

<b>Taxon:</b> <i>Melinis nerviglumis</i> (Franch.) Zizka	<b>Family:</b> Poaceae
<b>Common Name(s):</b> bristle-leaved red top pink bubble grass ruby grass	<b>Synonym(s):</b> <i>Rhynchelytrum nerviglume</i> (Franch.) <i>Rhynchelytrum rhodesianum</i> <i>Rhynchelytrum setifolium</i> (Stapf) <i>Tricholaena setifolia</i> Stapf

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 25 Oct 2019
<b>WRA Score:</b> 10.0	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** Ornamental Grass, Low Palatability, Non-Toxic, Self-Seeds, 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	?
301	Naturalized beyond native range		
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
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	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		

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	n
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	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	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	y
705	Propagules water dispersed	y=1, n=-1	n
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)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Darke, R. 2007. The Encyclopedia of Grasses for Livable Landscapes. Timber Press, Portland, OR	[No evidence of domestication] "Much of the material in cultivation was originally introduced as seed obtained in the 1980s by Gayle Weinstein, then on the Denver Botanic Gardens staff, from the Drakensberg Botanic Garden in Harrismith, South Africa." ... "Plants are often marketed with the name "Pink Crystals"; however, this is a common name, not a clonal cultivar name."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence of domestication

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2019). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2019). 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, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 24 Oct 2019]	"Native Africa EAST TROPICAL AFRICA: Kenya, Tanzania WEST-CENTRAL TROPICAL AFRICA: Burundi, Congo, Democratic Republic of the Congo, Gabon SOUTH TROPICAL AFRICA: Angola, Malawi, Mozambique, Zambia, Zimbabwe SOUTHERN AFRICA: Botswana, Eswatini, Lesotho, Namibia, South Africa [Cape Province, KwaZulu-Natal, Free State, Transvaal] WESTERN INDIAN OCEAN: Madagascar"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 24 Oct 2019]	

Qsn #	Question	Answer
203	<b>Broad climate suitability (environmental versatility)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2019). Flora of Zimbabwe: Species information: <i>Melinis nerviglumis</i> . <a href="https://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=107410">https://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=107410</a> . [Accessed 24 Oct 2019]	"Altitude range: (metres) 1000 - 2400 m" [Elevation range >1000 m]
	Burrows, J.E. & Willis, C.K. (eds). 2005. Plants of the Nyika Plateau: an account of the vegetation of the Nyika National Parks of Malawi and Zambia. Southern African Botanical Diversity Network Report No. 31. SABONET, Pretoria	"in grassland and <i>Brachystegia</i> woodland; 1,000–3, 000m. South Africa, Zimbabwe, Malawi, Mozambique, Zambia, northwards to Kenya and Gabon; also in Madagascar, Thailand, and Vietnam." [Elevation range >1000 m]
	Darke, R. 2007. The Encyclopedia of Grasses for Livable Landscapes. Timber Press, Portland, OR	"Its more intense flower color and clump-forming habit make it a better garden subject than <i>Melinis repens</i> ; however, it is not as cold hardy ... Zone 9."

Qsn #	Question	Answer
204	<b>Native or naturalized in regions with tropical or subtropical climates</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Madagascar, Africa Sub Saharan South Africa."
	Snow, N., & Davidse, G. 2011. Notes on grasses (Poaceae) in Hawai'i:3. Bishop Museum Occasional Papers. 110:11-22	"This species recently has been observed in cultivation in Wailupe area, Waipi'o, and Hawai'i kai on O'ahu. at the Wailupe and Waipi'o localities it was reseeding itself in the areas immediately adjacent to where it was being cultivated. in Hawai'i kai there was no evidence that it was reseeding itself in the one yard where it was found growing along the sidewalk (Snow, pers. obs., 2009). these plants were removed later by the homeowners after having been contacted about their potential to spread (Snow, pers. obs., 2010). the species has not been documented elsewhere in the state, but clearly has shown the ability to self-perpetuate from seed on O'ahu, and as such is a potential weed in Hawai'i."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Flora of North America Editorial Committee. 2007. Flora of North America: North of Mexico, Volume 24. Magnoliophyta: Commelinidae (in part): Poaceae, part 1. Oxford University Press, Oxford, UK	"A third species is now being sold in the Flora region as an ornamental, <i>Melinis nerviglumis</i> (Franch.) Zizka. The cultivar being marketed is 'Pink Crystal'.
	Klaassen, E.S. & Craven, P. (2003). Checklist of grasses in Namibia. Southern African Botanical Diversity Network Report No. 20. SABONET, Pretoria & Windhoek	"Distribution: southern Africa to tropical Africa, Madagascar; maybe introduced to south-east Asia"
	Master Gardener Program. (2013). Ruby grass, <i>Melinis nerviglumis</i> . University of Wisconsin-Madison. <a href="https://wimastergardener.org">https://wimastergardener.org</a> . [Accessed 24 Oct 2019]	"It was introduced commercially in the US in 1998, but is not commonly available in all areas."
	Snow, N., & Davidse, G. 2011. Notes on grasses (Poaceae) in Hawai'i:3. Bishop Museum Occasional Papers. 110:11-22	"This species recently has been observed in cultivation in Wailupe area, Waipi'o, and Hawai'i kai on O'ahu."

301	Naturalized beyond native range	
	Source(s)	Notes
	Snow, N., & Davidse, G. 2011. Notes on grasses (Poaceae) in Hawai'i:3. Bishop Museum Occasional Papers. 110:11-22	[In the process of naturalization before being controlled. Current status uncertain] "This species recently has been observed in cultivation in Wailupe area, Waipi'o, and Hawai'i kai on O'ahu. at the Wailupe and Waipi'o localities it was reseeding itself in the areas immediately adjacent to where it was being cultivated. in Hawai'i kai there was no evidence that it was reseeding itself in the one yard where it was found growing along the sidewalk (Snow, pers. obs., 2009). these plants were removed later by the homeowners after having been contacted about their potential to spread (snow, pers. obs., 2010). The species has not been documented elsewhere in the state, but clearly has shown the ability to self-perpetuate from seed on O'ahu, and as such is a potential weed in Hawai'i."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Master Gardener Program. (2013). Ruby grass, <i>Melinis nerviglumis</i> . University of Wisconsin-Madison. <a href="https://wimastergardener.org">https://wimastergardener.org</a> . [Accessed 24 Oct 2019]	"It is easily grown from seed and may reseed in some areas to the point of being invasive. It grows fast enough to use as an annual even in colder climates."
	Dave's Garden. (2019). Ruby Grass, Bristle-leaved Redtop 'Pink Crystals' - <i>Melinis nerviglumis</i> . <a href="https://davesgarden.com">https://davesgarden.com</a> . [Accessed 24 Oct 2019]	"On Sep 11, 2005, HillCntryGrdnr from Spring Branch, TX (Zone 8b) wrote: I love this beautiful grass, however, a year after planting, I have REMOVED every one of the Ruby Crystal plants. I have to call them invasive, as I do not provide supplemental water, and even with our Texas drought, they continued to spread. It's a shame, because they are a beautiful plant, but they kept coming up EVERYWHERE. I don't want them escaping into the hinterlands. My fellow Comal Master Gardeners have also been warned; they are invasive."

Qsn #	Question	Answer
	Wells, M. J., Balsinhas, A. A., Joffe, H., Engelbrecht, V.M., Harding, G. & Stirton, C.H. (1986). A Catalogue of problem plants in Southern Africa. Botanical Research Institute, Republic of South Africa	"Rhynchelytrum nerviglume ... KIND OF WEED: Ruderal (general), agrestal (general) ... UNDESIRABLE CHARACTERISTICS: Competitive (space, light, water, nutriment), unpalatable (relatively), contaminant (seed)" [Synonym for <i>Melinis nerviglumis</i> reported as a relatively unpalatable pasture grass. Impacts not reported anywhere else. Here categorized as a weed of uncertain impacts. Potential agricultural weed]
	Snow, N., & Davidse, G. 2011. Notes on grasses (Poaceae) in Hawai'i:3. Bishop Museum Occasional Papers. 110:11-22	"the species has not been documented elsewhere in the state, but clearly has shown the ability to self-perpetuate from seed on O'ahu, and as such is a potential weed in Hawai'i."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Disturbance-adapted] "found in disturbed veld, open veld, undisturbed open grassland, stony slopes, sandy to sandy loam soils, on very shallow and poor soil, clayey soils, bushveld, in rocky areas,"

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Wells, M. J., Balsinhas, A. A., Joffe, H., Engelbrecht, V.M., Harding, G. & Stirton, C.H. (1986). A Catalogue of problem plants in Southern Africa. Botanical Research Institute, Republic of South Africa	"Rhynchelytrum nerviglume ... KIND OF WEED: Ruderal (general), agrestal (general) ... UNDESIRABLE CHARACTERISTICS: Competitive (space, light, water, nutriment), unpalatable (relatively), contaminant (seed)" [Synonym for <i>Melinis nerviglumis</i> as a relatively unpalatable pasture grass. Impacts not reported anywhere else. Here categorized as a weed of uncertain impacts. See 3.02]

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK</p>	<p>[<i>Melinis minutiflora</i> &amp; <i>Melinis repens</i>] "<i>Melinis minutiflora</i> ... Molasses grass reproduces by seeds and vegetatively by its creeping stems, rooting at nodes. Seeds are wind dispersed and also attach to animal fur and clothing. The species is a fast growing fire-adapted C4 grass. Where it becomes invasive, it climbs over shrubs and forms dense and impenetrable mats up to 1.5 m deep on the floor, completely covering large areas and eliminating all native vegetation (Pivello et al., 1999a, 1999b). Plant and animal species richness is strongly reduced in such areas. The grass accumulates a large amount of dead biomass and increases fire hazards (Motooka et al., 2003; Hoffmann et al., 2004). An increased fire intensity caused by molasses grass and other alien grasses can lead to river-accompanying gallery forests diminishing in their area (Hoffmann et al., 2004). Altered fire regimes and extensive patches of molasses grass alter the geochemistry of soils in invaded habitats (Asner and Beatty, 1996). Molasses grass has the potential to transform seasonally dry forests on Hawaii into monospecific grasslands (D'Antonio et al., 2001)." ... "<i>Melinis repens</i> ... This grass has become naturalized in many regions of the tropics. It spreads in open and dry forests, shrublands and agricultural land. In Hawaii it is found from 0– 1950 m altitude (Wagner et al., 1999). It displaces low-growing grasses and forbs and increases fire hazards by accumulating large amounts of dead biomass (Motooka et al., 2003)."</p>

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	<p>Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL</p>	<p>[No evidence] "Perennial, small to dwarf, densely tufted, erect, unbranched, sparse foliage, nodes conspicuously bearded, inconspicuous ligule rimlike, basal sheaths strongly overlapping and hairy at the base, blue-green blades rolled and expanded, leaves hard and stringy, inflorescence a narrow or open panicle, spikelets with long hairs pink sometimes cream to purplish"</p>

402	Allelopathic	n
	Source(s)	Notes

Qsn #	Question	Answer
	Grobler, C. H., Bredenkamp, G. J., & Brown, L. R. (2006). Primary grassland communities of urban open spaces in Gauteng, South Africa. <i>South African Journal of Botany</i> , 72 (3), 367-377	"L. simplex–M. nerviglumis Major Grassland Community The L. simplex–M. nerviglumis Major Grassland is found on shallow soils of rocky crests and slopes (average slope of 14°), of higher lying, quartzite, dolomite or chert ridges and hills, on a variety of aspects. These areas mostly represent the Ib land type, where the predominant soil series are Mispah and Glenrosa with a clay content ranging between 10% and 30%. The Ib land type generally indicates a very high surface rock cover and a lack of soil (Land Type Survey Staff, 1985, 1987a,b). The vegetation typically has a mixture of grass species of which the bunch grasses <i>T. spicatus</i> , <i>D. amplexens</i> , <i>T. leucothrix</i> , <i>M. nerviglumis</i> , <i>P. natalense</i> , <i>L. simplex</i> and <i>Schizachyrium sanguineum</i> are locally prominent. One or more of these grass species may be prominent in local patches. These patches occur scattered throughout the distribution range of this major plant community. This major community is characterized by Species Group A (Table 1). The diagnostic species are mostly the bunch grasses <i>L. simplex</i> , <i>M. nerviglumis</i> , <i>S. sanguineum</i> , <i>Urelytrum agropyroides</i> , and <i>C. nardus</i> . These grasses are classified as Increaser 1 species (Trollope et al., 1990), indicating the sour and under-utilized (grazing) nature of this vegetation (Van Oudshoorn, 1999). The shrubby <i>A. capensis</i> and <i>Lopholaena coriifolia</i> , the suffrutex <i>Parinari capensis</i> and the forbs <i>Tephrosia longipes</i> , <i>Commelina africana</i> and <i>Senecio oxyriifolius</i> and the xerophytic fern <i>Pellaea calomelanos</i> are also diagnostic species. This major plant community is rich in plant species — an average of 43 plant species was recorded per 200 m2. "[No evidence of allelopathy in this species, which co-occurs with several other grasses]

403	Parasitic	n
	Source(s)	Notes
	Quattrocchi, U. 2006. <i>CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	"Perennial, small to dwarf, densely tufted, erect, unbranched, sparse foliage, nodes conspicuously bearded" [Poaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"It is not a good fodder grass because of its rolled leaves."
	Sekhukhune District Municipality. (2019). FINAL Integrated Development Plan (IDP) / Budget Review for 2019/2020. <a href="http://www.sekhukhunedistrict.gov.za">www.sekhukhunedistrict.gov.za</a>	" <i>Melinis nerviglumis</i> (Figure 18) is a densely tufted grass which is moderately palatable but is a good indicator of grassland condition since it grows in underutilized pastures. It is extremely common on shallow soils in rocky areas."
	Quattrocchi, U. 2006. <i>CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	"moderately palatable to relatively unpalatable"
	Spehn, E. M., Liberman, M., & Korner, C. (2006). <i>Land use change and mountain biodiversity</i> . CRC Press, Boca Raton, Florida	"Table 21.1 On a scale of grazing value ranging from 0 (poor) to 10 (excellent), <i>Melinis nerviglumis</i> scored a 2" [Apparently some grazing value, but on poor end of spectrum]



Qsn #	Question	Answer
	Grobler, C. H., Bredenkamp, G. J., & Brown, L. R. (2006). Primary grassland communities of urban open spaces in Gauteng, South Africa. <i>South African Journal of Botany</i> , 72 (3), 367-377	"This major community is characterized by Species Group A (Table 1). The diagnostic species are mostly the bunch grasses <i>L. simplex</i> , <i>M. nerviglumis</i> , <i>S. sanguineum</i> , <i>Urelytrum agropyroides</i> , and <i>C. nardus</i> . These grasses are classified as Increaser 1 species (Trollope et al., 1990), indicating the sour and under-utilized (grazing) nature of this vegetation (Van Oudshoorn, 1999)." [Under utilized, and therefore an increaser, not preferred, but not unpalatable]
	Jordaan, F. P., Biel, L. C., & Du Plessis, P. I. M. (1997). A comparison of five range condition assessment techniques used in the semi-arid western grassland biome of southern Africa. <i>Journal of Arid Environments</i> , 35(4), 665-671	"With the SM a higher range condition index was shown for the medium rangeland than for both the good and poor rangelands. This phenomenon is particularly apparent on the mid-slopes (Figs 1 and 2). The climax vegetation of the mid-slopes are comprised mainly of species such as <i>Diheteropogon amplexens</i> (Nees) Clayton, <i>Melinis nerviglumis</i> (Franch.) Zizka, <i>Schizachyrium sanguineum</i> (Retz.) Alst. and <i>Trachypogon spicatus</i> (L.f.) Kuntze. Although the aforementioned species are not known to be highly palatable species, they are however reasonably well utilised by animals."

405	Toxic to animals	n
	Source(s)	Notes
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	"moderately palatable to relatively unpalatable" [No evidence]
	Spehn, E. M., Liberman, M., & Korner, C. (2006). <i>Land use change and mountain biodiversity</i> . CRC Press, Boca Raton, Florida	"Table 21.1 On a scale of grazing value ranging from 0 (poor) to 10 (excellent), <i>Melinis nerviglumis</i> scored a 2" [Apparently some grazing value, but on poor end of spectrum, no evidence of toxicity]

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Bristle-leaved red top does not appear to be susceptible to pests and diseases." [No information found on specific pests or pathogens]

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	"moderately palatable to relatively unpalatable" [No evidence]
	Pollen Library. (2019). <i>Molasses Grass (Melinis)</i> . <a href="http://www.pollenlibrary.com/Genus/Melinis/">http://www.pollenlibrary.com/Genus/Melinis/</a> . [Accessed 25 Oct 2019]	"Molasses Grass Allergy Info: Although the grass family in general is considered significant allergenically, this genus is not typically considered to be problematic."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes

Qsn #	Question	Answer
	Swanepoel, B. A. (2006). The vegetation ecology of Ezemvelo Nature Reserve, Bronkhorstpruit, South Africa. MSc. Thesis. University of Pretoria, South Africa	"South African grasslands have a high level of endemic species as opposed to forest species, which indicates a long evolutionary history of the grasslands (Bredenkamp 1999) and cannot be accounted for by the hypothesis that South African grasslands are anthropogenically derived and maintained by fire." [Ecosystems apparently not created by anthropogenic fires, but no indication if grasslands are subject to natural fire regimes]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Darke, R. 2007. The Encyclopedia of Grasses for Livable Landscapes. Timber Press, Portland, OR	"Best in full sun. Very drought tolerant."
	Dave's Garden. (2019). Ruby Grass, Bristle-leaved Redtop 'Pink Crystals' - <i>Melinis nerviglumis</i> . <a href="https://davesgarden.com">https://davesgarden.com</a> . [Accessed 25 Oct 2019]	"Sun Exposure: Full Sun Sun to Partial Shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	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	"sandy to sandy loam soils, on very shallow and poor soil, clayey soils, bushveld, in rocky areas"
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Soil type: Sandy, Clay, Loam"

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 to dwarf, densely tufted, erect, unbranched, sparse foliage, nodes conspicuously bearded"

412	Forms dense thickets	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	"found in disturbed veld, open veld, undisturbed open grassland, stony slopes" [No evidence]

Qsn #	Question	Answer
	Grobler, C. H., Bredenkamp, G. J., & Brown, L. R. (2006). Primary grassland communities of urban open spaces in Gauteng, South Africa. <i>South African Journal of Botany</i> , 72 (3), 367-377	"L. simplex–M. nerviglumis Major Grassland Community The L. simplex–M. nerviglumis Major Grassland is found on shallow soils of rocky crests and slopes (average slope of 14°), of higher lying, quartzite, dolomite or chert ridges and hills, on a variety of aspects. These areas mostly represent the Ib land type, where the predominant soil series are Mispah and Glenrosa with a clay content ranging between 10% and 30%. The Ib land type generally indicates a very high surface rock cover and a lack of soil (Land Type Survey Staff, 1985, 1987a,b). The vegetation typically has a mixture of grass species of which the bunch grasses <i>T. spicatus</i> , <i>D. amplexens</i> , <i>T. leucothrix</i> , <i>M. nerviglumis</i> , <i>P. natalense</i> , <i>L. simplex</i> and <i>Schizachyrium sanguineum</i> are locally prominent. One or more of these grass species may be prominent in local patches. These patches occur scattered throughout the distribution range of this major plant community. This major community is characterized by Species Group A (Table 1). The diagnostic species are mostly the bunch grasses <i>L. simplex</i> , <i>M. nerviglumis</i> , <i>S. sanguineum</i> , <i>Urelytrum agropyroides</i> , and <i>C. nardus</i> . These grasses are classified as Increaser 1 species (Trollope et al., 1990), indicating the sour and under-utilized (grazing) nature of this vegetation (Van Oudshoorn, 1999). The shrubby <i>A. capensis</i> and <i>Lopholaena coriifolia</i> , the suffrutex <i>Parinari capensis</i> and the forbs <i>Tephrosia longipes</i> , <i>Commelina africana</i> and <i>Senecio oxyriifolius</i> and the xerophytic fern <i>Pellaea calomelanos</i> are also diagnostic species. This major plant community is rich in plant species — an average of 43 plant species was recorded per 200 m2." [M. nerviglumis makes up a prominent component of grassland within native range, but does not form dense thickets or impede movement]

501	Aquatic	n
	Source(s)	Notes
	Quattrocchi, U. 2006. <i>CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	[Terrestrial] "found in disturbed veld, open veld, undisturbed open grassland, stony slopes, sandy to sandy loam soils, on very shallow and poor soil, clayey soils, bushveld, in rocky areas"

502	Grass	y
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). <i>Germplasm Resources Information Network (GRIN-Taxonomy)</i> . National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 25 Oct 2019]	Family: Poaceae (alt.Gramineae) Subfamily: Panicoideae Tribe: Paniceae Subtribe: Melinidinae

Qsn #	Question	Answer
503	<b>Nitrogen fixing woody plant</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2019). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 25 Oct 2019]	Family: Poaceae (alt.Gramineae) Subfamily: Panicoideae Tribe: Paniceae Subtribe: Melinidinae
504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Perennial, small to dwarf, densely tufted, erect, unbranched, sparse foliage, nodes conspicuously bearded, inconspicuous ligule rimlike"
601	<b>Evidence of substantial reproductive failure in native habitat</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[No evidence] "Madagascar, Africa Sub Saharan South Africa."
602	<b>Produces viable seed</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	Darke, R. 2007. The Encyclopedia of Grasses for Livable Landscapes. Timber Press, Portland, OR	"Best propagated by seed."
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Easily grown from seed collected in summer when the inflorescences have almost turned white, seedlings can be planted out in early spring. Plants already established in a garden will self-seed."
603	<b>Hybridizes naturally</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2019). Personal Communication	Unknown. No evidence found

Qsn #	Question	Answer
604	<b>Self-compatible or apomictic</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Plants already established in a garden will self-seed."
	Kellogg, E. A. 2015. The Families and Genera of Vascular Plants. Volume XIII. Flowering Plants. ☐Monocots: Poaceae. Springer International Publishing, Switzerland	[Unknown, but with bisexual flowers, so potentially self-compatible] "Inflorescence much branched, with slender branches. Spikelets laterally compressed. Lower glume tiny or absent; upper glume awned or awnless, gibbous in some species. Lemma of lower flower awned. Lemma of the upper flower much less firm than the glumes, awnless or awned from a sinus."

605	Requires specialist pollinators	n
	<b>Source(s)</b>	<b>Notes</b>
	Kellogg, E. A. 2015. The Families and Genera of Vascular Plants. Volume XIII. Flowering Plants. ☐Monocots: Poaceae. Springer International Publishing, Switzerland	"Most grasses are wind-pollinated."
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"The flowers are wind pollinated, and the light, fluffy seeds are scattered by wind."

606	Reproduction by vegetative fragmentation	n
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Easily grown from seed collected in summer when the inflorescences have almost turned white, seedlings can be planted out in early spring."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Perennial, small to dwarf, densely tufted, erect, unbranched" [Non-stoloniferous]
	Dave's Garden. (2019). Ruby Grass, Bristle-leaved Redtop 'Pink Crystals' - <i>Melinis nerviglumis</i> . <a href="https://davesgarden.com">https://davesgarden.com</a> . [Accessed 25 Oct 2019]	"Propagation Methods: By dividing the rootball From seed; sow indoors before last frost From seed; direct sow after last frost"

607	Minimum generative time (years)	1
	<b>Source(s)</b>	<b>Notes</b>
	Master Gardener Program. (2013). Ruby grass, <i>Melinis nerviglumis</i> . University of Wisconsin-Madison. <a href="https://wimastgardener.org">https://wimastgardener.org</a> . [Accessed 24 Oct 2019]	"Ruby grass, <i>Melinis</i> (=Rhynchelytrum) <i>nerviglumis</i> , is a tender perennial from southern Africa hardy only in zones 9-10, but grown as an annual ornamental in temperate areas." ... "It grows fast enough to use as an annual even in colder climates. "
	Dave's Garden. (2019). Ruby Grass, Bristle-leaved Redtop 'Pink Crystals' - <i>Melinis nerviglumis</i> . <a href="https://davesgarden.com">https://davesgarden.com</a> . [Accessed 24 Oct 2019]	"Where to Grow: Can be grown as an annual"

701	<b>Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)</b>	
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"The flowers are wind pollinated, and the light, fluffy seeds are scattered by wind." [Fluffy seeds could potentially get attached to clothing or hair]

702	Propagules dispersed intentionally by people	y
	<b>Source(s)</b>	<b>Notes</b>
	Master Gardener Program. (2013). Ruby grass, <i>Melinis nerviglumis</i> . University of Wisconsin-Madison. <a href="https://wimastergardener.org">https://wimastergardener.org</a> . [Accessed ]	"It was introduced commercially in the US in 1998, but is not commonly available in all areas."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"ornamental"
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 24 Oct 2019]	"This pretty, tufted grass with its bluish leaves and shining pink inflorescences is an attractive addition to any border or wild garden. It is particularly effective when planted in wide swathes."
	Snow, N., & Davidse, G. 2011. Notes on grasses (Poaceae) in Hawai'i:3. Bishop Museum Occasional Papers. 110:11-22	"This species recently has been observed in cultivation in Wailupe area, Waipi'o, and Hawai'i kai on O'ahu."

703	Propagules likely to disperse as a produce contaminant	y
	<b>Source(s)</b>	<b>Notes</b>
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Ornamental"
	N.C. Cooperative Extension. (2019). <i>Melinis Nerviglumis</i> 'Savannah'. <a href="https://cutflowers.ces.ncsu.edu/melinis-nerviglumis-savannah/">https://cutflowers.ces.ncsu.edu/melinis-nerviglumis-savannah/</a> . [Accessed 25 Oct 2019]	"Nice pink/purple color (8); Small size for bouquets, interesting addition to arrangements; Good filler; Pretty plumes; Very easy, nice looking, retained color even when dried; Great look, great for fall bouquet work, nice foliage" [Potential to be spread in arrangements]
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"The attractive pinkish inflorescences can be used in flower arrangements." [Thereby potentially spreading seeds unintentionally]

704	Propagules adapted to wind dispersal	y
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"The flowers are wind pollinated, and the light, fluffy seeds are scattered by wind."

Qsn #	Question	Answer
705	<b>Propagules water dispersed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Bristle-leaved Red Top grows in undisturbed veld in shallow, stony soil, usually on slopes where it may be locally dominant. It is not a good fodder grass because of its rolled leaves. The flowers are wind pollinated, and the light, fluffy seeds are scattered by wind." [No evidence. Not in riparian areas]

706	<b>Propagules bird dispersed</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Birds make use of the fluffy seed heads as nesting material." [Potentially dispersing seeds to new sites, but not internally]
	Wild Flower Nursery. (2018). <i>Flueggea virosa</i> . <a href="https://wildflownursery.co.za/indigenous-plant-database/flueggea-virosa/">https://wildflownursery.co.za/indigenous-plant-database/flueggea-virosa/</a> . [Accessed 25 Oct 2019]	"The beautiful plumes of shiny fluffy pink to red seeds attract small seed eating birds." [Birds presumably act as seed predators]

707	<b>Propagules dispersed by other animals (externally)</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Johnson, I. (2003). <i>Melinis nerviglumis</i> . PlantZAfrica. SANBI. <a href="http://pza.sanbi.org/melinis-nerviglumis">http://pza.sanbi.org/melinis-nerviglumis</a> . [Accessed 25 Oct 2019]	"Birds make use of the fluffy seed heads as nesting material." [Potentially dispersing seeds to new sites, but not internally]

708	<b>Propagules survive passage through the gut</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"moderately palatable to relatively unpalatable" [A non-preferred, but not unpalatable grass. Unknown if viable seeds can be passed through ruminants]

801	<b>Prolific seed production (&gt;1000/m2)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	N.C. Cooperative Extension. (2019). <i>Melinis Nerviglumis</i> 'Savannah'. <a href="https://cutflowers.ces.ncsu.edu/melinis-nerviglumis-savannah/">https://cutflowers.ces.ncsu.edu/melinis-nerviglumis-savannah/</a> . [Accessed 25 Oct 2019]	"Produces millions of stems, but the stems just aren't very strong, thus my customers will go for the bigger stronger stemmed grasses first, it is so easy to grow, it might be a better landscape grass; Full blooms, larger than expected, they shimmer a metallic pink in the light, plants are tidy and healthy looking all season; They are so soft, we had no pest problems, and we are still harvesting after frost; Plants were a nice clump of grass, it may have potential as grown in pots for the cut flower industry, also, easy to sow and grow, we simply seeded it into plug trays and germinated it under a mist system." [Natural densities unknown]

802	<b>Evidence that a persistent propagule bank is formed (&gt;1 yr)</b>	
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Royal Botanic Gardens Kew. (2019) Seed Information Database (SID). Version 7.1. Available from: <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 25 Oct 2019]	"Storage Behaviour: No data available for species. Of 4 known taxa of genus <i>Melinis</i> , 100.00% Orthodox(p/?)" [Related species <i>M. minutiflora</i> & <i>M. repens</i> maintains seed viability in storage for a long time, both orthodox]

<b>803</b>	<b>Well controlled by herbicides</b>	<b>Y</b>
	<b>Source(s)</b>	<b>Notes</b>
	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>Melinis minutiflora</i> & <i>M. repens</i> sensitive to 1% glyphosate in water..." [Presumably <i>M. nerviglumis</i> would be susceptible as well]

<b>804</b>	<b>Tolerates, or benefits from, mutilation, cultivation, or fire</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2019). Personal Communication	Unknown. May tolerate some grazing by animals, so may also be able to resprout after repeated cutting, like many other grass species

<b>805</b>	<b>Effective natural enemies present locally (e.g. introduced biocontrol agents)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2019). Personal Communication	Unknown



**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Grows in tropical climates
- Started to naturalize on Oahu (Hawaiian Islands); Controlled before naturalization
- Disturbance-adapted, weedy grass
- Potential pasture weed due to relatively low palatability and ability to compete with more preferred forage grasses
- Other *Melinis* species are invasive
- Tolerates many soil types
- Reproduces by seeds
- A perennial, but grows as an annual in some climates
- Seeds dispersed by wind, birds (in nesting material) and both intentionally and unintentionally by people

Low Risk Traits

- Not currently reported as naturalized in the Hawaiian Islands
- Unarmed (no spines, thorns, or burrs)
- Palatable to grazing animals, but palatability relatively low
- May grow best in full sun, high light environments (but able to grow in partial shade)
- Not reported to spread vegetatively
- Herbicides may provide effective control