Taxon: Ehrharta calycina **Family:** Poaceae

Common Name(s): perennial veldt grass
purple veldtgrass
veldt grass

Synonym(s):

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 16 Nov 2015

WRA Score: 18.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Invasive Grass, Environmental Weed, Palatable, Fire Hazard, 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	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
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	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	y
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)	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	y
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		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	n
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
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)		
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
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**
	Hanelt, P. (ed.). (2001). Mansfeld's Encyclopedia of Agricultural and Horticultural Crops: (Except Ornamentals). Angiospermae - Monocotyledones: Orchidaceae - Pandanaceae, Volume 5. Springer-Verlag, Berlin, Heidelberg, New York	No evidence of domestication

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**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 13 Nov 2015]	"Native: AFRICA Southern Africa: Lesotho; Namibia [s.]; South Africa - Cape Province, Free State, KwaZulu-Natal"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 13 Nov 2015]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	FAO. 2015. Grassland Species Profiles - Ehrharta calycina. http://www.fao.org/ag/AGp/agpc/doc/gbase/Safricadata/ehrcal.htm. [Accessed 16 Nov 2015]	"Ehrharta calycina occurs in a wide range of habitats in the winter rainfall and temperate summer rainfall regions of South Africa. The climate is temperate and Mediterranean throughout the natural range of the species with annual rainfall varying from less than 200 to over 800 mm per annum."
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"Environmental Requirements: E. calycina is resistant to drought and moderate frost (Western Australian Herbarium, 2012)."

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 13 Nov 2015]	"Naturalized: ASIA-TROPICAL Indian Subcontinent: India AUSTRALASIA Australia: Australia NORTHERN AMERICA United States [w.]"

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"E. calycina is native to southern Africa (South Africa, Namibia and Lesotho), and has been introduced to several countries around the world: the USA (Texas, California and Hawaii), Tunisia, Uruguay, Spain, Portugal, India, Australia and New Zealand."

301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"Although present at Bodega Bay (Hickman 1993), the species has increased significantly in extent in recent years. It is also widespread as a naturalized weed in Australia (Tothill 1962, Cade 1980). It appears to be in an explosive stage of invasion in California, and may already be present in other areas or may appear in the near future."
	Edgar, E., Connor, H. E., & Shand, J. E. (1991). Checklist of oryzoid, arundinoid, and chloridoid grasses naturalised in New Zealand. New Zealand Journal of Botany, 29(2): 117-129	"Ehrharta calycina Smith DISTRIBUTION: Auckland (Waimauku), Manawatu (Bulls, Foxton, Waitarere Beach). FntsT RECORD: New record, e.g., CHR 156721, Waiterere Forest (south of Manawatu R. mouth), stable dunes, Cole, Oct. 1965; annotated by V.D. Zotov "first seen 1958; also at Santoft near Bulls in 1956'. REGION OF ORIGIN: South Africa."

Qsn #	Question	Answer
	Herbst, D.R.& Wagner, W.L. (1999). Contributions to the flora of Hawai'i. VII. Bishop Museum Occasional Papers 58: 12-36	"Ehrharta calycina Smith New state record.A collection made in 1997 is the second known collection of this species from Hawai'i, the first being from a trial grass plot at the Haleakalä Branch of the Hawaii Agricultural Experimental Station at Makawao, Maui (Hosaka, 2444). The collection is from a small, but definitely naturalized, population growing intermixed with the endemic Eragrostis atropioides and several naturalized grasses such as Bromus catharticus and Pennisetum setaceum. It is native to South Africa but has become naturalized in other parts of the world." ... "Material examined. MAUI: Haleakalä Branch Station, Makawao, 9 Apr 1939, Hosaka 2444 (BISH). HAWAI'I: North Kona District, Pohakuloa Training Area, Pu'u Ke'eke'e, 5600 ft, growing with Eragrostis atropioides and several other species of naturalized grasses in a bowl on the western side of the cinder cone, 1 Dec 1997, Herbst 9843 (BISH)."

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	DiTomaso, J. M., Kyser, G. B., Oneto, et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA	[Environmental weed] "These grasses can form dense stands in coastal dunes or wetlands and forests (erect veldtgrass) and reduce native plant diversity. Purple veldtgrass is the most common of the three species. It can increase the rate of organic matter accumulation and increase fire potential in shrublands and dunes. These consequences can have a dramatic effect on native plant composition."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	[Environmental weed] "It represents a major threat to native Banksia woodlands on sandy soils in Western Australia. In California, it spreads into native shrub communities and its invasion causes a rapid shift towards species-poor grassland. It is also considered as a major threat to sand dunes and their vegetation on California's central coast. Once established, it inhibits or prevents germination and establishment of native forbs and woody species. Large stretches of the species increase fire frequencies, because stems and leaves dry out during the summer months, providing excellent fuel."

304	Environmental weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"Ehrharta calycina, or perennial veldt grass, is native to southern Africa and has been introduced to several countries around the world. It commonly invades disturbed ecosystems but is also able to penetrate into closed vegetation, such as heathland, woodland and forests, after natural disturbances have occurred. It represents a major threat to native Banksia woodlands on sandy soils in Western Australia. In California, it spreads into native shrub communities and its invasion causes a rapid shift towards species-poor grassland. It is also considered as a major threat to sand dunes and their vegetation on California's central coast. Once established, it inhibits or prevents germination and establishment of native forbs and woody species. Large stretches of the species increase fire frequencies, because stems and leaves dry out during the summer months, providing excellent fuel. Fire promotes spread of this grass by reducing regrowth or establishment of native species and drastically increasing cover of E. calycina."
	California Invasive Pest Council. (2015). Ehrharta calycina (purple veldtgrass). http://www.cal-ipc.org/. [Accessed 13 Nov 2015]	"Purple veldtgrass is spreading very rapidly in the central coast region, where it invades dunes and shrublands. It was originally imported to California for use as a pasture grass and for erosion control. Purple veldtgrass displaces native vegetation and converts coastal scrub and chaparral communities to grasslands. It resprouts after fires and may increase fire frequency. "
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"The invasion of Ehrharta calycina into native shrub communities causes a rapid shift toward grassland. The more open the original vegetation, the more rapidly invasion occurs (U.S. Air Force 1996). The species spreads readily into disturbed areas, such as roadsides, and from there into openings between shrubs. Once established, E. calycina inhibits or prevents germination and establishment of native dune scrub and chaparral species (U.S. Air Force 1996). Studies at Vandenberg Air Force Base have documented the dramatic and explosive increase in E. calycina cover between 1979 and 1996. The spread of this grass is now considered to be the most serious threat to sand dunes of the central coast of California (Chipping, pers. comm.)."

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

Qsn #	Question	Answer
	Gluesenkamp, D. (2004). Eliminating Ehrharta. The Ardeid: 6-9	"Ehrharta erecta is a highly invasive perennial grass native to South Africa. The species was part of an experiment at the U.C. Berkeley botanical garden investigating whether increasing chromosome numbers increases invasive ability; as it turns out, Ehrharta erecta was tremendously invasive without any alteration whatsoever. By 1950 the species was abundant at the U.C. Berkeley campus, and in 1996 the tremendous abundance of Ehrharta erecta in San Francisco natural areas compelled recognition of the species as a major conservation concern (Sigg 1996). Ehrharta erecta is currently invading western Marin, with large populations in Olema Valley, along the Panoramic Highway on Mt. Tamalpais, around the towns of Inverness and Bolinas, and in Audubon Canyon Ranch's Bolinas Lagoon Preserve. Ehrharta erecta is a prolific seed producer, and the small seeds likely are carried to new sites via soil on shoes, on deer hooves, and as contamination in potted plants. Ehrharta can thrive in an extremely wide range of habitats, from coastal dunes to closed-canopy forest, and forms robust monospecific stands under full sun or in as little as 2.5% of daylight (Haubensak and Smyth 2000). Once established, populations increase rapidly and Ehrharta."
	Anderson, S. J., Stone, C. P., & Higashino, P. K. 1992. Distribution and spread of alien plants in Kipahulu Valley, Haleakala National Park, above 2,300 ft. elevation. Pp. 300 338.in Stone et al. (eds.). Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research, Cooperative National Park Resources Studies Unit, University of Hawaii, Honolulu, HI	"Ehrharta stipoides (meadow ricegrass) is a perennial with the capacity to form a dense monotypic ground cover even under shaded conditions. In ungulate-disturbed areas of Hawai`ian rain forests it is spread by barbed fruits that penetrate clothing and animal fur and skin. Several plants discovered at 4,200 ft (1,280 m) elevation along the trail on top of the Central Pali at the onset of this study were removed. Several additional plants found in April 1986 at the 4,700 ft (1,430 m) campsite were also uprooted."
	DiTomaso, J. M., Kyser, G. B., Oneto, et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA	"These grasses can form dense stands in coastal dunes or wetlands and forests (erect veldtgrass) and reduce native plant diversity. Purple veldtgrass is the most common of the three species. It can increase the rate of organic matter accumulation and increase fire potential in shrublands and dunes. These consequences can have a dramatic effect on native plant composition."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Ehrharta erecta] "It is capable of entering undisturbed native vegetation and invades Leptospermum laevigatum scrub. It forms dense swards and produces seedlings in high densities."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	[No evidence] "E. calycina is a tussock-forming grass 30-75 cm in height with flat, green to reddish-purple leaf blades 7-20 cm in length and 2-7 mm in width. A single tussock may consist of numerous stems."

Qsn #	Question	Answer
402	**Allelopathic**	
	Source(s)	**Notes**
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Unknown] "It forms dense and tall patches that eliminate all native herbaceous species."

403	Parasitic	n
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"E. calycina is a tussock-forming grass 30-75 cm in height with flat, green to reddish-purple leaf blades 7-20 cm in length and 2-7 mm in width." [Poaceae. Not parasitic]

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"Grazing: Sources have documented that Ehrharta calycina is not a suitable forage species because it is easily stressed by grazing, especially during flowering. Rossiter (1947) reports that E. calycina was unable t withstand continuous or even rotational grazing at normal stocking rates with sheep."

405	Toxic to animals	n
	Source(s)	**Notes**
	Hanelt, P. (ed.). (2001). Mansfeld's Encyclopedia of Agricultural and Horticultural Crops: (Except Ornamentals). Angiospermae - Monocotyledones: Orchidaceae - Pandanaceae, Volume 5. Springer-Verlag, Berlin, Heidelberg, New York	[No evidence of toxicity] "Highly palatable, but fairly drought tolerant and careful grazing management necessary."
	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**
	FAO. 2015. Grassland Species Profiles - Ehrharta calycina. http://www.fao.org/ag/AGp/agpc/doc/gbase/Safricadata/ehrcal.htm. [Accessed 13 Nov 2015]	"Diseases and pests: None known"
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"Pascoe et al. (2005) reported the smut fungus Tilletia ehrhartae on E. calycina in Australia."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	FAO. 2015. Grassland Species Profiles - Ehrharta calycina. http://www.fao.org/ag/AGp/agpc/doc/gbase/Safricadata/ehrcal.htm. [Accessed 13 Nov 2015]	"Toxicity - None reported and considered to be non-toxic."

Qsn #	Question	Answer
	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	y
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"In Australia, where Ehrharta calycina is also invasive, fire enhances invasiveness by reducing regrowth or establishment of native species and drastically increasing cover of E. calycina (Milberg and Lamont 1995). E. calycina creates a dense thatch during summer months, as the plant dries and the stems and leaves lean over. In addition to providing excellent fuel, this thatch may interfere with the germination and establishment of native plants during the wet fall and winter."
	California Invasive Pest Council. (2015). Ehrharta calycina (purple veldtgrass). http://www.cal-ipc.org/. [Accessed 13 Nov 2015]	"Purple veldtgrass displaces native vegetation and converts coastal scrub and chaparral communities to grasslands. It resprouts after fires and may increase fire frequency."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"The grass accumulates large quantities of dried plants thus increasing fire intensity and frequency. Fires themselves stimulate germination and regrowth, favouring the spread of the grass."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	**Notes**
	DiTomaso, J. M., Kyser, G. B., Oneto, et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA	[Prefers open, sunlit areas] "Purple veldtgrass has invaded grassland, roadsides, live oak woodlands, and coastal habitats such as dunes, scrub, and chaparral. It prefers open sunlight areas."
	FAO. 2015. Grassland Species Profiles - Ehrharta calycina. http://www.fao.org/ag/AGp/agpc/doc/gbase/Safricadata/ehrcal.htm. [Accessed 13 Nov 2015]	[Seeds may germinate in shade] "In Australia, it invades Banksia woodlands where it may germinate under a wide range of temperature and light conditions (Smith et al. 1999)."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	FAO. 2015. Grassland Species Profiles - Ehrharta calycina. http://www.fao.org/ag/AGp/agpc/doc/gbase/Safricadata/ehrcal.htm. [Accessed 13 Nov 2015]	"Soil requirements - Found mostly in sandy soil, but utilizes a variety of other habitats."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"E. calycina is a tussock-forming grass 30-75 cm in height with flat, green to reddish-purple leaf blades 7-20 cm in length and 2-7 mm in width. A single tussock may consist of numerous stems."

412	Forms dense thickets	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"E. calycina creates a dense thatch during summer months, as the plant dries and the stems and leaves lean over. In addition to providing excellent fuel, this thatch may interfere with the germination and establishment of native plants during the wet fall and winter." ... "The use of glyphosate is believed by some to be the most appropriate when E. calycina is growing as a near-monospecific stand, since it will cause damage to associated native plants."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"It forms dense and tall patches that eliminate all native herbaceous species."

501	Aquatic	n
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	[Terrestrial grass] "E. calycina grows in a wide range of habitats, usually on deep sandy soils."

502	Grass	y
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 13 Nov 2015]	"Family: Poaceae (alt. Gramineae) subfamily: Ehrhartoideae tribe: Ehrharteae"

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 13 Nov 2015]	"Family: Poaceae"

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"E. calycina is perennial and occasionally rhizomatous. It has dormant buds at its base from which it can resprout after damage"

Qsn #	Question	Answer
601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"Ehrharta calycina (perennial veldt grass) spreads almost entirely by seed, although rhizomes are occasionally present."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	Unknown

604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	Rossiter, R. C. (1947). Studies on Perennial Veldt Grass. (Ehrharta calycina Sm.). Bulletin No. 227. Council for Scientific and Industrial Research, Melbourne	[Almost entirely outcrossing] "Perennial veldt grass is essentially cross-fertile. Under selfing, '75 per cent. of the plants examined set less than 1· 5 per cent. seed, while under open~pol1ination 80 per cent. of the plants set from 40-80 per cent. seed."

605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	Zomlefer, W.B. 1994. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	Poaceae [anemophilous. Wind-pollinated]

606	**Reproduction by vegetative fragmentation**	
	Source(s)	**Notes**
	DiTomaso, J. 2007. Weeds of California and Other Western States, Volume 2. UCANR Publications, Oakland, CA	"Reproduces primarily by seed and sometimes vegetatively from short rhizomes."
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	[Possibly, but rarely] "Ehrharta calycina (perennial veldt grass) spreads almost entirely by seed, although rhizomes are occasionally present." ... "E. calycina grows in dense tufts, which can survive some burial by sand. As sand accumulates over the base of the plant, buried shoots sometimes form lateral branches, giving the appearance of rhizomes. True rhizomes occur rarely."

607	**Minimum generative time (years)**	**1**

Qsn #	Question	Answer
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	[Able to reproduce within first growing season] "In California, seeds of E. calycina germinate following winter rains. It grows and flowers throughout the rainy season (December to April), and into early summer in coastal areas with fog drip (Bossard et al. 2000). Most fruits mature between March and June in California. Root growth is rapid and extensive after rains. According to Bossard et al. (2000) flowering may occur for up to 25 weeks. In Australia, the species flowers from March to April or August to September (Western Australian Herbarium, 2012)."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**y**
	Source(s)	**Notes**
	DiTomaso, J. 2007. Weeds of California and Other Western States, Volume 2. UCANR Publications, Oakland, CA	"Florets also disperse to greater distances with human activities, water, soil movement, and possibly animals."
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"Seeds and pieces of tufts may be dispersed along roads and highways by agricultural machinery, mowers, and vehicles."

702	**Propagules dispersed intentionally by people**	**n**
	Source(s)	**Notes**
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Possibly in the past, but no evidence of current intentional introduction] "Seed production is abundant, and seeds are dispersed by wind, water and animals."

703	**Propagules likely to disperse as a produce contaminant**	**n**
	Source(s)	**Notes**
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seed production is abundant, and seeds are dispersed by wind, water and animals."

704	**Propagules adapted to wind dispersal**	**y**
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"The three species of Ehrharta spread primarily by wind-borne seed. Invasions of E. calycina spread primarily in the direction of prevailing wind (Tothill 1962) and are enhanced by disturbance (Chipping, pers. comm.)."

705	**Propagules water dispersed**	**y**
	Source(s)	**Notes**
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seed production is abundant, and seeds are dispersed by wind, water and animals."

Qsn #	Question	Answer
706	**Propagules bird dispersed**	**n**
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	[Possibly externally, but no evidence of internal dispersal] "Birds and mammals may disperse seeds of E. calycina if they become attached to feathers or fur (Frey, 2005)."

707	Propagules dispersed by other animals (externally)	
	Source(s)	**Notes**
	DiTomaso, J. 2007. Weeds of California and Other Western States, Volume 2. UCANR Publications, Oakland, CA	"Florets also disperse to greater distances with human activities, water, soil movement, and possibly animals."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seed production is abundant, and seeds are dispersed by wind, water and animals."

708	Propagules survive passage through the gut	y
	Source(s)	**Notes**
	Newsome, D., Smith, A., & Moore, S. A. (2008). Horse riding in protected areas: a critical review and implications for research and management. Current Issues in Tourism, 11(2): 144-166	"The presence of weed seeds in horse manure highlights that horses have the capacity to disperse viable propagules of both woody and herbaceous weeds. This is also born out by field observations of the rampant weed Veldt Grass (Ehrharta calycina) germinating from horse dung along trails in John Forrest National Park in Western Australia (Newsome, 2005)."
	Pickering, C. M., Hill, W., Newsome, D., & Leung, Y. F. (2010). Comparing hiking, mountain biking and horse riding impacts on vegetation and soils in Australia and the United States of America. Journal of Environmental Management, 91(3): 551-562	[Germinates from horse dung] "There do not appear to be any Australian or USA field studies confirming that weed species germinate in situ from horse manure along trails in protected areas (Table 1). Nonetheless, the environmental weed Ehrharta calycina has been observed by one of the authors (Newsome) germinating from dung deposited by horses on walk trails traversing weed free natural vegetation in John Forrest National Park, Western Australia."

801	Prolific seed production (>1000/m2)	y
	Source(s)	**Notes**
	CABI. 2015. Ehrharta calycina in: Invasive Species Compendium. www.cabi.org/isc	"In Australian woodland invaded by the species, recently burned areas contained up to 75,000 seeds per square metre (Smith et al., 1999)."
	Fisher, J. L., Loneragan, W. A., Dixon, K., & Veneklaas, E. J. (2009). Soil seed bank compositional change constrains biodiversity in an invaded species-rich woodland. Biological Conservation, 142(2): 256-269	"Native species germinants, mainly shrubs and perennial herbs, were highest in GC sites and least in poorer condition sites suggesting a reduction in their numbers had occurred over time. Introduced germinants were dominated by perennial and annual grasses, and annual herbs. E. calycina had the greatest seed density (8328 germinants m⍰-2)."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seed production is abundant, and seeds are dispersed by wind, water and animals."

Qsn #	Question	Answer
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y**
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"Ehrharta calycina (perennial veldt grass) spreads almost entirely by seed, although rhizomes are occasionally present. The species has been shown to accumulate persistent seedbanks (Pierce and Cowling 1991).

803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"Glyphosate (as Roundup) applied as a foliar spray at 2 percent concentration with added surfactant was shown to be effective against Ehrharta calycina under a wide variety of conditions at the Vandeberg Air Force Base dunes (Mulroy et al. 1992, U.S. Air Force Base 1996). Plants of different ages, with and without supplemental watering and/or mowing, were killed after one application."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	"Prescribed burning: Although fire is sometimes used as a control method for grasses, it is inappropriate for Ehrharta species, as studies have shown that fire increases the invasiveness of this species (Milberg and Lomont 1995)."
	California Invasive Pest Council. (2015). Ehrharta calycina (purple veldtgrass). http://www.cal-ipc.org/. [Accessed 13 Nov 2015]	"Purple veldtgrass displaces native vegetation and converts coastal scrub and chaparral communities to grasslands. It resprouts after fires and may increase fire frequency."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Roots and rhizomes are shallow and plants are easy to uproot. All rhizomes must be removed and prevent regrowth."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Bossard, C. C., Randall, J. M. & Hoshovsky, M. C. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley and Los Angeles, CA	[No evidence from the Hawaiian Islands] "Insects and fungi: No biological control efforts have been attempted for Erharta species in California. Doidge (1948) reported on results with the fungal pathogen Uredo ehrhartae-calycinae on E. calycina in South Africa."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Exhibits environmental versatility (grows in a wide range of habitats)
• Grows in tropical climates
• Naturalized on Hawaii island & elsewhere (including India, Australia, California)
• Environmental weed (excludes native vegetation)
• Other Ehrharta species are invasive
• Increases fire risk
• Tolerates many soil types
• Forms dense and tall patches that exclude & replace native vegetation
• Reproduces primarily be seed (& rarely by rhizomes)
• Able to reach maturity in one year
• Seeds dispersed by wind, water, human activities, internally by grazing animals & possibly externally (attached to fur or feathers)
• Prolific seed production
• Forms a persistent seed bank
• Resprouts after fire

Low Risk Traits
• Unarmed (no spines, thorns or burrs)
• Palatable to grazing animals (provides forage for livestock)
• Requires full sun
• Primarily outcrossing
• Rarely spreads vegetatively
• Herbicides may provide effective control