

Taxon: Enneapogon cenchroides (Roem. & Schult.) C. E. Hubb. **Family:** Poaceae

Common Name(s): soft feather pappus grass **Synonym(s):** Pappophorum cenchroides Licht.

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 15 Mar 2023

WRA Score: 10.0

Designation: H(HPWRA)

Rating: High Risk

Keywords: Annual Grass, Naturalized, Forage, Dense Cover, Wind-Dispersed

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

Qsn #	Question	Answer Option	Answer
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	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		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
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
	Flora of North America Editorial Committee, eds. (1993+). Flora of North America North of Mexico [Online]. 22+ vols. New York and Oxford. http://beta.floranorthamerica.org . [Accessed 6 Mar 2023]	"Enneapogon cenchroides has been introduced and is persisting in the Ajo, Santa Catalina, Tucson, and Galiuro mountains of southern Arizona. Outside the Americas, its range extends from Sudan southward to the Cape Provinces of South Africa, through Arabia to India, and on Ascension Island." [No evidence of domestication]
	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] "valuable forage, pioneer grass, useful for erosion control, weed species able to withstand long droughts, ground cover, growing in gravelly grassland, dry areas, dry sandy or stony soils, sandy wasteland, gypsum, woodland, cultivated ground, heavy soils, bushland, dry Acacia-Commiphora bushland, orange sandy plain, escarpment foothills, on disturbed areas, disturbed clay grassland, sandy soils, along roadsides, overgrazed veld"

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2023). 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	"South Africa, Mozambique, Tanzania, Uganda, Sudan, India, Yemen."

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	"South Africa, Mozambique, Tanzania, Uganda, Sudan, India, Yemen."

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

Qsn #	Question	Answer
	KewScience. (2023). Plants of the World Online - <i>Enneapogon cenchroides</i> . http://powo.science.kew.org . [Accessed 7 Mar 2023]	"Native to: Angola, Ascension, Botswana, Cape Provinces, Chad, Eritrea, Ethiopia, Free State, India, Kenya, KwaZulu-Natal, Madagascar, Mozambique, Namibia, Niger, Northern Provinces, Oman, Pakistan, Saudi Arabia, Somalia, Sudan, Swaziland, Tanzania, Uganda, Yemen, Zimbabwe Introduced into: Arizona, Brazil Northeast, St.Helena" [Found in regions with latitudes ranging from about 35° S to 30°12 N. It grows mostly in dry and warm climates]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Preferred Climate/s: Mediterranean, Subtropical, Tropical Origin: Africa, E Asia"
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"South Africa, Mozambique, Tanzania, Uganda, Sudan, India, Yemen."
	Faccenda, K. (2023). UH Botany Dept. Pers. Comm. 16 Jan	[Oahu] " https://www.inaturalist.org/observations/146926371 Confirmed ID, will publish soon. At least 200 plants along the road here, unsure how far it goes up the ridge, the population needs to be surveyed far more rigorously than I did. This seems very weedy"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	KewScience. (2023). Plants of the World Online - <i>Enneapogon cenchroides</i> . http://powo.science.kew.org . [Accessed 7 Mar 2023]	"Introduced into: Arizona, Brazil Northeast, St.Helena"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Pasture Dispersed by: Humans, Wind References: Global-N-85, South Africa-AZR-121, South Africa-W-382, United States of America-N-101, Madagascar-N-1001, La Reunion-N-1321, Brazil-N-1597, Brazil-N-1733."
	Faccenda, K. (2023). Soft Feather Pappus Grass <i>Enneapogon cenchroides</i> . https://www.inaturalist.org/observations/146926371 . [Accessed]	[Oahu] "Observed:Jan 16, 2023 · 9:44 AM HST Submitted:Jan 19, 2023 · 3:03 PM HST"

301	Naturalized beyond native range	y
	Source(s)	Notes
	Gómez-Bellver, C., Álvarez, H., & Sáez, L. (2016). New contributions to the knowledge of the alien flora of the Barcelona province (Catalonia, Spain). <i>Orsis</i> , 30: 167-189	"A single specimen in full bloom in the castle moat's perimetral way. It was thriving on sandy substrate of compacted gravel, accompanied by other ruderal alien species."
	Fabricante, J. R., & Siqueira-Filho, J. A. (2012). Exotic and invasive plants of the caatingas of the São Francisco River. <i>Flora of the Caatingas of the São Francisco River: Natural History and Conservation</i> . 1ed. Rio de Janeiro, RJ: Andrea Jakobsson Estúdio Editorial, 1, 366-393.	" <i>E. cenchroides</i> was collected near the perimeter irrigation canals in Petrolina, Pernambuco, and Juazeiro, Bahia. It was observed for the first time in the Americas in the state of Arizona (USA) in 2006 (McClaran & Nafus, 2007)."

Qsn #	Question	Answer
	Barkworth, M.E., Anderton, L.L., Capels, K.M., Long, S., Piep, M.B. (eds.). (2013). Manual of Grasses for North America. Utah State University Press, Logan, UT	"Enneapogon cenchroides has been introduced and is persisting in the Ajo, Santa Catalina, Tucson, and Galiuro mountains of southern Arizona. Outside the Americas, its range includes Ascension Island, and extends from Sudan southward to the Cape Provinces of South Africa, through Arabia to India."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Global-N-85, South Africa-AZR-121, South Africa-W-382, United States of America-N-101, Madagascar-N-1001, La Reunion-N-1321, Brazil-N-1597, Brazil-N-1733."
	Faccenda, K. (2023). UH Botany Dept. Pers. Comm. 16 Jan	[Oahu] "https://www.inaturalist.org/observations/146926371 Confirmed ID, will publish soon. At least 200 plants along the road here, unsure how far it goes up the ridge, the population needs to be surveyed far more rigorously than I did. This seems very weedy"
	Faccenda, K. (2023). Soft Feather Pappus Grass <i>Enneapogon cenchroides</i> . https://www.inaturalist.org/observations/146926371 . [Accessed 6 Mar 2023]	[Oahu] "Observed:Jan 16, 2023 · 9:44 AM HST Submitted:Jan 19, 2023 · 3:03 PM HST"

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"weed species able to withstand long droughts" [Impacts as a weed unspecified]

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	
	Source(s)	Notes

Qsn #	Question	Answer
	Webb, A. D. (2020). Pima County Ecological Monitoring Program's Monitoring Protocol for Tracking Invasive Plant Occurrences. Ecological Monitoring Program, Pima County Multi-species Conservation Plan. Report to the U.S. Fish and Wildlife Service, Tucson, Arizona	[Potential environmental weed in Arizona] "Soft feather pappusgrass has also been detected in Organ Pipe National Monument where it has been described a potentially serious invader (Felger et al. 2014), and it is a concern in Saguaro National Park (NPS 2019). In Pima County, staff have observed this species in Tucson Mountain Park, as well as in widespread floodplain areas and County-managed ranches on the east side of the Santa Catalina Mountains, such as A7 and M Diamond Ranches. The information available about this species in Arizona suggests that soft feather pappusgrass invades primarily thornscrub and semi-desert grassland, with some potential to occur in xeric riparian situations. This suggests that it is one of multiple invasive grass species that are likely contributing to the loss of native vegetation and conversion to grassland. Therefore, multiple desert and thornscrub species that depend on native plant communities, such as Sonoran desert tortoise, are at risk of losing their habitats. While more information on the distribution of soft feather pappusgrass would be helpful for making an informed assessment of the potential for control, existing information suggests the infestation covers a smaller area of the Southwest than most other invasive grasses in this report, indicating that it may be possible for soft feather pappusgrass to be greatly limited in its spread if there are opportunities for aggressive management."
	Felger, R.S., Rutman, S. & Malusa, J. (2014). Ajo Peak to Tinajas Altas: A flora of southwestern Arizona. Part 6. Poaceae – grass family. Phytoneuron 2014-35: 1–139	[Potential to become a serious invader] "Found at Alamo Canyon in the 1990s and later at an isolated hill west of the Diablo Mountains. It will probably spread and could become seriously invasive at higher elevation in the Ajo Mountains."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[<i>Enneapogon avenaceus</i>] "Major Pathway/s: Contaminant, Ornamental, Pasture Dispersed by: Humans, Animals, Livestock, Sheep Weed of: Orchards & Plantations References: Australia-N-945, United Kingdom-UZD-317, Australia-N-354, United Kingdom-ZD-1633, Pakistan-A-1030, Australia-W-1977."
	Khan, R. U., Mehmood, S., Khan, S. U., Muhammad, A., & Hussain, Z. (2014). Comparative study of weed species recorded in different field crops of Bannu, Khyber Pakhtunkhwa, Pakistan. Pakistan Journal of Weed Science Research, 20(4), 489-504	[Very abundant, and presumably affecting yield, quality, or production costs of sugarcane] "According to the Oosting Scale, the very abundant weeds in sugarcane fields were <i>Leptochloa panicea</i> , <i>Enneapogon avrnuceus</i> , <i>E. alba</i> , <i>E. crus-galli</i> and <i>C. dactylo</i> "

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[No evidence] "Annual or short-lived perennial bunchgrass, variable, robust, coarse, sometimes branched, loosely tufted, erect or semierect, generally geniculate, not bulbous at base, densely covered with glandular hairs, leaf sheath rounded and hairy, ligule a row of short hairs, basal leaves few, leaf blades with short hairs and a rough margin, panicle loosely contracted, spikes pointed, contracted panicle branches spreading somewhat at maturity, upper glume generally 3-nerved, lemmas with 9 hairy to ciliate awns, third lemma vestigial or barren"

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown. No evidence found

403	Parasitic	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] "Annual or short-lived perennial bunchgrass"

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Lusigi, W. J., Nkurunziza, E. R., & Masheti, S. (1984). Forage preferences of livestock in the arid lands of Northern Kenya. <i>Journal of Range Management</i> , 37(6): 542-548	"Table 1. Food preference of various livestock species in the Integrated Project on Arid Lands (I.P.A.L.) Study Area in the wet and dry seasons. (VD - Very desirable; D - Desirable; I - Intermediate; U - Undesirable)" [Enneapogon cenchroides: Desirable to Sheep & Cattle (Wet & Dry); Intermediate to Goats (Wet & Dry); Undesirable (Wet) to Intermediate (Dry) to Camels]
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"valuable forage"

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	"valuable forage" [No evidence]
	Lusigi, W. J., Nkurunziza, E. R., & Masheti, S. (1984). Forage preferences of livestock in the arid lands of Northern Kenya. <i>Journal of Range Management</i> , 37(6): 542-548	[No evidence] "Table 1. Food preference of various livestock species in the Integrated Project on Arid Lands (I.P.A.L.) Study Area in the wet and dry seasons. (VD - Very desirable; D - Desirable; I - Intermediate; U - Undesirable)" [Enneapogon cenchroides: Desirable to Sheep & Cattle (Wet & Dry); Intermediate to Goats (Wet & Dry); Undesirable (Wet) to Intermediate (Dry) to Camels]

406	Host for recognized pests and pathogens	

Qsn #	Question	Answer
	Source(s)	Notes
	Vanky, K. (1999). Taxonomical studies on Ustilaginales. XIX Mycotaxon, 73, 135-161	[Importance unclear] "Abstract : Graminicolous smut fungi of the tribe Pappophoreae and of the genera Dactyloctenium, Digitaria, Elionurus, Iseilema and Lepturus were studied, as well as some other smut fungi from different parts of the world. New species proposed: Sporisorium elionuri-tristis (type on Elionurus tristis, Madagascar); S. iseilematis-vaginiflori (type on Iseilema vaginiflorum, Australia); Ustilago austro-africana (type on Enneapogon cenchroides, Zimbabwe); U. lepturi-xerophili (type on Lepturus xerophilus, Australia); U. radulans (type on Dactyloctenium radulans, Australia); and U. viviparifera (type on Dactyloctenium aegyptium, India). New combinations proposed: Farysia caricis-petitiana based on Sphacelotheca caricis-petitiana (type on Carex petitiiana); Sporisorium diplosporum based on Ustilago diplospora (type on Digitaria sanguinalis); Sporisorium dolichosorum based on Sphacelotheca dolichosora (type on Digitaria longiflora); Sporisorium elionuri based on Ustilago elionuri (type on Elionurus muticus); Sporisorium linderi based on Sphacelotheca linderi (type on Digitaria horizontalis). Synonyms: Both Sphacelotheca digitariae-pedicellaris (type on Digitaria pedicellaris) and Ustilago belgiana (lectotype on Digitaria horizontalis) are Ustilago syntherismae (type on Digitaria sp.); Sporisorium pole-evansii (type on Digitaria eriantha) is Sporisorium linderi (type on Digitaria horizontalis); Ustilago longiflora (type on Digitaria longiflora) is Ustilago royleani (type on Digitaria stricta). Excluded species: Tuburcinia penniseti (type on Pennisetum hordeoides) is Phakopsora apoda (Uredinales). Both Ustilago parvula (type on Ischaemum arundinaceum) and Ustilago setariae-aureae (type on Setaria aurea) are Ustilaginoidea species (Mitosporic fungi, Fungi Imperfecti). LECTOTYPE is designated for Ustilago belgiana (=U. syntherismae)."

407	Causes allergies or is otherwise toxic to humans	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
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence, and no members of the genus Enneapogon cited as toxic or poisonous.

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

Qsn #	Question	Answer
	Olsson, A. D., Van Leeuwen, W. J., & Marsh, S. E. (2011). Feasibility of invasive grass detection in a deserts scrub community using hyperspectral field measurements and Landsat TM imagery. <i>Remote Sensing</i> , 3(10), 2283-2304	[Concern exists that non-native grasses, including <i>Enneapogon cenchroides</i> , can modify fire regimes and increase fire risk in invaded habitats] "In North America's Sonoran Desert, <i>Pennisetum ciliare</i> , <i>Pennisetum setaceum</i> , <i>Eragrostis lehmanniana</i> , <i>Eragrostis cilianensis</i> , <i>Melinis repens</i> , and <i>Enneapogon cenchroides</i> are expanding in desert scrub habitats poorly adapted to fire [5,6]. <i>P.ciliare</i> (buffelgrass) has already reached epidemic proportions, prompting the formation of a Buffelgrass Coordination Center and a noxious weed listing by the state of Arizona [5,7]. Primary concerns relate to the consequences of fire on the Arizona Upland vegetation zone of the Sonoran Desert, a vegetation known for its scenic beauty and high biodiversity [5,7]."
	Heinl, M. (2005). Fire regime and vegetation response in the Okavango Delta, Botswana. Doctoral dissertation. Technische Universität München	[Presumably occurs in areas with high fire frequency, but no information on contribution to fire regime or fuel load] "Table 1. Identified species with the number of records on drying floodplains (FQd) and active floodplains (FQa), sorted by indicator value." [Enneapogon cenchroides - response to high fire = n.s. not significant]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2023). Flora of Mozambique: Individual record no: 93146: <i>Enneapogon cenchroides</i> . https://www.mozambiqueflora.com . [Accessed 14 Mar 2023]	"Common, in full sun, in gravel along road verge."
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Unknown, but a pioneer grass in open, presumably high light environments. Dense shade may inhibit establishment or spread] "pioneer grass, useful for erosion control, weed species able to withstand long droughts, ground cover, growing in gravelly grassland dry areas, dry sandy or stony soils, sandy wasteland, gypsum woodland, cultivated ground, heavy soils, bushland, dry <i>Acacia-Commiphora</i> bushland, orange sandy plain, escarpment foothills, on disturbed areas,"

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	"disturbed clay grassland, sandy soils,"
	South Africa Online. (2023). Nine-awned Grass. https://southafrica.co.za/nine-awned-grass.html . [Accessed 14 Mar 2023]	"Nine-awned grass usually grows in disturbed veld in sandy and gravelly soil. It also grows in limestone areas and next to roads."
	Gibbs Russel, G. E., Watson, L., Koekemoer, M., Smook, L., Barker, N. P., Anderson, H. M., & Dallwitz, M. J. (1990). Grasses of Southern Africa. National Botanic Gardens / Botanical Research Institute, South Africa	"Sandy soils, in disturbed places and overgrazed veld."

Qsn #	Question	Answer
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	[No evidence] "Annual or short-lived perennial bunchgrass"

412	Forms dense thickets	y
	Source(s)	Notes
	Silverhill Seeds. (2023). <i>Enneapogon cenchroides</i> . https://silverhillseeds.co.za/product/enneapogon-cenchroides/ . [Accessed 14 Mar 2023]	"Can grow in dense stands in disturbed soils and is very good as a pioneer grass"
	South Africa Online. (2023). Nine-awned Grass. https://southafrica.co.za/nine-awned-grass.html . [Accessed 14 Mar 2023]	"This grass grows successfully and fast in the disturbed veld and thereby protects its soil. It is hardy and grows in dense stands, particularly after disturbances such as droughts or overgrazing."

501	Aquatic	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	[Terrestrial] "growing in gravelly grassland, dry areas, dry sandy or stony soils, sandy wasteland, gypsum, woodland, cultivated ground, heavy soils, bushland, dry Acacia-Commiphora bushland, orange sandy plain, escarpement foothills, on disturbed areas, disturbed clay grassland, sandy soils, along roadsides, overgrazed veld"

502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 6 Mar 2023]	Family: Poaceae (alt. Gramineae) Subfamily: Chloridoideae Tribe: Eragrostideae Subtribe: Cotteinae

503	Nitrogen fixing woody plant	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	Poaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Felger, R.S., Rutman, S. & Malusa, J. (2014). Ajo Peak to Tinajas Altas: A flora of southwestern Arizona. Part 6. Poaceae – grass family. <i>Phytoneuron</i> 2014-35: 1–139	"Robust annuals (often appearing perennial; probably non-seasonal annuals), (20) 35–70+ cm tall; roots strong and with conspicuous root hairs and rhizosheaths."

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"South Africa, Mozambique, Tanzania, Uganda, Sudan, India, Yemen."
	Barkworth, M.E., Anderton, L.L., Capels, K.M., Long, S., Piep, M.B. (eds.). (2013). Manual of Grasses for North America. Utah State University Press, Logan, UT	[No evidence] "Enneapogon cenchroides has been introduced and is persisting in the Ajo, Santa Catalina, Tucson, and Galiuro mountains of southern Arizona. Outside the Americas, its range includes Ascension Island, and extends from Sudan southward to the Cape Provinces of South Africa, through Arabia to India."

602	Produces viable seed	y
	Source(s)	Notes
	Silverhill Seeds. (2023). Enneapogon cenchroides. https://silverhillseeds.co.za/product/enneapogon-cenchroides/ . [Accessed 14 Mar 2023]	"Can grow in dense stands in disturbed soils and is very good as a pioneer grass Approximately 25 seeds per packet Sow in Spring"
	Ernst, W. H. O. (1991). Fire, dry heat and germination of savanna grasses in Botswana. Modern Ecology: basic and Applied Aspects, 349-361. Elsevier, New York	"Table 16.2: Impact of exposure of caryopses to dry heat (100 °C) for 2 minutes on germination, harmonic mean germination day (HMGD) and seedling survival of 6 savanna grasses one month after germination." [Enneapogon cenchroides - Germination (%) = 89.9 ± 1.4]

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	
	Source(s)	Notes
	Connor, H. E. (1979). Breeding systems in the grasses: a survey. New Zealand Journal of Botany, 17(4): 547-574	[Possibly] "Table 8 Genera where cleistogamy is reported." [Includes Enneapogon. Cleistogamy is a type of automatic self-pollination of certain plants that can propagate by using non-opening, self-pollinating flowers]

605	Requires specialist pollinators	n
	Source(s)	Notes
	Connor, H. E. (1979). Breeding systems in the grasses: a survey. New Zealand Journal of Botany, 17(4): 547-574	[Presumably wind- or self-pollinated] "Table 8 Genera where cleistogamy is reported." [Includes Enneapogon. Cleistogamy is a type of automatic self-pollination of certain plants that can propagate by using non-opening, self-pollinating flowers]

606	Reproduction by vegetative fragmentation	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Gibbs Russel, G. E., Watson, L., Koekemoer, M., Smook, L., Barker, N. P., Anderson, H. M., & Dallwitz, M. J. (1990). Grasses of Southern Africa. National Botanic Gardens / Botanical Research Institute, South Africa	[No evidence. Tufted, short-lived perennial or annual unlikely to spread vegetatively] "Short-lived perennial, or annual; tufted; to 1000 mm tall. Leaf blades 30-250 mm long; 3-8 mm wide."

607	Minimum generative time (years)	1
	Source(s)	Notes
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Annual or short-lived perennial bunchgrass"
	Felger, R.S., Rutman, S. & Malusa, J. (2014). Ajo Peak to Tinajas Altas: A flora of southwestern Arizona. Part 6. Poaceae – grass family. Phytoneuron 2014-35: 1–139	"Robust annuals (often appearing perennial; probably non-seasonal annuals), (20) 35–70+ cm tall; roots strong and with conspicuous root hairs and rhizosheaths."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2023). Flora of Mozambique: Individual record no: 93146: Enneapogon cenchroides. https://www.mozambiqueflora.com . [Accessed 14 Mar 2023]	"Common, in full sun, in gravel along road verge."
	South Africa Online. (2023). Nine-awned Grass. https://southafrica.co.za/nine-awned-grass.html . [Accessed 14 Mar 2023]	"Nine-awned grass usually grows in disturbed veld in sandy and gravelly soil. It also grows in limestone areas and next to roads." [Proximity to roads suggests potential movement by vehicles, footwear or equipment]
	Ernst, W. H. O., Veenendaal, E. M., & Kebakile, M. M. (1992). Possibilities for dispersal in annual and perennial grasses in a savanna in Botswana. Vegetatio, 102(1): 1-11	[Adapted for wind dispersal, but pappus may aid in attachment to clothing, footwear or other surfaces] "Disseminules of Enneapogon cenchroides have a pappus-like structure"

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	South Africa Online. (2023). Nine-awned Grass. https://southafrica.co.za/nine-awned-grass.html . [Accessed 14 Mar 2023]	"Can grow in dense stands in disturbed soils and is very good as a pioneer grass Approximately 25 seeds per packet Sow in Spring"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Wind"

Qsn #	Question	Answer
703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Potential pasture or feed contaminant] "Major Pathway/s: Contaminant, Pasture Dispersed by: Humans, Wind"

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Cheplick, G. P. (1998). Seed dispersal and seedling establishment in grass populations. Pp. 84-105 in Population Biology of Grasses. Cambridge University Press, Cambridge, UK	"African perennial grasses are either self dispersed or wind and animals function as dispersal agents, but data are limited. In a Botswana savanna, a species with a plume-like spikelet and a light disseminule (<i>Enneapogon cenchroides</i>) had a low rate of descent and could be transported up to 13 m at a wind velocity of 10 m s ⁻¹ "
	Ernst, W. H. O., Veenendaal, E. M., & Kebakile, M. M. (1992). Possibilities for dispersal in annual and perennial grasses in a savanna in Botswana. <i>Vegetatio</i> , 102(1): 1-11	"From the investigated grass species, <i>Chloris virgata</i> and <i>Enneapogon cenchroides</i> can be transported between 5 and 13 m from the parent plant at moderate wind velocity; their plume- and pappus-like structure can compensate for the small infructescence height compared to the tall infructescences of <i>Panicum maximum</i> ."

705	Propagules water dispersed	y
	Source(s)	Notes
	Fabricante, J. R., & Siqueira-Filho, J. A. (2012). Exotic and invasive plants of the caatingas of the São Francisco River. <i>Flora of the Caatingas of the São Francisco River: Natural History and Conservation</i> . 1ed. Rio de Janeiro, RJ: Andrea Jakobsson Estúdio Editorial, 1, 366-393.	" <i>E. cenchroides</i> was collected near the perimeter irrigation canals in Petrolina, Pernambuco, and Juazeiro, Bahia. It was observed for the first time in the Americas in the state of Arizona (USA) in 2006 (McClaran & Nafus, 2007)." [Suggests possible movement by water]
	Fabricante, J. R., Ziller, S. R., de Araújo, K. C. T., Furtado, M D. D. G., & de Arantes Basso, F. (2015). Non-native and invasive alien plants on fluvial islands in the São Francisco River, northeastern Brazil. <i>Check List</i> , 11(1), 1535-1535	[Presence on fluvial islands suggests water, in addition to wind, may contribute to seed dispersal] "This paper is the result of a survey of the alien flora present on fluvial islands in the São Francisco River, northeastern Brazil. The floristic similarities between the islands were assessed, as well as the relationship between area size and species richness. The study covered eight islands in the São Francisco River Valley and was carried out in a period of eight months. Thirty one alien species were registered, six of them (<i>Amaranthus viridis</i> , <i>Calotropis procera</i> , <i>Cenchrus ciliaris</i> , <i>Enneapogon cenchroides</i> , <i>Prosopis pallida</i> and <i>Ricinus communis</i>) present on all islands. The highest number of invasive alien species (26) was recorded on Massangano Island. The floristic similarity between the islands varied between medium and very high, while the number of alien species present was positively correlated with area size. The study demonstrates that the biodiversity on these eight fluvial islands is endangered, especially due to the presence of alien species capable of invading natural areas."

Qsn #	Question	Answer
706	Propagules bird dispersed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Wind"

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Ernst, W. H. O., Veenendaal, E. M., & Kebakile, M. M. (1992). Possibilities for dispersal in annual and perennial grasses in a savanna in Botswana. <i>Vegetatio</i> , 102(1): 1-11	[Adapted for wind dispersal, but pappus may aid in attachment to animals] "Disseminules of <i>Enneapogon cenchroides</i> have a pappus-like structure"

708	Propagules survive passage through the gut	
	Source(s)	Notes
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"valuable forage" [Unknown if viable seeds survive animal consumption]

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	SER, INSR, RBGK, (2023). Seed Information Database (SID). https://ser-sid.org/ . [Accessed 14 Mar 2023]	Unknown

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown but herbicides used on other grasses would likely be effective.

Qsn #	Question	Answer
804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Unknown but thrives in disturbed habitats. May be able to rapidly colonize, rather than persist after fire, or overgrazing] "weed species able to withstand long droughts, ground cover, growing in gravelly grassland, dry areas, dry sandy or stony soils, sandy wasteland, gypsum, woodland, cultivated ground, heavy soils, bushland, dry Acacia-Commiphora bushland, orange sandy plain, escarpment foothills, on disturbed areas, disturbed clay grassland, sandy soils, along roadsides, overgrazed veld"
	WRA Specialist. (2023). Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown

Summary of Risk Traits:

An annual to short lived perennial grass regarded as valuable forage and useful for erosion control in its native range of South Africa, Mozambique, Tanzania, Uganda, Sudan, India, and Yemen. Introduced to and naturalized in Arizona, this pioneer species spreads by wind-dispersed seeds and establishes in disturbed habitats. There is concern that it could impact thornscrub and semi-desert grassland and may also invade xeric riparian situations. A population of this grass was confirmed to be established on Oahu in early 2023.

High Risk / Undesirable Traits

- Broad latitudinal range, suggesting environmental versatility.
- Thrives and capable of spreading in regions with tropical climates.
- Naturalized on Oahu (Hawaiian Islands), Arizona, Spain, Brazil and possibly elsewhere.
- A disturbance adapted grass that could invade and potentially impact native ecosystems.
- Other *Enneapogon* species are invasive weeds.
- Tolerates many soil types.
- Reported to form dense stands.
- Reproduces by wind-dispersed seeds.
- An annual grass, capable of reaching maturity in one growing season.
- In addition to wind, seeds dispersed through intentional cultivation, along waterways, and possibly as a pasture or seed contaminant.
- Tolerates heavy grazing, mowing and fire.

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Valued as a forage grass.
- Non-toxic
- Grows best in high light environments (dense shade may inhibit spread)