Taxon: Ehrharta stipoides **Family:** Poaceae

Common Name(s): meadow ricegrass
weeping grass

Synonym(s): Microlaena gunnii Hook.f.
Microlaena micranthera Ohwi
Microlaena stipoides (Labill.) R.Br.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 27 Jul 2015

WRA Score: 19.0 **Designation:** H(Hawai'i) **Rating:** High Risk

Keywords: Environmental Weed, Forage Grass, Fire Hazard, Cleistogamous, Externally Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	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	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	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	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
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	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
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		
801	Prolific seed production (>1000/m2)	y=1, n=-1	n
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)	y=-1, n=1	n

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	Malory, S. 2014, Accelerated domestication of Australian native grass species using molecular tools. PhD Dissertation. Southern Cross University, Lismore, NSW	[Artificial domestication a future possibility] "Potentially useful SNPs can be used in establishing new breeding lines of M. stipoides suitable for domestication. Once domesticated, M. stipoides may become a new crop for commercial food production. This technique can also be utilised for other wild grasses to screen for desirable domestication traits and possibly to create new crops for food consumption."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Multiple uses, but no evidence of domestication] "lawn grass, ornamental , pasture and turf, recommended for lawns on semishaded sites under trees, sand dune restoration"

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**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Indonesia, Australia, Southeast Asia."

202	Quality of climate match data	High
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Florabank. 2015. Microlaena stipoides. http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Microlaena_stipoides.htm. [Accessed 27 Jul 2015]	"Var. stipoides: Climate parameters Mean annual rainfall: 200-2250 mm Rainfall distribution pattern: summer, uniform or winter Mean annual temperature: 9-20 °C Mean max. temperature of the hottest month: 15-41 °C Mean min. temperature of the coldest month: -1-9 °C Frosts (approx. no. per year): greater than 20 Frost intensity: light to moderate (0 to -5°C) Altitude: 0-1200 metres Tolerance of extremes in climate Drought: known to be moderately drought tolerant Frost: tolerates frosts in the 0° to -5°C range Wind: tolerates salt-laden coastal winds"
	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] "in Hawai'i naturalized in openings in wet forest, and other moist, shaded sites, 20-1,400 m"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Indonesia, Australia, Southeast Asia."
	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 to Australia, New Zealand, and the Philippines; in Hawai'i naturalized in openings in wet forest, and other moist, shaded sites, 20-1,400 m, on O'ahu, Maui, and Hawai'i."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"M. stipoides has been introduced into Hawaii and Réunion Island and has been reported as invasive on both (PIER 2010). In the Hawaiian Islands, M. stipoides (usually as E. stipoides) has been recorded for Oahu, Maui, Hawaii (O'Connor, 1990), Kauai (Lorence et al., 1995), Kaho'olawe (Herbst and Clayton 1998) and Molokai (Wysong et al. 2006). M. stipoides has been reported as invasive in Reunion Island (Lavergne, 2006; PIER, 2010). It is listed as one of the principal invading exotic plants of the natural environment by Soubeyran (2008). It is naturalized in Chile (Global Compendium of Weeds, 2012; Encyclopedia of Life, 2012). In the UK, Stace (2010) described it as a 'rather infrequent wool alien' and 'scattered over England'. In South Africa, M. stipoides is listed by SANBI (2012) as a naturalized exotic. A known specimen of M. stipoides was collected from KwaZulu-Natal, in the Liais River district of South Africa (Council of Heads of Australasian Herbaria, 2012). Grassworld (2012) states that M. stipoides has a distribution covering Sri Lanka, as well as Indonesia (Java, Lesser Sunda Islands), the Philippines and New Guinea, but does not state whether these places belong to the natural or introduced range of M. stipoides. The Kew database of grasses (Clayton et al., 2012), records M. stipoides (as Ehrharta stipoides) from India, but no other records indicate its presence in India."

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Vorontsova, M. S., Nanjarisoa, O. P., & Besnard, G. (2014). Three new grass records for Madagascar. Candollea, 69(1): 85-87	"An Australian and South East Asian species, Ehrharta stipoides Labill. (also referred to as Microlaena stipoides (Labill.) R. Br. or meadow rice grass, now included in the genus Ehrharta Thunb. following Verboom & al. 2003) is recorded as naturalised in Kwa-Zulu Natal, Sri Lanka, and Easter Island (WCSP, 2014), and in both Hawaii and Réunion, where it has become invasive..." ... "The lack of other collections and other sightings suggests this could be a recent arrival brought in by visitors to the Andringitra National Park. No other species of Ehrharta have been recorded in Madagascar in spite of the common occurrence of E. erecta Lam. in South Africa and Réunion. Specimen examined. – MADAGASCAR. Prov. Fianarantsoa: Parc National Andringitra, Riampotsy, at camp 3, single plant sheltered under the picnic table, 22°10'49''S 46°54'12''E, 2064 m, 28.X.2013, Nanjarisoa, Vorontsova, Rakotonasolo & Joseph 90 (K!, P!, TAN!)."
	Wysong, M., Hughes, G. & Wood, K.R. (2007). New Hawaiian plant records for the island of Molokaʻi. Bishop Museum Occasional Papers 96: 1-8	"Native to Australia, New Zealand, and the Philippines, E. stipoides (meadow ricegrass) was first collected on Hawaiʻi in 1916 (Hitchcock 14465, BISH). In Hawaiʻi it has previously been reported as naturalized in openings in wet forest and other moist sites from 20 to 1400 m on Kauaʻi, Oʻahu, Maui, Kahoʻolawe, and Hawaiʻi (Wagner et al. 1999). Material examined. MOLOKAʻI: Puʻu Aliʻi NAR, collected in wet 'öhiʻa native tree and shrub forest near Landing Zone 3, 1073 m, 17 Aug 2005, Hughes 1132."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawaiʻi Press and Bishop Museum Press, Honolulu, HI.	"Native to Australia, New Zealand, and the Philippines; in Hawai'i naturalized in openings in wet forest, and other moist, shaded sites, 20-1,400 m, on O'ahu, Maui, and Hawai'i. First collected on Hawai'i in 1916 (Hitchcock 14465, BISH)."

Qsn #	Question	Answer
	Herbst, Derral R. & Clayton, W. D. 1998. Notes on the grasses of Hawai'i: new records, corrections, and name changes. Bishop Museum Occasional Papers. 55:17-38	"The following collection represents a new island record for this species. It previously was known from O'ahu, Maui, and Hawai'i (O'Connor, 1990: 1536), and recently was reported from Kaua'i (Lorence et al., 1995: 45). Material examined. KAHO'OLAWE: Smuggler's Cove, 25 Jan 1991, Ellshoff 196 (BISH)."
	Lorence, D.H., Flynn, T.W. & Wagner, W.L. 1995. Contributions to the flora of Hawai'i. III. New additions, range extensions, and rediscoveries of flowering plants. Bishop Museum Occasional Papers 41: 19-58	"The meadow ricegrass was previously recorded as being naturalized on Oahu, Maui, and Hawaii (O'Connor 1990: 1536). On Kauai it is naturalized at higher elevations in disturbed areas of native Metrosideros and Acacia forest and as a lawn weed. Material examined. KAUAI: Waimea District, Kokee State Park, Mohihi Road ca. 1 mile E of Hwy 550, cabin of Frank Hay, 1 Nov 1983, T. Flynn 683 (PTBG); Kokee State Park, on Canyon Trail to Waipoo Falls,885–1098 m, 26 Aug 1983, W.L. Wagner et al. 4944 (BISH, US); Kumuwela Road ca. 1.6 miles past junction with Mohihi Road, 10 May 1985, T. Flynn 1093 (BISH, PTBG)."

302	Garden/amenity/disturbance weed	
	Source(s)	**Notes**
	Contu, S. 2013. Ehrharta stipoides. The IUCN Red List of Threatened Species. Version 2015.2. www.iucnredlist.org	[Disturbance adapted grass with negative environmental impacts] "This species is a perennial tufted grass which is common in moist and wet habitats. It invades disturbed sites rapidly. "
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Disturbance adapted. Negative environmental impacts] "commonly found in woodland on sandstone and clay soils, disturbed sites"

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"During the Australian summer, it has been claimed the seed from M. stipoides can cause serious damage to sheep's eyes and skin and can be a contaminant of wool (VVPCMN, 2012). No other reports could be found that specify M. stipoides for seeds that can harm sheep, but numerous exotic grasses are implicated in damaging animal pelts. There are many references, particularly in Australian literature and websites, as to the usefulness of M. stipoides for lawns and pastures within its natural range. Examples include: Jones and Whalley (1994a, 1994b), Martin (2004), Davies et al. (2005a), Smith (2005) and Native Seeds Pty Ltd. (2011)."
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence. Environmental weed

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

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 Hawaiian 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."
U.S. Fish and Wildlife Service. 1995. Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for Thirteen Plants From the Island of Hawaii, State of Hawaii. Federal Register. Vol. 60, No. 185: 49377-49392	"Ehrharta stipoides (meadow ricegrass) is naturalized in openings in wet forest and other moist, shaded sites on Oahu, Maui, and Hawaii (O'Connor 1990). Meadow ricegrass is the third grass species to threaten Hibiscadelphus giffardianus and Melicope zahlbruckneri."
Friday, J. B., Scowcroft, P. G., & Ares, A. (2008). Responses of native and invasive plant species to selective logging in an Acacia koa-Metrosideros polymorpha forest in Hawai'i. Applied Vegetation Science, 11(4): 471-482	"Ehrharta stipoides is a shade-tolerant alien grass that can form dense stands in the understory of native forests and inhibit regeneration of native species (Denslow et al. 2006)."
Hess, S. C., Jeffrey, J. J., Pratt, L. W., & Ball, D. L. (2010). Effects of Ungulate Management on Vegetation at Hakalau Forest National Wildlife Refuge, Hawaii Island. Pacific Conservation Biology, 1(2): 144-150	"Invasive grasses have become established throughout the tropics, altering ecosystem processes (D'Antonio and Vitousek 1992). Three grass species and one rush species comprised the majority of invasive monocots at HFNWR. In order of decreasing cover these were: Pennisetum clandestinum, Ehrharta stipoides, Juncus effusus, and Anthoxanthum odoratum. None of these alien monocots exhibited any significant change in cover over the course of study at HFNWR."
US Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Listing 23 Species on Oahu as Endangered and Designating Critical Habitat for 124 Species; Proposed Rule. Federal Register 46362-46594	"Nonnative plant threats to the five plant species (Korthasella degeneri, Melicope makahae, Platydesma cornuta var. decurrens, Pleomele forbesii, and Pteralyxia macrocarpa) which are proposed for listing in this proposed rule and that inhabit the dry cliff ecosystem include..." ... "Nonnative grasses that are a threat to this ecosystem include Digitaria insularis (sourgrass), Ehrharta stipoides (meadow ricegrass), Melinus minutiflora, Panicum maximum, and Paspalum conjugatum (Hilo grass) (HBMP 2008). These nonnative plant species pose a serious threat..."
U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designations of Critical Habitat for Plant Species From the Island of Hawaii, Hawaii. Federal Register. Vol. 67, No. 102: 36968-37106	"The major threats to Hibiscadelphus giffardianus are bark, flower, and fruit feeding by black rats; leaf damage in the form of stippling and yellowing by Sophonia rufofascia (two-spotted leafhopper) and yellowing by the native plant bug Hyalopeplus pellucidus; competition from the non-native grasses Ehrharta stipoides (meadow ricegrass), Paspalum conjugatum (Hilo grass),"
Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"This wiry, perennial tufted grass is common in moist and wet habitats. It invades disturbed sites rapidly. The awned fruit are dispersed on clothing or animal fur. It is a fire-stimulated grass and in Hawai'i carries fires over larger areas than normal. It has not been evaluated for biological control. It grows between 100-1,500 m in dry to mesic areas. There are major infestations from Puna to South Kona on Hawai'i."
U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Determination of Endangered Species Status for 15 Species on Hawaii Island. Final Rule. Federal Register Vol. 78, No. 209: 64638 -64690	[Threatenes 3 endangered species (Cyanea tritomantha, Pritchardia lanigera, and Stenogyne cranwelliae)] "Nonnative Plants in the Lowland Wet Ecosystem ..." ... "The nonnative grasses Axonopus fissifolius, Ehrharta stipoides, Paspalum conjugatum, and Setaria palmifolia also pose a threat to the three species in this ecosystem (HBMP 2010c; HBMP 2010f; HBMP 2010k), because they form thick mats that prevent growth and regeneration. These nonnative plant species pose serious and ongoing threats to the three species that depend on this ecosystem."

Qsn #	Question	Answer
305	Congeneric weed	y
	Source(s)	Notes
	Lambert, A. M., D'Antonio, C., & Dudley, T. L. (2010). Invasive species and fire in California ecosystems. Fremontia, 38(2-3), 29-36	"Shrublands along California's foggy central coast are also affected by an increase in the abundance of the fire-responsive African perennial veldtgrass (Ehrharta calycina). This species was introduced at least 40 years ago for erosion control in sandy soils. It produces relatively continuous fuel that promotes the spread of fire through coastal chaparral and sage scrub, but it also responds rapidly to fire. This species also promotes fire and it increases in density following fire in similar Mediterranean climate areas of Southwest Australia. The result in California is that many habitats which burned either in accidental or prescribed fires are becoming heavily dominated by low diversity stands of veldtgrass. This conversion is most apparent on Vandenberg Air Force base where Ehrharta was widely planted in the 1900s and has spread widely. Such coastal chaparral and shrublands on unique marine terrace soils (in this case, sands) are well known for their high endemism (being unique to a particular geographic region). So an increase in fire occurrence and an increase in the growth of highly competitive grasses after fire could lead to the decline of endemic species."
	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 establishments of native dune scrub and chaparral species (U.S. Air Force 1996)."

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] "Slender rhizomatous perennials; culms ascending or erect, usually decumbent at base, 30-75 cm tall, glabrous. Sheaths 2-6 cm long, shorter than internodes, glabrous or retrorsely scabrous; ligule membranous, 0.2-0.5 mm long, margins erose; blades flat, 3-8 (-14) cm long, 2-3 mm wide, glabrous or scaberulous, margins scabrous."

402	Allelopathic	
	Source(s)	Notes
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence of allelopathy documented

Qsn #	Question	Answer
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.	"Slender rhizomatous perennials" [Poaceae. No evidence]

404	Unpalatable to grazing animals	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	"dense cover plant with invasive tendency. provides fodder, will produce a large bulk of green feed" ... "tolerant of heavy grazing and acid soil"

405	Toxic to animals	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] "dense cover plant with invasive tendency. provides fodder, will produce a large bulk of green feed" ... "tolerant of heavy grazing and acid soil"
	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**
	Lapierre, H. 2004. Viruses and Virus Diseases of Poaceae (Gramineae). INRA, Paris	"Bromus striate mosaic virus" ... "The agronomic importance of BrSMV is unknown but it is unlikely that BrSMV poses any serious threat to agriculture." [Microlaena stipoides list among hosts of this virus]
	McKenzie, E. H. C., & Latch, G. C. M. (1984). New plant disease records in New Zealand: Graminicolous fungi. New Zealand Journal of Agricultural Research, 27(1): 113-123	[Importance of diseases on other plants unknown] "Cercospora microlaenae ... On Microlaena stipoides" ... "Colletotrichum graminicola ... On Microlaena stipoides" ... "Pseudoseptoria stomaticola ... On Microlaena stipoides"

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	The Asthma Foundation of Victoria. 2013. The Low Allergen Garden. How to avoid garden allergens. West Melbourne VIC	Microlaena stipoides recommended for a low allergen garden
	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**

Qsn #	Question	Answer
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"It is a fire-stimulated grass and in Hawai'i carries fires over larger areas than normal."
	Denslow, J. S., Uowolo, A. L., & Hughes, R. F. (2006). Limitations to seedling establishment in a mesic Hawaiian forest. Oecologia, 148(1): 118-128	[Fire uncommon] "In addition to logging, the forest was open to grazing and browsing by cattle, goats, pigs, and mufflon sheep until TNC-Hawaii acquired the property in 1999, at which point Honomalino was fenced and ungulate removal initiated (M. Johansen, personal communication). With the exception of Ehrharta, other non-indigenous species, while common along trails, roadsides, and other disturbed areas, are scarce in this forest. Fire is uncommon in these mesic ecosystems."
	Loh, R., McDaniel, S., Schultz, M., Ainsworth, A., Benitez, D., Palumbo, D., Smith, K., Tunison, T. & Vaidya, M. (2007). Rehabilitation of seasonally dry ʻōhi ʻa woodlands and mesic koa forest following the Broomsedge Fire, Hawaii Volcanoes National Park. Technical Report 147. Pacific Cooperative Studies Unit, University of Hawaiʻi, Honolulu, HI	[Increases vulnerability of degraded koa forest to wildfires] "The strategy in mesic koa forest was to create a vegetated fuel barrier that would reduce the likelihood of fire penetrating Kipuka Puaulu Special Ecological Area (Figure 1). Kipuka Puaulu is a rare mesic soapberry-koa-ʻōhiʻa community that contains a number of endangered and rare plant species. Surrounding the Kipuka is degraded koa forest that is vulnerable to wild fire. These are koa forests that have regenerated in abandoned pastures following the removal of cattle in the 1950`s. Koa came up vigorously and reformed a forest canopy, but very little regeneration of the sub-canopy and understory vegetation occurred. The result was an oversimplified koa community composed of koa and alien grasses (Ehrharta stipoides, Pennisetum clandestinum) that was more vulnerable to wild fire. During the Broomsedge Burn, fire carried by meadow ricegrass (Ehrharta stipoides) burned 85 ac of koa forest and came within 50 m of Kipuka Puaulu Special Ecological Area before changing weather conditions and control lines constructed by fire fighters stopped the fire."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	**Notes**
	McDaniel, S., & Ostertag, R. (2010). Strategic light manipulation as a restoration strategy to reduce alien grasses and encourage native regeneration in Hawaiian mesic forests. Applied Vegetation Science, 13(3): 280-290	"In a two-part study we examined the effect of light availability on common native woody and alien grass species found in secondary forests in Hawaii. A field survey was conducted to examine the relationship between light availability and canopy type (open pasture, planted canopy and secondary forest) on understory grass biomass and litter accumulation. We then experimentally manipulated light levels to determine the effect of light availability on growth and survival of six native woody species and three alien grasses. Low-light (5%), medium-light (10%) and high-light (20-30%) treatments were created using shade structures erected beneath the existing secondary koa canopy." ... "In the low-light treatment, the highest growth rates were found for the grass Ehrharta, and two native species, Coprosma and Pipturus." ... "In this study we also found that Ehrharta is less affected by low-light conditions than Pennisetum. Given that Ehrharta has also been documented with low biomass in low-light conditions (2%) (Scowcroft et al. 2008), we feel that Ehrharta may be a species that will always persist in understory."

Qsn #	Question	Answer
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"shaded or semishaded sites, semishade in forests"
	Denslow, J. S., Uowolo, A. L., & Hughes, R. F. (2006). Limitations to seedling establishment in a mesic Hawaiian forest. Oecologia, 148(1): 118-128	"The Honomalino tract of the Kona-Hema Nature Reserve reflects the history of logging and grazing and the spread of invasive pasture grasses typical of many mesic montane forests in Hawaii. The forest is a mosaic of Metrosideros polymorpha Gaud. woodland and young A. koa forest, all undergrown by the shade-tolerant exotic grass, Ehrharta stipoides Labill."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	**Notes**
	NSW Department of Primary Industries. 2015. 'Grassed up' – Microlaena stipoides (Microlaena or Weeping grass). http://www.dpi.nsw.gov.au/agriculture/pastures/pastures-and-rangelands/rangelands/publications/grassedup/species/microlaena. [Accessed 24 Jul 2015]	[Occurs on a wide variety of acidic soils] "Microlaena can be sown on a wide variety of soil types provided the pH is less than about 5.5. Naturally occurring microlaena is more abundant the more acid the soil down to a pH of about 3.9. Areas to be sown to microlaena should not be treated with lime."

411	Climbing or smothering growth habit	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	"Perennial, small , slender, prostrate , tufted, contracted or spreading short rhizomes, stems arching," ... "dense cover plant with invasive tendency"

412	Forms dense thickets	y
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"dense cover plant with invasive tendency"
	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 Hawaiian rain forests it is spread by barbed fruits that penetrate clothing and animal fur and skin."
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Within its natural range, M. stipoides may form almost pure swards, or occur with a wide variety of other grasses, herbaceous dicots, shrubs and trees. On Menipo Island, a small island in the Lesser Sunda Islands, M. stipoides was recorded as a co-dominant grass in savannah vegetation (Sutrisno, 1993)."

501	Aquatic	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in openings in wet forest, and other moist, shaded sites" [Terrestrial grass]

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 23 Jul 2015]	"Family: Poaceae subfamily Ehrhartoideae tribe Ehrharteae"

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.	"Slender rhizomatous perennials; culms ascending or erect, usually decumbent at base, 30-75 cm tall, glabrous." [Poaceae. No evidence]

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.	"Slender rhizomatous perennials"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**
	Contu, S. 2013. Ehrharta stipoides. The IUCN Red List of Threatened Species. Version 2015.2. www.iucnredlist.org	"Ehrharta stipoides is assessed as Least Concern. The species has a wide distribution range, the population is currently believed to be stable and no real threats are known at present."

602	Produces viable seed	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.	"Caryopsis yellow, narrow, somewhat compressed, 5-6 mm long."
	NSW Department of Primary Industries. 2015. 'Grassed up' – Microlaena stipoides (Microlaena or Weeping grass). http://www.dpi.nsw.gov.au/agriculture/pastures/pastures-and-rangelands/rangelands/publications/grassedup/species/microlaena. [Accessed 24 Jul 2015]	"Microlaena seeds will germinate in any month of the year in most Australian environments."

Qsn #	Question	Answer
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"The seed heads are weeping and ripen from December to May in southern Australia. The seeds have rough awns up to 20 mm long and tend to cling together"

603	Hybridizes naturally	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	y
	Source(s)	**Notes**
	Clifford, H. T. (1962). Cleistogamy in Microlaena stipoides (Labill.) R. Br. University of Queensland Papers, Department of Botany 4: 63-72	"The spikelets of Microlaena stipoides are of two kinds, chasmogamous and cleistogamous. This does not appear to have been noted previously and the failure to recognize both spikelet forms has resulted in considerable confusion in the taxonomic literature." [Cleistogamy or automatic self pollination describes the trait of certain plants to propagate by using non-opening, self-pollinating flowers.]

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Clifford, H. T. (1962). Cleistogamy in Microlaena stipoides (Labill.) R. Br. University of Queensland Papers, Department of Botany 4: 63-72	"The spikelets of Microlaena stipoides are of two kinds, chasmogamous and cleistogamous."
	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	y
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"M. stipoides can also reproduce via rhizome fragments, and can spread very slowly by its short rhizomes under the soil."

Qsn #	Question	Answer
607	**Minimum generative time (years)**	**2**
	Source(s)	**Notes**
	Florabank. 2015. Microlaena stipoides. http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Microlaena_stipoides.htm. [Accessed 27 Jul 2015]	"Growth rate: fast"
	Mitchell, M. L., Virgona, J. M., Jacobs, J. L., & Kemp, D. R. (2014). Population biology of Microlaena stipoides in a south-eastern Australian pasture. Crop and Pasture Science, 65(8): 767-779	[Probably between 1-2 years from seed set to maturity] "The seasonal development pattern of Microlaena was evident over the experimental period (Fig. 2); the plants moved from vegetative growth in winter, to stem elongation and ear emergence in spring–early summer, to seed maturity and seed fall in summer and autumn. Microlaena has an indeterminate growth pattern; only one period was recorded during which all plants were vegetative."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**y**
	Source(s)	**Notes**
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"The awned fruit are dispersed on clothing or animal fur."

702	**Propagules dispersed intentionally by people**	**y**
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Deliberate sowing of seed may also occur, as it is sometimes used for stock grazing, erosion control and turf management."

703	**Propagules likely to disperse as a produce contaminant**	**y**
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"The arrival of M. stipoides in England was attributed to its presence as seed in imported wool (Shimwell, 2006)."

704	**Propagules adapted to wind dispersal**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Peart, M. H. (1981). Further experiments on the biological significance of the morphology of seed-dispersal units in grasses. The Journal of Ecology, 69(2): 425-436	[Not adapted for wind dispersal] "It is argued that the morphology of diaspores of Aristida vagans and Microlaena stipoides does not encourage dispersal by wind but rather promotes establishment of seedlings in the immediate vicinity of the parent plant" ... "Microlaena stipoides have diaspores bearing two or three rigid awns and a sharp callus bearing antrorse bristles. By virtue of the orientation imposed by the awns on the diaspores during flight these dispersal units may land in cracks or crevices in the soil surface or become embedded in the leaf litter strewn on the ground. Alternatively they may make their own microsites by penetrating an unbroken soil surface and so become anchored in a position promoting establishment. It is doubtful whether any of these devices act as parachutes and disperse seed over great distances"

705	Propagules water dispersed	
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"There are no records of non-biotic dispersal, although seeds may disperse very short distances by wind or water."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Disturbance may facilitate establishment, but water may also facilitate dispersal along streams] "along streams"

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Awned fruit can be dispersed on clothing or animal fur and this appears to be the main method by which seed reaches new sites (Smith, 1985; Anderson et al. 1992; Wagner, 1999). In ungulate disturbed areas of Hawaiian rainforest, pigs are the chief vector (Madeiros et al., 1998); in Australia and New Zealand, sheep may carry seed (NSWDPI, 2012). There are reports of dogs dispersing seed in Australia (Native Grasses as Turf, 2010)."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	**Notes**
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"The awned fruit are dispersed on clothing or animal fur."

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Possibly Yes] "The use of grazing animals to consume flower heads seasonally might be an option to reduce seed output, but would need to be done before seed matures. Seed is likely to pass through the gut of herbivorous mammals and animal disturbance of sites with M. stipoides is likely to benefit establishment of the grass."

801	Prolific seed production (>1000/m2)	n
	Source(s)	**Notes**
	Mitchell, M. L., Virgona, J. M., Jacobs, J. L., & Kemp, D. R. (2014). Population biology of Microlaena stipoides in a south-eastern Australian pasture. Crop and Pasture Science, 65(8): 767-779	"Seed yields were substantial (mean 800 seeds m–2), with seed rain occurring over December –May. Microlaena has two distinct periods of high seed rain, in early summer and in early autumn. Seed predation is high."
	Drake, D. R. (1998). Relationships among the seed rain, seed bank and vegetation of a Hawaiian forest. Journal of Vegetation Science, 9(1): 103-112	"Table 1. Abundance (abs = absolute; % = relative) of seed plant species in the seed rain, seed bank and vegetation at Kealakomo." [Ehrharta stipoides - 1.2 seeds per square meter measured in the seed rain]
	Mitchell, M., Virgona, J., Jacobs, J. & Kemp, D. 2012. Seed rain of Microlaena stipoides. In Yunusa, I. (ed.). Capturing Opportunities and Overcoming Obstacles in Australian Agronomy. Proceedings of 16th Australian Agronomy Conference 2012, 14-18 October 2012, Armidale, NSW	"This study has quantified the amount of Microlaena seed rain in a native pasture and showed this is mostly in summer, before autumn rainfall is normally expected. Seed abundance was unexpectedly low, with an average yield of 23 kg seed/ha, though this still equates to 370 seeds/m2."

Qsn #	Question	Answer
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y**
	Source(s)	**Notes**
	NSW Department of Primary Industries. 2015. 'Grassed up' – Microlaena stipoides (Microlaena or Weeping grass). http://www.dpi.nsw.gov.au/agriculture/pastures/pastures-and-rangelands/rangelands/publications/grassedup/species/microlaena. [Accessed 24 Jul 2015]	"Microlaena seed has very little dormancy and will germinate a couple of weeks after harvest. Seeds should be stored in a dry place at ambient temperatures and away from sunlight and vermin."
	Mitchell, M. L., Virgona, J. M., Jacobs, J. L., & Kemp, D. R. (2014). Population biology of Microlaena stipoides in a south-eastern Australian pasture. Crop and Pasture Science, 65(8): 767-779	[A small percentage of seeds can persist for >1 year] "In year 2, Microlaena germinated in three of the four cycles (Table 4). A small proportion (<10%) of Microlaena seed may have long-term viability or dormancy. Whalley (1987) also found that freshly harvested seed did not germinate immediately and may have some form of dormancy mechanism. The larger number of Microlaena seeds in year 2 may be the reason that this dormancy was detected. Low levels of Microlaena seed dormancy and high germination percentages (>80%) have been found previously (Johnston et al. 1998; Clarke and French 2005; Clarke et al. 2007). Previous studies have not examined germinable seedbanks from Microlaena pastures over several wetting and drying cycles." ... "Friend et al. (1997) reported 24 and 8 seedlingsm–2 of Microlaena in a study that examined seedbanks over a 2-year period. Such comparative evidence across studies suggests that if there is any seed dormancy in Microlaena, it is at a low percentage."

803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"M. stipoides can be killed by herbicide applications. One report cited success on Hawaii with the foliar herbicide glyphosate (Medeiros et al., 1998); however, Bennett and Mitchell (2012) stated that M. stipoides is tolerant of glyphosate herbicides. Trials reported by Dodd et al. (2010) in pastures showed that it was more tolerant of glyphosate than all other species in the plots. Even at 8 l per ha, not all M. stipoides was killed. In situations where M. stipoides is an unwanted invasive species, glyphosate is likely to be more expensive and more damaging to non-target species than is usual for glyphosate weed control."
	Cole, I., Koen, T., Metcalfe, J., Johnston, W., & Mitchell, M. (2003). Tolerance of Austrodanthonia fulva, Microlaena stipoides and Elymus scaber seedlings to nine herbicides. Plant Protection Quarterly, 18(1): 18-22	[Certain herbicides provide effective control] "Microlaena stipoides was tolerant to chlorsulfuron (15 g a.i. ha-1) and partially tolerant to bromoxynil (400-800 g a.i. ha-1), metsulfuron-methyl (4.8-9.6 g a.i. ha-1), chlorsulfuron (30 g a.i. ha-1), metolachlor (432 g a.i. ha-1) and to a lesser degree, diclofop-methyl (563-1125 g a.i. ha-1) and metolachlor (864 g a.i. ha-1). Sensitivity to atrazine (500-1000 g a.i. ha-1), cyanazine (750-1500 g a.i. ha-1), prometryn (625-1250 g a.i. ha-1), and simazine (750-1500 g a.i. ha-1) was observed. "

Qsn #	Question	Answer
	Nazer, C. & Carder, J. (1999). Evaluation of selective herbicides for control of exotic grasses in remnant native grasslands in southern Australia. Pp 406-410 In 12th Australian Weeds Conference, Papers and Proceedings, Hobart, Tasmania, Australia, 12-16 September 1999	[Moderately susceptible to herbicides] "Two trials were conducted in 1994/95 to evaluate herbicides for selective control of exotic grasses that may be growing in association with seven native grass species - Bothriochloa macra, Themeda triandra, Microlaena stipoides, Danthonia richardsonii, Poa labillardieri, Danthonia linkii and Danthonia caespitosa." ... "Most of the established perennial native grass species were unaffected or only slightly affected by the selective broad-leaf herbicide treatments. The exception was Microlaena stipoides that was susceptible to damage from MCPAat 4.0 L ha-1." ... "The low rate of fluazifop-P also severely damaged four of the grass species. Exceptions were Poa labillardieri that was tolerant and Microlaena stipoides and Danthonia richardsonii that were moderately damaged." ... "The tolerance (as determined by a low phytotoxicity rating) of the native grass species to sethoxydim, haloxyfop and quizalofop-P varied. Danthonia caespitosa, D. linkii, Themeda triandra and Bothriocloa macra were the species most susceptible to herbicide damage, i.e. they were severely damaged by seven of the ten graminicide treatments. Danthonia richardsonii, Poa labillardieri and Microlaena stipoides were the grass species most tolerant to the graminicide treatments, with four of the ten treatments causing severe damage."
	Dodd, M., Burns, B., McGowan, A., Trolove, M., James, T., & Luo, D. (2010). Relative tolerance of Microlaena stipoides to glyphosate herbicide, In: H Dove and RA Culvenor (Eds). "Food Security from Sustainable Agriculture". Proceedings of the 15th Australian Agronomy Conference, 15-18 November 2010, Lincoln, New Zealand. Australian Society of Agronomy	[Somewhat tolerant to low rates of glyphosate] "Microlaena stipoides (meadow rice grass, weeping grass, pātītī) is a native grass of Australasia and Malesia and is reputed to have a high degree of tolerance to the herbicide glyphosate. We conducted a glyphosate application rate experiment on a set of 3m × 3m plots covered with a mixed sward including Microlaena as a component, using rates varying from 0 – 8 L ha-1 equivalent of the product G Force Max® (54% glyphosate formulation) applied in May 2009. Foliage damage assessments over the following 8 weeks indicated that Microlaena was more tolerant of the herbicide than Pennisetum clandestinum (kikuyu) and Agrostis capillaris (browntop), with mean damage levels of 63% at 2 L ha-1, a level which killed all other species in the plots. At 8 L ha-1, damage to Microlaena at 8 weeks was highly variable, with a mean of 77%. Species cover assessments conducted in late February 2009 (pre-spray) and March 2010 (post-spray) showed that all three major sward components declined in cover at all herbicide rates over that year. However, for Microlaena there was no difference between the rates in terms of the magnitude of the decline, in contrast to kikuyu and browntop, which both had greater declines at higher herbicide rates. We conclude that it is possible to use low rates of glyphosate in autumn to discriminate in favour of Microlaena in a mixed grass sward."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	Tooth, I. M., & Leishman, M. R. (2013). Post-fire resprouting responses of native and exotic grasses from Cumberland Plain Woodland (Sydney, Australia) under elevated carbon dioxide. Austral Ecology, 38(1): 1-10	"Table 8. The most common native and exotic species with resprouting individuals and individuals growing from seed (all sites combined)" [Microlaena stipoides resprouts after fire]

Qsn #	Question	Answer
	Mitchell, M., Virgona, J., Jacobs, J. & Kemp, D. 2012. Seed rain of Microlaena stipoides. In Yunusa, I. (ed.). Capturing Opportunities and Overcoming Obstacles in Australian Agronomy. Proceedings of 16th Australian Agronomy Conference 2012, 14-18 October 2012, Armidale, NSW	[Tolerates grazing] "Jones (1996) believed that Microlaena maintains healthy populations of plants of a range of ages by being able to regenerate by re-sprouting and by re-establishing from seed under grazing."
	Murdoch, R., Aldous, D. E., & Delpratt, C. J. (2006). Effects of Mowing Height and Frequency on Some Agronomic Characteristics of a Turf-type Weeping Grass (Microlaena stipoides (Labill.) R. Br var. stipoides). Acta Horticulturae 762: 107-114	[Tolerates mowing] "Weeping grass is distributed over the wetter, temperate coastal regions of eastern Australia, South Australia and SE Western Australia, as well as parts of New Zealand and the islands of the South Pacific. The grass has been shown to be sustainable under restricted watering conditions and low light. More recently a number of tuft-type species have shown to have potential as a low maintenance grass for golf course fairways and roughs, home lawns, parks and reserves, roadside verges and lawn cemeteries. The objective of the trial was to determine the effects of mowing height and frequency on some agronomic characteristics of a turf-type weeping grass. Grass performance was examined under four mowing heights (0, 12.5 mm, 25 mm, and 50 mm), grown under field conditions for a period of 90 days. Results showed that mowing heights of 12.5 mm and 25 mm produced significantly higher dry matter yields compared to the 50 mm treatment and the non-mown control. Lower mowing heights improved tiller density but produced less new shoot regrowth over the test period. Final root dry weights showed that non-mown plants produced more roots when compared to cutting frequencies of 7 day and 14 day intervals, and their respective heights. Under the regime of known mowing heights and one-third shoot tissue removal, the 25 mm mowing height, at frequencies of 14 day intervals over the growing season, provided not only improved tiller density, but also improved total yield and turf quality. "

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**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. Naturalized & invasive in the Hawaiian Islands] "in Hawai'i naturalized in openings in wet forest, and other moist, shaded sites"
	CABI, 2015. Microlaena stipoides. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence of natural enemies

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Grows in tropical climates
• Naturalized in the Hawaiian Islands (Kauai, Oahu, Maui, Molokai, Kahoolawe, and Hawaii), Reunion Island, Chile, England, & South Africa
• Disturbance adapted
• An environmental weed in the Hawaiian Islands, preventing recruitment of native plants & threatening endangered species
• Other Ehrharta species are invasive
• Increases fire hazard in native ecosystems
• Shade-tolerant
• Forms dense ground cover
• Reproduces by seed
• Able to self-pollinate (cleistogamous)
• Able to spread vegetatively with rhizomes
• Reaches maturity quickly (1-2 years)
• Seeds dispersed by attaching to clothing, fur, as a contaminant of wool, & intentionally planted
• A small percentage of seeds may persist in the soil for >1 year
• Tolerates grazing, fire & mowing
• No natural enemies known in the Hawaiian Islands

Low Risk Traits
• Unarmed (no spines, thorns or burrs)
• Palatable to grazing animals
• Non-toxic
• Some herbicides provide effective control