Taxon: Mollugo cerviana **Family:** Molluginaceae

Common Name(s): slender carpetweed
threadstem carpetweed
wire-stem chickweed

Synonym(s): Pharnaceum cerviana L.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 13 Jan 2016

WRA Score: 9.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Annual Herb, Disturbance Weed, Crop Weed, Fodder, Small-seeded

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed		
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
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
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	n
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		
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)		
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	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m2)		
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		
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.	"A weed of warm temperate and tropical regions, perhaps native to the Old World" [No evidence of domestication]

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 12 Jan 2016]	"Distributional Range: Native: Africa East Tropical Africa: Kenya; Tanzania; Uganda South Tropical Africa: Mozambique; Zambia; Zimbabwe Southern Africa: Botswana; Namibia; South Africa - Cape Province, - Free State, - Transvaal West Tropical Africa: Benin; Gambia; Guinea; Mali; Niger; Nigeria; Senegal; Togo Asia-Temperate Arabian Peninsula: Oman; Saudi Arabia; Yemen China: China - Hebei, - Xinjiang Middle Asia: Kazakhstan Mongolia: Mongolia Siberia: Russian Federation-Western Siberia - Western Siberia Western Asia: Turkey Asia-Tropical Indian Subcontinent: India; Pakistan; Sri Lanka Indo-China: Myanmar Australasia Australia: Australia - New South Wales, - Northern Territory, - Queensland, - South Australia, - Western Australia Europe East Europe: Russian Federation-European part - European part Southeastern Europe: Albania; Bulgaria; Greece; Italy; Romania Southwestern Europe: Portugal; Spain"

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 12 Jan 2016]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	**Notes**
	Kearney, T.H. & Peebles, R.H. (1960). Arizona Flora. University of California Press, Berkeley, CA	[Elevation range exceeds 1000 m, demonstrating environmental versatility] "Mollugo cerviana" ... "Coconino County to Cochise and Pima counties, 1,500 to 7,000 feet, sandy soil,"
	Flora of North America Editorial Committee. 2004. Flora of North America: Volume 4: Magnoliophyta: Caryophyllidae, Part 1. Oxford University Press US, New York and Oxford	[Elevation range exceeds 1000 m, demonstrating environmental versatility] "Open woodlands, dry sandy soils; 400-2300 m; introduced; Ariz., Calif., N.Mex., Tex., Utah; n Mexico; s Europe; s Asia; Africa; Australia."

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. 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 sites, only on the island of Hawai'i."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Tropics and subtropics of Africa and Asia."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"A weed of warm temperate and tropical regions, perhaps native to the Old World"
	Flora of North America Editorial Committee. 2004. Flora of North America: Volume 4: Magnoliophyta: Caryophyllidae, Part 1. Oxford University Press US, New York and Oxford	"Flowering late summer-early fall. Open woodlands, dry sandy soils; 400-2300 m; introduced; Ariz., Calif., N.Mex., Tex., Utah; n Mexico; s Europe; s Asia; Africa; Australia."

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized in low elevation dry sites, only on the island of Hawai'i. First collected in 1975 (Herbst & Ishikawa 5386, BISH)."

Qsn #	Question	Answer
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 11 Jan 2016]	"Naturalized: Asia-Temperate Arabian Peninsula: Qatar Northern America Northern Mexico: Mexico - Baja California, - Sonora South-Central U.S.A.: United States - New Mexico, - Texas Southwestern U.S.A.: United States - Arizona, - California, - Utah"
	Herbst, D.R., Staples, G.W. & Imada, C.T. (2004). New Hawaiian plant records for 2002-2003. Bishop Museum Occasional Papers 78: 3-12	"Previously known from low, dry areas on the island of Hawai'i, where it is well established on the northwestern side of the island, especially in the South Kohala District (Wagner et al., 1999: 922). The following collection documents its presence on the island of O'ahu. Material examined. O'AHU: Kahuku, next to abandoned airstrip, close to Marconi Rd, 21º42'N, 157º58'W, 10 ft, 25 May 2001, F.R. Warshauer 5180."
	Imada, C.T., James, S.A., Kennedy, B.H. (2008). New plant records from Herbarium Pacificum for 2007. Bishop Museum Occasional Papers 100: 12-16	"Previously reported as naturalized only from low, dry areas on the island of Hawai'i (Wagner et al. 1990: 922) and from a single collection next to an abandoned airstrip on O'ahu (Herbst et al. 2004: 9), threadstem carpetweed has recently been collected on Läna'i. The small population of low-statured but reproductive individuals was found in disturbed habitat resulting from the construction of a meteorological tower."
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2016. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm. [Accessed 12 Jan 2016]	"Status: Naturalized Distribution: O/ L/ H"

302	Garden/amenity/disturbance weed	y
	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	"a troublesome weed"
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"A weed of roadsides, cultivation, waste places, bare ground and dry river beds"
	Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2016). Flora of Zimbabwe: Species information: Mollugo cerviana var. cerviana. http://www.zimbabweflora.co.zw/. [Accessed 12 Jan 2016]	"In grassland and on river banks and as a weed of gardens, disturbed and cultivated areas."
	Flora of North America Editorial Committee. 2004. Flora of North America: Volume 4: Magnoliophyta: Caryophyllidae, Part 1. Oxford University Press US, New York and Oxford	"Mollugo cerviana is a weed of sandy places in tropical and subtropical regions around the world"
	Matthew, K.M. (1995). An excursion flora of Central Tamilnadu, India. CRC Press, Boca Raton, FL	"Plains from the coast inwards in sandy places/disturbed ground; often a courtyard weed"

Qsn #	Question	Answer
	Avila-Jiménez, D. Z. (2005). Changes in the Pinacate Reserve ecosystems: invasion of non-native plants. USDA Forest Service Proceedings RMRS-P-36, 99, 295-297	"Within this ecosystem is the heart of the Sonoran Desert called the Pinacate Reserve (Reserva de la Biosfera El Pinacate y Gran Desierto de Altar). The Pinacate Reserve registers 97 invasive plant species, of which 18 are altering the natural ecosystems." [Mollugo cerviana - Common in wildlands. A potential environmental weed]

303	Agricultural/forestry/horticultural weed	y
	Source(s)	**Notes**
	Gaddeyya, G., & Kumar, P. R. (2014). Studies on weed infestation of some agricultural fields at Visakhapatnam district, Andhra Pradesh. Journal of Crop and Weed, 10(2), 419-429	"A systematic field study was conducted in crop fields such as food crops, pulses, vegetable crops, oil crops and commercial crops at Visakhapatnam District. A total of 120 weed species belonging to 40 families were carefully studied and recorded." ... "Table 3: The list of weed flora and their status in agricultural crops of study area ... Mollugo cerviana - Weed status = Frequent"
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"A weed of roadsides, cultivation, waste places, bare ground and dry river beds;" ... "Regarded as a troublesome weed in areas where it occurs."
	Moody, K. 1989. Weeds Reported in Rice in South and Southeast Asia. International Rice Research Institute, Manila, Philippines	A weed of rice in Indonesia

304	Environmental weed	
	Source(s)	**Notes**
	Avila-Jiménez, D. Z. (2005). Changes in the Pinacate Reserve ecosystems: invasion of non-native plants. USDA Forest Service Proceedings RMRS-P-36, 99, 295-297	"Abstract—Over the years, humans have modified the Sonoran Desert by introducing invasive plants that prosper in disturbed and non-disturbed habitats. These invaders modify the dynamics and structure of populations and the composition of communities, which in turn can result in radical changes in wildlife habitat. The natural landscape of the Sonoran Desert is characterized by extensive valleys with parallel and discontinuous arrangements of narrow ranges (Shreve and Wiggins, 1964). Within this ecosystem is the heart of the Sonoran Desert called the Pinacate Reserve (Reserva de la Biosfera El Pinacate y Gran Desierto de Altar). The Pinacate Reserve registers 97 invasive plant species, of which 18 are altering the natural ecosystems." ... "Table 1—Invasive plants of interest in the Pinacate Reserve" [Mollugo cerviana included among the list of 18 that are altering natural ecosystems. Otherwise, impacts unspecified]
	Flora of North America Editorial Committee. 2004. Flora of North America: Volume 4: Magnoliophyta: Caryophyllidae, Part 1. Oxford University Press US, New York and Oxford	"The species does not compete well in crowded conditions"

305	Congeneric weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	"Mollugo verticillata L. Molluginaceae See: Mollugo berteriana Ser. Cultivated Arid - Refs: 74 1278-N, 1275-A, 1255-U, 1243-N, 1226-W, 1220-U, 1215-N, 1203-W, 1165-I, 1134-Q, 1104-W, 1040-N, 1035- N, 1017-N, 1007-N, 967-A, 946-W, 945- N, 933-A, 929-A, 923-A, 904-I, 898-N, 878-I, 876-NI, 869-W, 850-N, 819-N, 809-U, 794-N, 791-N, 777-N, 773-N, 761-N, 725-NI, 719-A, 718-N, 662-N, 642-A, 543-A, 482-N, 407-W, 368-E, 361-W, 354-N, 327-E, 300-N, 299-XW, 295-W, 287-N, 286-W, 270-A, 261-W, 255-W, 251-I, 249-G, 245-A, 243-A, 236 -A, 218-W, 211-AW, 210-W, 207- AW, 198-N, 180-A, 179-W, 174-v, 173- A, 161-W, 157-W, 101-N, 86-N, 85- NZW, 34-W"
	Dave's Garden. (2016). Green Carpetweed - Mollugo verticillata. http://davesgarden.com/guides/pf/go/62666/. [Accessed 13 Jan 2016]	"On Sep 12, 2014, Farmerdill from Augusta, GA (Zone 8a) wrote: Persistant plant in cultivated plots. It is easy to remove by either cultivation or pulling. But it serves no useful purpose under those conditions so I rate it as negative. It is seed propagated and an annual so one does not have to deal with persistant roots."
	Teasdale, J. R., Beste, C. E., & Potts, W. E. (1991). Response of weeds to tillage and cover crop residue. Weed Science, 39(2): 195-199	[Mollugo verticillata - carpetweed controlled as a crop weed] "Abstract. Total weed density increased after 1 yr of no-tillage and after 2 yr of conventional tillage in a 4-yr experiment with repeated assignment of the same treatment to the same plots. Large crabgrass, goosegrass, and carpetweed densities were higher in the no-tillage compared with the conventional-tillage treatment in at least 1 yr"
	Holm, L. G., Pancho, J.V., Herberger, J.P. & Plucknett, D.L. 1979. A Geographical Atlas of World Weeds. John Wiley and Sons, New York, NY	M. pentaphylla considered a principal weed of agriculture in Indonesia

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.	"Annual herbs; stems numerous, ascending, filiform, 0.4-1.5(-2) dm long. Leaves glaucous, basal ones in a rosette, linear-spatulate to narrowly oblanceolate, 1-1.5 cm long, 0.2-0.3 cm wide, stem leaves in whorls of 5-10 per node, linear, 1-2 cm long, ca. 0.1-0.15 cm wide."

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.	"Annual herbs" [Molluginaceae. No evidence]

404	Unpalatable to grazing animals	n

Qsn #	Question	Answer
	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	"tender cooked leaves used as vegetable, plant for fodder"

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	"tender cooked leaves used as vegetable, plant for fodder" [No evidence]
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	WRA Specialist. 2016. Personal Communication	Uncommon

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	"tender cooked leaves used as vegetable, plant for fodder" [No evidence]
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	[No evidence] "USES: Food: Leaves are used as a vegetable. Tender leaves are collected, sorted, chopped and cooked. Coconut milk or groundnut paste may be added and then the vegetable served with ugali or rice."
	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	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.	"Annual herbs" ... "naturalized in low elevation dry sites" [Occurs in dry, & potentially fire prone habitats, but unlikely to increase fire hazard significantly, relative to flammable non-native grasses]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Flora of North America Editorial Committee. 2004. Flora of North America: Volume 4: Magnoliophyta: Caryophyllidae, Part 1. Oxford University Press US, New York and Oxford	"Open woodlands, dry sandy soils; 400-2300 m" [Shade tolerance unknown. Open habitats suggest high light environment]
	Baldwin, B.G., Goldman, D.H., Keil, D.J., Patterson, R., & Rosatti, T.J. (eds.). 2012. The Jepson Manual. Vascular Plants of California, Second Edition, Thoroughly Revised and Expanded.University of California Press, Berkeley and Los Angeles	"Seasonal pools, sandy washes, flats, slopes" [Habitat suggests high light environments]

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	**Notes**
	Kearney, T.H. & Peebles, R.H. (1960). Arizona Flora. University of California Press, Berkeley, CA	"1,500 to 7,000 feet, sandy soil"
	Flora of North America Editorial Committee. 2004. Flora of North America: Volume 4: Magnoliophyta: Caryophyllidae, Part 1. Oxford University Press US, New York and Oxford	"Open woodlands, dry sandy soils"

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.	"Annual herbs; stems numerous, ascending, filiform, 0.4-1.5(-2) dm long."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Went, F. W. (1948). Ecology of desert plants. I. Observations on germination in the Joshua Tree National Monument, California. Ecology, 29(3), 242-253	"Mollugo cerviana (L.) Ser. Is locally very abundant after summer rains only." [As an annual, unlikely to form dense cover that inhibits other vegetation]
	Flora of North America Editorial Committee. 2004. Flora of North America: Volume 4: Magnoliophyta: Caryophyllidae, Part 1. Oxford University Press US, New York and Oxford	"The species does not compete well in crowded conditions" [No evidence]

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] "in Hawai'i naturalized in low elevation dry sites, only on the island of Hawai'i."

Qsn #	Question	Answer
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 11 Jan 2016]	Molluginaceae

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.	"Annual herbs; stems numerous, ascending, filiform, 0.4-1.5(-2) dm long." [Molluginaceae]

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Boetsch, J. R. (2002). The Aizoaceae and Molluginaceae of the southeastern United States. Castanea, 67(1): 42-53	"Annual or perennial herbs, non-succulent or slightly succulent. Stems procumbent or ascending from a slender taproot, or absent."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2016). Flora of Zimbabwe: Species information: Mollugo cerviana var. cerviana. http://www.zimbabweflora.co.zw/. [Accessed 12 Jan 2016]	[No evidence] "Widespread in Old World tropics and subtropics; introduced in America."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Capon, S. J., & Brock, M. A. (2006). Flooding, soil seed bank dynamics and vegetation resilience of a hydrologically variable desert floodplain. Freshwater Biology, 51(2): 206-223	"Appendix List of species recorded from the soil seed bank of the Cooper Creek floodplain" [Includes Mollugo cerviana. †Indicates species present in soil seed bank only.]
	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 subglobose, 1.5- 1.8 mm in diameter. Seeds finely reticulate."
	Baldwin, B.G., Goldman, D.H., Keil, D.J., Patterson, R., & Rosatti, T.J. (eds.). 2012. The Jepson Manual. Vascular Plants of California, Second Edition, Thoroughly Revised and Expanded.University of California Press, Berkeley and Los Angeles	"SEED: brown"

Qsn #	Question	Answer
603	**Hybridizes naturally**	
	Source(s)	**Notes**
	WRA Specialist. 2016. Personal Communication	Unknown

604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	Kubitzki, K., Rohwer, J.G. & Bittrich, V. (eds.). 1993. The Families and Genera of Vascular Plants: Volume II. Flowering Plants. Dicotyledons: Magnoliid, Hamamelid and Caryophyllid Families. Springer-Verlag, Berlin, Heidelberg, New York	"In the three most widely spread, weedy species of Mollugo (M. verticil/ala, M. nudicaulis and M. cerviana) both self- and insect pollination have been reported (Pax and Hoffmann 1934; Bogle 1970)."
	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.	[Perfect flowers. Self-compatibility unknown] "Flowers small, perfect, axillary, solitary or in cymes, pedicels long, filiform; sepals 5, persistent, margins scarious; petals absent; stamens 3-5, rarely more; ovary 3-celled"

605	**Requires specialist pollinators**	**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.	"Flowers verticiliate, the capillary pedicels often longer than leaves; sepals elliptic to elliptic-obovate, ca. 1 mm long, reticulate-nerved; stamens usually 5."
	Kubitzki, K., Rohwer, J.G. & Bittrich, V. (eds.). 1993. The Families and Genera of Vascular Plants: Volume II. Flowering Plants. Dicotyledons: Magnoliid, Hamamelid and Caryophyllid Families. Springer-Verlag, Berlin, Heidelberg, New York	"In the three most widely spread, weedy species of Mollugo (M. verticil/ala, M. nudicaulis and M. cerviana) both self- and insect pollination have been reported (Pax and Hoffmann 1934; Bogle 1970)."

606	**Reproduction by vegetative fragmentation**	**n**
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"An attractive annual herb, very small, with many slender, stiff upright stems 4-17 cm long." ... "it can be propagated by seeds and cuttings." [No evidence]

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.	"Annual herbs; stems numerous, ascending, filiform, 0.4-1.5(-2) dm long."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"FRUIT: A capsule with tiny brown seeds." ... "A weed of roadsides, cultivation, waste places, bare ground and dry river beds" [Small seed size & distribution along heavily trafficked corridors suggests potential for inadvertent movement]

702	Propagules dispersed intentionally by people	n
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"Collected from the wild and not cultivated or protected by the local people. However, it can be propagated by seeds and cuttings." [Unlikely to be intentionally dispersed]

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	**Notes**
	WRA Specialist. 2016. Personal Communication	Occurrence with crops indicates potential to be dispersed as a produce contaminant

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	Jurado, E., Westoby, M., & Nelson, D. (1991). Diaspore weight, dispersal, growth form and perenniality of central Australian plants. The Journal of Ecology, 79(3): 811-828	"Seed mass, dispersal, perenniality and growth form of some species of the Central Australian flora" [Mollugo cerviana - Dispersal: Unassisted(U)" [Wind may carry seeds a short distance, but they otherwise lack adaptations for wind dispersal]

705	Propagules water dispersed	y
	Source(s)	**Notes**
	Capon, S. J., & Brock, M. A. (2006). Flooding, soil seed bank dynamics and vegetation resilience of a hydrologically variable desert floodplain. Freshwater Biology, 51(2): 206-223	"Appendix List of species recorded from the soil seed bank of the Cooper Creek floodplain" [Includes Mollugo cerviana. Presence in floodplain suggests dispersal by water]
	Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2016). Flora of Zimbabwe: Species information: Mollugo cerviana var. cerviana. http://www.zimbabweflora.co.zw/. [Accessed 12 Jan 2016]	"In grassland and on river banks and as a weed of gardens, disturbed and cultivated areas." [Distribution along river banks suggests seeds may be dispersed by water]
	Baldwin, B.G., Goldman, D.H., Keil, D.J., Patterson, R., & Rosatti, T.J. (eds.). 2012. The Jepson Manual. Vascular Plants of California, Second Edition, Thoroughly Revised and Expanded.University of California Press, Berkeley and Los Angeles	"Uncommon. Seasonal pools, sandy washes, flats, slopes" [Presence near pools & washes suggests water dispersal]

706	Propagules bird dispersed	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"FRUIT: A capsule with tiny brown seeds." [Not fleshy-fruited]

707	Propagules dispersed by other animals (externally)	
	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 subglobose, 1.5- 1.8 mm in diameter. Seeds finely reticulate." [Capsules & seed lack means of external attachment, although small size may enable seeds to adhere to mud on feet or fur of animals]

708	Propagules survive passage through the gut	
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"The plant is used for fodder" [Unknown if seed can survive consumption & retain viability]

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"A capsule with tiny brown seeds." [Unknown]
	Went, F. W. (1948). Ecology of desert plants. I. Observations on germination in the Joshua Tree National Monument, California. Ecology, 29(3), 242-253	"Mollugo cerviana (L.) Ser. Is locally very abundant after summer rains only." [Potentially]

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 13 Jan 2016]	[Unknown] "Storage Behaviour: No data available for species. Of 3 known taxa of genus Mollugo, 100.00% Orthodox(p/?)"

Qsn #	Question	Answer
803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	Richardson, R. J., Wilson, H. P., Armel, G. R., & Hines, T. E. (2009). Responses of Imidazolinone-Resistant Corn, Several Weeds, and Two Rotational Crops to Trifloxysulfuron. Weed Technology 19(3): 744-748	Carpetweed (M. verticillata) was "controlled by at least 95% by Smetolachlor fb trifloxysulfuron applications". [Herbicides would also presumably be effective on M. cerviana]

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	Ruffo, C.K., Birnie, A. & Tengnäs, B. (2002). Edible Wild Plants of Tanzania. RELMA Technical Handbook Series 27. Regional Land Management Unit (RELMA), Swedish International Development Cooperation Agency (Sida), Nairobi, Kenya	"A weed of roadsides, cultivation, waste places, bare ground and dry river beds" [Unknown, but thrives in disturbed areas & cultivated sites]

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized in low elevation dry sites, only on the island of Hawai'i. First collected in 1975 (Herbst & Ishikawa 5386, BISH)." [Presence of natural enemies unknown]

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Capable of growing in tropical climates
• Naturalized on Hawaii, Lanai, and Oahu, Hawaiian Islands, and elsewhere
• Garden & disturbance weed
• Agricultural & crop weed
• Other Mollugo species are invasive weeds
• Reproduces by seeds
• An annual herb, capable of reaching reproductive maturity in <1 year
• Unassisted seed dispersal, although small size may enable seeds to spread through a number of vectors

Low Risk Traits
• Unarmed (no spines, thorns or burrs)
• Provides fodder for livestock
• Edible to humans
• Not reported to spread vegetatively