Taxon: Cynodon plectostachyus (K. Schum.) Pilg. **Family:** Poaceae

Common Name(s): giant star grass
star grass

Synonym(s): Cynodon ruspolianus Chiov.
Leptochloa plectostachya K. Schum.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 15 Oct 2021

WRA Score: 15.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Perennial Grass, Invasive Elsewhere, Palatable, Stoloniferous, Dense Swards

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed		
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		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	y
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	y
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
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)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	[Not domesticated] "C. plectostachyus has a fairly restricted natural distribution along the Rift Valley through Ethiopia , Kenya, northern Uganda and northern Tanzania."

Qsn #	Question	Answer
102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	NA

Qsn #	Question	Answer
103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	NA

Qsn #	Question	Answer
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. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 13 Oct 2021]	"Native Africa NORTHEAST TROPICAL AFRICA: Ethiopia EAST TROPICAL AFRICA: Kenya, Tanzania, Uganda Naturalized (natzd. elsewhere)"
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Tropical Africa, Tanzania, Kenya, Ethiopia, Uganda."

Qsn #	Question	Answer
202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 13 Oct 2021]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 13 Oct 2021]	"C. aethiopicus extends over a similar native range to C. nlemfuensis, but C. plectostachyus appears limited to a more restricted range within the tropics than the others."

Qsn #	Question	Answer
	Heuzé V., Tran G., Salgado P., & Lebas F. (2015). Giant star grass (Cynodon plectostachyus). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/468. [Accessed]	"Cynodon plectostachyus is native of East Africa and is common, at an altitude of 800-2000 m, in Ethiopia, Tanzania, Kenya and Uganda along the Rift Valley (Bogdan, 1977). It is the most widespread grass in Mexico and Latin America (Yong-Angel et al., 2012). It is now naturalised throughout the tropics and sub-tropics (Bogdan, 1977). It grows in disturbed areas, in dry and light textured soils in grassland, cattle paddocks and roadsides (Cook et al., 2005; Bogdan, 1977)."
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Frost tolerance. It survives frost. Altitude range. Sea-level to 2 000 m. Rainfall requirements. It is adapted to semi-arid areas with rainfalls from 500-875 mm."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"C. plectostachyus has a fairly restricted natural distribution along the Rift Valley through Ethiopia , Kenya, northern Uganda and northern Tanzania."
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Tropical Africa, Tanzania, Kenya, Ethiopia, Uganda."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**
	Wu, Y. & Taliaferro, C. M. (2009). Bermudagrass. Pp. 229-274 in Genetic Resources, Chromosome Engineering, and Crop Improvement. Volume 5: Forage Crops. CRC Press, Boca Raton, FL	"The natural distribution of the species is along the Eastern Great Rift in Ethiopia, Kenya, Tanzania, Zambia, Malawi, Uganda, and East Congo. Harlan (1970) noted that C. plectostachyus is most abundant on the floor of the Rift. The species has been introduced as a forage grass to Zimbabwe, South Africa, Ghana, Nigeria, Madagascar, Sri Lanka, India, and the United States."

301	Naturalized beyond native range	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	"aggressive, naturalized elsewhere"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Brazil-W-255, Peru and Ecuador-A-281, Brazil-W-360, Brazil-W-407, Global-N-85, United States of America-N-101, South Africa-AR-121, South Africa-W-382, Japan-N-287, Japan-N-794, Paraguay-N-876, United States of America-W-946, Global-A-1207, Brazil-I-984, India-UN-1345, south and southeast Asia-A-1408, Cuba-NI-1505, Australia-A-87, Kenya-A-87, Costa Rica-W-1570, Paraguay-N-1796, Mexico-N-1881, -I-, -I-, Cuba-I-2055, Colombia-W-1977, Cuba-W-1977, India-W-1977, Mexico-W-1977, Global--1324."

Qsn #	Question	Answer
	Heuzé V., Tran G., Salgado P., & Lebas F. (2015). Giant star grass (Cynodon plectostachyus). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/468. [Accessed 13 Oct 2021]	"It is the most widespread grass in Mexico and Latin America (Yong-Angel et al., 2012). It is now naturalised throughout the tropics and sub-tropics (Bogdan, 1977). It grows in disturbed areas, in dry and light textured soils in grassland, cattle paddocks and roadsides (Cook et al., 2005; Bogdan, 1977)."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 13 Oct 2021]	"Naturalized (natzd. elsewhere)"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	Not recorded as naturalized in the Hawaiian islands at the time of publication

302	Garden/amenity/disturbance weed	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	"aggressive, naturalized elsewhere" ... "found in dry areas, semiarid areas, deciduous bushland, along roadsides, disturbed sites, black cracking clay soils, weedy places"
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Main attributes. Its rapid colonization of bare land and invasion of overgrazed land. Main deficiency. It may become a little aggressive in cultivations."
	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	[Cynodon plectostachyus] KIND OF WEED: Ruderal (general), flora, health related (livestock generally) UNDESIRABLE CHARACTERISTICS: Competitive (space, light, water, nutriment), replacing preferred vegetation (indigenous), poisonous (sometimes)"
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Potential environmental weed. Here classified as a weed of potential, unquantified impacts] "C. plectostachyus is a grass cultivated as a forage species that has been established and has persisted in pastures across the tropics and which currently occupies a large area principally in wet areas. It can grow on a wide range of habitats and soil types and competes well with other grasses and weeds due to its aggressive growth and rapid propagation. It is a fast-growing grass characterized by a rapid elongation of stolons and a rapid production and death of leaves, displacing native vegetation and generating large accumulation of dry-matter biomass associated with changes in fuel load and fire regimes in invaded habitats (Barkworth, 2003; Heuzé et al., 2015; PROTA, 2015)."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 15 Oct 2021]	[Potential weed of cropping systems] "All have fibrous, resilient stolons that survive ploughing, stands actually being improved by cultivation. These grasses can therefore become weeds in cropping systems, although they are not as serious as C. dactylon."
	WRA Specialist. (2021). Personal Communication	Reported as a potential weed of cropping systems and native ecosystems, but impacts have generally not been quantified. Here designated as a general weed with the potential to impact agriculture or the natural environment

Qsn #	Question	Answer
303	**Agricultural/forestry/horticultural weed**	
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 15 Oct 2021]	[Potential weed of cropping systems] "All have fibrous, resilient stolons that survive ploughing, stands actually being improved by cultivation. These grasses can therefore become weeds in cropping systems, although they are not as serious as C. dactylon."

304	**Environmental weed**	
	Source(s)	**Notes**
	Román-Dañobeytia, F. J., Castellanos-Albores, J., Levy-Tacher, S. I., Aronson, J., Ramírez-Marcial, N., & Rodrigues, R. R. (2012). Responses of transplanted native tree species to invasive alien grass removals in an abandoned cattle pasture in the Lacandon region, Mexico. Tropical Conservation Science, 5(2), 192-207	[Inhibits tree recruitment in pastures. May interfere with restoration of native ecosystems] "Invasive alien grass species such as Cynodon plectostachyus, and many others originally introduced as pasture plants, commonly form dense, monospecific stands in tropical pastures, resulting in the inhibition of natural or induced tree regeneration by competitive interactions and the occurrence of fires [10, 11]."
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Potentially, although cited references do not describe specific impacts to native vegetation] "C. plectostachyus is a grass cultivated as a forage species that has been established and has persisted in pastures across the tropics and which currently occupies a large area principally in wet areas. It can grow on a wide range of habitats and soil types and competes well with other grasses and weeds due to its aggressive growth and rapid propagation. It is a fast-growing grass characterized by a rapid elongation of stolons and a rapid production and death of leaves, displacing native vegetation and generating large accumulation of dry-matter biomass associated with changes in fuel load and fire regimes in invaded habitats (Barkworth, 2003; Heuzé et al., 2015; PROTA, 2015)."

305	**Congeneric weed**	**y**
	Source(s)	**Notes**
	Weber, E. (2017). Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Cynodon dactylon] "Where invasive, the grass forms solid mats crowding out native species, especially smaller species of the ground flora. Grass individuals quickly expand by rhizomes and stolons."

401	**Produces spines, thorns or burrs**	**n**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	[No evidence] "A large, robust. non-rhizomatous grass. True C. plectostachyus is a diploid which can easily be identified by the small glumes, rarely as long as one-third of the spikelet; soft foliage; racemes in two or more whorls and arching stolon internodes"

402	**Allelopathic**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Compatibility with other grasses and legumes. It tends to form a monospecific sward, but will grow with Medicago species, Trifolium semipilosum and Lotononis bainesii (Clatworthy , 1970)."
	Liang, J. C., Sheen, S. S., & Chou, C. H. (1982). Competitive allelopathic interaction among some subtropical pastures. In Chou, CH; Waller, GR (eds.). Seminar on Allelochemicals and Pheromones. Institute of Botany, Academia Sinica, Taipei City, Taiwan	Possibly yes. Extracts demonstrate allelopathic properties under experitmental conditions

403	Parasitic	n
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"A large, robust. non-rhizomatous grass." [Poaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"It is extremely palatable."
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"useful pasture grass and hay, not particularly palatable, good grazing for livestock, forage, fodder, whole plant eaten by baboons"

405	Toxic to animals	
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Toxicity. No toxicity can be attributed to this grass in Queensland (Everist , 1974)."
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"under certain conditions could develop toxic properties"
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 13 Oct 2021]	"While reports of high levels of HCN in C. plectostachyus exist, these may well result from mistaken identification of the species in question, and actually refer to C. nlemfuensis ."

Qsn #	Question	Answer
	Alfayo, K., Maranga, E. K., & Obonyo, M. (2016). Grazing intensity contributes to cyanogenic toxicity in savannah grasses in Baringo county. Int. J. Biol. Res, 4, 91-96	[May produce Cyanigenic glycocides at younger stages of growth which could result in poisoning if consumed in excess] "The potential role of anti-herbivory mechanisms used by plants and their synergistic responses to grazing and interactive effects on herbivores are poorly understood. The aim of this study was to quantify the influence of grazing intensity on cyanogenic glycosides in Lake Bogoria, Baringo County Kenya. Field experiments were carried out in ten 50×10m enclosures. Grazing intensity was varied using simulated grazing method where two grazing treatments used; heavy grazing and light grazing. Grasses were categorized into two age classes; young and old. Cyanigenic glycocides (CNglc) were tested using impregnated picrate paper and their concentration determined by hydrolysis and trapping in 1M NaOH. Our findings showed that five of 16 sampled species produce cyanogenic glycosides; Cynodon dactylon, Cynodon plectostachyus, Digitaria scalarum, Sporobolus spicatus and Cyperus laevigatus. There was an inverse relation between Cyanide concentration and age of the plants. Young cuttings yield more Hydrogen Cyanide than older cuttings of the same grasses. Grazing intensity had a significant effect on the concentration of cyanogenic content in some grass species; C. dactylon (P=0.024) and S. laevigatus (P=0.003). The findings imply that grazing regime of managed pastures should consider the age of forage while allowing utilization of pastures preferably grazed on mature pastures with low levels of cyanogenic glycosides."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 15 Oct 2021]	"None of these grasses is greatly affected by diseases, particularly if managed to remain young and leafy. The major diseases are rust, caused by Puccinia graminis and P. cynodonis, and Helminthosporium leaf-spot. There are also records of leaf blight disease caused by Rhizoctonia solani during the rainy season, black choke on inflorescences and leaves caused by Ephelis sp., a smut caused by Ustilago cynodontis, and another spikelet disease caused by a Fusarium sp. Nematodes isolated from these grasses include the stubby root (Trichodorus), spiral (Helicotylenchus), stealth (Hemicycliophora), ring (Hemicriconemoides), stunt (Tylenchorhynchus), awl (Dolichodorus), and lance (Hoplalaimus) nematodes. Farmers need to be aware that build up of nematodes under stargrass can lead to severe consequences in subsequent nematode-susceptible vegetable and ornamental crops. Fall armyworm (Spodoptera frugiperda) and spittlebug (Prosapia bicinata) are the major insect pests, along with strip grass looper caterpillar (Mocis latipes)."

Qsn #	Question	Answer
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	[Potentially toxic to animals under certain conditions] "under certain conditions could develop toxic properties, useful pasture grass and hay"

408	**Creates a fire hazard in natural ecosystems**	**y**
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It is a fast-growing grass characterized by a rapid elongation of stolons and a rapid production and death of leaves, displacing native vegetation and generating large accumulation of dry-matter biomass associated with changes in fuel load and fire regimes in invaded habitats"
	Negrete-Ramos, L. F. (1987). Response of six tropical grasses to prescribed burning in the west coast of Mexico. MSc Thesis, Texas Tech University, Lubbock, TX	[Burns and recovers from fire, but forage quality not improved] "This study was conducted to evaluate the effects of prescribed burning on yield and forage quality of six grass species commonly used for livestock production in the State of Nayarit, Mexico. Based on the results of this study, fire did not affect yield and forage quality of guinea, jaragua, ferrer bermuda, and African star grasses. The role of fire for these species may be to enhance other objectives, such as eliminate old decadent standing material characteristic of tropical grasses."
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	[Potentially. Survives fire and may increase fire risk during drought or in drier habitats] "It is adapted to semi-arid areas with rainfalls from 500-875 mm." ... "It tends to form a monospecific sward, but will grow with Medicago species, Trifolium semipilosum and Lotononis bainesii" ... "Response to fire. It survives fire very well and quickly responds to subsequent rain."

409	**Is a shade tolerant plant at some stage of its life cycle**	**n**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 13 Oct 2021]	"All grow best in full sun or light shade, although some types, at least, seem adapted to moderate shade providing fertility is adequate."
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Response to light. It prefers to grow in full sunlight."
	Galindo, V., Calle, Z., Chará, J., & Armbrecht, I. (2017). Facilitation by pioneer shrubs for the ecological restoration of riparian forests in the Central Andes of Colombia. Restoration Ecology, 25(5), 731-737	[Light interception (i.e. shade) attributed to inhibition of grasses] "Over a period of 15 months, 4.4% coverage of P. auritum was insufficient to inhibit grasses. In contrast, 81% coverage of T. diversifolia limited the growth of dominant grasses such as Cenchrus purpureus, Paspalum paniculatum, and Cynodon plectostachyus likely by intercepting more than 90% of photosynthetically active radiation (PAR), even though other factors cannot be ruled out."

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 13 Oct 2021]	" C. plectostachyus is tolerant of alkaline soils and is always found in what appear to be alkaline areas in Kenya. It is adapted to soils with pH 6.5–8.5, but gives best performance in the neutral to slightly alkaline range."
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"found in dry areas, semiarid areas, deciduous bushland, along roadsides, disturbed sites, black cracking clay soils, weedy places, red clay soil, bare land, sandy loams, on dry lake beds, alluvial silts and clays, overgrazed land"
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"It has a wide range of tolerance from sandy loams to alluvial silts and clays, and black cracking clay soils, but prefers soil of high fertility."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"A large, robust, non-rhizomatous grass."

412	Forms dense thickets	y
	Source(s)	**Notes**
	Román-Dañobeytia, F. J., Castellanos-Albores, J., Levy-Tacher, S. I., Aronson, J., Ramírez-Marcial, N., & Rodrigues, R. R. (2012). Responses of transplanted native tree species to invasive alien grass removals in an abandoned cattle pasture in the Lacandon region, Mexico. Tropical Conservation Science, 5(2), 192-207	"Across the tropics, millions of hectares of forest have been converted to cattle pasture and then abandoned [6]. Invasive alien grass species such as Cynodon plectostachyus, and many others originally introduced as pasture plants, commonly form dense, monospecific stands in tropical pastures, resulting in the inhibition of natural or induced tree regeneration by competitive interactions and the occurrence of fires [10, 11]."
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"It tends to form a monospecific sward, but will grow with Medicago species, Trifolium semipilosum and Lotononis bainesii (Clatworthy , 1970)."
	Ortega-Pieck, A., López-Barrera, F., Ramírez-Marcial, N., & García-Franco, J. G. (2011). Early seedling establishment of two tropical montane cloud forest tree species: The role of native and exotic grasses. Forest Ecology and Management, 261(7), 1336-1343	"Most of the economically important pasture grasses of the American tropics originated in Africa. These have proven to be explosively aggressive, invading and holding vast areas wherever they have received the slightest support byman (Parsons, 1972). An example is Cynodon plectostachyus, which is a fast-growing species that can quickly cover the soil surface. Its shoots are long and its stolons grow up to 5m (Ackerman, 1983), forming dense, tall and monodominant stands. It has been widely propagated and can produce 30–35 tons/ha/yr (Mejía-Saules, 1986). Moreover, it is a highly competitive species that may affect the establishment of woody species in the landscapes of Veracruz (Guevara et al., 1992; Muniz- Castro et al., 2006)."
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Perennial weed species, large, robust, stout and woody, spreading, forming dense turf,"

501	Aquatic	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	[Terrestrial] "Natural habitat. Dry lake beds."

502	Grass	y
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 14 Oct 2021]	Family: Poaceae (alt. Gramineae) Subfamily: Chloridoideae Tribe: Cynodonteae Subtribe: Eleusininae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 14 Oct 2021]	Family: Poaceae (alt. Gramineae) Subfamily: Chloridoideae Tribe: Cynodonteae Subtribe: Eleusininae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"A large, robust, non-rhizomatous grass."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "C. plectostachyus is a grass cultivated as a forage species that has been established and has persisted in pastures across the tropics and which currently occupies a large area principally in wet areas. It can grow on a wide range of habitats and soil types and competes well with other grasses and weeds due to its aggressive growth and rapid propagation. It is a fast-growing grass characterized by a rapid elongation of stolons and a rapid production and death of leaves, displacing native vegetation and generating large accumulation of dry-matter biomass associated with changes in fuel load and fire regimes in invaded habitats (Barkworth, 2003; Heuzé et al., 2015; PROTA, 2015). C. plectostachyus recovers quickly after fire, and can even benefit from fire through spittlebug and disease control (FAO, 2015; Heuzé et al., 2015). Currently, C. plectostachyus is listed as invasive in California (USA), Cuba, and Brazil (Oviedo Prieto et al., 2012; I3N-Brasil, 2015; USDA-NRCS, 2015)."

Qsn #	Question	Answer
602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 13 Oct 2021]	"C. nlemfuensis genotypes produce little or no seed, whereas, generally speaking, C. aethiopicus and C. plectostachyus produce reasonable amounts of seed."
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Sowing methods. It can be established from seed or by splits dug into the soil, this latter requiring less land preparation. Sowing depth and cover. Seed should be surface sown and lightly covered and rolled. Sowing time and rate. In the wet season at 6.5 kg/ha. Number of seeds per kg. 25-40 million florets with one caryopsis (Bogdan & Pratt , 1967)."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Harlan, J. R., De Wet, J. M. J., & Richardson, W. L. (1969). Hybridization studies with species of Cynodon from East Africa and Malagasy. American Journal of Botany, 56(8), 944-950	[Possibly No] "Genetically, C. plectostachyus is also very well isolated from all other species (Table 1). Despite a massive effort only two plants were obtained that could possibly be hybrids. Both of these were with a tetraploid C. nlemfuensis var. robustus as the female parent, and both "hybrids" were tetraploid indicating that if they were hybrids, unreduced male gametes of C. plectostachyus were involved. Neither plant was very thrifty and one turned a pale yellow after making a considerable growth in the nursery. On morphological grounds they were rather more maternal than one would expect but still showed some characters of the male parent. There is a possibility that they were actually selfed plants or S:lme other combination resulting from stray pollen. The two possible hybrid plants do not alter the fact that the species is very well isolated genetically. A major barrier obviously occurs after presumptive hybrid seeds are produced. The seeds appear to be plump and well formed, but of 1529 seeds, we succeeded in growing only 15 plants, and only 2 of these could possibly be hybrids. The species is distinct morphologically and genetically, but its potential in an interspecific breeding program would appear to be slight."

604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	Wu, Y. & Taliaferro, C. M. (2009). Bermudagrass. Pp. 229-274 in Genetic Resources, Chromosome Engineering, and Crop Improvement. Volume 5: Forage Crops. CRC Press, Boca Raton, FL	"Results by Burton (1947), Burton and Hart (1967), and Taliaferro and Lamle (1997) indicated that cross-pollination and self-incompatibility result in strong outcrossing in the species."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 14 Oct 2021]	[Unknown for Cynodon plectostachyus] "Evidence suggests that some types, at least of C. aethiopicus, are apomictic, while C. nlemfuensis may be outcrossing."

605	**Requires specialist pollinators**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	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."

606	Reproduction by vegetative fragmentation	y
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Ability to spread naturally. Excellent - under good conditions its stoloniferous habit allows it to spread rapidly."
	Heuzé V., Tran G., Salgado P., & Lebas F. (2015). Giant star grass (Cynodon plectostachyus). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/468. [Accessed 14 Oct 2021]	"Cynodon plectostachyus is propagated by planting freshly harvested stem cuttings (1 cutting/m²) at the beginning of the rainy season on a firm seed bed (Taliaferro et al., 2004)."

607	Minimum generative time (years)	1
	Source(s)	**Notes**
	Heuzé V., Tran G., Salgado P., & Lebas F. (2015). Giant star grass (Cynodon plectostachyus). Feedipedia, a programme by INRAE, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/468. [Accessed 15 Oct 2021]	[Presumably <1-2 years] "It competes well with other grasses and weeds due to its aggressive growth and rapid propagation (Pozo et al., 2000; Clayton et al., 1970)."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"C. plectostachyus spreads by seeds and vegetatively by stolons. Plants are capable of significant seed production. Seeds can be dispersed as a contaminant in machinery and adhered to human clothes and animal fur (I3N-Brasil, 2015). Under suitable environmental conditions its stoloniferous habit allows it to spread rapidly (FAO, 2015)."

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"The risk of introduction of C. plectostachyus is moderate to high. This grass has been intentionally introduced in tropical and subtropical regions of the world. It has repeatedly escaped from cultivation and rapidly colonizes disturbed environments and forms dense stands with the potential to displace native vegetation and alter fire regimes in invaded areas (Barkworth, 2003; Cook et al., 2005; FAO, 2015; Heuzé et al., 2015; PROTA, 2015)."

703	Propagules likely to disperse as a produce contaminant	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 15 Oct 2021]	[Possibly, if occurring with other crops] "All have fibrous, resilient stolons that survive ploughing, stands actually being improved by cultivation. These grasses can therefore become weeds in cropping systems, although they are not as serious as C. dactylon."

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Wind probably disperses some seeds, but not regarded as an important vector here] "C. plectostachyus spreads by seeds and vegetatively by stolons. Plants are capable of significant seed production. Seeds can be dispersed as a contaminant in machinery and adhered to human clothes and animal fur (I3N-Brasil, 2015). Under suitable environmental conditions its stoloniferous habit allows it to spread rapidly (FAO, 2015)."

705	Propagules water dispersed	
	Source(s)	**Notes**
	Galindo, V., Calle, Z., Chará, J., & Armbrecht, I. (2017). Facilitation by pioneer shrubs for the ecological restoration of riparian forests in the Central Andes of Colombia. Restoration Ecology, 25(5), 731-737	[Possibly, when occurring in riparian habitats] "The riparian corridors were dominated by the exotic grasses Cenchrus purpureus (Schumach.) (Poaceae), Paspalum paniculatum L. (Poaceae), Megathyrsus maximus (Jacq.) B.K. Simon & S.W.L. Jacobs (Poaceae), and Cynodon plectostachyus (K. Schum.) (Poaceae), which were introduced in the region as livestock forage during the last three decades and persist in the riparian areas."

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"C. plectostachyus spreads by seeds and vegetatively by stolons. Plants are capable of significant seed production. Seeds can be dispersed as a contaminant in machinery and adhered to human clothes and animal fur (I3N-Brasil, 2015). Under suitable environmental conditions its stoloniferous habit allows it to spread rapidly (FAO, 2015)."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"C. plectostachyus spreads by seeds and vegetatively by stolons. Plants are capable of significant seed production. Seeds can be dispersed as a contaminant in machinery and adhered to human clothes and animal fur (I3N-Brasil, 2015)."

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"It is extremely palatable." [Unknown if viable seeds survive ingestion and gut passage]

801	**Prolific seed production (>1000/m2)**	
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"C. plectostachyus spreads by seeds and vegetatively by stolons. Plants are capable of significant seed production."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 13 Oct 2021]	[Seed densities not specified] "Some types of C. aethiopicus and C. plectostachyus are capable of significant seed production, although experience in Florida suggests some genotypes of C. aethiopicus produce little or no seed there."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"C. plectostachyus spreads by seeds and vegetatively by stolons. Plants are capable of significant seed production." [Longevity unspecified]

803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	Brighenti, A. M., Souza Sobrinho, F., & Benites, F. R. G. (2020). Differential tolerance and selectivity of herbicides in forages of the genus Cynodon. Grassland Science, 66(2), 88-94	"Among the two species of Cynodon, Tifton 85, in general, was more tolerant to the applied herbicides than was the African star grass and consequently with less probability to occur forage yield losses. The most phytotoxic herbicides for both forages were fluroxypyr + aminopyralid (160.0 + 80.0 g ae/ha [grams of acid equivalent per hectare]), fluroxypyr + triclopyr (320.0 + 960.0 g ae/ha) and glyphosate (180 g ae/ha). The most selective herbicides were bentazon (720.0 g ai/ha [grams of active ingredient per hectare]), imazapyr (25.0 g ai/ha) and MSMA (1,440.0 g ai/ha), which have potential for use in fields of Tifton 85 and African star grass."
	Cook, B.G., et al. (2020). Tropical Forages: an interactive selection tool – Digital ISBN 978958694234-8. https://www.tropicalforages.info/text/intro/index.html. [Accessed 13 Oct 2021]	"Cynodon spp. are generally fairly tolerant of glyphosate at normal rates, but appear susceptible to haloxyfop."

Qsn #	Question	Answer
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**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	"can stand heavy grazing"
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Response to fire. It survives fire very well and quickly responds to subsequent ram."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad elevation range (sea level to 2000 m)
• Grows and spreads in regions with tropical climates
• Naturalized throughout the tropics and subtropics (but not in the Hawaiian Islands to date)
• Identified as an aggressive, weedy grass that may become a weed in cropping systems and could interfere with woody plant regeneration in pastures
• A potential environmental weed
• Other Cynodon species have become invasive
• May produce cyanogenic glycoside at certain stages of growth, result in potential poisoning to livestock
• Can modify fire regime and increase fire risk
• Tolerates many soil types
• Forms dense, monospecific swards that could inhibit other vegetation
• Reproduces by seeds and vegetatively by stolons
• Seeds dispersed as a contaminant in machinery and adhered to human clothes and animal fur, and intentionally by people
• Tolerates grazing and fire

Low Risk Traits
• Unarmed (no spines, thorns, or burrs)
• Valued as forage grass for livestock
• Relatively shade-intolerant (dense shade or cover may inhibit spread)
• Herbicides may provide effective control