

Taxon: Elephantopus mollis	Family: Asteraceae
Common Name(s): elephantopus elephant's foot false tobacco tobacco weed	Synonym(s): Elephantopus mollis var. bracteosus Elephantopus mollis var. capitulatus Elephantopus tomentosus auct.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 23 Apr 2015
WRA Score: 17.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Pasture Weed, Perennial Herb, Unpalatable, Wind-Dispersed, 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	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
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	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		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
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		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
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	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	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
	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

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. 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
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"E. mollis is native to Central and South America, from Argentina to Mexico, including the Caribbean, but has been spread very widely into Africa, eastern Asia and the Pacific."

202	Quality of climate match data	High
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"E. mollis prefers humid tropical conditions. It is said to require full sunlight for optimum growth, and relatively high rainfall."

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"E. mollis is native to Central and South America, from Argentina to Mexico, including the Caribbean, but has been spread very widely into Africa, eastern Asia and the Pacific."
	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.	"Pantropical; in Hawai'i naturalized and sometimes common in relatively dry pastures, along roadsides, trails, and other disturbed areas in wet forest on Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Elephantopus mollis is a herbaceous perennial in the family Asteraceae. Native to the American tropics, it has been widely introduced elsewhere since the beginning of the 20th century, to Africa, Asia and the Pacific, where it has become an invasive weed of pastures and plantations in high rainfall tropical situations in many countries."

Qsn #	Question	Answer
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.	"Pantropical; in Hawai'i naturalized and sometimes common in relatively dry pastures, along roadsides, trails, and other disturbed areas in wet forest on Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i. First collected on Kaua'i in 1926 (Degener s.n., BISH"
	Merlin, M. D. (1985). Woody vegetation in the upland region of Rarotonga, Cook Islands. Pacific Science 39(1): 81-99	"Weedy plants that have become abundant in some parts of the lower habitats of Rarotonga include herbaceous species such as Bidens pilosa, Elephantopus mollis, Euphorbia hirta, Mimosa pudica, Sida rhombifolia, Mikania micrantha, Momordica charantia, Panicum maximum, Chrysopogon aciculatus, Cenchrus echinatus, Sorghum bicolor, and Stenotaphrum secundatum." ... "A number of herbaceous weeds of foreign origin can also be found in some open areas of the uplands where humans have caused changes in the vegetation. Among the more important of these are Elephantopus mollis, Mikania micrantha, and Paspalum conjugatum."

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	A pasture weed, and a threat to endangered plant species

Qsn #	Question	Answer
303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Swarbrick, J.T. 1997. Weeds of the Pacific Islands. Technical paper no. 209. South Pacific Commission, Noumea, New Caledonia	"Competitive with pasture species because of rosette habit of young plants and unpalatability to stock."

Qsn #	Question	Answer
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Declared noxious in Regulations 2 and NW 10 and for State land leases. Spread s rapi diy, coveri ng voluabl e pastures, rangelands, and cultivated areas. Its long, stiff hairs cause itching when brushed against."
	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	"Distribution: Pantropical origin. Found in mesic to wet areas in pastures, forest roads, and other non-croplands on Kauaïi, Oÿahu, Molokaïi, Maui, and Hawai'i. First collection on Kauaïi in 1926(70)." ... "Environmental impact: Displaces forages in pastures."
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"E. mollis mainly impacts pastures, especially where overgrazed, and also plantation crops including coconuts." ... "E. mollis is a weed of turf in Brazil (Maciel et al., 2008), and regarded as a serious weed of various crops in the Pacific. In Australia it is well documented as a weed of pasture -- Queensland Government (2013) states that it 'smothers healthy thick pastures with dense masses of broad-leafed seedlings' and is a 'major threat to the beef and dairy industries of North Queensland' -- but no economic loss data have been seen. It is competitive with pasture species because of the rosette habit of young plants and its unpalatability to stock."
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	"Tobacco weed is a vigorous and aggressive weed and is regarded as a serious weed of agriculture in many wet tropical/subtropical countries. It seeds prolifically and dense masses of broad-leafed seedlings can grow through and smother healthy, thick pastures. The plant is not a nutritious feed for cattle and reduces pasture productivity within a few years." ... "Preferring fertile soils and needing moderate to high rainfall, tobacco weed is a major threat to the beef and dairy industries of north Queensland."
	Moody, K. 1989. Weeds Reported in Rice in South and Southeast Asia. International Rice Research Institute, Manila, Philippines	"Weed reported to occur in rice in the Philippines" [Includes E. mollis]

304	Environmental weed	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"The rosettes form a very dense ground cover that smothers other low vegetation and contributes to the degradation of useful pasture. It is recorded as a major weed in the Pacific region and is among species threatening endangered species in Hawaii. It is classed as a Declared class 2 pest plant in Queensland, Australia (Queensland Government, 2014)."

Qsn #	Question	Answer
	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	[Listed among the weed threats to <i>Cyanea undulata</i> , <i>Dubautia pauciflorula</i> & <i>Viola helenae</i>] " <i>Cyanea undulata</i> ... " ... "The primary threats to this species include competition with the alien plant species <i>Psidium cattleianum</i> , <i>Melastoma candidum</i> , <i>Rhodomyrtus tomentosa</i> (rose myrtle), <i>Clidemia hirta</i> , <i>Melaleuca quinquenervia</i> (paperbark tree), <i>Stachytarpheta dichotoma</i> , <i>Rubus rosaefolius</i> , <i>Elephantopus mollis</i> (NCN), ..." ... " <i>Dubautia pauciflorula</i> ... The threats to this plant include direct competition with the alien plant species such as <i>Psidium cattleianum</i> and <i>Melastoma candidum</i> , and potential threats from <i>Rhodomyrtus tomentosa</i> , <i>Clidemia hirta</i> , <i>Melaleuca quinquenervia</i> , <i>Stachytarpheta dichotoma</i> , <i>Rubus rosaefolius</i> , <i>Elephantopus mollis</i> , ..." ... " <i>Viola helenae</i> ... Threats include competition from alien plant species, including <i>Psidium cattleianum</i> , <i>Melastoma candidum</i> , potentially <i>Melaleuca quinquenervia</i> , <i>Stachytarpheta dichotoma</i> , <i>Rubus rosaefolius</i> , <i>Elephantopus mollis</i> ..."
	U.S. Fish and Wildlife Service. 2010. <i>Schiedea apokremnos</i> (maolioli) 5-Year Review Summary and Evaluation. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, HI	<i>Elephantopus mollis</i> listed among the weeds that threaten <i>Schiedea apokremnos</i> . No specific impacts documented

305	Congeneric weed	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	" <i>E. mollis</i> is similar in appearance to the closely related <i>E. scaber</i> , which is also an invasive weed. <i>E. mollis</i> can be distinguished from <i>E. scaber</i> by its smaller florets, up to 5 mm long (<i>E. scaber</i> 7-8 mm) and by the pappus elements being abruptly narrowed above a dilated short scale-like base, while those of <i>E. scaber</i> taper gradually from a scale-like lower half (Pope, 1992). Some sources indicate that they are distinguished by flower colour, <i>E. scaber</i> being always purplish and <i>E. mollis</i> usually white (e.g. eFloras, 2013), but the flowers of the latter can also be purplish to blue as indicated by Lorenzi (1982) for Brazil. It is also suggested that <i>E. scaber</i> is less robust and has less leafy stems than <i>E. mollis</i> but these do not appear to be very distinct characters."
	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>Elephantopus spicatus</i> " ... "Environmental impact: Displaces forage species in pastures."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Coarse perennial herbs 3-15(-20) dm tall, villous, often densely so. Leaves cauline, rarely primarily basal, upper surface dark green, lower surface paler, oblanceolate to elliptic-oblanceolate, 7-22 cm long, 2-7 cm wide, lower surface densely soft pubescent, margins crenate, base clasping the stem."

402	Allelopathic	

Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. 2015. 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.	[No evidence. Asteraceae] "Coarse perennial herbs 3-15(-20) dm tall, villous, often densely so."

404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Swarbrick, J.T. 1997. Weeds of the Pacific Islands. Technical paper no. 209. South Pacific Commission, Noumea, New Caledonia	"Competitive with pasture species because of rosette habit of young plants and unpalatability to stock."
	Nicholls, D. F., & Plucknett, D. L. (1972). Control of Elephantopus in Hawaii's pastures. Hawaii Farm Science, 21(1): 3-5	"In Hawaii, Elephantopus mollis is classified as a noxious weed. It rapidly invades pasture but has no forage value itself."
	Partridge, I. J. (1986). Effect of stocking rate and superphosphate level on an oversown fire climax grassland of mission grass (<i>Pennisetum polystachyon</i>) in Fiji. Tropical Grasslands, 20(4), 166-180	[Increased stocking rates result in an increase in <i>E. mollis</i> cover, suggesting it is unpalatable relative to other pasture plants] "This paper describes changes in botanical composition caused by increasing stocking rates and by applying different levels of superphosphate during eight years of continuous grazing. Animal production data is presented in a second paper (Partridge 1986)." ... "Other broadleaf weeds included tobacco weed (<i>Elephantopus mollis</i>) and "kaumoce" (<i>Cassia tora</i>). <i>E. mollis</i> seed is wind dispersed, and spread to provide about 4% of d.m. yield. It was common throughout all paddocks but more frequent at higher stocking rates."

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	[Presumably not toxic to cattle. Used as a fish poison] "ground roots fed to animals for maggot wounds; whole plant fed to cows to improve lactation; leaf paste given to cattle as astringent in diarrhea." ... "Whole plant as fish poison"
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence
	CABI, 2015. Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"The fungus Coleosporium elephantopi is recorded in Guatemala (Kern, 1907), Belize and elsewhere in the warmer regions of the Americas (Mains, 1939). E. mollis is eaten by the grasshopper (Abracris dilecta) in Brazil (Sperber, 1996)."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[Possibly] "The hairs on the leaves can cause irritation to the skin (Topoclimate Australia, 2013)."
	Quattrocchi, U.. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	Multiple uses in traditional medicine

408	Creates a fire hazard in natural ecosystems	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	[Unlikely. Does not occur in fire prone areas] "Found in moderate to high rainfall areas."
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	Not listed among impacts

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"It is said to require full sunlight for optimum growth, and relatively high rainfall."
	Fontoura, S. B., Ganade, G., & Larocca, J. (2006). Changes in plant community diversity and composition across an edge between Araucaria forest and pasture in South Brazil. Revista Brasileira de Botanica 29(1): 79-91	[Elephantopus mollis - Light requirement represents: I = indifferent] "Table 1. Taxonomical list of species sampled in the study area. Life forms represent: canopy tree (CT); sub-canopy tree (ST); shrub (SH), herb (HB) and probably canopy-tree (PCT). Light requirement represents: L = light demanding; S = shade tolerant and I = indifferent."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"E. mollis apparently thrives on high soil fertility but also tolerates poor soils, and is reported as a problem weed in degraded pastures."

411	Climbing or smothering growth habit	n
	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.	"Coarse perennial herbs 3-15(-20) dm tall, villous, often densely so."

412	Forms dense thickets	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"The rosettes form a very dense ground cover that smothers other low vegetation and contributes to the degradation of useful pasture." ... "As an invasive weed, E. mollis can have a significant impact as a result of the dense shading from its basal rosette of leaves."

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] "...naturalized and sometimes common in relatively dry pastures, along roadsides, trails, and other disturbed areas..."

502	Grass	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.	[Asteraceae] "Coarse perennial herbs 3-15(-20) dm tall, villous, often densely so."

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.	[Asteraceae] "Coarse perennial herbs 3-15(-20) dm tall, villous, often densely so."

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.	[No evidence] "Coarse perennial herbs 3-15(-20) dm tall, villous, often densely so."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[No evidence. Widespread] "E. mollis is native to Central and South America, from Argentina to Mexico, including the Caribbean, but has been spread very widely into Africa, eastern Asia and the Pacific."

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"E. mollis mainly impacts pastures, especially where overgrazed, and also plantation crops including coconuts."
603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown
604	Self-compatible or apomictic	
	Source(s)	Notes
	Burdon, J. J., & Marshall, D. R. (1981). Biological control and the reproductive mode of weeds. <i>Journal of Applied Ecology</i> 18(2): 649- 658	"TABLE 1. A worldwide list of projects for the biological control of weeds together with a list of the predominant means of reproduction of the target species" [Elephantopus mollis - Predominant means of reproduction = Unknown]
	Ramírez, N. (2005). Plant sexual systems, dichogamy, and herkogamy in the Venezuelan Central Plain. <i>Flora-Morphology, Distribution, Functional Ecology of Plants</i> , 200(1): 30-48	[Unknown, but sexual system would promote outcrossing] "Appendix A Sexual system, dichogamy, herkogamy, and dispersal syndrome for 210 plant species in the Venezuelan Central Plain" [Elephantopus mollis - Sexual system = Monoecy; Dichogamy = protandry; Herkogamy = NH, non-herkogamy]
605	Requires specialist pollinators	n
	Source(s)	Notes
	Rejas, D. (2008). A preliminary survey of Apoidea (Anthophila) and their use of floral resources on the island of Moorea, French Polynesia. <i>UCB Moorea Class: Biology and Geomorphology of Tropical Islands</i> . UC Berkeley, Berkeley, CA	"Appendix B: Bee genera floral use and collection" [Elephantopus mollis used, and presumably pollinated, by Apis mellifera and two other bee species]
	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 from flora morphology] "Heads in terminal clusters subtended by broadly deltate bracts, each head with ca. 4 florets; involucre bracts 8, in 2 series, the outer ones 4.5-5 mm long, the inner ones 5.5-7.5 mm long; corollas white or pinkish, 3-4 mm long; pappus of 5(-8) straight bristles."
606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. <i>Handbook of Hawaiian Weeds</i> . University of Hawaii Press, Honolulu, HI	"Propagation: By seed. Dispersed by wind and animals." [No evidence of vegetative spread]
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al.1975. <i>Flora of Panama</i> . Part IX. Family 184. Compositae. <i>Annals of the Missouri Botanical Garden</i> 62(4): 835-1321	[May possess a creeping rootstock, but otherwise not known to spread vegetatively] "Coarse perennial herbs mostly 30-150 (-200) cm tall, occasionally from a creeping rootstock"
607	Minimum generative time (years)	

Qsn #	Question	Answer
	Source(s)	Notes
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	"Germination to reproduction time and the time ungerminated seeds remain viable is not known; however, field observations have noted seed banks building up in the soil."

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	"Distribution: Pantropical origin. Found in mesic to wet areas in pastures, forest roads, and other non-croplands on Kauaï, Oÿahu, Molokaï, Maui, and Hawai'i. First collection on Kauaï in 1926(70)."
	CABI, 2015. Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Seed may be dispersed in the fur of animals (Queensland Government, 2014) and on the clothing of humans." ... "According to Queensland Government (2014) the seeds can also be transported on machinery."
	Woodson, Jr., R.E., Schery, R.W., D'Arcy, W.G. et al. 1975. Flora of Panama. Part IX. Family 184. Compositae. Annals of the Missouri Botanical Garden 62(4): 835-1321	[Common along roads] " <i>Elephantopus mollis</i> is pantropical. In Panama it is widespread, particularly in more protected habitats along roadsides, in pastures, and on forest margins."

702	Propagules dispersed intentionally by people	
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Possibly, but probably not currently introduced intentionally] "The reasons for its introduction are not clear, but probably included its use as a medicinal plant, as well as accidental introduction as a contaminant of pasture seed." ... "Although there is no record of it, there has presumably been deliberate introduction either as an ornamental plant or as a medicinal herb."

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"The reasons for its introduction are not clear, but probably included its use as a medicinal plant, as well as accidental introduction as a contaminant of pasture seed." ... "There are no specific records of accidental introduction, but it has presumably happened as a result of contamination of seeds of pasture species." ... "Queensland Government (2004) gives general advice on the management of <i>E. mollis</i> . It advises: 'Limit spread by developing and implementing hygiene and prevention practices. Prevent the spread of tobacco weed into uninfested properties by enforcing restrictions on the movement of products and machinery contaminated with seed.'"

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes

Qsn #	Question	Answer
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Seeds black, about 3 mm long, densely covered in fine short hairs, apex with 5 white bristles –4.5 mm long, each with a broad base; receptacle without scales." ... "Seeds are spread by wind (up to a few hundred metres) and water (Queensland Government, 2014)."
705	Propagules water dispersed	y
	Source(s)	Notes
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	"Running water is also a major dispersal agent of this weed."
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Seeds are spread by wind (up to a few hundred metres) and water (Queensland Government, 2014)."
706	Propagules bird dispersed	n
	Source(s)	Notes
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	[Not fleshy-fruited] "After flowering, a large number of 3 mm long, brown to greyish-black seeds are released, each with five fine, straight, white, bristle-like hairs on the top. Wind can only blow the seeds a few hundred metres, so tobacco weed is predominantly spread by water, in the coats of animals, and on machinery."
707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Seed may be dispersed in the fur of animals (Queensland Government, 2014) and on the clothing of humans."
708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	[Unlikely. Not adapted for internal dispersal] "Wind can only blow the seeds a few hundred metres, so tobacco weed is predominantly spread by water, in the coats of animals, and on machinery."
801	Prolific seed production (>1000/m²)	
	Source(s)	Notes
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	"It seeds prolifically and dense masses of broad-leafed seedlings can grow through and smother healthy, thick pastures."
802	Evidence that a persistent propagule bank is formed (>1 yr)	

Qsn #	Question	Answer
	Source(s)	Notes
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	"Germination to reproduction time and the time ungerminated seeds remain viable is not known; however, field observations have noted seed banks building up in the soil."
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[10% of seeds may persist in soil for 1-2 years] "Longevity of the seeds in the soil is quite short -- 90% of seeds may be lost in one year and 100% in 2 years (Far North Queensland Pest Advisory Forum, 2009). Little information is available on the longevity of the plant."

803	Well controlled by herbicides	y
	Source(s)	Notes
	CABI, 2015. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"E. mollis is reported to be susceptible to glyphosate and dicamba and moderately so to triclopyr and metsulfuron. It is susceptible to 2,4-D and paraquat when young. A 2,4-D/picloram mixture is registered for use in pastures in Australia. Fenoprop has also been used in Hawaii, where Nicholls and Plucknet (1972) reported that the best control was obtained with a combination of pesticide treatment and mowing – see below under ‘IPM’."
	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	[Control of related taxon is effective] "Management: E. spicatus was sensitive to picloram and dicamba, moderately so to triclopyr and metsulfuron."
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	[Grazon DS recommended at a rate of 300 ml/100 L or 45 ml/15 L knapsack. Spray actively growing plants to point of run-off. Add wetting agent as per label recommendations.] "Herbicide recommendations for tobacco weed are shown in Table 1. It is critical for seedlings to be sprayed before they develop the flowering stem. Careful follow-up monitoring is needed as tobacco weed shows a pronounced ability to regrow after treatment. Aerial spraying is an option when plants are inaccessible, but every care needs to be taken to prevent drift onto remnant and regenerating rainforest in the margins of the paddocks. Tobacco weed becomes increasingly difficult to kill with herbicides once the plant has begun to flower (and possibly as early as at the beginning of stem growth). In the far north, the wet season may limit access to pastures and not provide opportunities for control until after seed production has occurred."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	Notes
	Swarbrick, J.T. 1997. Weeds of the Pacific Islands. Technical paper no. 209. South Pacific Commission, Noumea, New Caledonia	[Cultivation may be effective, but slashing may not be] "Controlled by chipping and cultivation before flowering. Competitive with pasture species because of rosette habit of young plants and unpalatability to stock. Slashing only temporarily prevents flowering, and may prolong the life of rosettes."

Qsn #	Question	Answer
	Queensland Government. 2014. Tobacco weed. <i>Elephantopus mollis</i> . Fact Sheet. The State of Queensland, Department of Agriculture, Fisheries and Forestry, Queensland, AU	[Cultivation, fire & slashing may be effective] "Tobacco weed is readily controlled by cultivation and so is unlikely to become a problem in cropping areas; however, it readily becomes a pest in permanent pastures." ... "As no underground buds are produced, fire could kill a significant number of plants and may be a useful tool during the dry season. Mechanical control Slashing has been used to switch reproductive plants back to the vegetative mode, to allow treatment with herbicide."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Winston, R.L., Schwarzländer, M., Hinz, H.L., Day, M.D., Cock, M.J.W., Julien, M.H. (eds.). 2014. Biological Control of Weeds: A World Catalogue of Agents and Their Target Weeds, 5th edition. USDA Forest Service, Forest Health Technology Enterprise Team, Morgantown, West Virginia	" <i>Tetraeuaresta obscuriventris</i> ... Widespread and abundant following release. Partial control on KA initially, but more recently appears to be ineffective agent."
	CABI, 2015. Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Effectiveness uncertain] "The tephritid fly <i>Tetraeuaresta obscuriventris</i> , a biological control agent which was introduced from the Caribbean to Fiji for the biocontrol of <i>E. mollis</i> , is reported as established there and has also spread to Tonga (Hancock and Drew, 1994). It was introduced to Hawaii in 1961 and is well established there, but the level of damage being caused is not clear (Alyokhin et al., 2002)."
	Alyokhin, A. V., Messing, R. H., & Duan, J. J. (2002). Infestation of <i>Elephantopus mollis</i> (Asteraceae) flowerheads by <i>Tetraeuaresta obscuriventris</i> (Diptera: Tephritidae) on Kauai, Hawaiian islands. <i>Entomological News</i> 113(4): 247-252	[Well-established, but effectiveness unspecified] "We surveyed the incidence of a tephritid fly of New World origin, <i>T. obscuriventris</i> , on the island of Kauai (Hawaii, USA). This fly was introduced to the island in 1961 for the biological control of an important weed species, <i>Elephantopus mollis</i> . Between 80-90% of flowerheads collected at 3- to 4-week intervals during January-April 1999 from <i>E. mollis</i> contained immature <i>T. obscuriventris</i> . An average infested flowerhead contained approximately 5.2 fly larvae. Fly populations in the surveyed areas followed aggregated distribution, and the mean number of flies per infested flowerhead was positively correlated with the percent of infested flowerheads."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in wet tropical climates
- Widely naturalized in the Hawaiian Islands & elsewhere
- Pasture weed that reduces forage for livestock
- Environmental weed that threatens endangered species
- Other *Elephantopus* species have become invasive
- Relatively unpalatable to livestock
- Hairs can cause skin irritation
- Tolerates many soil types
- Able to form dense ground cover
- Reproduces by seed
- Seeds dispersed by wind, water, attached to animals, machinery & probably as a contaminant of other pasture seed
- Prolific seed production (densities unknown)
- Seeds may persist in soil for 1-2 years

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Medicinal uses
- Reported to be indifferent to light requirements, but appears to thrive in high light environments
- Not reported to spread vegetatively
- Herbicides may provide effective control
- Cultivation & fire may provide effective control
- Biocontrol agents released (effectiveness uncertain)