

Taxon: <i>Heterotheca grandiflora</i> Nutt.	Family: Asteraceae
Common Name(s): silk-grass golden-aster sticky daisy telegraph weed	Synonym(s): <i>Heterotheca floribunda</i> Benth.

Assessor: Chuck Chimera	Status: Approved	End Date: 26 May 2024
WRA Score: 14.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Annual-Biennial Herb, Aromatic, Unpalatable, Self-Compatible, Wind-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		
304	Environmental weed	y = 2*multiplier (see Appendix 2), n = 0	y
305	Congeneric weed	y = 1*multiplier (see Appendix 2), n = 0	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	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	y = 1, n = 0	n

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y = 1, n = 0	n
412	Forms dense thickets	y = 1, n = 0	y
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		
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y = 1, n = -1	y
705	Propagules water dispersed	y = 1, n = -1	y
706	Propagules bird dispersed	y = 1, n = -1	n
707	Propagules dispersed by other animals (externally)	y = 1, n = -1	y
708	Propagules survive passage through the gut	y = 1, n = -1	n
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y = -1, n = 1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y = 1, n = -1	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
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[No evidence of domestication in this weedy native taxon] "Telegraphplant is a ruderal native that is common on roadsides and other disturbed places. It is usually considered a weed only when it inhabits agricultural land and landscaped areas."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	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
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native from California to Arizona and Baja California, Mexico; in Hawai'i a relatively common weed of dry, disturbed areas, 10- 2,270 m, probably on all of the main islands but not documented from Ni'ihau and Moloka'i."
202	Quality of climate match data	High
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"Although generally described as a temperate climate, the climate within the species' native range can be seasonally very dry and hot. The fact that <i>H. grandiflora</i> has naturalised in Arizona, Nevada, Utah and old lava flows and sand dunes of Hawaii suggests that it is well adapted for survival in arid, sandy or otherwise well-drained soils in temperate and sub-tropical areas, including deserts."
	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.	[Elevation range exceeds 1000 m, demonstrating environmental versatility] "Native from California to Arizona and Baja California, Mexico; in Hawai'i a relatively common weed of dry, disturbed areas, 10- 2,270 m,"
204	Native or naturalized in regions with tropical or subtropical climates	y

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.	"Native from California to Arizona and Baja California, Mexico; in Hawai'i a relatively common weed of dry, disturbed areas, 10- 2,270 m, probably on all of the main islands but not documented from Ni'ihau and Moloka'i. First collected on Maui in 1909 (Faurie 937, BISH)."

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.	"...in Hawai'i a relatively common weed of dry, disturbed areas, 10- 2,270 m, probably on all of the main islands but not documented from Ni'ihau and Moloka'i. First collected on Maui in 1909"
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	"Introduced to Arizona and Utah."

301	Naturalized beyond native range	y
	Source(s)	Notes
	PlantNET. (2024). New South Wales Flora Online - <i>Heterotheca grandiflora</i> . https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Heterotheca~grandiflora . [Accessed 26 May 2024]	"Distribution and occurrence: Grows in pasture, along roadsides and in wasteland in the Raymond Terrace-Newcastle area. Native of Central America. NSW subdivisions: *NC, *CC, *CWS"
	Baldwin, B.G., Goldman, D>H., Keil, D.J., Patterson, R. Rosatti, T.J. (eds.). (2012). The Digital Jepson Manual: Vascular Plants of California, Second Edition, Thoroughly Revised and Expanded. University of California Press, Berkeley and Los Angeles, CA	"Disturbed areas, dry streambeds, sand dunes. ... introduced in AZ, UT."
	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 a relatively common weed of dry, disturbed areas, 10- 2,270 m, probably on all of the main islands but not documented from Ni'ihau and Moloka'i."
	Csurhes, S. & Edwards, R. (1998). Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	"Naturalised populations exist around Newcastle in coastal New South Wales (Harden 1992). On the Gold Coast (south-east Queensland), it has become common along roadsides and tracks on coastal sand dunes and is probably beyond eradication."
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"Naturalised populations exist in Hawaii, Japan and a small area near Newcastle in New South Wales."

302	Garden/amenity/disturbance weed	
	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 a relatively common weed of dry, disturbed areas, 10- 2,270 m"
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	"Telegraphplant is a ruderal native that is common on roadsides and other disturbed places. It is usually considered a weed only when it inhabits agricultural land and landscaped areas."

Qsn #	Question	Answer
	<p>Medeiros, A.C., Loope, L.L. & Chimera, C.G. (1998). Flowering Plants and Gymnosperms of Haleakala National Park. Technical Report 120. Pacific Cooperative Studies Unit, Honolulu, HI</p>	<p>[Invades disturbed areas in aeolian zones of Haleakala, Maui] "Haleakala's alpine zone occurs above 6560 ft (2000 meters) elevation within the cinder dominated crater (an erosional depression with relatively recent volcanic activity) and above 8530 ft (2600 meters) on the older, outside western slope of the volcano." ... "Generally, non native species are few, limited in cover, and largely restricted to habitats modified by man, such as on compacted cinder, surrounding buildings, and in pavement cracks in parking lots. Characteristic alien species include Hypochoeris radicata (gosmore), Oenothera stricta (evening primrose), and Bromus willdenowii (rescue grass). Bromus tectorum (cheatgrass) and Heterotheca grandiflora (telegraph plant) are invasive with natural levels of disturbance that occur in cinder flats and slopes in the crater. Based on its invasiveness in similar conditions on Hawai'i island, Verbascum thapsus (mullein) should be regarded as a serious potential weed in the alpine zone of Haleakala." ... "Erect, yellow-flowered herb characteristic of disturbed areas at low elevations, or at drier leeward sites. Locally, however, this species grows at higher elevations within Haleakala Crater in fairly level areas where cinder has been disturbed by winter flooding. In these conditions, Heterotheca can sporadically be quite common, especially in the eastern Crater. First recorded in the Park at base of the Lelewi pali by Mitchell (1945)."</p>
	<p>WRA Specialist. (2024). Personal Communication</p>	<p>A disturbance adapted weed that may threaten native species in high elevation habitats of the Hawaiian Islands. See 3.04</p>

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	<p>Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). (1983). Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI</p>	<p>"A weed in pastures, rangelands, and cultivated areas."</p>
	<p>Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. Heterotheca grandiflora. The State of Queensland, Department of Employment, Economic Development and Innovation</p>	<p>"This study was unable to find any documented evidence that H. grandiflora has a significant impact overseas. There is no evidence that it replaces native vegetation or impacts on agriculture."</p>
	<p>Flint, S. D. (1977). Autoecology of the Ruderal Weed Heterotheca grandiflora With Emphasis on Germination Dimorphism. MSc Thesis. Utah State University, Logan, UT</p>	<p>"Though Jepson [1924] lists it as one of the economically important plants of California, telegraphplant has remained a weed of roadsides and other disturbed areas. It has never become an agricultural pest [Stebbins , 1965a] except when introduced into the pineapple fields of Hawaii [Wagenknecht , 1960]."</p>

304	Environmental weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Willsher, L., Mason, P., & Whyte, B. (2008). Preventing the spread of telegraph weed in South East Queensland. In Proceedings of the 16th Australian Weeds Conference, Cairns Convention Centre, North Queensland, Australia, 18-22 May, 2008. Queensland Weed Society	"A weed risk assessment was carried out in August 2004 by the Department of Natural Resources and Water (NRW) with telegraph weed (<i>Heterotheca grandiflora</i>) being recommended for declaration. It was declared in December 2007 as a class 2 pest under the Land Protection (Pest and Stock Route Management) Act 2002. The Gold Coast City Council has taken a proactive management approach and initiated an ongoing telegraph weed containment programme along the Southport Spit in September 2004. Control work on surrounding infestations began in late 2005 in a joint project between the Gold Coast City Council and various Queensland state agencies including Biosecurity Queensland Invasive Plants and Animals, Department of Primary Industries and Fisheries (formally NRW Land Protection), the State Land Asset Management unit of NRW, Queensland Transport and Environmental Protection Agency. Since the control programme began there have been only two new minor infestations of telegraph weed found on the Gold Coast beaches that are targeted for eradication. The core infestation areas are declining in size and the northern spread of the weed has been halted resulting in the protection of coastal dunes and sand islands of high conservation and tourism value."
	Daehler, C. C. (2005). Upper-montane plant invasions in the Hawaiian Islands: patterns and opportunities. Perspectives in Plant Ecology, Evolution and Systematics, 7(3): 203-216	[Disruptive in native communities] "Naturalized plants occurring above 2000m elevation in the Hawaiian Islands." [<i>Heterotheca grandiflora</i> - Notes = D = "disruptive in native communities, forming dense stands that appear to inhibit recruitment of natives"]
	US Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Listing 15 Species on Hawaii Island as Endangered and Designating Critical Habitat for 3 Species; Proposed Rule. Federal Register / Vol. 77, No. 201: 63928-64018	[Identified as a threat to an endangered plant in Hawaii Island] "Nonnative plant species that threaten the plant species <i>Schiedea hawaiiensis</i> in the montane dry ecosystem on Hawaii Island include the understory and subcanopy species <i>Heterotheca grandiflora</i> (telegraph weed) and <i>Senecio madagascariensis</i> (Madagascar fireweed)" ... "This species is an opportunistic colonizer that grows quickly, forms dense stands, and inhibits recruitment of native plants ..."
	Csurhes, S. & Edwards, R. (1998). Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	[Not considered a serious environmental weed in this report from Australia] "It is restricted to areas where most of the natural vegetation has been removed or severely damaged and its ability to invade and replace native vegetation appears limited."

305	Congeneric weed	y
	Source(s)	Notes
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"A closely related congener, <i>H. subaxillaris</i> (Lam.) Britt and Risby (camphor weed), is listed as a weed in the USA (Holm et al. 1979; Whitson et al. 1991)."
	Awang, M. B., & Monaco, T. J. (1978). Germination, growth, development, and control of camphorweed (<i>Heterotheca subaxillaris</i>). Weed Science, 26(1): 51-57	"Recently, growers in the Sandhills area of North Carolina reported that camphorweed is a troublesome weed in peach orchards. Major problem areas in North Carolina appear to be the counties of Anson, Montgomery, Richmond and Union. In orchards it may interfere with harvest operations and reduce yields. The weed is not classified as noxious, but its camphor-like odor is objectionable."

Qsn #	Question	Answer
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.	"Aromatic annual or biennial herbs; stems 5-20 dm long, stout and unbranched below the inflorescence, branched in the inflorescence, coarsely hirsute and glandular pubescent above. Leaves ovate to oblong or oblanceolate, 2-5 cm long, 1- 3.5 cm wide, densely villous to hirsute, margins coarsely serrate, lower ones on petioles 1-4 cm long, upper ones sessile and often with stipulelike lobes at base."

402	Allelopathic	
	Source(s)	Notes
	Morimoto, M., Cantrell, C. L., Libous-Bailey, L., & Duke, S. O. (2009). Phytotoxicity of constituents of glandular trichomes and the leaf surface of camphorweed, <i>Heterotheca subaxillaris</i> . <i>Phytochemistry</i> , 70(1): 69-74	[Unknown for <i>H. grandiflora</i> . Related species suspected of allelopathy] "Camphorweed, <i>Heterotheca subaxillaris</i> (Lam.) Britt. & Rusby, has a camphor-like odor, and its leaf surfaces contain glandular trichomes of the type shown to contain high levels of isoprenoids in other species. Borneol (1), the phytotoxic calamenene-type sesquiterpenes (2-5, 9-11), and methylated flavones (12- 15) were isolated from the dichloromethane rinsate of camphorweed aerial tissues. The strongest plant growth inhibitor against <i>Agrostis stolonifera</i> and <i>Lactuca sativa</i> seedlings, as well as duckweed (<i>Lemna paucicostata</i>), was 2-methoxy calamenene-14-carboxylic acid (2). Esterification of calamenene carboxylic acids decreased their biological activity." ... "The activity of 2 is sufficient to warrant further study of its mode of action and, perhaps, its role in chemical ecology, including allelopathy."

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.	"Aromatic annual or biennial herbs; stems 5-20 dm long, stout and unbranched below the inflorescence, branched in the inflorescence, coarsely hirsute and glandular pubescent above." [Asteraceae. No evidence]

Qsn #	Question	Answer
404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Oppenheimer, H. (2010). New Hawaiian plant records from Maui County for 2008. Bishop Museum Occasional Papers 107: 33-40	"Probably on all of the main islands but not documented from Ni'ihau and Moloka'i (Wagner et al. 1999: 326), <i>H. grandiflora</i> was found on Moloka'i in a feral goat-ravaged area with very sparse vegetation. It may be unpalatable to these animals."
	Green, L.R. & Newell, L.A. (1982). Using Goats to Control Brush Regrowth on Fuel breaks. General Technical Report PSW-59. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA	"Telegraph weed (<i>Heterotheca grandiflora</i> Nutt.) also had a low palatability rating, even though not quite dry."
	Scowcroft, P.G. & Conrad, C.E. (1992). Alien and Native Plant Response to Release from Feral Sheep Browsing on Mauna Kea. Pp. 625-665 in Stone, C.P., Smith, C.W. & Tunison, J.T. (eds.). Alien Plant Invasions in Native Ecosystems of Hawai'i: Management and Research. University of Hawaii Cooperative National Park Resources Studies Unit, Honolulu, HI	[Higher densities outside enclosure suggest lack of palatability] "Recovery trends for alien and native species outside Pu`u o Ka`uha in the years since sheep "eradication" appear to be following the general trend observed inside during the first few years after fencing. Total alien and total native plant densities in 1975 inside the enclosure were not significantly different from those in 1986 outside the enclosure. Only two individual species, both aliens, were significantly more abundant in 1986 outside than in 1975 inside - <i>Heterotheca grandiflora</i> and mullein. Both are prolific seed producers, and mullein is aggressively colonizing the southern and western flanks of Mauna Kea, as we noted earlier. Furthermore, neither is an important forage species, so their populations probably were expanding even when sheep were grazing."

405	Toxic to animals	n
	Source(s)	Notes
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	No evidence
	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

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Costa, H. S., Raetz, E., Pinckard, T. R., Gispert, C., Hernandez Martinez, R., Dumenyo, C. K., & Cooksey, D. A. (2004). Plant hosts of <i>Xylella fastidiosa</i> in and near southern California vineyards. <i>Plant Disease</i> , 88(11): 1255-1261	[Not reported as a host of the bacterium] " <i>Xylella fastidiosa</i> is a xylem-limited bacterium that causes Pierce's disease (PD) of grapevines." ... "Plant species sampled from the field that did not test positive by any method were ... telegraphplant, <i>Heterotheca grandiflora</i> , n = 15;"
	Nakahara, S. (1981). List of the Hawaiian Coccoidea (Homoptera: Sternorrhyncha). <i>Proceedings of the Hawaiian Entomological Society</i> , 23(3): 387-424	[The solenopsis mealybug is an important plant pest worldwide. The pest occurs on a number of widespread weeds] " <i>Phenacoccus solani</i> " ... "Hosts: <i>Achillea millefolium</i> , <i>Ananas comosus</i> , <i>Centella asiatica</i> , <i>Emilia sonchifolia</i> , <i>Heterotheca grandiflora</i> , <i>Lycopersicon esculentum</i> , <i>Portulaca</i> , <i>P. oleracea</i> , <i>Sonchus oleraceus</i> , <i>Verbesina encelioides</i> "

407	Causes allergies or is otherwise toxic to humans	n
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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	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
	FIREWISE 2000, Inc. (2014). La Costa Oaks South Landscape Evaluation for Wildfire Safety. Carlsbad, California. FIREWISE 2000, Inc., Escondido, CA	"The following species are highly flammable and should be avoided when planting within the first 50 feet adjacent to a structure. The plants listed below are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio." [Heterotheca grandiflora included in undesirable, flammable plant list]
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. (1999). Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Occurs in dry areas that may be fire prone, but non-native grasses are typically regarded as the main driver of fires in these ecosystems] "in Hawai'i a relatively common weed of dry, disturbed areas, 10-2,270 m,"

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. Heterotheca grandiflora. The State of Queensland, Department of Employment, Economic Development and Innovation	[Cover decreases with increasing shade] "H. grandiflora is a quick-growing opportunistic coloniser that is well adapted to open, dry, sandy sites in sub-tropical and warm temperate areas." ... "H. grandiflora is absent or rare in dune vegetation where native tree and shrub cover is taller and produces shade over the sand surface for most of the day. ... Plant abundance and approximate percentage shade were recorded at one metre intervals along each transect. Mean abundance per square metre was plotted against percentage shade (Figure 5). At both sites, there was a clear correlation between abundance of H. grandiflora and percentage shade, with maximum abundance on sites with full sun>" ... "H. grandiflora poses a threat to open areas of coastal dunes but is unlikely to become abundant wherever trees and shrubs are dominant."

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Flora of North America Editorial Committee. 2006. Flora of North America: North of Mexico. Magnoliophyta: Asteridae, part 6: Asteraceae, part 1. Oxford University Press, Oxford, UK	"Sandy and gravelly soils, dunes, disturbed ground, roadsides, vacant lots, fields; 0-100(-900) m; Ariz., Calif., Nev., Utah; introduced in Pacific Islands (Hawaii). "
	The Pollinator Partnership & NAACP. (2008). Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners In the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast. The Pollinator Partnership™/North American Pollinator Protection Campaign, San Francisco, CA	"Soil - moist to dry"
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"The fact that <i>H. grandiflora</i> has naturalised in Arizona, Nevada, Utah and old lava flows and sand dunes of Hawaii suggests that it is well adapted for survival in arid, sandy or otherwise well drained soils in temperate and sub-tropical areas, including deserts."

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.	"Aromatic annual or biennial herbs; stems 5-20 dm long, stout and unbranched below the inflorescence, branched in the inflorescence, coarsely hirsute and glandular pubescent above."

412	Forms dense thickets	y
	Source(s)	Notes
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"If allowed to spread, it has the potential to form dense stands covering bare areas of sand along south-east Queensland's coastline."
	Daehler, C. C. (2005). Upper-montane plant invasions in the Hawaiian Islands: patterns and opportunities. <i>Perspectives in Plant Ecology, Evolution and Systematics</i> , 7(3): 203-216	"Naturalized plants occurring above 2000m elevation in the Hawaiian Islands." [Heterotheca grandiflora - Notes = D = "disruptive in native communities, forming dense stands that appear to inhibit recruitment of natives"]
	Smiley, F.J. (1922). Weeds of California and Methods of Control. Department of Agriculture, Sacramento, CA	[Possibly] "This is one of the most characteristic weeds of late summer and fall in southern California, often forming a nearly continuous hedge of varying height along the country roads, or occurring in scattered groups of two or three on vacant lots, where the tall, stiff stalks, as high as a man, suggest the popular names applied to the plant."

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] "Aromatic annual or biennial herbs" ... "in Hawai'i a relatively common weed of dry, disturbed areas, 10- 2,270 m"

502	Grass	n
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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.	Asteraceae
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.	"Aromatic annual or biennial herbs" [Asteraceae]
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Not a geophyte, but may persist from deep taproot] "Taproot deep, upper portion weakly woody."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Flint, S. D., & Palmblad, I. G. (1978). Germination dimorphism and developmental flexibility in the ruderal weed <i>Heterotheca grandiflora</i> . <i>Oecologia</i> , 36(1): 33-43	" <i>Heterotheca grandiflora</i> Nutt. (Asteraceae, tribe Astereae) is one of the few native Californian plant species increasing its range as a weed. The production of dimorphic seed, together with flexible development in either the annual or biennial habit, may contribute to its range expansion."
602	Produces viable seed	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	"Propagation: By seed."

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes
	Kadereit, J.W. & Jeffrey, C. (eds.). (2010). The Families and genera of vascular plants. Volume VIII. Flowering Plants. Eudicots: Asterales. Springer-Verlag, Berlin, Heidelberg, New York	"Circa 25-30 species, USA, Canada, Mexico."
	Keil, D. J., Luckow, M. A., & Pinkava, D. J. (1988). Chromosome studies in Asteraceae from the United States, Mexico, the West Indies, and South America. American Journal of Botany, 75(5): 652-668	[Hybridization reported in genus] The count of 2n = 3x 9III for <i>H. villosa</i> x <i>H. fulcrata</i> is the first report for this hybrid combination and probably represents a cross between a tetraploid <i>H. villosa</i> (variety not determined) and a diploid <i>H. fulcrata</i> ."
	Semple, J. C. (2008). Cytotaxonomy and cytogeography of the goldenaster genus <i>Heterotheca</i> (Asteraceae: Astereae). Botany, 86 (8), 886-900	[Hybridization reported in other species in genus] "Like Semple (1992b) noted for asters and goldenrods, triploidy is very rare in the genus <i>Heterotheca</i> ; several of these were probable inter-taxon level hybrids, accounting for both the odd ploidy level and their unusually morphology."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Harms, V. L. (1965). Cytogenetic evidence supporting the merger of <i>Heterotheca</i> and <i>Chrysopsis</i> (Compositae). Brittonia, 17(1): 11-16	[<i>Heterotheca latifolia</i> var. <i>macgregoris</i> is self-incompatible] "Both parents are sexually reproducing, insect pollinated, self-incompatible species."
	Olsen, K. M. (1996). Pollination effectiveness and pollinator importance in a population of <i>Heterotheca subaxillaris</i> (Asteraceae). Oecologia, 109(1): 114-121	[Related taxon self-incompatible] " <i>H. subaxillaris</i> is self-incompatible (personal observations; D.L. Venable, personal communication)."
	Flint, S. D. (1977). Autoecology of the Ruderal Weed <i>Heterotheca grandiflora</i> With Emphasis on Germination Dimorphism. MSc Thesis. Utah State University, Logan, UT	[Self-compatible, or possibly apomictic] "The plant appears to have some limited self-pollinating ability when pollinators are excluded in the greenhouse, but experiences much improved seed set (especially in the pistillate ray flowers) in the field ." ... "The apparent self-compatibility shown for this taxon contrasts sharply with the self-incompatibility shown for several congeners [Harms , 1965], but the possibility of some type of apomictic mechanism cannot be conclusively eliminated without further tests." ... "My finding of apparent self-compatibility in <i>H. grandiflora</i> would make this the second known self-compatible taxon in <i>Heterotheca</i> (including <i>Chrysopsis</i>). It is difficult to conclusively exclude the possibility of some form of apomixis, which is common among the Asteraceae, without cytological tests [Stebbins , 1957]; however, variation patterns in <i>H. grandiflora</i> suggest outcrossing [Stebbins, 1965a]."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Flint, S. D. (1977). Autoecology of the Ruderal Weed <i>Heterotheca grandiflora</i> With Emphasis on Germination Dimorphism. MSc Thesis. Utah State University, Logan, UT	"The bees frequenting <i>Heterotheca</i> are probably generalized pollinators visiting whatever species are present."
	The Pollinator Partnership & NAACP. (2008). Selecting Plants for Pollinators. A Regional Guide for Farmers, Land Managers, and Gardeners In the California Coastal Chaparral Forest and Shrub Province Along the Southern California Coast. The Pollinator Partnership™/North American Pollinator Protection Campaign, San Francisco, CA	[Attracts generalist insect pollinators] "Plants that attract pollinators for the California Coastal Chaparral Forest" [<i>Heterotheca grandiflora</i> - Visitation by Pollinator = bees, beetles, flies, butterflies]
	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.	[Floral morphology adapted for generalist insect pollinators] "Heads several to numerous; involucre 7-9 mm high; ray florets 25- 35 per head, rays 4-6 mm long; disk corollas ca. 4 mm long; pappus yellowish brown to reddish, the outer series inconspicuous."

Qsn #	Question	Answer
	Olsen, K. M. (1996). Pollination effectiveness and pollinator importance in a population of <i>Heterotheca subaxillaris</i> (Asteraceae). <i>Oecologia</i> , 109(1): 114-121	[Related taxon visited by generalist & specialist pollinators] "Assessing the relative contributions to seed set for each of a plant species' floral visitors provides an indication of the relative influence of these visitors on the plant's reproductive success. This study examined pollinator activity and seed set in a population of <i>Heterotheca subaxillaris</i> , a species that exhibits a floret dimorphism (heads bearing disk and ray florets), and that is visited by both generalist foragers and specialist bees."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). <i>Weeds of California and Other Western States, Volume 1</i> . UCANR Publications, Oakland, CA	[No evidence of vegetative spread] "Erect summer annual, biennial, or short-lived perennial to 2 m tall, with yellow flower heads." ... "Reproduces by seed"

607	Minimum generative time (years)	1
	Source(s)	Notes
	Flint, S. D., & Palmblad, I. G. (1978). Germination dimorphism and developmental flexibility in the ruderal weed <i>Heterotheca grandiflora</i> . <i>Oecologia</i> , 36(1): 33-43	" <i>Heterotheca grandiflora</i> Nutt. (Asteraceae, tribe Astereae), or telegraphplant, is one of these native Californian weedy species (Stebbins, 1965). Growing as either an annual or biennial, it has extended its range considerably in recent years (Munz and Keck, 1968) by colonizing roadsides and waste places (Robbins et al., 1941)."
	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.	[Annual or biennial. 1-2 year reproductive lifecycle] "Aromatic annual or biennial herbs; stems 5-20 dm long, stout and unbranched below the inflorescence, branched in the inflorescence, coarsely hirsute and glandular pubescent above."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Csurhes, S. (2009). <i>Weed Risk Assessment</i> . Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"Machinery has been blamed for dispersal of seeds into Queensland from New South Wales, since some of the first plants detected on the Gold Coast appeared at a site where a new sewerage pipeline had just been laid. However, movement of seeds adhering to the clothing of tourists is equally likely and it is possible that existing <i>H. grandiflora</i> simply colonised the area of sand that had been disturbed by machinery."
	Oahu Army Natural Resource Program. (2014). <i>Status Report for the Makua and Oahu Implementation Plans</i> . PCSU, Schofield Barracks, HI	[A contaminant of sand bags] "Staff noted a new location of <i>Heterotheca grandiflora</i> on SBE this year. At all three known locations, plants were observed growing out of sand. At one site, the sand was spread around the base of the rappel tower, at another, it was spread below a par-course type obstacle, and at the third, the sand was spilling out of bags left on an LZ. In tracing the source of the sand, it appears that there is no stockpile on SBE, but rather, bags are filled elsewhere and brought on range as needed. In the coming year, staff will survey sand piles on Schofield Barracks and identify a way to sanitize them. While it is unclear how much of a threat <i>H. grandiflora</i> poses, it is an example of how facility maintenance activities can directly lead to invasive species spread."

Qsn #	Question	Answer
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Distribution along roadsides likely aids in inadvertent dispersal] "Habitat: Disturbed areas, roadsides, waste places, fields, dry streambeds, sand dunes, coastal sage scrub, oak woodland, agricultural fields, orchards, and vineyards." ... "Ray achenes generally fall near the parent plant. Disk achenes disperse with wind. Both types also dispersed with water, soil movement and human activities."
	Ornduff, R. 1974. An Introduction to California Plant Life. University of California Press, Berkeley and Los Angeles, CA	[Disturbance along roads, and hairs on achene likely aid in inadvertent dispersal] "Most weedy species that occur in California are of exotic origin, although a few native species have also developed weedy tendencies. For example, the fall- and winter-flowering Telegraph Weed (<i>Heterotheca grandiflora</i> , Compositae) is a native species that probably originated as an inhabitant of sandy soils in southern California. In recent years this species has spread northward into central and southern California, where it now is now common along roadsides or in sandy fields."
	Smiley, F.J. (1922). Weeds of California and Methods of Control. Department of Agriculture, Sacramento, CA	[Dominant along roadside] "This is one of the most characteristic weeds of late summer and fall in southern California, often forming a nearly continuous hedge of varying height along the country roads, or occurring in scattered groups of two or three on vacant lots, where the tall, stiff stalks, as high as a man, suggest the popular names applied to the plant."

702	Propagules dispersed intentionally by people	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown how or why <i>Heterotheca grandiflora</i> was introduced to the Hawaiian Islands or Australia, but there was no evidence of intentional introduction found to either locale. Propagation & distribution by native plant society's may occur within its native range.

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Unknown, but may potentially be dispersed as a seed contaminant when growing as a weed in agricultural lands] "Telegraphplant is a ruderal native that is common on roadsides and other disturbed places. It is usually considered a weed only when it inhabits agricultural land and landscaped areas."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	"Ray achenes generally fall near the parent plant. Disk achenes disperse with wind. Both types also dispersed with water, soil movement and human activities."
	Cody, M.L. (2006). Plants on Islands: Diversity and Dynamics on a Continental Archipelago. University of California Press, Berkeley and Los Angeles, CA	"Such seed polymorphisms that collectively cover a number of different dispersal options are rather like bet hedging. A well known composite example is telegraphweed (<i>Heterotheca grandiflora</i>), in which the disk flowers produce achenes with a well-developed pappus and disperse well via anemochory, while the achenes of the ray flowers lack a pappus and simply fall to the ground close to the parent plant (Flint and Palmblad 1978)."
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). (1983). Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	[Hairs on achene presumably aid in wind dispersal] "Fruit 118 to 3/16 inch long, slightly broadened in the middle, covered with silky hairs, and ending in a tuft of white hairs 1/4 inch long"

Qsn #	Question	Answer
705	Propagules water dispersed	y
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	"Ray achenes generally fall near the parent plant. Disk achenes disperse with wind. Both types also dispersed with water, soil movement and human activities."
706	Propagules bird dispersed	n
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[No evidence. Not fleshy-fruited] "Ray achenes generally fall near the parent plant. Disk achenes disperse with wind. Both types also dispersed with water, soil movement and human activities."
707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"Secondary dispersal vectors include animals and people, since the pappus adheres to fur and socks."
	Smiley, F.J. (1922). Weeds of California and Methods of Control. Department of Agriculture, Sacramento, CA	[Hairs aid in wind dispersal, but may aid in adherence to fur or feathers] "The single head large (3/4 inch across), containing about 30 marginal ray-flowers surrounding the numerous tubular diskflowers, all with hairy ovaries which ripen into 1-seeded dry fruits (achenes), the ripe fruits of the disk-flowers surmounted by a persistent brick-red pappus of simple, straight hairs as long or longer than the silky achene."
708	Propagules survive passage through the gut	n
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Unlikely to be consumed due to unpalatability of foliage. Seeds adapted for wind dispersal] "Ray achenes generally fall near the parent plant. Disk achenes disperse with wind. Both types also dispersed with water, soil movement and human activities."
801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Flint, S. D. (1977). Autoecology of the Ruderal Weed <i>Heterotheca grandiflora</i> With Emphasis on Germination Dimorphism. MSc Thesis. Utah State University, Logan, UT	[Densities unspecified] "Table 17. The ideal (?) weed." ... "Very high seed output in favorable circumstances" ... "Expression of characteristic in <i>Heterotheca grandiflora</i> - Yes - can easily be many thousand"
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	"Disk achenes are not dormant at maturity and can germinate with or without light as soon as moisture conditions become favorable, typically in fall. Ray achenes have a harder seed coat and remain dormant until the seed coat degrades or is scarified and conditions become favorable. Soil disturbance enhances ray achene germination."

Qsn #	Question	Answer
	Flint, S. D., & Palmblad, I. G. (1978). Germination dimorphism and developmental flexibility in the ruderal weed <i>Heterotheca grandiflora</i> . <i>Oecologia</i> , 36(1): 33-43	"Well dispersed disc achenes germinate rapidly to high percentages while poorly dispersed ray achenes show considerable dormancy, germinating at a much lower rate to lower final percentages. Ray achenes appear more sensitive to environmental factors and have more specific germination requirements than do disc achenes. Thus, germination is distributed in space and time." ... "Since the initially dormant ray has more time to be buried, it is reasonable that they, not the larger disc, possess a light requirement. Typically, seed requiring light are small (Harper et al., 1970). Though this may preclude emergence from depth, small seed size may permit more favorable water relations near the soil surface (Harper and Benton, 1966)."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Csurhes, S. (2009). Weed Risk Assessment. Telegraph weed. <i>Heterotheca grandiflora</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	"This species is readily controlled by herbicides."
	Dow AgroSciences. 2013-2015. Snapshot DG Herbicide Label. Dow AgroSciences LLC, Indianapolis, IN	"Weeds controlled when applied at 100 lb per acre (2.3 lb per 1000 sq ft):" [Includes <i>Heterotheca grandiflora</i>]
	Willsher, L., Mason, P., & Whyte, B. (2008). Preventing the spread of telegraph weed in South East Queensland. In Proceedings of the 16th Australian Weeds Conference, Cairns Convention Centre, North Queensland, Australia, 18-22 May, 2008. Queensland Weed Society	[2,4 provides effective control] "All known areas of infestation are being treated with the herbicide 2,4-D amine on a regular basis to prevent further spread and reduce the size of core infestations." ... "An example of the control programs success is Wavebreak Island, an area of approximately 37 ha. When control work started on the island in September 2005, 30 person days and 2.22 kg of 2,4-D a.i. were needed to complete spot spraying of telegraph weed throughout the island. There has been a steady decline in the amount of herbicide (96%) and labour (83%) required with the latest treatment on Wavebreak Island on 4th of March 2008 requiring only five person days and 0.08 litres of 2,4-D a.i. to spot spray plants over the same area."
	Zandstra, B., Particka, M. & Masabni, J. (2004). Guide to Tolerance of Crops and Susceptibility of Weeds to Herbicides. Extension Bulletin E-2833. Michigan State University, East Lansing, Michigan	Isoxaben is reported to provide excellent pre-emergent control of telegraphplant. No application rates are specified

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	Notes
	Smiley, F.J. (1922). Weeds of California and Methods of Control. Department of Agriculture, Sacramento, CA	"Control. Mow and burn before the heads are ripe if the plants are numerous; elsewhere hand-pulling is an effective way of keeping the8e unsightly summer weeds in check."
	DiTomaso, J. & Healy, E. A. (2007). Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	"Manual removal or cultivation before plants develop seed can control telegraphplant. Cultivation can deplete the soil seedbank of hard-coated achenes by stimulating germination."
	Vanderwoude, C., Klasner, F., Kirkpatrick, J. & Kaye, S. 2015. Maunakea Invasive Species Management Plan. Technical Report 191. Pacific Cooperative Studies Unit, University of Hawaii, Honolulu, HI	[Controlled manually] "In 2012, monthly volunteer weed control efforts were organized to begin to remove invasive broadleaf herbs, including fireweed (<i>Senecio madagascariensis</i>), telegraph weed (<i>Heterotheca grandifolia</i>), mullein (<i>Verbascum</i> spp.) from around parking lots and buildings."

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

Qsn #	Question	Answer
	<p>Ramadan, M. M., Murai, K. T., & Johnson, T. (2011). Host range of <i>Secusio extensa</i> (Lepidoptera: Arctiidae), and potential for biological control of <i>Senecio madagascariensis</i> (Asteraceae). <i>Journal of Applied Entomology</i>, 135(4): 269-284</p>	<p>[<i>Heterotheca grandiflora</i> not affected by biocontrol agent] "<i>Secusio extensa</i> (Lepidoptera: Arctiidae) was evaluated as a potential biological control agent for Madagascar fireweed, <i>Senecio madagascariensis</i> (Asteraceae), which has invaded over 400 000 acres of rangeland in the Hawaiian Islands and is toxic to cattle and horses. The moth was introduced from southeastern Madagascar into containment facilities in Hawaii, and host specificity tests were conducted on 71 endemic and naturalized species (52 genera) in 12 tribes of Asteraceae and 17 species of non-Asteraceae including six native shrubs and trees considered key components of Hawaiian ecosystems. No-choice feeding tests indicated that plant species of the tribe Senecioneae were suitable hosts with first instars completing development to adult stage on <i>S. madagascariensis</i> (78.3%), <i>Delairea odorata</i> (66.1%), <i>Senecio vulgaris</i> (57.1%), <i>Crassocephalum crepidioides</i> (41.2%), and at significantly lower rates on <i>Emilia fosbergii</i> (1.8%) and <i>Erechtites hieracifolia</i> (1.3%). A low rate of complete larval development also was observed on sunflower, <i>Helianthus annuus</i> (11.6%), in the tribe Heliantheae."</p>

Summary of Risk Traits:

Heterotheca grandiflora (telegraph weed) is an annual or biennial herb native to arid coastal regions of North America, from California to northern Mexico. It produces large numbers of wind-dispersed seeds and is naturalized on all the main Hawaiian Islands, USA, as well as in coastal regions of both New South Wales and south-east Queensland, Australia. In Hawaii it invades dry, disturbed sites from near sea level to over 2200 m elevation, forming dense cover and competing with native plants species including the endangered *Schiedea hawaiiensis*. In Australia, it is considered a potential or emerging environmental threat that invades and dominates disturbed sites and is designated a Class 2 weed in Queensland.

High Risk / Undesirable Traits

- Elevation range exceeds 2000 m, demonstrating environmental versatility
- Grows in tropical climates
- Naturalized in the Hawaiian Islands, Australia & possibly Japan
- A disturbance-adapted plant that may threaten certain endangered plant species in Hawaii
- Other species have become invasive
- Aromatic foliage deters browsing
- Able to form dense ground cover
- Reproduces by seed
- Self-compatible
- Able to reach maturity in 1-2 growing seasons
- Seeds dispersed by wind, gravity & secondarily by water, soil movement, attachment of seeds to clothing or animals, & other human activities
- Prolific seed production (densities unknown)
- Disk achenes not dormant, but ray achenes are dormant & may form a persistent seed bank (seed longevity unknown)

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Non-toxic
- Pollinator-plant
- Not reported to spread vegetatively
- Herbicides provide effective control
- Manual removal provides effective control

