

<b>Taxon:</b> <i>Euploca procumbens</i> (Mill.) Diane & Hilger	<b>Family:</b> Heliotropiaceae
<b>Common Name(s):</b> fourspike heliotrope slender heliotrope	<b>Synonym(s):</b> Heliotropium gracile var. depressum Cham. Heliotropium ovalifolium var. depressum (Cham.) Merr. Heliotropium procumbens Mill. Heliotropium procumbens var. depressum (Cham.) Fosberg & Sacht

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Approved	<b>End Date:</b> 21 Feb 2024
<b>WRA Score:</b> 8.0	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** Annual/Perennial Herb, Naturalized, Mat-Forming, Water-Dispersed, Accidentally 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	n
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		
303	Agricultural/forestry/horticultural weed	y = 2*multiplier (see Appendix 2), n = 0	n
304	Environmental weed	y = 2*multiplier (see Appendix 2), n = 0	n
305	Congeneric weed		
401	Produces spines, thorns or burrs	y = 1, n = 0	n
402	Allelopathic		
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	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y = 1, n = 0	n
408	Creates a fire hazard in natural ecosystems	y = 1, n = 0	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
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		
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		
704	Propagules adapted to wind dispersal	y = 1, n = -1	n
705	Propagules water dispersed	y = 1, n = -1	y
706	Propagules bird dispersed	y = 1, n = -1	y
707	Propagules dispersed by other animals (externally)	y = 1, n = -1	y
708	Propagules survive passage through the gut	y = 1, n = -1	y
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
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
	<b>Source(s)</b>	<b>Notes</b>
	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 from southern United States south to Central and South America and the West Indies; in Hawai'i naturalized in low elevation, dry, often coastal sites on Midway Atoll, French Frigate Shoals (Tern Island), O'ahu, and Maui. First collected on O'ahu in 1975 (Herbst & Ishikawa 5466, BISH)."

102	Has the species become naturalized where grown?	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2024). Personal Communication	NA

103	Does the species have weedy races?	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2024). 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
	<b>Source(s)</b>	<b>Notes</b>
	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 south to Central and South America and the West Indies"
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 13 Feb 2024]	"Native Northern America NORTH-CENTRAL U.S.A.: United States [Oklahoma] SOUTHEASTERN U.S.A.: United States [Arkansas, Florida, Louisiana, Mississippi] SOUTH-CENTRAL U.S.A.: United States [Texas] SOUTHWESTERN U.S.A.: United States [Arizona, California] SOUTHERN MEXICO: Mexico [Campeche, Chiapas, Quintana Roo, Tabasco, Veracruz de Ignacio de la Llave] Southern America CARIBBEAN: Hispaniola, Bahamas, Cuba, Jamaica, United States [Puerto Rico] CENTRAL AMERICA: Belize, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador NORTHERN SOUTH AMERICA: Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Bolivia, Colombia, Peru SOUTHERN SOUTH AMERICA: Argentina, Paraguay, Uruguay"

202	Quality of climate match data	High
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 13 Feb 2024]	"Native Northern America NORTH-CENTRAL U.S.A.: United States [Oklahoma] SOUTHEASTERN U.S.A.: United States [Arkansas, Florida, Louisiana, Mississippi] SOUTH-CENTRAL U.S.A.: United States [Texas] SOUTHWESTERN U.S.A.: United States [Arizona, California] SOUTHERN MEXICO: Mexico [Campeche, Chiapas, Quintana Roo, Tabasco, Veracruz de Ignacio de la Llave] Southern America CARIBBEAN: Hispaniola, Bahamas, Cuba, Jamaica, United States [Puerto Rico] CENTRAL AMERICA: Belize, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador NORTHERN SOUTH AMERICA: Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Bolivia, Colombia, Peru SOUTHERN SOUTH AMERICA: Argentina, Paraguay, Uruguay"

203	Broad climate suitability (environmental versatility)	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.	"naturalized in low elevation, dry, often coastal sites"
	Godfrey, R.K. & Wooten, J.W. (1981). Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. University of Georgia Press, Athens, GA	[Occurs at low elevations, but broadly distributed] "Weedy on shell mounds, scrub, roadsides, citrus groves, saline shores, edges of mangrove swamps, only marginally a wetland plant. Near the coasts from cen. pen. Fla. southward and on the Fla. Keys; trop. Am."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Faccenda, K. & Daehler, C. C. (2024). New records of weedy, non-grass plants from Moloka'i. Bishop Museum Occasional Papers 156: 33-36	" <i>Euploca procumbens</i> is now known to be naturalized on Kaua'i, O'ahu, Moloka'i, and Maui (Imada 2019). It is also present on Hawai'i Island but has yet to be vouchered."

Qsn #	Question	Answer
	<p>USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a>. [Accessed 13 Feb 2024]</p>	<p>"Native Northern America NORTH-CENTRAL U.S.A.: United States [Oklahoma] SOUTHEASTERN U.S.A.: United States [Arkansas, Florida, Louisiana, Mississippi] SOUTH-CENTRAL U.S.A.: United States [Texas] SOUTHWESTERN U.S.A.: United States [Arizona, California] SOUTHERN MEXICO: Mexico [Campeche, Chiapas, Quintana Roo, Tabasco, Veracruz de Ignacio de la Llave] Southern America CARIBBEAN: Hispaniola, Bahamas, Cuba, Jamaica, United States [Puerto Rico] CENTRAL AMERICA: Belize, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador NORTHERN SOUTH AMERICA: Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Bolivia, Colombia, Peru SOUTHERN SOUTH AMERICA: Argentina, Paraguay, Uruguay Naturalized Africa WESTERN INDIAN OCEAN: British Indian Ocean Terr [Diego Garcia] Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii, United States Minor Outlying Islands] NORTHWESTERN PACIFIC: Marshall Islands, Palau, United States [United States Minor Outlying Islands] SOUTHWESTERN PACIFIC: Kiribati [Gilbert Islands, Phoenix Islands]"</p>

205	Does the species have a history of repeated introductions outside its natural range?	y
	<p><b>Source(s)</b></p> <p>USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a>. [Accessed 16 Feb 2024]</p>	<p><b>Notes</b></p> <p>"Naturalized Africa WESTERN INDIAN OCEAN: British Indian Ocean Terr [Diego Garcia] Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii, United States Minor Outlying Islands] NORTHWESTERN PACIFIC: Marshall Islands, Palau, United States [United States Minor Outlying Islands] SOUTHWESTERN PACIFIC: Kiribati [Gilbert Islands, Phoenix Islands]"</p>

301	Naturalized beyond native range	y
	<p><b>Source(s)</b></p> <p>Faccenda, K. &amp; Daehler, C. C. (2024). New records of weedy, non-grass plants from Moloka'i. Bishop Museum Occasional Papers 156: 33-36</p>	<p><b>Notes</b></p> <p>"Heliotropiaceae <i>Euploca procumbens</i> (Mill.) Diane &amp; Hilger New island record <i>Euploca procumbens</i> is now known to be naturalized on Moloka'i, where approximately 30 plants were seen along the highway between 'Ualapu'e and Kaunakakai. <i>Euploca procumbens</i> was previously published as naturalized in Hawai'i under the name <i>Heliotropium procumbens</i>, but the genus <i>Euploca</i> is now recognized as distinct based on molecular evidence (Frohlich et al. 2022). <i>Euploca procumbens</i> is now known to be naturalized on Kaua'i, O'ahu, Moloka'i, and Maui (Imada 2019). It is also present on Hawai'i Island but has yet to be vouchered. Material examined. MOLOKA'I: Rt 450, ca 3 km W of 'Ualapu'e, roadside weed in dry, sunny area, 5 plants seen in this area, more seen when driving towards Kaunakakai, 11 m, 21.053809, -156.869421, 29 Dec 2022, K. Faccenda 2958."</p>

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.	"in Hawai'i naturalized in low elevation, dry, often coastal sites on Midway Atoll, French Frigate Shoals (Tern Island), O'ahu, and Maui. First collected on O'ahu in 1975 (Herbst & Ishikawa 5466, BISH)."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 13 Feb 2024]	"Naturalized Africa WESTERN INDIAN OCEAN: British Indian Ocean Terr [Diego Garcia] Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii, United States Minor Outlying Islands] NORTHWESTERN PACIFIC: Marshall Islands, Palau, United States [United States Minor Outlying Islands] SOUTHWESTERN PACIFIC: Kiribati [Gilbert Islands, Phoenix Islands]"

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Herbst, D.R. & Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) Alien Plant Invasions in Native Ecosystems of Hawai'i: Management & Research. Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI	"Although <i>H. procumbens</i> is not presently considered a management problem, it does represent a foreign element in the Leeward Islands and potentially could replace native vegetation. No management plan is being considered at present."
	Godfrey, R.K. & Wooten, J.W. (1981). Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. University of Georgia Press, Athens, GA	[Common in areas disturbed by water] "Commonly along rivers on muddy alluvium after flooding, river shores, exposed margins or bottoms of ponds, marshes, ditches."
	Vieira, D. D., Melo, J. I. M. D., & Conceição, A. D. S. (2015). Boraginales Juss. ex Bercht. & J. Presl in the Ecoregion Raso da Catarina, Bahia, Brazil. <i>Biota Neotropica</i> , 15(3): e20140201	[Described as invasive in anthropogenic habitats, but impacts are not described in this publication] "In the Ecoregion Raso da Catarina it is quite common in anthropized areas close to small farms, houses and vacant land lots. Thus, it can be considered an invasive species."
	Lee, C. T. (1985). Common Weeds of Guam. University of Guam. Guam Agricultural Experiment Station	[In disturbed habitats] "Found along roadsides and waste places."
	Liogier, A.H. & Martorell, L.F. (2000). Flora of Puerto Rico and adjacent islands: a systematic synopsis. Second Edition Revised. La Editorial, UPR, San Juan, Puerto Rico	[Listed as a weed, but with no description of impacts] "Heliotropium procumbens Mill. In thickets and hillsides in the dry southern districts, sometimes a weed in wetter areas"
	WRA Specialist. (2024). Personal Communication	Commonly referred to as a weed, but evidence of any detrimental impacts is generally not provided.

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited in listed of agricultural weeds. Impacts have not been confirmed] "References: Brazil-W-255, Argentina-W-237, Chile-N-241, United States of America-W-179, Global-N-85, Pacific-W-621, Venezuela-A-932, Central America-A-933, Dominican Republic-A-1473, Dominican Republic-A-1475, Trinidad-A-87, Venezuela-A-87, North America-N-1760, Chile-I-1872."

Qsn #	Question	Answer
	<p>Leopardi-Verde, C. L., Guzmán-González, S., Carnevali, G., Duno de Stefano, R., &amp; Tapia-Muñoz, J. L. (2021). Weeds of commercial crops in Colima, Mexico. <i>Revista Mexicana de Biodiversidad</i>, 92: e923622</p>	<p>[Listed as a crop weed with no description of impacts] "Weeds are plants adapted to habitats modified by people and that often interfere with different human activities. These plants constitute an economically and ecologically relevant group because of their implications for agriculture. Because the agrestal weeds of the state of Colima, Mexico have been poorly documented, we surveyed these plants in commercial agricultural fields and plantations of the state, from February 2015 through May 2019. We surveyed 25 sites, each of about 1 ha, dedicated to cash-crops (blueberry, blackberry, coffee, maize, onion, jalapeño pepper, papaya, Mexican lime, and sugarcane). We found 222 weedy species (43 eudicots, 6 monocots, 2 magnoliids, 1 fern, and 1 liverwort), belonging to 53 families. The most species-rich families were Poaceae (29 species) and Asteraceae (25). A high percent of the weed flora was native (84.2%) and 15.8% alien. The most common species were <i>Euphorbia hirta</i> and <i>Heliotropium procumbens</i>. We found 21 endemic species and <i>Manihot chlorosticta</i> in the near threatened (NT) risk category of the IUCN. Also, we found that each crop tends to have a distinctive weed community, which in general appears to be determined by bioclimatic factors, principally temperature and precipitation."</p>

304	Environmental weed	n
	Source(s)	Notes
	<p>Herbst, D.R. &amp; Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) Alien Plant Invasions in Native Ecosystems of Hawai'i: Management &amp; Research. Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI</p>	<p>"Although <i>H. procumbens</i> is not presently considered a management problem, it does represent a foreign element in the Leeward Islands and potentially could replace native vegetation. No management plan is being considered at present."</p>
	<p>Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall</p>	<p>[Not cited as an environmental weed] "Heliotropium procumbens Mill. Boraginaceae Total N° of Refs: 14 Habit: Herb Preferred Climate/s: Subtropical, Tropical Major Pathway/s: Herbal References: Brazil-W-255, Argentina-W-237, Chile-N-241, United States of America-W-179, Global-N-85, Pacific-W-621, Venezuela-A-932, Central America-A-933, Dominican Republic-A-1473, Dominican Republic-A-1475, Trinidad-A-87, Venezuela-A-87, North America-N-1760, Chile-I-1872."</p>
	<p>Starr, F., &amp; Starr, K. (2006). Oahu offshore islets botanical survey. United States Geological Survey, Haleakala Field Station.</p>	<p>[Rare, easily controlled weed of offshore islands] "<i>Heliotropium procumbens</i> -- Heliotrope -- (Boraginaceae) -- Alien Rare. One patch in center of islet. First collected during this survey. This decumbent herb, resembling some native <i>Heliotropium</i> species, is a common non-native element of Hawaiian coastal vegetation. It can be hand pulled."</p>

Qsn #	Question	Answer
305	<b>Congeneric weed</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Antony, A. A., Javad, P., & Antony, A. (2024). <i>Euploca wightiana</i> (Heliotropiaceae), a new species from South India. <i>Nordic Journal of Botany</i> , e03920	" <i>Euploca wightiana</i> has been found growing on roadsides and as a weed in dried cultivated lands."
	Schmelzer, G.H. & Gurib-Fakim, A. (Eds.). (2008). <i>Plant Resources of Tropical Africa</i> 11(1). Medicinal Plants 1. PROTA Foundation, Wageningen, Netherlands	" <i>Heliotropium amplexicaule</i> Vahl is native to South America, but is now found throughout the tropics. In pastures it can cause fatal poisoning in cattle. In Mauritius, where it is locally a weed in sugarcane, a decoction of the plant is drunk to cure cough and fever."
	WRA Specialist. (2024). Personal Communication	A number of <i>Heliotropium</i> and <i>Euploca</i> species have been cited as minor weeds, or weeds of no described impacts.

401	<b>Produces spines, thorns or burrs</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	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.	[No evidence] "Pale green to gray, erect to decumbent perennial herbs 1-5 dm tall, moderately to densely appressed pubescent; stems 1 to several from base, usually branched above. Leaves numerous, linear-lanceolate, narrowly oblanceolate to elliptic, flat, sometimes revolute, 1-4 cm long, 0.2-1 cm wide, apex acute or short-acuminate, gradually narrowed toward the base. Flowers in clusters of 1-4 elongate, open, bracteate, scorpioid cymes 2.5-10 cm long, peduncles 0.5-3 cm long; calyx deeply divided, the lobes unequal, linear to lanceolate, at anthesis 1-1.2 mm long, at maturity nearly doubling in size and becoming progressively more unequal; corolla white, 1.5-3 mm long, the tube sparsely strigose externally. Nutlets 4, 1-seeded, ovoid, 1-2 mm long, densely strigose."

402	<b>Allelopathic</b>	
	<b>Source(s)</b>	<b>Notes</b>
	De Castro, R. A., Fabricante, J. R., & de Araújo, K. C. T. (2017). Sociabilidade e potencial alelopático de espécies da caatinga sobre a invasora <i>Nicotiana glauca</i> Graham (Solanaceae). <i>Natureza online</i> , 15(1), 59-69	[ <i>Euploca procumbens</i> extracts did not exhibit allelopathic properties on <i>N. glauca</i> ] "Abstract <i>Nicotiana glauca</i> Graham is one of the most important invasive alien species in the São Francisco River integration project (PISF). This study aimed to identify native species highly sociable with <i>N. glauca</i> , and assess their allelopathic potential on its germination and early development. The study area is located in Pernambuco. All species were inventoried and the association with <i>N. glauca</i> was verified by the Association Index (AI). The native species more highly associated with <i>N. glauca</i> were tested for their allelopathic influence on <i>N. glauca</i> . These species are: <i>Tarenaya spinosa</i> (Jacq.) Raf., <i>Melochia tomentosa</i> L., <i>Euploca procumbens</i> (Mill.) Diane & Hilger, <i>Ipomoea asarifolia</i> (Desr.) Roem. & Schult. e <i>Sida galheirensis</i> Ulbr. Only the extracts of <i>I. asarifolia</i> , <i>T. spinosa</i> and <i>M. tomentosa</i> affected the germination of the alien invasive species. These species are widely distributed in Caatinga sites altered by PISF development, show high reproductive capacity and are indigenous, which favors their development and increases their competitive ability. These species are therefore recommended for use in <i>N. glauca</i> control programs."



Qsn #	Question	Answer
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.	"Pale green to gray, erect to decumbent perennial herbs 1-5 dm tall, moderately to densely appressed pubescent; stems 1 to several from base, usually branched above." [No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Nunes, A. T., Cabral, D. L. V., Amorim, E. L. C., dos Santos, M. V. F., & Albuquerque, U. P. (2016). Plants used to feed ruminants in semi-arid Brazil: A study of nutritional composition guided by local ecological knowledge. <i>Journal of Arid Environments</i> , 135, 96-103	"Table 1. Classification of the species listed by key informants of the Cachoeira and Barrocas communities of Soledad/PB (NE Brazil) according to their salience and preference and the scientific evaluation of their nutritional value." [Heliotropium procumbens - Local nutritional evaluation = "Good for fattening.". Entire plant consumed]
	Sena, F. H., Schulz, K., Cierjacks, A., Falcão, H. M., Lustosa, B. M., & Almeida, J. S. (2021). Goats foster endozoochoric dispersal of exotic species in a seasonally dry tropical forest ecosystem. <i>Journal of Arid Environments</i> , 188, 104473	[Consumed and dispersed by goats] "Plant species that germinated ex-situ from goat feces collected in the municipalities of Floresta and Itacuruba, Pernambuco, Brazil." [Includes <i>Euploca procumbens</i> ]

405	Toxic to animals	n
	Source(s)	Notes
	Nunes, A. T., Cabral, D. L. V., Amorim, E. L. C., dos Santos, M. V. F., & Albuquerque, U. P. (2016). Plants used to feed ruminants in semi-arid Brazil: A study of nutritional composition guided by local ecological knowledge. <i>Journal of Arid Environments</i> , 135, 96-103	[No evidence] "Table 1. Classification of the species listed by key informants of the Cachoeira and Barrocas communities of Soledad/PB (NE Brazil) according to their salience and preference and the scientific evaluation of their nutritional value." [Heliotropium procumbens - Local nutritional evaluation = "Good for fattening.". Entire plant consumed]
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence

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

Qsn #	Question	Answer
	Herbst, D.R. & Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) Alien Plant Invasions in Native Ecosystems of Hawai'i: Management & Research. Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI	[No evidence. Unlikely to carry fuel given low growth habit] "The heliotrope <i>Heliotropium procumbens</i> is a low, mat-forming, perennial herb."
<b>409</b>	<b>Is a shade tolerant plant at some stage of its life cycle</b>	
	<b>Source(s)</b>	<b>Notes</b>
	PictureThis. (2024). How to Care for Fourspike Heliotrope. <a href="https://www.picturethisai.com/care/Euploca_procumbens.html">https://www.picturethisai.com/care/Euploca_procumbens.html</a> . [Accessed 20 Feb 2024]	"Fourspike heliotrope originates from bright, open environments where it thrives in full sun. It can tolerate partial sun but prefers direct sunlight for optimal growth. This annual and biennial plant is known for its sun-loving nature."
	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.	[Light requirements unknown, but typically occurs in open, presumably high light environments] "in Hawai'i naturalized in low elevation, dry, often coastal sites"
<b>410</b>	<b>Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Godfrey, R.K. & Wooten, J.W. (1981). Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. University of Georgia Press, Athens, GA	"Commonly along rivers on muddy alluvium after flooding, river shores, exposed margins or bottoms of ponds, marshes, ditches."
	Shreve, F. & Wiggins, I.L. (1964). Vegetation and Flora of the Sonoran Desert, Volume 1. Stanford University Press, Stanford, CA	"In saline, soil or along arroyos and. margins of pools
	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.	"naturalized in low elevation, dry, often coastal sites" [Soil type unspecified, but likely sandy]
	Richardson, A. (1995). Plants of the Rio Grande Delta. University of Texas Press, Austin, TX	"Palm groves, moist soils."
<b>411</b>	<b>Climbing or smothering growth habit</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	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.	"Pale green to gray, erect to decumbent perennial herbs 1-5 dm tall, moderately to densely appressed pubescent; stems 1 to several from base, usually branched above."
<b>412</b>	<b>Forms dense thickets</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Herbst, D.R. & Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) Alien Plant Invasions in Native Ecosystems of Hawai'i: Management & Research. Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI	"The heliotrope <i>Heliotropium procumbens</i> is a low, mat-forming, perennial herb."
<b>501</b>	<b>Aquatic</b>	<b>n</b>

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	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 in low elevation, dry, often coastal sites"
	Godfrey, R.K. & Wooten, J.W. (1981). Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. University of Georgia Press, Athens, GA	[Not aquatic, but occurs in proximity to riparian areas] "Commonly along rivers on muddy alluvium after flooding, river shores, exposed margins or bottoms of ponds, marshes, ditches."

502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 13 Feb 2024]	"Genus: Euploca Family: Heliotropiaceae"

503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch">https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch</a> . [Accessed 13 Feb 2024]	"Genus: Euploca Family: Heliotropiaceae"

601	Evidence of substantial reproductive failure in native habitat	n
	<b>Source(s)</b>	<b>Notes</b>
	Vieira, D. D., Melo, J. I. M. D., & Conceição, A. D. S. (2015). Boraginales Juss. ex Bercht. & J. Presl in the Ecoregion Raso da Catarina, Bahia, Brazil. <i>Biota Neotropica</i> , 15(3): e20140201	[No evidence] "Euploca procumbens spreads from the South of the United States to Argentina as well as in the West Indies and in Brazil in northern (Acre, Para´, Rondoˆnia, Roraima), northeastern (Alagoas, Bahia, Ceara´, Maranhaˆo, Para´ba, Pernambuco, Piau´, Rio Grande do Norte and Sergipe), mid-western (Goia´s, Mato Grosso and Mato Grosso do Sul), southeastern (Minas Gerais and Saˆo Paulo) and southern (Rio Grande do Sul and Santa Catarina) regions. In the Brazilian territory it is found in all the vegetation types, mainly in the Caatinga where it is frequently observed sympatrically with <i>H. angiospermum</i> and <i>H. elongatum</i> (Melo & Semir 2010)."
	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 from southern United States south to Central and South America and the West Indies"

602	Produces viable seed	y
	<b>Source(s)</b>	<b>Notes</b>
	Vieira, D. D., Melo, J. I. M. D., & Conceição, A. D. S. (2015). Boraginales Juss. ex Bercht. & J. Presl in the Ecoregion Raso da Catarina, Bahia, Brazil. <i>Biota Neotropica</i> , 15(3): e20140201	"Schizocarp 1.2-2 1-1.8 mm, sub-globose, green at maturity, sericeous, 4 nutlets with 1 seed each. Seeds 4, 0.8-1 0.5-0.7 mm, oval, light green, smooth."

Qsn #	Question	Answer
	Sena, F. H., Schulz, K., Cierjacks, A., Falcão, H. M., Lustosa, B. M., & Almeida, J. S. (2021). Goats foster endozoochoric dispersal of exotic species in a seasonally dry tropical forest ecosystem. <i>Journal of Arid Environments</i> , 188, 104473	"Table 2 Plant species that germinated ex situ from goat feces collected in the municipalities of Floresta and Itacuruba, Pernambuco, NE, Brazil. Goat feces were collected from areas with different surface water characteristics: permanent water (PW) - plots located in the vicinity of permanent watercourses; temporary water (TW) - areas located in the vicinity of temporary watercourses; no water (NW) - no signs of surface water in the vicinity." [ <i>Euploca procumbens</i> germinated at all study sites]

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Frohlich, M. W. et al. (2022). Molecular phylogenetics of <i>Euploca</i> (Boraginaceae): homoplasy in many characters, including the C4 photosynthetic pathway. <i>Botanical Journal of the Linnean Society</i> , 199(2), 497-537	"Reproductive strategies are diverse, including species that are dioecious/insect pollinated, perfect-flowered/insect pollinated, chasmogamous/apparently obligately self-pollinated and cleistogamous, and there is even a putative apomict (Frohlich, 1978; Craven, 1996; Frohlich, unpublished)." ... " <i>Euploca procumbens</i> , however, has a low pollen-ovule ratio and should be obligately self-pollinated; this species was cited in Cruden (1977) as <i>Heliotropium</i> sp. Its flowers are visited by Lepidoptera. Almost all <i>E. procumbens</i> fruits contain four seeds."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Frohlich, M. W. et al. (2022). Molecular phylogenetics of <i>Euploca</i> (Boraginaceae): homoplasy in many characters, including the C4 photosynthetic pathway. <i>Botanical Journal of the Linnean Society</i> , 199(2), 497-537	"Reproductive strategies are diverse, including species that are dioecious/insect pollinated, perfect-flowered/insect pollinated, chasmogamous/apparently obligately self-pollinated and cleistogamous, and there is even a putative apomict (Frohlich, 1978; Craven, 1996; Frohlich, unpublished)." ... " <i>Euploca procumbens</i> , however, has a low pollen-ovule ratio and should be obligately self-pollinated; this species was cited in Cruden (1977) as <i>Heliotropium</i> sp. Its flowers are visited by Lepidoptera. Almost all <i>E. procumbens</i> fruits contain four seeds."

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Herbst, D.R. & Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) <i>Alien Plant Invasions in Native Ecosystems of Hawai'i: Management &amp; Research</i> . Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI	"The heliotrope <i>Heliotropium procumbens</i> is a low, mat-forming, perennial herb." [Unknown. Growth habit suggests vegetative spread may be possible]

607	Minimum generative time (years)	1
	Source(s)	Notes
	Godfrey, R.K. & Wooten, J.W. (1981). <i>Aquatic and Wetland Plants of Southeastern United States: Dicotyledons</i> . University of Georgia Press, Athens, GA	"Annual, simple or usually bushy-branched, branches often sprawling, 1-5 dm long, strigose throughout, stems and leaves grayish green." [May also grow as a perennial in the Hawaiian Islands]

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.	"Pale green to gray, erect to decumbent perennial herbs 1-5 dm tall, moderately to densely appressed pubescent; stems 1 to several from base, usually branched above."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Herbst, D.R. & Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) Alien Plant Invasions in Native Ecosystems of Hawai'i: Management & Research. Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI	"Heliotropium procumbens, introduced by military flights from O`ahu to two of the three leeward islands with runways, is an example of an accidental introduction that has not become a management problem." ... "For about three centuries, Spanish galleons regularly laid over on Guam to load fresh supplies, drop off goods, and unload passengers during the annual Acapulco to Manila trip. Because the Guam populations or this heliotrope most closely resemble those of Mexico (Fosberg, pers. comm.), and because Heliotropium procumbens is otherwise native only in America, it seems likely that it represents an early, accidental introduction into Guam from Mexico." ... "H. procumbens was first discovered in 1975 in Hawai`i, at the Campbell Industrial Park at Barbers Point, O`ahu (Herbst and Ishikawa 5466: herbarium specimen, B.P. Bishop Museum), where it may have been brought accidentally by one of the frequent military flights between Hawai`i and Guam. On O`ahu, it was next seen at construction sites or other areas having a direct connection to Barbers Point. For example, it now grows at the Sand Island gas storage tanks that store gasoline refined at Barbers Point (Herbst and Ishikawa 5643: herbarium specimen, B.P. Bishop Museum). This heliotrope also occurs at the ready-mix concrete plant on Sand Island (D.R. Herbst observation), which uses raw materials brought from Barbers Point. Heliotropium procumbens has been spread from the concrete plant to various construction sites on O`ahu, such as the Entomology building at the University of Hawai`i at Manoa, (D.R. Herbst observation) and a Mariner's Ridge housing development (Nagata 1286: herbarium specimen, B.P. Bishop Museum). In recent years, it has gradually migrated to other disturbed sites on O`ahu and, more recently, has been collected on Maui (Hobdy 1042: herbarium specimen, B.P. Bishop Museum). H. procumbent was collected on Tern Island in 1978 and Midway Atoll in 1980. The Midway and Tern Island plants probably were accidentally introduced by military flights from Barbers Point (Herbst 1980)."

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	n
	Source(s)	Notes
	Herbst, D.R. & Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) Alien Plant Invasions in Native Ecosystems of Hawai'i: Management & Research. Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI	[No evidence of intentional cultivation in Hawaii. Limited evidence of on-line cultivation elsewhere] "H. procumbens was first discovered in 1975 in Hawai'i, at the Campbell Industrial Park at Barbers Point, O`ahu (Herbst and Ishikawa 5466: herbarium specimen, B.P. Bishop Museum), where it may have been brought accidentally by one of the frequent military flights between Hawai'i and Guam. On O`ahu, it was next seen at construction sites or other areas having a direct connection to Barbers Point. For example, it now grows at the Sand Island gas storage tanks that store gasoline refined at Barbers Point (Herbst and Ishikawa 5643: herbarium specimen, B.P. Bishop Museum). This heliotrope also occurs at the ready-mix concrete plant on Sand Island (D.R. Herbst observation), which uses raw materials brought from Barbers Point. Heliotropium procumbens has been spread from the concrete plant to various construction sites on O`ahu, such as the Entomology building at the University of Hawai'i at Manoa, (D.R. Herbst observation) and a Mariner's Ridge housing development (Nagata 1286: herbarium specimen, B.P. Bishop Museum). In recent years, it has gradually migrated to other disturbed sites on O`ahu and, more recently, has been collected on Maui"

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	Herbst, D.R. & Wagner, W.L. (1992). Alien Plants on the Northwestern Hawaiian Islands. Pp. 189-224 in Stone et al. (eds.) Alien Plant Invasions in Native Ecosystems of Hawai'i: Management & Research. Coop. Nat. Park Res. Studies Unit, U Hawaii, Honolulu, HI	[Primarily moved with by human activities, unrelated to agriculture] "H. procumbens was first discovered in 1975 in Hawai'i, at the Campbell Industrial Park at Barbers Point, O`ahu (Herbst and Ishikawa 5466: herbarium specimen, B.P. Bishop Museum), where it may have been brought accidentally by one of the frequent military flights between Hawai'i and Guam. On O`ahu, it was next seen at construction sites or other areas having a direct connection to Barbers Point."

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Nunes, E. N., Ribeiro, J. E. D. S., Souza, R. S., de Queiroz, R. T., da Cruz, D. D., & de Lucena, R. F. P. (2023). <i>Euploca procumbens</i> (Mill.) Diane & Hilger Boraginaceae. In <i>Ethnobotany of the Mountain Regions of Brazil</i> (pp. 393-398). Cham: Springer International Publishing	"The seed dispersal can be zoochoric, often carried out by birds, mammals, and ants, but can also be hydrophoric, a characteristic that makes the species prefer habitats near waterways, such as streams, rivers, and creeks, being found in aquatic habitats (Melo et al. 2009; SIBBr 2022)."

705	Propagules water dispersed	y
	Source(s)	Notes
	Frohlich, M. W. et al. (2022). Molecular phylogenetics of <i>Euploca</i> (Boraginaceae): homoplasy in many characters, including the C4 photosynthetic pathway. <i>Botanical Journal of the Linnean Society</i> , 199(2), 497-537	" <i>Euploca procumbens</i> is a widespread weed that also grows on natural disturbed sites along riverbanks, so it may also experience growing conditions of unpredictable duration."
	Nunes, E. N., Ribeiro, J. E. D. S., Souza, R. S., de Queiroz, R. T., da Cruz, D. D., & de Lucena, R. F. P. (2023). <i>Euploca procumbens</i> (Mill.) Diane & Hilger Boraginaceae. In <i>Ethnobotany of the Mountain Regions of Brazil</i> (pp. 393-398). Cham: Springer International Publishing	"The seed dispersal can be zoochoric, often carried out by birds, mammals, and ants, but can also be hydrophoric, a characteristic that makes the species prefer habitats near waterways, such as streams, rivers, and creeks, being found in aquatic habitats (Melo et al. 2009; SIBBr 2022). Studies in areas that are periodically flooded in the Pantanal show that variation in flooding is an important factor to ensure greater recruitment and favors the maintenance of the population in the environment, especially immediately following the flooding (Souza et al. 2016)."

Qsn #	Question	Answer
	Godfrey, R.K. & Wooten, J.W. (1981). Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. University of Georgia Press, Athens, GA	[Distribution along riparian habitats suggests water is an important dispersal vector] "Commonly along rivers on muddy alluvium after flooding, river shores, exposed margins or bottoms of ponds, marshes, ditches. Fla. Panhandle to s.e. Tex., s.e. Okla., (Ark.?). trop. Am."
706	<b>Propagules bird dispersed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Nunes, E. N., Ribeiro, J. E. D. S., Souza, R. S., de Queiroz, R. T., da Cruz, D. D., & de Lucena, R. F. P. (2023). <i>Euploca procumbens</i> (Mill.) Diane & Hilger Boraginaceae. In <i>Ethnobotany of the Mountain Regions of Brazil</i> (pp. 393-398). Cham: Springer International Publishing	[Bird dispersal may be external, as the species is not fleshy-fruited] "The seed dispersal can be zoochoric, often carried out by birds, mammals, and ants, but can also be hydrophoric, a characteristic that makes the species prefer habitats near waterways, such as streams, rivers, and creeks, being found in aquatic habitats (Melo et al. 2009; SIBBr 2022)."
707	<b>Propagules dispersed by other animals (externally)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Nunes, E. N., Ribeiro, J. E. D. S., Souza, R. S., de Queiroz, R. T., da Cruz, D. D., & de Lucena, R. F. P. (2023). <i>Euploca procumbens</i> (Mill.) Diane & Hilger Boraginaceae. In <i>Ethnobotany of the Mountain Regions of Brazil</i> (pp. 393-398). Cham: Springer International Publishing	[Dispersed by ants, and possibly by adhering to birds or mammals] "The seed dispersal can be zoochoric, often carried out by birds, mammals, and ants, but can also be hydrophoric, a characteristic that makes the species prefer habitats near waterways, such as streams, rivers, and creeks, being found in aquatic habitats (Melo et al. 2009; SIBBr 2022)."
708	<b>Propagules survive passage through the gut</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Sena, F. H., Schulz, K., Cierjacks, A., Falcão, H. M., Lustosa, B. M., & Almeida, J. S. (2021). Goats foster endozoochoric dispersal of exotic species in a seasonally dry tropical forest ecosystem. <i>Journal of Arid Environments</i> , 188, 104473	"Plant species that germinated ex-situ from goat feces collected in the municipalities of Floresta and Itacuruba, Pernambuco, Brazil." [Includes <i>Euploca procumbens</i> ]
	de Lima, E. A., & de Melo, J. I. M. (2015). Biological spectrum and dispersal syndromes in an area of the semi-arid region of north-eastern Brazil. <i>Acta Scientiarum. Health Sciences</i> , 37(1), 91-100	"Table 1. Floristic list containing fruit types, respective dispersal syndromes and life forms. Key: Fruit types. Cap = capsule; Ach = achene; Fol = follicle; Utr = utricle; Dru = drupe; Sam = samara; Cyp = cypsela; Ber = berry; Cer = ceratium; Sch= schizocarp; Leg= legume; Lom= loment; Car= caryopsis; Coc = coccarium. Dispersal syndromes types. Aut = autochory; Ane= anemochory; Zoo = zoochory. Life forms. Cha = chamaephyte; The = therophyte; Hem = hemicryptophyte; Pha = phanerophyte; Cry = cryptophyte. Collector: E.A. Lima." [ <i>Euploca procumbens</i> - Dispersal syndrome = zoochory]
801	<b>Prolific seed production (&gt;1000/m2)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Chapla, T. E., & Campos, J. B. (2011). Soil seed bank during succession at an abandoned pasture in the upper Paraná river-floodplain. <i>Acta Scientiarum. Biological Sciences</i> , 33(1): 59-69	"Table 1. Density (seeds m-2 ± standard error), life form (LF) (T = tree; S = shrub; H = herb; L = liana), and ecological category (C) (P = pioneer; I = invasive; S = secondary) of species collected from the soil seed bank in Porto Rico Island in active pasture (1996) and secondary forest on 10-year abandoned pasture (2007)." [ <i>Heliotropium procumbens</i> seeds collected at densities of 594±299 seeds m-2 in 1996 and 387±100 seeds m-2 in 2007]
802	<b>Evidence that a persistent propagule bank is formed (&gt;1 yr)</b>	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	De Souza, E. B., Bao, F., Damasceno Junior, G. A., & Pott, A. (2021). Differences between species in seed bank and vegetation helps to hold functional diversity in a floodable Neotropical savanna. <i>Journal of Plant Ecology</i> , 14(4), 605-615	[Longevity unknown] "Several annual herbs of the study area need saturated or wet soils to germinate and grow; others depend on inundation to enhance recruitment, such as <i>Richardia grandiflora</i> , <i>Euploca procumbens</i> and <i>Cyperus surinamensis</i> (de Souza et al. 2016)."

803	Well controlled by herbicides	
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2024). Common Heliotrope. <a href="http://www.herbiguide.com.au/Descriptions/hg_Common_Heliotrope.htm">http://www.herbiguide.com.au/Descriptions/hg_Common_Heliotrope.htm</a> . [Accessed 20 Feb 2024]	[Methods to control <i>Heliotropium europaeum</i> may be effective in control of <i>Euploca procumbens</i> ] "Hormone herbicides amitrole, glyphosate, metsulfuron and bromoxynil control seedlings but lose effectiveness when the plants start their reproductive growth. Chlorsulfuron and triasulfuron are effective on young plants and have some residual activity which helps control subsequent germinations. However, the occurrence of the weed on alkaline soils often restricts the use chlorsulfuron and triasulfuron due to long plant back periods for broadleaf crops and pastures. Diquat and paraquat are more effective on old plants."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	<b>Source(s)</b>	<b>Notes</b>
	HerbiGuide. (2024). Common Heliotrope. <a href="http://www.herbiguide.com.au/Descriptions/hg_Common_Heliotrope.htm">http://www.herbiguide.com.au/Descriptions/hg_Common_Heliotrope.htm</a> . [Accessed 20 Feb 2024]	[Methods to control <i>Heliotropium europaeum</i> may be effective] "Cropping favours its establishment. Cultivation will control seedlings present but needs to be repeated for each new germination. Maintaining good ground cover over spring and summer help reduce infestations."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2024). Personal Communication	Unknown



**Summary of Risk Traits:**

*Euploca procumbens*, (fourspike heliotrope or slender heliotrope), is a low growing, trailing or prostrate herb that is native to North and South America. It is often found in open, disturbed areas, such as fields, roadsides, and waste areas. It was likely introduced and moved around the Hawaiian Islands in military flights and construction materials and is now naturalized in the Northwestern Hawaiian Islands as well as the island of Kauai, Oahu, Molokai, Maui, and Hawaii. It is considered weedy and may be able to compete with low-growing native vegetation but has not been targeted as a management problem to date.

**High Risk / Undesirable Traits**

- Thrives and spreads in low elevation tropical climates
- Naturalized on Kauai, Oahu, Molokai, Maui and Hawaii (Hawaiian Islands), the Northwestern Hawaiian Islands and widely naturalized in the wet tropics and elsewhere.
- A disturbance-adapted weed of low elevation sites.
- Cited as an agricultural weed, but impacts have not been quantified.
- Other Heliotropium species are invasive weeds (previously classified as Heliotropium procumbens)
- Reproduces by seeds
- Self-pollinated
- An annual or perennial, able to reach maturity in one growing season.
- Seeds dispersed by water, internally by animals, externally by ants and possibly other animals, and as a contaminant of vehicles and construction materials.

**Low Risk Traits**

- Despite weedy traits, has not been targeted as a management priority where naturalized
- Unarmed (no spines, thorns, or burrs)
- Palatable to goats and probably other livestock
- Non-toxic
- Grows best in high light environments (dense shade may inhibit spread)
- Herbicides provide effective control of weedy species in the related genus Heliotropium and may be effective if needed to control *Euploca procumbens*.