

Taxon: *Triumfetta semitriloba* Jacq.

Family: Malvaceae

Common Name(s): burweed
Sacramento-bur

Synonym(s):

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 24 Mar 2016

WRA Score: 15.0

Designation: H(Hawai'i)

Rating: High Risk

Keywords: Noxious Weed, Environmental Weed, Unpalatable, Spiny Burrs, Animal-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		
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)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	y
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	y
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		
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	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	n
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	y
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	n
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence of domestication] "Native to North America from Baja California and Mexico south to South America and the West Indies; in Hawai'i naturalized and often common in dry, disturbed sites"

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. 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, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 24 Mar 2016]	"Native: Northern America Northern Mexico: Mexico - Chihuahua, - San Luis Potosi, - Sinaloa, - Sonora, - Tamaulipas Southeastern U.S.A.: United States - Florida Southern Mexico: Mexico - Campeche, - Chiapas, - Guanajuato, - Guerrero, - Hidalgo, - Jalisco, - Michoacan, - Morelos, - Nayarit, - Puebla, - Queretaro, - Veracruz, - Yucatan Southern America Brazil: Brazil Caribbean: Antigua and Barbuda; Bahamas; Barbados; Bermuda; Cayman Islands; Cuba; Dominica; Dominican Republic; Grenada; Guadeloupe; Haiti; Jamaica; Martinique; Montserrat; Puerto Rico; St. Lucia; St. Vincent and Grenadines; Virgin Islands (British) - Tortola; Virgin Islands (U.S.) Mesoamerica: Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama Northern South America: Guyana Southern South America: Argentina - Chaco, - Corrientes, - Formosa, - Jujuy, - Misiones, - Salta; Paraguay Western South America: Bolivia; Ecuador; Peru"

Qsn #	Question	Answer
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 24 Mar 2016]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Lay, K. K. (1950). The American Species of <i>Triumfetta</i> L. <i>Annals of the Missouri Botanical Garden</i> , 37(3): 315-395	"A common weed of the tropics, which finds its habitat usually in abandoned fields or cut-over forest areas, and in general being a nuisance to both man and his animals, growing from sea-level to about an elevation of 2000 m."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. <i>Handbook of Hawaiian Weeds</i> . University of Hawaii Press, Honolulu, HI	"Areas from sea level to 3,500 feet with 30 to 60 inches of rainfall" [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Francis, J. K. (ed.). 2004. <i>Wildland shrubs of the United States and its Territories: thamnic descriptions: volume 1</i> . Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Burweed grows in pinelands and hammocks in Florida (Long and Lakela 1976) and in roadsides, neglected pastures, and wastelands in Puerto Rico. It grows in sand to clay soils with pH values from about 5.5 to 8.0. In Puerto Rico, burweed grows from near sea level to about 700 m in elevation. This diverse habitat receives annual precipitation from about 900 to 2200 mm. In Hawaii, it grows from sea level to 1,067 m in elevation in areas with annual rainfalls of 760 to 1500 mm (Haselwood and Motter 1966)."
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	" <i>T. semitriloba</i> is predominantly a neotropical species, but has a native range that also extends into the subtropics, where it will also tolerate dry and even temperate climates at the extremes of its range. In the native range in Puerto Rico, the diverse habitats populated by <i>T. semitriloba</i> are in areas with an annual rainfall within the range of 900-2200 mm."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. <i>Manual of the flowering plants of Hawaii</i> . Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized and often common in dry, disturbed sites, 30-860 m, on Kaua'i, O'ahu, Maui, and Hawai'i. First collected on Maui in 1910 (Forbes s.n., BISH)."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"It has been introduced and has become invasive in a number of Pacific islands. It is a declared noxious weed in Hawaii and is noted as invasive in the Galapagos islands, Micronesia, Tonga, Guam and Taiwan, generally found in wasteland, farmland and forest areas."

301	Naturalized beyond native range	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized and often common in dry, disturbed sites, 30-860 m, on Kaua'i, O'ahu, Maui, and Hawai'i. First collected on Maui in 1910 (Forbes s.n., BISH)."
	Wysong, M., Hughes, G. & Wood, K.R. (2007). New Hawaiian plant records for the island of Moloka'i. Bishop Museum Occasional Papers 96: 1-8	"Native to North America from Baja California and Mexico to South America and the West Indies, <i>T. semitriloba</i> (Sacramento bur) was first collected on O'ahu in 1895 (Heller 2293, BISH). In Hawai'i it has been previously known to be naturalized in dry, disturbed sites from 30 to 860 m on Kaua'i, O'ahu, Maui, and Hawai'i (Wagner et al. 1999). The following represent the first record of naturalization on Moloka'i. Material examined. MOLOKA'I: Waikolu west rim, collected in native lowland wet forest dominated by <i>Metrosideros polymorpha</i> , <i>Cheirodendron trigynum</i> , and <i>Dicranopteris linearis</i> , from a small, disturbed pig wallow, 686 m, 2 Feb 2004, Hughes 1137"
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	" <i>T. semitriloba</i> is recorded as introduced throughout much of the Pacific region, as far as the Philippines and Taiwan (PIER, 2015). However, there are no records from mainland New Zealand or Australia, nor from any part of Africa or mainland Asia. Noting its morphological similarity to the much more widespread and naturalized weed <i>T. rhomboidea</i> , it is possible that it is present elsewhere but remains as yet unidentified. Unconfirmed herbarium records in GBIF (2015) in Cameroon, Papua New Guinea and West Papua, Indonesia, are examples where further work may yield additional records or clarify uncertainty."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnic descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[Disturbance-adapted. Impacts agriculture and endangered species in Hawaiian Islands] "The species needs disturbance for establishment. If given an equal start, it competes well with other herbs, grasses, and shrubs in full sun or partial shade."

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Habitat: Areas from sea level to 3,500 feet with 30 to 60 inches of rainfall. A weed in postures, rangelands, and cultivated areas." ... "Declared noxious in Regulations 2 and NW 10 and for State land leases. Spreads rapidly, crowding out forage plants. Of little or no forage value."

304	Environmental weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Environmental impact: Prevents establishment of native species in disturbed forest sites. Burs a nuisance to man and beast in pastures and in forests."
	U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designations of Critical Habitat for Plant Species From the Island of Oahu, HI. Federal Register. Vol. 67, No. 102: 37108-37272	"On Oahu, the major threats to <i>Nototrichium humile</i> are habitat degradation by feral goats and pigs; military activities; competition from the alien plant species <i>Grevillea robusta</i> , <i>Panicum maximum</i> , <i>Lantana camara</i> , <i>Hyptis pectinata</i> , <i>Rivina humilis</i> , <i>Aleurites moluccana</i> , <i>Toona ciliata</i> , <i>Coffea arabica</i> , <i>Passiflora suberosa</i> , <i>Melia azedarach</i> , <i>Syzygium cumini</i> , <i>Blechnum occidentale</i> , <i>Oplismenus hirtellus</i> , <i>Schefflera actinophylla</i> , <i>Spathodea campanulata</i> , <i>Psidium guajava</i> , <i>Triumfetta semitriloba</i> (Sacramento bur), <i>Buddleia asiatica</i> , <i>Ageratina adenophora</i> , <i>Ficus microphylla</i> , <i>Kalanchoe pinnata</i> , <i>Adiantum hispidulum</i> , <i>Caesalpinia decapetala</i> , <i>Cordyline fruticosa</i> , <i>Pimenta dioica</i> , <i>Montanoa hibiscifolia</i> , <i>Schinus terebinthifolius</i> , <i>Leucaena leucocephala</i> , <i>Melinis minutiflora</i> , and <i>Psidium cattleianum</i> ; road building and maintenance; and fire (Service 1998b; HINHP Database 2001; 56 FR 55770)."
	US Fish and Wildlife Service. 2000. Endangered and Threatened Wildlife and Plants; Determinations of Whether Designation of Critical Habitat Is Prudent for 81 Plants and Proposed Designations for 76 Plants From the Islands of Kauai and Niihau, Hawaii. Federal Register Vol. 65, No. 216: 66808-66885	" <i>Schiedea spergulina</i> var. <i>spergulina</i> is threatened by competition with alien plant taxa, including <i>Erigeron karvinskianus</i> , <i>Lantana camara</i> , <i>Melia azedarach</i> , and <i>Triumfetta semitriloba</i> (Sacramento bur)."
	US Fish and Wildlife Service. 1994. Determination of Endangered or Threatened Status for 24 Plants From the Island of Kauai, HI; Final Rule. Federal Register / Vol. 59, No. 38	" <i>Triumfetta semitriloba</i> (Sacramento bur) is a subshrub now found on four Hawaiian Islands and considered to be a noxious weed by the State of Hawaii (DOA 1981, Wagner et al. 1990). Populations of <i>Munroidendron racemosum</i> and <i>Schiedea spergulina</i> var. <i>spergulina</i> are threatened by Sacramento bur (HHP 1991y5, HPCC 1990h)."
	US Fish and Wildlife Service. 1995. Endangered and Threatened Wildlife and Plants; Proposed Endangered or Threatened Status for Nineteen Plant Species From the Island of Kauai, Hawaii. Federal Register / Vol. 60, No. 185: 49359-49377	" <i>Triumfetta semitriloba</i> (Sacramento bur) is a subshrub now found on four Hawaiian Islands and considered to be a noxious weed by the State of Hawaii (DOA 1981, Wagner et al. 1990). Sacramento bur threatens the Koaie Stream population of <i>Kokia kauaiensis</i> (HPCC 1990b3)."

305	Congeneric weed	y
	Source(s)	Notes
	Bosch, C.H., 2011. <i>Triumfetta rhomboidea</i> Jacq. [Internet] Record from PROTA4U. Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 24 Mar 2016]	" <i>Triumfetta rhomboidea</i> is a pantropical weed. It is very widespread in continental Africa, including South Africa. It is introduced and naturalized in Cape Verde, Madagascar, Seychelles, Réunion and Mauritius and in Australia."
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	" <i>Triumfetta rhomboidea</i> " ... "Environmental impact: Invades pastures, disturbed areas in forests. Prevents establishment of native species. Burs a nuisance to man and beast in pastures and forests."

401	Produces spines, thorns or burrs	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Capsules with hooked bristles] "Perennial herbs or subshrubs to ca 5-20 dm tall; stems erect, younger ones densely stellate pubescent, glabrate with age. Leaves variable in shape, usually broadly ovate to lanceolate, 4-20 cm long, 3.5-8 cm wide, usually slightly 3-lobed, 3-nerved from base, stellate pubescent, more densely so on lower surface, margins irregularly serrate-dentate, apex acuminate, base very broadly cuneate to truncate, rarely subcordate, petioles 1.5-6 cm long." ... "Capsules globose, indehiscent, 4-5 mm in diameter, puberulent, glabrate with age, covered with retrorsely setose, hooked bristles"

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

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.	"Perennial herbs or subshrubs to ca 5-20 dm tall" [Malvaceae. No evidence]

404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Moog, F. A. 1986. Forages in Integrated Food Cropping Systems. Pp. 152-156 in Forages in Southeast Asian and South Pacific agriculture: proceedings of an international workshop held at Cisarua, Indonesia, 19-23 August 1985, ACIAR Proceedings Series No. 12	"Feeding of animals in mixed crop/livestock farming systems revolves around forages which include crop residues, weeds, tree leaves and planted fodder crops" ... "Broadleaves, particularly <i>Synedrella nodiflora</i> , <i>Pseudoelephantopus</i> sp., <i>Triumfetta semitriloba</i> , though not fed in high amounts, are always a feed component throughout the year."
	Hosaka, E. Y., Thistle, A. & Wadsworth, H. A. 1954. Noxious Plants of Hawaiian Ranges. Extension Bulletin 62. University of Hawaii, Honolulu	"Sacramento bur spreads rapidly by seed and forms such dense stands that few other plants survive in association with it. It has little forage value."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Spreads rapidly, crowding out forage plants. Of little or no forage value." [Low palatability]

405	Toxic to animals	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	" <i>T. semitriloba</i> is an alternative host of the leafhopper <i>Empoasca formosana</i> , which is a vector of cadang-cadang disease on coconuts. However, the plant was found not to be a reservoir for the actual virus responsible for cadang-cadang (Bigornia, 1963)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown. May contribute to fuel load in fire prone dry habitats] "in Hawai'i naturalized and often common in dry, disturbed sites,"
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The species needs disturbance for establishment. If given an equal start, it competes well with other herbs, grasses, and shrubs in full sun or partial shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"It grows in sand to clay soils with pH values from about 5.5 to 8.0."

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.	"Perennial herbs or subshrubs to ca 5-20 dm tall; stems erect, younger ones densely stellate pubescent, glabrate with age."

412	Forms dense thickets	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Burweed may be found growing in small patches and as single, dispersed plants."
	Hosaka, E. Y., Thistle, A. & Wadsworth, H. A. 1954. Noxious Plants of Hawaiian Ranges. Extension Bulletin 62. University of Hawaii, Honolulu	"Why a pest: Sacramento bur spreads rapidly by seed and forms such dense stands that few other plants survive in association with it. It has little forage value." [Possibly, although this older reference is contradicted by more recent evidence from Hawaii]

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 herb] "Perennial herbs or subshrubs to ca 5-20 dm tall" ... "naturalized and often common in dry, disturbed sites, 30-860 m"

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 24 Mar 2016]	Family: Malvaceae Subfamily: Grewioideae Altfamily: Tiliaceae

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	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.	"Perennial herbs or subshrubs to ca 5-20 dm tall" [Malvaceae]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Perennial herbs or subshrubs to ca 5-20 dm tall; stems erect, younger ones densely stellate pubescent, glabrate with age."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "T. semitriloba has a very broad native range in the Americas, from Mexico and central Florida, down through the Caribbean and Central America, to northern and central South America as far as northern Argentina and Chile (USDA-ARS, 2015). Isolated records from the very south-east of Georgia, USA, are recorded as introduced (USDA-NRCS, 2015)."

602	Produces viable seed	y
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"It is an abundant seed producer. Fruits collected in Puerto Rico averaged 0.0040 + 0.0016 g/fruit. Seeds separated from those fruits averaged 0.0039 + 0.0001 g/seed or 256,000 seeds/kg."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Propagation: By seed."

603	Hybridizes naturally	
	Source(s)	Notes
	Lay, K. K. (1950). The American Species of <i>Triumfetta</i> L. <i>Annals of the Missouri Botanical Garden</i> , 37(3): 315-395	" <i>Triumfetta brachypetala</i> " ... "A hybrid species between <i>T. lappula</i> and <i>T. semitriloba</i> . I have not seen the type, and the very short description is inadequate for diagnosis." [Unknown if natural hybrids occur]

604	Self-compatible or apomictic	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Seed production is guaranteed by self-pollination, but crosspollination increases seed set and probably quality (Collevatti and others 1997a)."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"In Brazil, solitary and social bees visit and pollinate burweed (Collevatti and others 1997b)."
	Collevatti, R. G., Campos, L. A., & Silva, A. F. (1998). Pollination ecology of the tropical weed <i>Triumfetta semitriloba</i> Jacq.(Tiliaceae), in the south-eastern Brazil. <i>Revista Brasileira de Biologia</i> , 58(3), 383-392	"This work aimed to study the pollination ecology of the tropical weed <i>Triumfetta semitriloba</i> Jacq. (Tiliaceae), in Viçosa, South-eastern Brazil, during the flowering season of 1993 and 1994. Two patches located in pasture (P1 and P2) and one patch in a forest trail (P3) were chosen and ten plants on each patch were sorted. The number of opened flowers were counted during one day, in each flowering month and patch. All observed flower visitors were identified and their behavior while visiting flowers was recorded. Frequency of visits to flowered branches was obtained and some pollinator individuals were captured for analysis of pollen load. Flowers are conspicuously yellow and actinomorphic, with five nectaries around the ovary base, and opened sequentially in the afternoon. Flower phenology followed a modified steady-state Gentry's pattern. The number of opened flowers was higher in P2, but differences between months were not homogeneous between patches. Considering behaviour when collecting pollen or nectar, which permitted impregnation of stigma with pollen, visiting frequency and percent of <i>T. semitriloba</i> pollen on pollen load (100% for all of them, except for <i>Augochlorella michaelis</i> which was 81%) the following species were the mainly pollinators: <i>Augochloropsis cupreola</i> , <i>Augochlorella michaelis</i> , <i>Cressomiella aff. sussurans</i> , <i>Cressomiella sussurans</i> , <i>Cressomiella sp.</i> , <i>Pseudocentron paulistana</i> , <i>Ceratinula sp1</i> , <i>Ceratinula sp2</i> and <i>Ceratinula sp3</i> , <i>Melissodes sexcincta</i> , <i>Apis mellifera</i> , <i>Plebeia cf. nigriceps</i> , <i>Plebeia droryana</i> . Frequency of pollinators visitation was not different between patches and not uniform during anthesis. There was a higher pollinator activity between 15:00 and 17:00 hr. "

Qsn #	Question	Answer
606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	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
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Burweed blooms and fruits continuously (Long and Lakela 1976), beginning at about 6 months of age." ... "Burweed lives between 1 and 3 years. In seasonally dry habitat, this species behaves as an annual."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Burs cling to clothing and fur, so sanitation measures and control before sacramento bur sets seed are critical to prevent its spread."

702	Propagules dispersed intentionally by people	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Because of its weedy nature, planting burweed is unlikely, and ill-advised outside its native range. Indeed, control is often needed in croplands and pastures."

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	CABI, 2016. <i>Triumfetta semitriloba</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Difficult to identify/detect as a commodity contaminant"

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Hosaka, E. Y., Thistle, A. & Wadsworth, H. A. 1954. Noxious Plants of Hawaiian Ranges. Extension Bulletin 62. University of Hawaii, Honolulu	"Dissemination: The hooked spines of the burs cling to the hair on animals, and the seeds are carried to new locations."

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The fruits, round burs 6 to 8 mm in diameter with numerous hooked spines, are borne in groups of two or three. Each fruit has three compartments and contains three seeds, if complete (Howard 1989, Liogier 1994, Long and Lakela 1976)." ... "Seeds are dispersed when they cling to passing animals."

705	Propagules water dispersed	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.	"in Hawai'i naturalized and often common in dry, disturbed sites" [No evidence. Occurs in dry habitats & adapted for dispersal by external attachment]
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The fruits, round burs 6 to 8 mm in diameter with numerous hooked spines, are borne in groups of two or three. Each fruit has three compartments and contains three seeds, if complete (Howard 1989, Liogier 1994, Long and Lakela 1976)." ... "Seeds are dispersed when they cling to passing animals."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Seeds are dispersed when they cling to passing animals." [Not adapted for internal dispersal by birds. Burs might be able to attach to feathers]

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Burs cling to clothing and fur, so sanitation measures and control before sacramento bur sets seed are critical to prevent its spread."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[Not fleshy-fruited & plants not eaten by animals] "The fruits, round burs 6 to 8 mm in diameter with numerous hooked spines, are borne in groups of two or three. Each fruit has three compartments and contains three seeds, if complete"

801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"It is an abundant seed producer. Fruits collected in Puerto Rico averaged 0.0040 + 0.0016 g/fruit. Seeds separated from those fruits averaged 0.0039 + 0.0001 g/seed or 256,000 seeds/kg."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2016) Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 24 Mar 2016]	"Storage Behaviour: No data available for species. Of 14 known taxa of genus <i>Triumfetta</i> , 100.00% Orthodox(p/?)"

803	Well controlled by herbicides	y
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Management: Sensitive to foliar drizzle applications of triclopyr and of glyphosate. On Koaiye Trail, Waimea Canyon, Kauai, initially suppressed by application of mixture of triclopyr and glyphosate, each at 1 lb/ acre; subsequently emerging seedlings by half that rate"

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	Notes
	Hosaka, E. Y., Thistle, A. & Wadsworth, H. A. 1954. Noxious Plants of Hawaiian Ranges. Extension Bulletin 62. University of Hawaii, Honolulu	"Control: The plant itself is not difficult to kill by uprooting or plowing. A preliminary harrowing to knock down the dense growth, followed by burning during a dry period, will destroy most of the plants." ... "Planting with aggressive short grasses such as kikuyu and pangola, followed by periodic mowing, keeps the Sacramento bur under effective control."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unlikely] "Native to North America from Baja California and Mexico south to South America and the West Indies; in Hawai'i naturalized and often common in dry, disturbed sites, 30-860 m, on Kaua'i, O'ahu, Maui, and Hawai'i."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized on Kauai, Oahu, Maui, and Hawaii, Molokai & elsewhere
- Pasture weed, displacing more valuable forage plants
- Environmental weed, threatening rare & endangered species in the Hawaiian Islands
- Other *Triumfetta* species are invasive
- Burrs covered with hooked bristles
- Little or no forage value
- Tolerates many soil types
- Reproduces by seeds
- Self-compatible
- Able to reach reproductive maturity in 6 months
- Burrs attach to clothing & fur & disperse seeds
- Prolific seed production

Low Risk Traits

- Requires disturbance for establishment
- Non-toxic
- Not reported to spread vegetatively
- Herbicides provide effective control
- Effectively controlled by uprooting, plowing, or burning