 1/2 or less the length of blades, stipules filiform, 2-5 mm long, each subtended by a short tubercle."

402	Allelopathic	y
	Source(s)	Notes
	Pope, D. F., Thompson, A. C., & Cole, A. W. (1985). Phytotoxicity of root exudates and leaf extracts of nine plant species. Pp. 219-234 in Thompson (ed.) The Chemistry of Allelopathy. American Chemical Society, Washington, D.C.	"Root exudate oleracea L.), prickly sida [<i>Sida spinosa</i> L.], johnsongrass [<i>Sorghum halapense</i> (L.) Pers.], bahiagrass [<i>Paspalum notatum</i> Flugge 'Pensacola'], cotton [<i>Gossypium hirsutum</i> L. 'Stoneville 213'], soybean [<i>Glycine max</i> (L.) Merr. 'Bragg'], cogongrass [<i>Imperata cylindrica</i> (L.) Beauv.], lantana [<i>Lantana camara</i> L.] and Illinois bundleflower [<i>Desmanthus illinoensis</i> (Michx.) MacMill. Ex B. L. Robins] were tested for phytotoxicity in germination, root growth and height growth bioassays. Root exudates of common purslane, prickly sida, johnsongrass, bahiagrass and lantana significantly slowed soybean height increase. Prickly sida root exudate reduced radish (<i>Raphanus sativus</i> L. 'Champion') and tomato (<i>Lycopersicon esculentum</i> Miller 'Homestead 24') root growth. Root exudates of soybean, johnsongrass, cogongrass and prickly sida reduced 24 hour beet (<i>Beta vulgaris</i> L. 'Asgrow Wonder') germination. Bahiagrass, soybean, cotton, prickly sida and johnsongrass root exudates reduced 48, 72 and 96 hour okra (<i>Abelmoschus esculentus</i> L. 'Clemson Spineless') germination. Leaf extracts of cogongrass, soybean, johnsongrass and Illinois bundleflower reduced tomato root growth."

403	Parasitic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Erect annual or perennial herbs 0.5-0.8 m tall, copiously but minutely stellate puberulent, eventually glabrate." [Malvaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Bosworth, S. C., Hoveland, C. S., Buchanan, G. A., & Anthony, W. B. (1980). Forage Quality of selected Warm-Season Weed Species. <i>Agronomy Journal</i> , 72(6), 1050-1054	"Examples of less palatable weeds in this study would probably include sicklepod, coffee senna, hemp sesbania, prickly sida, and jimsonweed. However, many of these species may be incorporated in hay or silage and still offer a high nutrition level."

Qsn #	Question	Answer
	Bowers, M. (1993). Influence of Herbivorous Mammals on an Old-Field Plant Community: Years 1-4 after Disturbance. <i>Oikos</i> , 67(1), 129-141	"Plants increasing with herbivore pressure (most notably, <i>C. scandens</i> , but also <i>Sida spinosa</i> , <i>Acalypha rhomboidea</i> , and <i>Cerastium vulgatum</i>), are less palatable, slower growing, low growing or prostrate species that are probably poorer competitors relative to many species in the community."
	Hilty, J. (2017). Weedy Wildflowers of Illinois - <i>Sida spinosa</i> (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"The foliage is not known to be toxic and it may be eaten occasionally by mammalian herbivores."
	Huff, S. & Rhodes, Jr., G. N. (2017). Arrowleaf Sida/Prickly Sida. D 51. University of Tennessee Institute of Agriculture, Knoxville, TN. http://utbfc.utk.edu . [Accessed]	[Suggests Arrowleaf Sida, <i>Sida rhombifolia</i> and Prickly Sida, <i>Sida spinosa</i> , are relatively unpalatable since they thrive in actively grazed areas] "Both weeds are common in areas of pastures where grass is lacking or thin due to over- grazing or heavy animal traffic. They will show up along field roads through pastures and hay fields and around feeding areas and areas where cattle spend much time resting. Thin stands of grass provide little competition, thus allowing the weeds to flourish. Both species are often problematic in horse pastures, which are often over- grazed (Fig. 5)."

405	Toxic to animals	n
	Source(s)	Notes
	Hilty, J. (2017). Weedy Wildflowers of Illinois - <i>Sida spinosa</i> (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"The foliage is not known to be toxic and it may be eaten occasionally by mammalian herbivores."
	Bryson, C.T.& DeFelice, M.S. 2009. Weeds of the South. University of Georgia Press, Athens, GA	"Toxic Properties None reported."

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Bryson, C.T.& DeFelice, M.S. 2009. Weeds of the South. University of Georgia Press, Athens, GA	"Toxic Properties None reported."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Possibly if seeds are consumed. Probably unlikely] "Seed poisonous if ingested. Decoction of roots for infantile diarrhea, fever, diaphoretic. Root and root bark used in debility and fever, irritability of bladder, genital disorders; powdered rootbark mixed with sugar and taken with milk as a sexual tonic. Leaves demulcent and refrigerant, diaphoretic, diuretic, emollient, stomachic, tonic, used in gonorrhoea, for venomous stings, bites, diarrhea, and to stop early graying of hair."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes

Qsn #	Question	Answer
	Vanangamudi, K., Bhaskaran, M., Balavidhya, S. & Arthanari, M. (2013). Weed Seed Biology. Scientific Publishers, Jodhpur	[Not considered a fire risk. Fire hazard not listed among impacts] "Sida spinosa is an annual weed, reproducing by seeds, which strongly competes with crops for water and nutrients. It can seriously reduce the yield and quality of harvested cereals and other field crops. In pastures, the weed replaces other herbaceous plants, reducing the quality of pasturage."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Copes, J. T. (2016). Prickly Sida (<i>Sida spinosa</i> L.): Biology and In-Crop and Post-Harvest Management Programs. PhD Dissertation. Louisiana State University, Baton Rouge, Louisiana	"In shade studies, prickly sida was able to emerge and persist under a heavy shade environment and to produce a significant amount of seed when exposed to both increasing and decreasing shade levels as the growing season progressed. Under a season-long 30% shade environment, around 3,000 prickly sida seed were produced per plant. With exposure to 90% shade in the early season followed by a gradual decrease in shade to full sun, total seed production was around 8,100 seed per plant."
	Hilty, J. (2017). Weedy Wildflowers of Illinois - <i>Sida spinosa</i> (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"Typical growing conditions are full or partial sun and moist to mesic soil that is loamy and fertile."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Hilty, J. (2017). Weedy Wildflowers of Illinois - <i>Sida spinosa</i> (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"Typical growing conditions are full or partial sun and moist to mesic soil that is loamy and fertile."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Soil requirements unknown, but probably not likely to be limited by substrate] "in Hawai'i naturalized in Honolulu and vicinity as well as in the Wai'anae Mountains, O'ahu, Kohala District, Hawai'i, and possibly other of the main islands. Naturalized prior to 1871 (Hillebrand, 1888), and detected first by Hillebrand on O'ahu."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Erect annual or perennial herbs 0.5-0.8 m tall, copiously but minutely stellate puberulent, eventually glabrate."

Qsn #	Question	Answer
412	Forms dense thickets	n
	Source(s)	Notes
	Hilty, J. (2017). Weedy Wildflowers of Illinois - <i>Sida spinosa</i> (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"This plant spreads by reseeding itself, and it occasionally forms colonies." [A typically annual, sometimes perennial herb, so unlikely to permanently exclude other vegetation]
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Thrives in hot, dry regions at lower elevations. A weed in pastures, cultivated areas, and wastelands." [No evidence that dense stands are formed]
501	Aquatic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Erect annual or perennial herbs 0.5-0.8 m tall, copiously but minutely stellate puberulent, eventually glabrate."
	Flora of North America. (2019). <i>Sida spinosa</i> . http://www.efloras.org . [Accessed 1 May 2019]	[Terrestrial] "Roadsides, pastures, disturbed ground; 0–1500 m"
502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 1 May 2019]	Family: Malvaceae Subfamily: Malvoideae Tribe: Malveae
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 1 May 2019]	Family: Malvaceae Subfamily: Malvoideae Tribe: Malveae
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Erect annual or perennial herbs 0.5-0.8 m tall, copiously but minutely stellate puberulent, eventually glabrate."
	KarensGardenTips.com. (2013). Weeds and Their Control: Prickly Sida (<i>Sida spinosa</i>). http://www.karensgardentips.com . [Accessed 1 May 2019]	"The root system consists of a shallow taproot with fibrous secondary roots."
601	Evidence of substantial reproductive failure in native habitat	n

Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Native to tropical America, a morphologically variable species of disturbed areas, now widely naturalized in tropical and warm temperate regions worldwide;"

602	Produces viable seed	y
	Source(s)	Notes
	Vanangamudi, K., Bhaskaran, M., Balavidhya, S. & Arthanari, M. (2013). Weed Seed Biology. Scientific Publishers, Jodhpur	"Propagation : By seeds" ... "Seeds of buried for 3.5 years showed 21 % viability (Egley and Chandler, 1983)." ... "Sida spinosa is an annual weed, reproducing by seeds, which strongly competes with crops for water and nutrients."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Propagation: By seed."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Harms, V. (1965). Some Observations on the Breeding System of <i>Sida spinosa</i> (Malvaceae). Transactions of the Kansas Academy of Science (1903-), 68(1), 122-124	"Flower bagging tests for self-fertility revealed that plants of this species were self-compatible. The white-flowered plant open-pollinated in a population of normal yellow-flowered individuals, produced mostly white-flowered offspring (120 white; 3 yellow). The white-petalled plants, when selfed, produced like progeny through four generations. The selfed yellow-flowered offspring of the original white-flowered plant produced 194 yellow- and 54 white-flowered offspring. Attempts to artificially pollinate white-flowered greenhouse plants with pollen from yellow-flowers gave white-flowered offspring but a few had yellow petals. When four such yellow-flowered plants were selfed, their progenies revealed yellow- to white-flowered individuals in the ratios of 52:24, 88:31, 102:27 and 57:12, respectively."

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Hilty, J. (2017). Weedy Wildflowers of Illinois - <i>Sida spinosa</i> (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"The flowers attract various bees, including bumblebees, little carpenter bees, and Halictid bees, as well as small to medium-sized butterflies and skippers. Charles Robertson observed the following Lepidopteran species on the flowers of Prickly Sida: <i>Colias philodice</i> (Clouded Sulfur), <i>Eurema lisa</i> (Little Yellow), <i>Pieris rapae</i> (Cabbage White), <i>Pontia protodice</i> (Checkered White), and <i>Pyrgus communis</i> (Common Checkered Skipper)."
	Harms, V. (1965). Some Observations on the Breeding System of <i>Sida spinosa</i> (Malvaceae). <i>Transactions of the Kansas Academy of Science</i> (1903-), 68(1), 122-124	"When outcrossing does occur in nature, pollination is probably accomplished by insects."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Vanangamudi, K., Bhaskaran, M., Balavidhya, S. & Arthanari, M. (2013). <i>Weed Seed Biology</i> . Scientific Publishers, Jodhpur	" <i>Sida spinosa</i> is an annual weed, reproducing by seeds, which strongly competes with crops for water and nutrients."

607	Minimum generative time (years)	1
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. <i>Manual of the flowering plants of Hawaii</i> . Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Erect annual or perennial herbs 0.5-0.8 m tall, copiously but minutely stellate puberulent, eventually glabrate."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Cattle, Livestock, Sheep, Vehicles, Escapee"
	Hilty, J. (2017). Weedy Wildflowers of Illinois - <i>Sida spinosa</i> (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"The foliage is not known to be toxic and it may be eaten occasionally by mammalian herbivores. These animals help to distribute the seeds as the spines on the segments of the seedpods can cling to either fur or clothing."

702	Propagules dispersed intentionally by people	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. <i>Manual of the flowering plants of Hawaii</i> . Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Long history of naturalization. No current evidence of intentional cultivation or dissemination] "in Hawai'i naturalized in Honolulu and vicinity as well as in the Wai'anae Mountains, O'ahu, Kohala District, Hawai'i, and possibly other of the main islands. Naturalized prior to 1871 (Hillebrand, 1888), and detected first by Hillebrand on O'ahu."

703	Propagules likely to disperse as a produce contaminant	y
-----	--	---

Qsn #	Question	Answer
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Herbal, Ornamental"
	Vanangamudi, K., Bhaskaran, M., Balavidhya, S. & Arthanari, M. (2013). Weed Seed Biology. Scientific Publishers, Jodhpur	"Seeds are also carried with harvested seeds of many crops, grain and hay, but also with other plant products."
	Norsworthy, J. K., Smith, K. L., Steckel, L. E., & Koger, C. H. (2009). Weed seed contamination of cotton gin trash. Weed Technology, 23(4), 574-580	"Viable seeds of barnyardgrass, large crabgrass, Palmer amaranth, and prickly sida were present in the surface layer (0- to 25-cm depth) of gin trash piles after 1 yr of composting."

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Cattle, Livestock, Sheep, Vehicles, Escapee"
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Mericarps 5, 3-4 mm long, grading apically into 2 antrorsely pubescent awns 0.5-1.5 mm long, lower dorsal and lateral walls strongly reticulate, apical surfaces smooth, puberulent. Seeds ca. 1.5 mm long, glabrous or with a few hairs around the hilum." [No adaptations for wind dispersal]

705	Propagules water dispersed	n
	Source(s)	Notes
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. The Journal of Ecology, 79(3): 811-828	"APPENDIX Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [Sida spinose - Dispersal = adhesive (AD)]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Hilty, J. (2017). Weedy Wildflowers of Illinois - Sida spinosa (Prickly Sida). http://www.illinoiswildflowers.info . [Accessed 3 May 2019]	"The foliage is not known to be toxic and it may be eaten occasionally by mammalian herbivores. These animals help to distribute the seeds as the spines on the segments of the seedpods can cling to either fur or clothing." [Possibly externally dispersed by birds, but no evidence of internal dispersal]
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Not fleshy-fruited] "Mericarps 5, 3-4 mm long, grading apically into 2 antrorsely pubescent awns 0.5-1.5 mm long, lower dorsal and lateral walls strongly reticulate, apical surfaces smooth, puberulent. Seeds ca. 1.5 mm long, glabrous or with a few hairs around the hilum."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Vanangamudi, K., Bhaskaran, M., Balavidhya, S. & Arthanari, M. (2013). Weed Seed Biology. Scientific Publishers, Jodhpur	"Animals help to distribute the seeds as the spines on the segments"

Qsn #	Question	Answer
708	Propagules survive passage through the gut	
	Source(s)	Notes
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. <i>The Journal of Ecology</i> , 79(3): 811-828	"APPENDIX Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [<i>Sida spinosa</i> - Dispersal = adhesive (AD)]
	Blake, S. et al. (2012). Seed dispersal by Galápagos tortoises. <i>Journal of Biogeography</i> , 39(11), 1961-1972	"Table 1 Summary data indicating the frequency of occurrence of intact seeds in dung piles of tortoises (<i>Chelonoidis nigra</i>) found in farmland and in the Galapagos National Park on the island of Santa Cruz." [<i>Sida spinosa</i> seeds found in s small percentage of dung piles. Viability unspecified]
	WRA Specialist. (2019). Personal Communication	Possible in some circumstances, but primarily dispersed externally by adhering to fur or clothings

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Mericarps 5, 3-4 mm long, grading apically into 2 antrorsely pubescent awns 0.5-1.5 mm long, lower dorsal and lateral walls strongly reticulate, apical surfaces smooth, puberulent. Seeds ca. 1.5 mm long, glabrous or with a few hairs around the hilum." [fruit a schizocarp with 5 1-seeded mericarps. Densities in Hawaii unknown]
	Schwartz, L. M., et al. (2015). Seedbank and field emergence of weeds in glyphosate-resistant cropping systems in the United States. <i>Weed Science</i> , 63(2), 425-439	"The ten most frequent weed species represented in the soil seedbank over all sites were carpetweed (44% of 150 sites, 265 seeds m-2), purslane speedwell (<i>Veronica peregrina</i> L.) (34%, 199 seeds per m-2), prickly sida (<i>Sida spinosa</i> L.) (32%, 66 seeds m-2),..."
	Copes, J. T. (2016). Prickly Sida (<i>Sida spinosa</i> L.): Biology and In-Crop and Post-Harvest Management Programs. PhD Dissertation. Louisiana State University, Baton Rouge, Louisiana	"Under a season-long 30% shade environment, around 3,000 prickly sida seed were produced per plant. With exposure to 90% shade in the early season followed by a gradual decrease in shade to full sun, total seed production was around 8,100 seed per plant."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Vanangamudi, K., Bhaskaran, M., Balavidhya, S. & Arthanari, M. (2013). <i>Weed Seed Biology</i> . Scientific Publishers, Jodhpur	"Seeds buried for 3.5 years showed 21 % viability (Egley and Chandler, 1983)."
	Egley, G. H., & Chandler, J. M. (1983). Longevity of weed seeds after 5.5 years in the Stoneville 50-year buried-seed study. <i>Weed Science</i> , 31(2), 264-270	"Table 2. Percentage of original population of weed seeds germinating and still viable after burial for 3 .5 to 5 .5 yr." [Prickly sida - A small percentage of seeds continue to germinate after 5.5 years]

803	Well controlled by herbicides	y
	Source(s)	Notes

Qsn #	Question	Answer
	Huff, S. & Rhodes, Jr., G. N. (2017). Arrowleaf Sida/Prickly Sida. D 51. University of Tennessee Institute of Agriculture, Knoxville, TN. http://utbfc.utk.edu . [Accessed 3 May 2019]	"Timely herbicide applications are required to effectively control arrowleaf and prickly sida. To be adequately controlled, they must be sprayed before exceeding 3 inches tall. Few herbicides provide good control of arrowleaf/prickly sida. A herbicide containing aminopyralid such as ForeFront R&P HL / GrazonNext HL (aminopyralid + 2,4-D) or Chaparral (aminopyralid + metsulfuron) is required for adequate control."
	Grichar, W. J., Lemon, R. G., Dotray, P. A., & Besler, B. A. (2004). Control of problem weeds and net returns with herbicide programs in peanut (<i>Arachis hypogaea L.</i>). In <i>Weed Biology and Management</i> (pp. 485-515). Springer, Dordrecht	[Certain herbicides are effective] "Prickly sida (<i>Sida spinosa L.</i>) is mainly a problem in the southeastern peanut growing region. Prickly sida is listed as a troublesome weed in five peanut-producing states of the U.S. (Dowler, 1998). Bentazon and imazethapyr POST will control prickly sida when applied to small sized plants (Wilcut et al., 1994b; York et al., 1995), but if larger than two-leaf, imazethapyr POST is ineffective (Wilcut et al., 1991a, 1994b). Wilcut et al. (1991a) noted that imazapic controlled at least 95% five-leaf prickly sida. The dinitroaniline herbicides do not control prickly sida (Wilcut et al., 1995a). However, when diclosulam was added to ethalfluralin PPI, prickly sida was controlled at least 95% (Bailey et al., 1999a,b). Bailey et al. (1999b) reported that POST herbicides did not improve prickly sida control over ethalfluralin applied PPI followed by diclosulam applied PRE. Prickly sida was controlled less than 60% with POST herbicides when ethalfluralin was the only soil applied herbicide in the system."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown. Herbicides have been identified which effectively control this species

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown, but unlikely. No limiting factors appear to have prevented its spread throughout the islands] "in Hawai'i naturalized in Honolulu and vicinity as well as in the Wai'anae Mountains, O'ahu, Kohala District, Hawai'i, and possibly other of the main islands. Naturalized prior to 1871 (Hillebrand, 1888), and detected first by Hillebrand on O'ahu."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability
- Grows in temperate and tropical climates
- Naturalized on the Hawaiian Islands of Kauai, Oahu, Lanai, Maui, Molokai and Hawaii. Widely naturalized elsewhere
- A weed of crops, pastures, roadsides, disturbed sites and waste areas
- Other *Sida* species are invasive weeds
- May be unpalatable to animals (although some limited browsing may occur)
- Shade tolerant
- Reproduces by seeds
- Self-compatible
- An annual, reaching maturity in one growing season
- Seeds dispersed externally by adhering to animals and people. Seeds also dispersed as a produce contaminant
- May produce prolific numbers of seeds in certain situations
- Forms a persistent seed bank (3+ years for a small percentage of seeds)

Low Risk Traits

- In the Hawaiian Islands, primarily a weed of disturbed areas and waste lands, and generally not considered a significant environmental weed
- Not reported to spread vegetatively
- Herbicides may provide effective control