

Taxon: <i>Euphorbia prostrata</i> Aiton	Family: Euphorbiaceae
Common Name(s): prostrate sandmat prostrate spurge	Synonym(s): Chamaesyce prostrata (Aiton) Small

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 16 Apr 2019
WRA Score: 18.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Annual Herb, Crop Weed, Toxic Properties, Disturbance-Adapted, Easily 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	n=0, y = 2*multiplier (see Appendix 2)	n
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	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	y
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		

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
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		
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	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
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
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	[No evidence of domestication] " <i>Euphorbia prostrata</i> is native to the West Indies, but is now widely distributed throughout the tropics and subtropics. It occurs throughout tropical Africa and the Indian Ocean islands."

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
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 14 Apr 2019]	"Native Northern America NORTH-CENTRAL U.S.A.: United States [Oklahoma] SOUTHEASTERN U.S.A.: United States [Alabama, Arkansas, Florida, Georgia, Louisiana, North Carolina, South Carolina, Mississippi] SOUTH-CENTRAL U.S.A.: United States [New Mexico, Texas] Mexico Southern America CARIBBEAN: Bahamas, Bermuda, Cayman Islands, Cuba, Dominican Republic, Haiti, Jamaica, Trinidad and Tobago, United States, [Puerto Rico, Virgin Islands, U.S.] Virgin Islands (British) CENTRAL AMERICA: Belize, Costa Rica, Guatemala, Honduras, Nicaragua NORTHERN SOUTH AMERICA: French Guiana, Guyana, Suriname, Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Bolivia, Colombia, Ecuador, Peru SOUTHERN SOUTH AMERICA: Argentina (n.), Paraguay"

Qsn #	Question	Answer
202	Quality of climate match data	High
	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 14 Apr 2019]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	" <i>Euphorbia prostrata</i> grows in gardens, on disturbed ground, in cultivated land and roadsides, especially in sandy soils, from sea-level up to 2050 m altitude." [Elevation range exceeds 2000 m, demonstrating environmental versatility]
	Dave's Garden. (2019). <i>Euphorbia</i> Species, Prostrate Spurge, Prostrate Sandmat - <i>Euphorbia prostrata</i> . https://davesgarden.com/guides/pf/go/53135/ . [Accessed 15 Apr 2019]	"Hardiness: USDA Zone 4a: to -34.4 °C (-30 °F) USDA Zone 4b: to -31.6 °C (-25 °F) USDA Zone 5a: to -28.8 °C (-20 °F) USDA Zone 5b: to -26.1 °C (-15 °F) USDA Zone 6a: to -23.3 °C (-10 °F) USDA Zone 6b: to -20.5 °C (-5 °F) USDA Zone 7a: to -17.7 °C (0 °F) USDA Zone 7b: to -14.9 °C (5 °F) USDA Zone 8a: to -12.2 °C (10 °F) USDA Zone 8b: to -9.4 °C (15 °F) USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F)"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	" <i>Euphorbia prostrata</i> is native to the West Indies, but is now widely distributed throughout the tropics and subtropics. It occurs throughout tropical Africa and the Indian Ocean islands."
	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 from southern United States to South America, the West Indies, and the Paleotropics; in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites on Midway Atoll and all of the main islands"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	" <i>Euphorbia prostrata</i> is native to the West Indies, but is now widely distributed throughout the tropics and subtropics. It occurs throughout tropical Africa and the Indian Ocean islands."

301	Naturalized beyond native range	y
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Qsn #	Question	Answer
	Source(s)	Notes
	<p>Wood, K. R. 2012. Possible extinctions, rediscoveries, and new plant records within the Hawaiian Islands. Bishop Museum Occasional Papers 113: 91-102</p>	<p>"Euphorbia prostrata Aiton New island record Previously recorded on Midway, Kaua'i, o'ahu, Moloka'i, Lāna'i, Maui, Kaho'olawe, and the Big Island of Hawai'i (Wagner, Herbst et al. 1999; Hughes 1995), the prostrate spurge is now documented on Ni'ihau's offshore islet of Lehua. Material examined. NIIHAU: Lehua Islet, West Horn, Sida fallax shrubland with Tribulus cistoides, Waltheria indica, Jacquemontia ovalifolia subsp. sandwicensis, several native grasses such as Panicum torridum, Panicum fauriei var. latius, and Panicum pellitum, relatively bare with ca 75% of the ground being exposed barren tuff along with many hundreds of naturally hallowed burrows, decumbent stems pink or green-purple, leaves green or green-red, cyathial gland white, uncommon, island record, 30 m elev., 2 May 2009, Wood 13714 (BISH, PtBG, US)."</p>
	<p>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.</p>	<p>"in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites on Midway Atoll and all of the main islands except Ni'ihau and Moloka'i, perhaps more widespread. First collected on O'ahu in 1909 (Forbes 1023.0, BISH)."</p>

Qsn #	Question	Answer
	<p>USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 14 Apr 2019]</p>	<p>"Naturalized Africa MACARONESIA: Cape Verde, Portugal, [Azores, Madeira Islands] Spain [Canary Islands] NORTHERN AFRICA: Egypt NORTHEAST TROPICAL AFRICA: Eritrea, Ethiopia EAST TROPICAL AFRICA: Kenya, Tanzania, Uganda WEST-CENTRAL TROPICAL AFRICA: Burundi, Cameroon, Equatorial Guinea, Rwanda WEST TROPICAL AFRICA: Cote D'Ivoire, Ghana, Guinea, Liberia, Nigeria, Senegal, Sierra Leone SOUTH TROPICAL AFRICA: Angola, Malawi, Mozambique, Zambia, Zimbabwe SOUTHERN AFRICA: Botswana, Eswatini, Namibia, South Africa WESTERN INDIAN OCEAN: Madagascar, Mauritius, Reunion Asia-Temperate ARABIAN PENINSULA: Yemen WESTERN ASIA: Turkey CHINA: China EASTERN ASIA: Japan, [Ryukyu Islands] Taiwan Asia-Tropical INDIAN SUBCONTINENT: Bhutan, India, Nepal, Pakistan PAPUASIA: Papua New Guinea INDO-CHINA: India, [Andaman and Nicobar Islands] Thailand MALESIA: Indonesia, Philippines Australasia AUSTRALIA: Australia [New South Wales, Queensland, Western Australia] Europe SOUTHEASTERN EUROPE: Greece, Italy (incl. Sicily) SOUTHWESTERN EUROPE: Portugal, Spain (incl. Balears) Northern America NORTH-CENTRAL U.S.A.: United States [Nebraska, South Dakota] SOUTHWESTERN U.S.A.: United States [California] United States (n. & c.) Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii] NORTHWESTERN PACIFIC: Marshall Islands, Micronesia, United States [Guam, Northern Mariana Islands, United States Minor Outlying Islands] SOUTH-CENTRAL PACIFIC: Cook Islands, French Polynesia SOUTHWESTERN PACIFIC: Kiribati [Gilbert Islands]"</p>
	<p>Hughes, G. D. 1995. New Hawaiian plant records II. Bishop Museum Occasional Papers. 42: 1-10</p>	<p>"Previous knowledge: First collected on Oahu in 1909 (Forbes 1023.O, BISH). Hawaiian Archipelago distribution Midway Atoll, Kauai, Oahu, Lanai, Maui, Kahoolawe, and Hawaii; perhaps more widespread. Native from southern United States to South America, the West Indies, and the Paleotropics (Wagner et al. 1990: 613). Significance: New island record for Molokai in Kalamaula Game Management Area, 30 m, in 1992 (Hughes 8, US). This naturalized species is common in mixed Kiawe/Haole koa lowland shrubland, Cenchrus ciliaris lowland grassland, and other dry, disturbed sites. Identification confirmed by W.L. Wagner."</p>

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Dave's Garden. (2019). <i>Euphorbia</i> Species, Prostrate Spurge, Prostrate Sandmat - <i>Euphorbia prostrata</i> . https://davesgarden.com/guides/pf/go/53135/ . [Accessed 15 Apr 2019]	"On Jul 26, 2011, smramsey from Anniston, AL wrote: I CANNOT get rid of this! Might be OK for a ground cover ...far far away from your garden...then again, the way it pops up from "nothing", I wouldn't advise it."
	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.	[Disturbance weed] "in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites on Midway Atoll and all of the main islands"
	Alsaadawi, I. S. (1992). Allelopathic research activity in Iraq. In <i>Allelopathy</i> (pp. 251-269). Springer, Dordrecht	[Lawn weed] " <i>Euphorbia prostrata</i> L., which is locally named as cancer of bermudagrass (<i>Cynodon dactylon</i>), is a perennial weed in bermudagrass lawns in Iraq. The weed often expanded the size of its stand from a few plants to a large area in a few months. The expansion occurred in spite of a heavy stand of bermudagrass. As <i>E. prostrata</i> spreads, it almost eliminates the bermudagrass and occurred virtually in pure stands."

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	" <i>Chamaesyce prostrata</i> ... Weed of: Bananas, Cereals, Orchards and Plantations, Pastures, Pome Fruits" ... " <i>Euphorbia prostrata</i> ... Weed of: Cereals, Cotton, Forestry, Grapevines, Nursery Production, Orchards & Plantations, Pastures, Sunflowers, Vegetables"
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). <i>PROTA (Plant Resources of Tropical Africa)</i> , Wageningen, Netherlands	" <i>Euphorbia prostrata</i> is considered a weed, and can be a nuisance in crops due to the large number of seedlings. It is known to accumulate heavy metals from the soil."
	Alsaadawi, I. S. (1992). Allelopathic research activity in Iraq. In <i>Allelopathy</i> (pp. 251-269). Springer, Dordrecht	" <i>Euphorbia prostrata</i> L., which is locally named as cancer of bermudagrass (<i>Cynodon dactylon</i>), is a perennial weed in bermudagrass lawns in Iraq. The weed often expanded the size of its stand from a few plants to a large area in a few months. The expansion occurred in spite of a heavy stand of bermudagrass. As <i>E. prostrata</i> spreads, it almost eliminates the bermudagrass and occurred virtually in pure stands."
	Altland, J. E., Gilliam, C. H., & Olive, J. W. (2002). Postemergence prostrate spurge (<i>Chamaesyce prostrata</i>) control in container-grown liriopse. <i>Journal of Environmental Horticulture</i> , 20(1), 41-46	"Prostrate spurge (<i>Chamaesyce prostrata</i> (Ait.) Small (syn. <i>Euphorbia prostrata</i>)) is a serious container nursery weed problem in the southeastern United States (10)."

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Cereals, Cotton, Forestry, Grapevines, Nursery Production, Orchards & Plantations, Pastures, Sunflowers, Vegetables"
	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.	[Possibly, but primarily in disturbed sites] "in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites on Midway Atoll and all of the main islands"

305	Congeneric weed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Euphorbia esula ... Leafy spurge has become one of the worst invaders in northern America causing both ecological and economic damage."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Numerous Euphorbia species have become invasive weeds

401	Produces spines, thorns or burrs	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] "Mat-forming annual herbs; stems often purplish, prostrate, 0.07-0.2 m long, crisp-pubescent to pilose or sometimes glabrate. Leaves oblong to ovate-oblong, 3-9 mm long, 1.5-5 mm wide, -sparsely pubescent or sometimes glabrate, margins serrate, apex rounded or obtuse, base rounded, petioles 0.5-1 mm long, stipules ± distinct, yellowish to purplish, linear-lanceolate, 1-2 mm long, ciliate."

402	Allelopathic	y
	Source(s)	Notes
	Alsaadawi, I. S. (1992). Allelopathic research activity in Iraq. In Allelopathy (pp. 251-269). Springer, Dordrecht	"Our results showed that E. prostrata is more allelopathic to bermudagrass and A. retroflexus than to M. sativum and cotton. This suggests that residues or living plants of E. prostrata may prove useful to control bermudagrass and A. retroflexus in certain crops."

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.	"Mat-forming annual herbs" [Euphorbiaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Everitt, J. H., & Gonzalez, C. L. (1981). Seasonal nutrient content in food plants of white-tailed deer on the South Texas Plains. Journal of Range Management, 34(6): 506-510	"Prostrate euphorbia and desert lantana (<i>Lantana macropoda</i>) were the only species with sufficient P levels for white-tailed deer survival (Table I). The higher P levels of forbs could offset a serious P deficiency, but forbs usually provide only 10% of the summer diet of deer (Arnold and Drawe 1979). Thus, P is probably deficient in summer."
	Alfonso Martinez M., Víctor Molina, Fernando González S., Marroquín, J., & Jesús Navar Ch. (1997). Observations of White-Tailed Deer and Cattle Diets in Mexico. Journal of Range Management, 50(3), 253-257	"Table 1. Botanical composition of rotational grazed (RG) and continuous grazed (CG) areas, diets of cattle and white-tailed deer in each area, and calculated relative preferences." [Euphorbia prostrata - small percentage recorded in cattle diet. Unknown if intentionally or incidentally browsed]

Qsn #	Question	Answer
	Khan, M. & Hussain, F. 2012. Palatability and animal preferences of plants in Tehsil Takht-e-Nasrati, District Karak, Pakistan. African Journal of Agricultural Research 7 (44): 5858-5872	"The most preferred species by animals were Zizyphus mauritiana, Acacia modesta, Cyperus species, Dichanthium annulatum, Euphorbia prostrata and Kickxia ramosissima."
	WRA Specialist. (2019). Personal Communication	Palatable despite toxic properties

405	Toxic to animals	Y
	Source(s)	Notes
	Orlando, R. (2018). Weeds in the Urban Landscape. North Atlantic Books, Berkeley, CA	"Chamaesyce prostrata and Chamaesyce maculate... Like other spurges, they contain a milky sap that can be poisonous to livestock and cause skin rashes as well."
	Allred, K. W., & Roth, T. E. (2010). An Annotated Checklist of Poisonous or Injurious Range Plants of New Mexico. Circular 636. New Mexico State University, Cooperative Extension Service, Las Cruces	"Euphorbia prostrata Alt. Common name: euphorbia Toxin: unknown acrid principle Habitat: open plains and waste areas Animals affected: cattle"
	Sperry, O. E., Turk, R. D., Hoffman, G. O., & Stroud, F. B. (1955). Photosensitization of Cattle in Texas. Bulletin 812. Texas Agricultural Experiment Station, College Station, Texas	"Figure 5. Animal fed prostrate euphorbia. The abnormal stance and digestive disturbance became more pronounced as the feedings of the spurge continued." ... "Two heifers were fed 1 04 ounces each of prostrate euphorbia (a spurge) in four successive daily feedings . Both animals salivated profusely during each feeding, apparently because of the irritating effect of the plant material . Twenty-four hours after the first feeding of 24 ounces , both animals showed arched backs, severe scours and a jerking or "thumps" of the abdominal muscles, indicating pain in the digestive tract. The reactions became more severe with each successive feeding. No material was fed after the Figure 6. The types of animals, pens and feeding arrangements used in the grass feeding experiments. The watery and matted eyes are symptoms typical of early photosensitization. fourth day. Scours continued for 10 days and the animals lost 35 and 50 pounds, respectively."
	WRA Specialist. (2019). Personal Communication	Toxic if ingested in large quantities.

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Mosango, D.M. 2008. Euphorbia prostrata Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Euphorbia prostrata is a host of the root-knot nematodes Meloidogyne incognita and Meloidogyne javanica."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Mosango, D.M. 2008. Euphorbia prostrata Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"The latex is applied to warts and abscesses. It is also used as an arrow poison." ... "Euphorbia prostrata has many local medicinal use and showed antibacterial activities as well as inhibitory effects against HIV-1 protease and hepatitis C virus protease. Although considerable chemical and pharmacological research has been done, more research is still needed to evaluate its potential."

Qsn #	Question	Answer
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Used medicinally, but may have toxic properties. Reportedly toxic to animals] "Whole plant pasted and applied for mumps, sores, taken orally a treatment for stomachache; whole plant of <i>Euphorbia prostrata</i> powdered together with pepper and a small piece of lime peel and applied to eczema; whole plant juice for irregular menstruation; whole plant infusion to treat diarrhea, dysentery and cataract, a wash of the infusion for skin infections. When used as a vegetable this plant brings about lactation in women. Fresh leaves extract consumed orally in gastric troubles."

408	Creates a fire hazard in natural ecosystems	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.	[Occurs in dry, fire prone habitats, but low growth habit would probably not contribute much to fire risk relative to flammable grasses and taller-statured, woody vegetation] "Mat-forming annual herbs; stems often purplish, prostrate, 0.07-0.2 m long," ... "in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites"

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Minnesota Wildflowers. (2019). <i>Euphorbia prostrata</i> (Prostrate Spurge). https://www.minnesotawildflowers.info/flower/prostrate-spurge . [Accessed 15 Apr 2019]	"Habitat: part shade, sun"
	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.	"in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites" [May be high light environments]
	Lady Bird Johnson Wildflower Center. (2019). <i>Chamaesyce prostrata</i> . https://www.wildflower.org/plants/result.php?id_plant=chpr6 . [Accessed 15 Apr 2019]	"Light Requirement: Sun , Part Shade"
	Dave's Garden. (2019). <i>Euphorbia</i> Species, Prostrate Spurge, Prostrate Sandmat - <i>Euphorbia prostrata</i> . https://davesgarden.com/guides/pf/go/53135/ . [Accessed 15 Apr 2019]	"Sun Exposure: Full Sun"

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Orlando, R. (2018). Weeds in the Urban Landscape. North Atlantic Books, Berkeley, CA	"Chamaesyce prostrata and Chamaesyce maculate" ... "Both plants are summer annuals, well adapted to full sun and dry, compacted soil, but thrive in all light conditions and soil types."
	Minnesota Wildflowers. (2019). Euphorbia prostrata (Prostrate Spurge). https://www.minnesotawildflowers.info/flower/prostrate-spurge . [Accessed 15 Apr 2019]	"dry, sandy or gravelly soil; lawns, gardens, sidewalk cracks, waste areas, roadsides, railroads"
	Mosango, D.M. 2008. Euphorbia prostrata Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Euphorbia prostrata grows in gardens, on disturbed ground, in cultivated land and roadsides, especially in sandy soils, from sea-level up to 2050 m altitude."

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.	"Mat-forming annual herbs; stems often purplish, prostrate, 0.07-0.2 m long, crisp-pubescent to pilose or sometimes glabrate."

412	Forms dense thickets	
	Source(s)	Notes
	Alsaadawi, I. S. (1992). Allelopathic research activity in Iraq. In Allelopathy (pp. 251-269). Springer, Dordrecht	"As E. prostrata spreads, it almost eliminates the bermudagrass and occurred virtually in pure stands."
	WRA Specialist. (2019). Personal Communication	Ability to form pure stands in some situations may be related to allelopathic properties.

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.	[Terrestrial] "Mat-forming annual herbs... in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites"

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 14 Apr 2019]	Family: Euphorbiaceae Subfamily: Euphorbioideae Tribe: Euphorbieae Subtribe: Euphorbiinae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes

Qsn #	Question	Answer
	USDA, ARS, Germplasm Resources Information Network. 2019. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 14 Apr 2019]	Family: Euphorbiaceae Subfamily: Euphorbioideae Tribe: Euphorbieae Subtribe: Euphorbiinae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Monoecious, prostrate, annual herb with branches up to 20 cm long, tinged purplish, with numerous adventitious roots; stems with latex."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	[No evidence] " <i>Euphorbia prostrata</i> is native to the West Indies, but is now widely distributed throughout the tropics and subtropics. It occurs throughout tropical Africa and the Indian Ocean islands." ... " <i>Euphorbia prostrata</i> has a very large area of distribution and is weedy, and is thus not at risk of genetic erosion."

602	Produces viable seed	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.	"Capsules ovoid, 3-angled, 1-1.4 mm long, pilose on the angles, otherwise glabrous. Seeds gray to tan, narrowly ovoid, strongly 4-angled, ca. 1 mm long, the faces strongly ridged."
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	" <i>Euphorbia prostrata</i> is a prolific seed producer. Most seeds will germinate at the same time when ecological conditions are favourable, especially during the rainy season."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	Unknown. Hybridization documented in genus <i>Euphorbia</i>

604	Self-compatible or apomictic	
	Source(s)	Notes
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	[Probably yes] "In <i>Euphorbia</i> , which has bisexual pseudanthia, monoecious species are self-compatible, but in some species there is functional andromonoecy, with some earlyproduced cyathia lacking functional pistillate flowers (Narbona et al. 2002)."

605	Requires specialist pollinators	n
	Source(s)	Notes

Qsn #	Question	Answer
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Euphorbs with fully pseudanthial inflorescences have either "normal" unisexual flowers (Dalechampia, Pera) or highly reduced unisexual flowers united in a cyathium (Euphorbia and relatives in Euphorbieae). In the latter case the staminate flowers are reduced to a single stamen and the pistillate flowers to a single pistil, with perianth absent in both cases. In both situations, pollinators visit the clusters of flowers as if they were a single flower—hence, application of the term pseudanthium (false flower) or blossom. Pollination of euphorbs with pseudanthial inflorescences is often highly generalized."
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Flowers unisexual; male flowers sessile, bracteoles hair-like, perianth absent, stamen c. 1 mm long; female flowers with pedicel c. 1.5 mm long and reflexed in fruit, perianth a rim, ovary superior, glabrous, 3-celled, styles 3, minute, 2-fid." [Pollination of euphorbs with pseudanthial inflorescences is often highly generalized]

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	"Monoecious, prostrate, annual herb with branches up to 20 cm long, tinged purplish, with numerous adventitious roots; stems with latex." ... " <i>Euphorbia prostrata</i> grows rapidly and flowers and fruits 12–14 weeks after germination. It can be found flowering and fruiting throughout the year if enough water is available." ... " <i>Euphorbia prostrata</i> is a prolific seed producer. Most seeds will germinate at the same time when ecological conditions are favourable, especially during the rainy season. "
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Propagation: By seed."

607	Minimum generative time (years)	1
	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.	"Mat-forming annual herbs"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Khan, I., Navie, S., George, D., O'Donnell, C., & Adkins, S. W. (2018). Alien and native plant seed dispersal by vehicles. <i>Austral Ecology</i> , 43(1), 76-88	"Five species of <i>Chamaesyce</i> , <i>C. hirta</i> , <i>C. hyssopifolia</i> , <i>C. maculata</i> , <i>C. ophthalmica</i> and <i>C. prostrata</i> were also identified on vehicles (Table 2)."
	Brisbane City Council. (2019). Weed Identification Tool - <i>Chamaesyce prostrata</i> . https://weeds.brisbane.qld.gov.au/weeds . [Accessed 16 Apr 2019]	"This species reproduces only by seed, which are dispersed by wind, water, vehicles, in soil and in contaminated agricultural produce."

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	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.	[Widespread weed. Used medicinally in some parts of the world, but unlikely to be intentionally introduced or cultivated in the Hawaiian Islands] "in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites on Midway Atoll and all of the main islands except Ni'ihau and Moloka'i, perhaps more widespread. First collected on O'ahu in 1909 (Forbes 1023.0, BISH)."

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	Brisbane City Council. (2019). Weed Identification Tool - <i>Chamaesyce prostrata</i> . https://weeds.brisbane.qld.gov.au/weeds . [Accessed 16 Apr 2019]	"This species reproduces only by seed, which are dispersed by wind, water, vehicles, in soil and in contaminated agricultural produce."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Brisbane City Council. (2019). Weed Identification Tool - <i>Chamaesyce prostrata</i> . https://weeds.brisbane.qld.gov.au/weeds . [Accessed 16 Apr 2019]	"This species reproduces only by seed, which are dispersed by wind, water, vehicles, in soil and in contaminated agricultural produce."

705	Propagules water dispersed	y
	Source(s)	Notes
	Vosse, S., Esler, K. J., Richardson, D. M., & Holmes, P. M. (2008). Can riparian seed banks initiate restoration after alien plant invasion? Evidence from the Western Cape, South Africa. <i>South African Journal of Botany</i> , 74(3), 432-444	"Table 3 The 20 most frequently occurring species in riparian aboveground vegetation and soil seed banks (seedling emergents) samples taken from reference and invaded sections along four rivers in the Western Cape, South Africa (Berg, Eerste, Molenaars & Wit Rivers)" [Includes <i>Euphorbia prostrata</i>]
	Brisbane City Council. (2019). Weed Identification Tool - <i>Chamaesyce prostrata</i> . https://weeds.brisbane.qld.gov.au/weeds . [Accessed 16 Apr 2019]	"This species reproduces only by seed, which are dispersed by wind, water, vehicles, in soil and in contaminated agricultural produce."

706	Propagules bird dispersed	n
	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, Cattle, Livestock, Vehicles, Escapee"
	Brisbane City Council. (2019). Weed Identification Tool - <i>Chamaesyce prostrata</i> . https://weeds.brisbane.qld.gov.au/weeds . [Accessed 16 Apr 2019]	"This species reproduces only by seed, which are dispersed by wind, water, vehicles, in soil and in contaminated agricultural produce."

707	Propagules dispersed by other animals (externally)	
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Qsn #	Question	Answer
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Cattle, Livestock, Vehicles, Escapee" [Possibly yes. Small seeds common in disturbed areas. Could likely adhere to animals in soil]

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Cattle, Livestock, Vehicles, Escapee"
	Middleton, B. A., & Mason, D. H. (1992). Seed herbivory by nilgai, feral cattle, and wild boar in the Keoladeo National Park, India. <i>Biotropica</i> , 24(4): 538-543	"Most of the small-seeded species, however, germinated from dung of the three herbivores collected during more than 1 season of the year including the dominant aquatic species, <i>Paspalum distichum</i> , as well as <i>Cyperus rotundus</i> , <i>Euphorbia prostrata</i> , and <i>Polypogon monspeliensis</i> ."

801	Prolific seed production (>1000/m ²)	
	Source(s)	Notes
	Mosango, D.M. 2008. <i>Euphorbia prostrata</i> Aiton. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa), Wageningen, Netherlands	" <i>Euphorbia prostrata</i> is a prolific seed producer. Most seeds will germinate at the same time when ecological conditions are favourable, especially during the rainy season." [Potentially yes. Densities unspecified]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2019) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ . [Accessed 16 Apr 2019]	"Storage Behaviour: Orthodox"

803	Well controlled by herbicides	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Altland, J. E., Gilliam, C. H., & Olive, J. W. (2002). Postemergence prostrate spurge (<i>Chamaesyce prostrata</i>) control in container-grown liriopse. <i>Journal of Environmental Horticulture</i>, 20(1), 41-46</p>	<p>"Four experiments were conducted to evaluate herbicides for postemergence prostrate spurge (<i>Chamaesyce prostrata</i> (syn. <i>Euphorbia prostrata</i>)) control and tolerance of container-grown liriopse (<i>Liriope muscari</i>). In Experiment 1, Manage, Image, Trimec Southern, and Roundup were applied at three rates each to single bib liners of 'Big Blue' liriopse in 10.2 cm (4 in) pots. Pots were infested with prostrate spurge that were 1 to 2 cm (0.4 to 0.8 in) wide with no flower or seed structures. Only Roundup at 0.45 kg ai/ha (0.4 lb ai/A) provided effective postemergence spurge control (96%) and caused no short-term or long-term injury to 'Big Blue'. In Experiment 2, Finale and Roundup were applied at three rates each to established 'Big Blue' in 3.8 liter (1 gal) containers. By 21 DAT, Finale at rates of 0.28 kg ai/ha (0.25 lb ai/A) or greater caused slight though significant injury to 'Big Blue' while Roundup caused no injury. No injury was observed on any plant at 60 DAT and the following spring, growth was similar among all treatments indicating no long-term effects. In Experiment 3, Finale and Roundup applications were made to recently divided liners of 'Variegata' liriopse infested with mature spurge 17.0 to 20.1 cm (6.7 to 7.9 in) wide, which were flowering and seeding. Finale at 1.12 kg ai/ha (1.0 lb ai/A) and Roundup at 1.8 kg ai/ha (1.6 lb ai/A) provided effective spurge control (100 and 92.8%, respectively) and caused no short-term or long-term injury to 'Variegata'. Lower rates were not effective in controlling mature spurge. In Experiment 4, Finale and Roundup were applied to recently divided liners of 'Big Blue' infested with mature spurge 23 to 31 cm (9.1 to 12.2 in) wide, which were flowering and seeding. At 21 DAT, Finale at 1.12 kg ai/ha (1 lb ai/A) and Roundup at 1.8 kg ai/ha (1.6 lb ai/A) provided 100% control, while lower rates of both herbicides provided poor control (14 to 85%). Both herbicides caused slight initial injury to 'Big Blue', however, injury was outgrown by 60 DAT and by the following spring all plants were similar in size and number of new bibs produced compared to nontreated controls."</p>

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	<p>University of Guam. (2019). <i>Chamaesyce prostrata</i>. https://cnas-re.uog.edu/guam-weeds/chamaesyce-prostrata/. [Accessed 16 Apr 2019]</p>	<p>"Habitat: disturbed areas, lawns, homes, landscaped areas, turf, facultative upland; ability to survive arid conditions, tolerates mowing Propagation: seed; regrowth from lower nodes reduces effectiveness of hand/ mechanical weeding if root system is not completely removed"</p>

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<p style="text-align: center;">Source(s)</p> <p>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.</p>	<p style="text-align: center;">Notes</p> <p>[Unlikely given widespread distribution] "in Hawai'i naturalized and relatively common in low elevation, dry, disturbed sites on Midway Atoll and all of the main islands except Ni'ihau and Moloka'i, perhaps more widespread. First collected on O'ahu in 1909 (Forbes 1023.0, BISH)."</p>

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 2000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized on all the main Hawaiian Islands and widely naturalized elsewhere
- Disturbance-adapted lawn and crop weed
- Other *Euphorbia* species are invasive weeds
- Allelopathic
- Toxic to livestock
- Tolerates many soil types
- Reproduces by prolific seed production
- Annual, reaching maturity in one growing season
- Seeds dispersed by wind, water, vehicles, in soil and in contaminated agricultural produce
- Seeds survive gut passage
- Able to resprout from roots and tolerates mowing

Low Risk Traits

- In Hawaiian Islands, occurs in low elevation, dry disturbed sites and generally not considered a significant environmental weed
- Unarmed (no spines, thorns, or burrs)
- Palatable to animals despite reports of toxicity
- Not reported to spread vegetatively
- Herbicides may provide effective control