Taxon: Urochloa decumbens (Stapf) R. D. Webster **Family:** Poaceae

Common Name(s): Basilisk signal grass
signal grass
Surinam grass

Synonym(s): Brachiaria decumbens Stapf

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 4 Jan 2022

WRA Score: 17.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Perennial Grass, Environmental Weed, Palatable, Dense Cover, Apomictic

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		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	y
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		
409	Is a shade tolerant plant at some stage of its life cycle		

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	y=1, n=-1	n
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people		
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
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	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
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	"Distribution. Native to Africa and now widespread in the tropics and subtropics." [Not domesticated]

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

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2021). 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. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Jan 2022]	"Native Africa EAST TROPICAL AFRICA: Kenya, Tanzania, Uganda WEST-CENTRAL TROPICAL AFRICA: Burundi, Democratic Republic of the Congo, Rwanda"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Jan 2022]	

203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Optimum temperature for growth. 30-35°C. Frost tolerance. It is readily frosted, but its winter production is better than pangola grass in frost-free areas. Latitudinal limits. About 27”N and S. Altitude range. Sea-level to 1 750 m. Rainfall requirements. It is essentially a grass of the wet tropics, but still has good drought tolerance adapted to a dry season of four to five months. It prefers 1 500 mm or more of rain."

Qsn #	Question	Answer
204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Jan 2022]	"Native Africa EAST TROPICAL AFRICA: Kenya, Tanzania, Uganda WEST-CENTRAL TROPICAL AFRICA: Burundi, Democratic Republic of the Congo, Rwanda Cultivated Southern America CARIBBEAN: Cuba WESTERN SOUTH AMERICA: Colombia Naturalized Southern America CENTRAL AMERICA: Costa Rica NORTHERN SOUTH AMERICA: French Guiana, Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Colombia, Peru SOUTHERN SOUTH AMERICA: Paraguay"
	Snow, N. & Lau, A. (2010). Notes on grasses (Poaceae) in Hawai'i: 2. Bishop Museum Occasional Papers 107: 46–60	"Several specimens in Hawai'i formerly treated as B. brizantha are re-determined below. Based on current holdings at BISH, B. brizantha appears to be limited to a single collection from Maui (Oppenheimer 2008: 31) collected from the Hāna District, apart from an experimental planting from 1940 on O'ahu (Hosaka 2553). Material examined. KAUA'I: Kōloa Distr, Kalāheo, roadside bank along Ikala Rd, 21°55'48"N, 159°30'57"W, 249 m [ca 815 ft], 15 oct 2007, C. Trauernicht 208 & M. Clark; Kōloa Distr, Kalāheo, vacant lot near junction of Kikala and Wawe roads, 224 m [ca 735 ft], 15 Oct 2007, T. Flynn 7371. MOLOKA'I: Hawai'i Plant Materials Center, extremely vigorous growth, probably introduced as a contaminant from seed shipment from Australia, Apr 1993, R. Joy s.n. (BISH 634161). KAHO'OLAWE: Moa'ulanui, near K1 where it heads into the crater, 5 m mauka of rd. (20°33'N, 156°34'W), 395 m [ca 1295 ft], 7 Jun 2004, F. Starr & K. Starr 040607-4. HAWAI'I: South Hilo Distr, Hwy 11 near Hilo, 90 m [ca 295 ft], 17 Jun 2003, L.W. Pratt 3341."

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Jan 2022]	"Cultivated Southern America CARIBBEAN: Cuba WESTERN SOUTH AMERICA: Colombia Naturalized Southern America CENTRAL AMERICA: Costa Rica NORTHERN SOUTH AMERICA: French Guiana, Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Colombia, Peru SOUTHERN SOUTH AMERICA: Paraguay"

Qsn #	Question	Answer
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"U. decumbens is native to tropical eastern Africa including Kenya, Tanzania, Uganda, Burundi, Rwanda and Congo Democratic Republic (former Zaire). It has been widely cultivated as a pasture grass across tropical and subtropical regions of the world and can now be found naturalized in tropical Asia, Central and South America, the West Indies, Australia, and on several islands in the Pacific Ocean"

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Jan 2022]	"Naturalized Southern America CENTRAL AMERICA: Costa Rica NORTHERN SOUTH AMERICA: French Guiana, Venezuela BRAZIL: Brazil WESTERN SOUTH AMERICA: Colombia, Peru SOUTHERN SOUTH AMERICA: Paraguay"
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed 4 Jan 2022]	"Widely naturalised in northern and eastern Australia. It is most common in the coastal districts of Queensland and northern New South Wales, but is also naturalised in the northern parts of Western Australia and in some inland parts of Queensland."
	Snow, N. & Lau, A. (2010). Notes on grasses (Poaceae) in Hawai'i: 2. Bishop Museum Occasional Papers 107: 46–60	[Kauai, Molokai, Kahoolawe, Hawaii] "Several specimens in Hawai'i formerly treated as B. brizantha are re-determined below. Based on current holdings at BISH, B. brizantha appears to be limited to a single collection from Maui (Oppenheimer 2008: 31) collected from the Hāna District, apart from an experimental planting from 1940 on O'ahu (Hosaka 2553). Material examined. KAUA'I: Kōloa Distr, Kalāheo, roadside bank along Ikala Rd, 21°55'48"N, 159°30'57"W, 249 m [ca 815 ft], 15 oct 2007, C. Trauernicht 208 & M. Clark; Kōloa Distr, Kalāheo, vacant lot near junction of Kikala and Wawe roads, 224 m [ca 735 ft], 15 Oct 2007, T. Flynn 7371. MOLOKA'I: Hawai'i Plant Materials Center, extremely vigorous growth, probably introduced as a contaminant from seed shipment from Australia, Apr 1993, R. Joy s.n. (BISH 634161). KAHO'OLAWE: Moa'ulanui, near K1 where it heads into the crater, 5 m mauka of rd. (20°33'N, 156°34'W), 395 m [ca 1295 ft], 7 Jun 2004, F. Starr & K. Starr 040607-4. HAWAI'I: South Hilo Distr, Hwy 11 near Hilo, 90 m [ca 295 ft], 17 Jun 2003, L.W. Pratt 3341."
	Lau, A. & Frohlich, D. (2013). New plant records for the Hawaiian Islands 2011–2012. Bishop Museum Occasional Papers 114: 5–16	[Oahu] "Urochloa decumbens (Stapf) R.d. Webster New island record This species has previously been documented as naturalized on Hawai'i, Kaho'olawe, and Kaua'i islands. it is documented here as naturalized in open, highly disturbed areas at a military landing zone on O'ahu. Material examined. O'AHU: Schofield Barracks east Range, at "lower 72" landing zone. Weedy, open area cleared for landing zone operations, surrounding area is mesic mixed native/nonnative forest. Grass 0.5 m tall, 15 Mar 2012, J. Beachy, J. Hawkins, M. Akiona, D. Frohlich & A. Lau US Army 272."

302	Garden/amenity/disturbance weed	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed 4 Jan 2022]	[Primarily an environmental weed in some ecosystems] "A weed of gardens, parks, roadsides, disturbed sites, waste areas, creek-banks (i.e. riparian areas), open woodlands and plantation crops (e.g. sugar cane) in sub-tropical and tropical regions."

303	Agricultural/forestry/horticultural weed	
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Orchards & Plantations, Pastures"
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Primarily an environmental weed] "It also invades annual and perennial crops and orchards reducing the production and generating control and removal costs (I3N-Brasil, 2015)."

304	Environmental weed	y
	Source(s)	**Notes**
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed 4 Jan 2022]	"Signal grass (Urochloa decumbens) is regarded as an environmental weed in south-eastern Queensland, and was recently listed among the top 200 most invasive plants in this region. It vigorously colonises disturbed environments and forms dense stands in the understorey of open woodlands, along waterways and on floodplains. This species has also been observed to colonise disturbed corridors that are created for powerlines and road networks in rainforests in the Wet Tropics World Heritage Area in northern Queensland. Where signal grass (Urochloa decumbens) occurred in these corridors, it was generally observed to dominate the site."
	Barbosa, E. G., Pivello, V. R., & Meirelles, S. T. (2008). Allelopathic evidence in Brachiaria decumbens and its potential to invade the Brazilian cerrados. Brazilian Archives of Biology and Technology, 51, 625-631	"The high dominance of Brachiaria grasses over cerrado native herbs has recently raised investigations on the presence of phytotoxins in some species. In cerrados, B. decumbens (Nees) Stapf. has advanced massively throughout the native vegetation and formed monospecific patches with no other species growing below or close to it. In situ studies in São Paulo State cerrado areas have shown that even M. minutiflora, another East-African grass that invaded the cerrado, could have been displaced by B. decumbens (Pivello et al., 1999a; 1999b), revealing a high competitive advantage of the latter species."
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"U. decumbens is a weed and an aggressive invasive grass that rapidly colonizes principally disturbed habitats and forms dense stands in the understory of open forests, woodlands, lowlands, along waterways and on floodplains (Weeds of Australia, 2015; PIER, 2015). It is also a serious problem in soyabean and sugarcane crops (I3N-Brasil, 2015). In Australia (i.e., Queensland) it has been recently listed among the top 200 most invasive plants (Weeds of Australia, 2015). In Brazil, it is invading areas in the “cerrado” and the “caatinga” where it is forming dense stands and displacing native vegetation. It also invades annual and perennial crops and orchards reducing the production and generating control and removal costs (I3N-Brasil, 2015)."

Qsn #	Question	Answer
	de Assis, G. B. (2017). Invasão do campo cerrado por braquiária (Urochloa decumbens): perdas de diversidade e técnicas de restauração. PhD Dissertation. Jardim Botânico do Rio de Janeiro & Escola Nacional de Botânica Tropical, Rio de Janeiro	[Environmental impacts reported in Brazilian savanna] "With the comparison of paired plots, we showed the direct relationship between the presence of U. decumbens, the loss of species and the changes in the plant community. Invaded and not invaded communities differed in richness and density of plants. The impact of the invasion was greater on native subshrubs, forbs and native grasses. The presence of the invasive grass also caused environmental changes in abiotic factors such as soil temperature and available light. In the invasion management experiment, glyphosate treatments showed greater economic viability, but had a great impact on native plants. Hand weeding with or without fire were provided the better results on native vegetation, but had the highest costs. The fire associated with weeding was effective in reducing the cost of this technique by 42%. The recolonization of the areas by the native species after the control of the invasion occurred, mainly, by the regrowth of species already present before the application of the treatments. In savanna ecosystems such as cerrado, which present residual native vegetation showing resilience, passive restoration is viable from the control of the invasive grass. However, some functional groups of species, especially herbaceous plants, are not recovered in the short term."

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	"Urochloa mutica is a fast-growing grass associated with wet habitats. It has become invasive in a number of regions and forms dense covers along streams and other water bodies. Stems grow out on the water surface and build up floating rafts. Such mats may grow up to l m thick. Floating stems may become up to 6 m long (Langeland and Craddock Burks, 1998). The dense and monospecific stands of the weed choke out other plant species (Cowie and Werner, 1993). The grass is tolerant of brackish water and withstands periods of drought. It reproduces and spreads primarily vegetatively by stem fragments, which are carried by water. Viable seeds are rarely produced in Florida (Langeland and Craddock Burks, 1998)."
	Smith, C.W. (1985). Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	[Brachiaria mutica = Urochloa mutica] "This perennial grass can reach heights of 2 m. It forms dense monotypic stands by layering from trailing stems. It will overgrow most shrubs and trees in its habitat. It has mild allelopathic activity (Chou and Young 1975). Man is the principal dispersal agent. Fire is rare in its habitat but the dense stands rapidly regenerate from any damage that they suffer. It has not been evaluated for biological control because it is a valued pasture grass in lowland areas."

Qsn #	Question	Answer
401	**Produces spines, thorns or burrs**	**n**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Description. A trailing perennial 30-60 cm high with heavy lanceolate leaf-blades 8-10 mm wide. Two to five racemes, 2-5 cm long with a broad ciliate rachis and 4-mm-long spikelets (Napper, 1965). The erect stems arise from a long, stoloniferous base and root down from the lower nodes producing a dense sward (Loch, 1978)"

Qsn #	Question	Answer
402	**Allelopathic**	**y**
	Source(s)	**Notes**
	Barbosa, E. G., Pivello, V. R., & Meirelles, S. T. (2008). Allelopathic evidence in Brachiaria decumbens and its potential to invade the Brazilian cerrados. Brazilian Archives of Biology and Technology, 51, 625-631	[Documented in laboratory assays. Field trials recommended to corroborate laboratory results] "Although the results here obtained came from a laboratory assay, they indicate the capacity of B. decumbens to release allelopathic substances to the environment. As in natural conditions, where a great number of interactions with the physical nvironment, as well as with other organisms, can enhance or restrain allelopathic effects, field experiments must be carried out to test the effectiveness of such allelopathic potential under natural conditions (Inderjit and Callaway, 2003). However, the great success of B. decumbens on invading cerrados could in part be due to allelopathy, as suggested in other parts of the world by authors who related allelopathy to biological invasions (Hiero and Callaway, 2003; Vivanco et al,. 2004; Ridenour and Callaway, 2001; Vaughn and Berhow, 1999)."

Qsn #	Question	Answer
403	**Parasitic**	**n**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"A trailing perennial 30-60 cm high with heavy lanceolate leaf-blades 8-10 mm wide."

Qsn #	Question	Answer
404	**Unpalatable to grazing animals**	**n**
	Source(s)	**Notes**
	Sotomayor-Rios, A. & Pitman, W. D.(Eds.). (2000). Tropical Forage Plants: Development and Use. CRC Press, Boca Raton, FL	"Brachiaria decumbens (signalgrass) is a decumbent, stoloniferous, and rhizomatous apomictic perennial, which is well adapted to the humid tropical areas but does not tolerate flooding. It is readily established from seed and forms a dense ground cover that is tolerant of heavy grazing."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"highly palatable to stock, readily grazed, forage, withstands drought but not waterlogging, valuable grass for erosion control, withstands heavy grazing"

Qsn #	Question	Answer
405	**Toxic to animals**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Reported to cause scouring if eaten continually for a long time."
	Burrows, G. E., & Tyrl, R. J. (2013). Toxic Plants of North America. Second Edition. Wiley-Blackwell, Hoboken, NJ	"Urochloa decumbens is the cause, elsewhere in the world, of several problems, including hepatogenous photosensitization, kidney disease, and decreased rumen motility (Abas Mazni et al. 1983; Salam Abdullah et al. 1988, 1989). It and U. brizantha cause crystal -associated or crystalloid cholangiohepatopathy (Graydon et al. 1991; Cruz et al. 2001; Brum et al. 2007; Riet -Correa et al. 2011). Neurotoxic effects including ataxia, head pressing, and circling, are seen occasionally, and are probably secondary to the liver problems (Salam Abdullah et al. 1989). These problems are similar to those produced by species of closely related Panicum, Tribulus in the Zygophyllaceae (Chapter 76), and Agave and Nolina in the Agavaceae (Chapter 3)."
	Sotomayor-Rios, A. & Pitman, W. D.(Eds.). (2000). Tropical Forage Plants: Development and Use. CRC Press, Boca Raton, FL	[May cause problems when grazed in pure stands] "Photosensitization of skin and hepatic disorders can be problems for young cattle, goats, and sheep when signalgrass is grazed as a pure stand."

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 4 Jan 2022]	"Relatively free from diseases and pests including leaf-cutting ants but susceptible to spittlebugs (Aeneolamia, Deois and Zulia spp. Hemiptera: Cercopidae). Spittlebug susceptibility has greatly reduced the use of signal grass in tropical America, although mature stands may recover from attack. Susceptible to to spider mite (Tetranychus urticae). Numerous fungal diseases have been identified, the more serious being rust caused by Uromyces setariae-italicae, inflorescence blight caused by Claviceps sulcata, and foliar blight caused by Rhizoctonia solani."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Potentially harmful to grazing animals, but no evidence of toxicity to humans] "Reported to cause scouring if eaten continually for a long time."

408	Creates a fire hazard in natural ecosystems	
	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 4 Jan 2022]	"Usually not subjected to regular burning because leaf is normally heavily grazed or harvested before fires occur. However, U. decumbens can be burnt during the dry season and recovers rapidly from stolons and seed with the onset of rains."

Qsn #	Question	Answer
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	[May contribute to fuel load in fire prone habitats or increase fire risk during dry periods] "Response to fire. It is affected by burning but if the environment is dry enough, B. decumbens will take a fire and recovery after fire is usually satisfactory. It colonizes bare patches in Cymbopogon nardus grassland in Ankole, Uganda, which is usually burnt annually (Harrington, 1974)."

409	Is a shade tolerant plant at some stage of its life cycle	
	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 4 Jan 2022]	"Intermediate tolerance to shade and suitable for ground cover under more open plantations. It is a common species under mature coconuts (>60% light transmission), but less tolerant of heavy grazing under reduced light than in full sun."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Soil requirements. It is tolerant of a wide range of soils and is little affected by high aluminium soils (Spain & Andrew, 1977) or shallow soils. It needs good drainage and fertile conditions for its maximum growth but persists on poor soils."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"A trailing perennial 30-60 cm high with heavy lanceolate leaf-blades 8-10 mm wide."

412	Forms dense thickets	y
	Source(s)	**Notes**
	Barbosa, E. G., Pivello, V. R., & Meirelles, S. T. (2008). Allelopathic evidence in Brachiaria decumbens and its potential to invade the Brazilian cerrados. Brazilian Archives of Biology and Technology, 51, 625-631	"In cerrados, B. decumbens (Nees) Stapf. has advanced massively throughout the native vegetation and formed monospecific patches with no other species growing below or close to it. In situ studies in São Paulo State cerrado areas have shown that even M. minutiflora, another East-African grass that invaded the cerrado, could have been displaced by B. decumbens (Pivello et al., 1999a; 1999b), revealing a high competitive advantage of the latter species."
	Sotomayor-Rios, A. & Pitman, W. D.(Eds.). (2000). Tropical Forage Plants: Development and Use. CRC Press, Boca Raton, FL	"It is readily established from seed and forms a dense ground cover that is tolerant of heavy grazing. Compatibility with legumes can be a problem, especially in fertile situations."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	[Terrestrial] "Open grasslands and partial shade on the Great Lakes Plateau in Uganda and adjoining countries of East and Central Africa (Loch, 1978)."

502	**Grass**	**y**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Jan 2022]	Family: Poaceae (alt. Gramineae) Subfamily: Panicoideae Tribe: Paniceae Subtribe: Melinidinae

503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Jan 2022]	Family: Poaceae (alt. Gramineae) Subfamily: Panicoideae Tribe: Paniceae Subtribe: Melinidinae

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 trailing perennial 30-60 cm high with heavy lanceolate leaf-blades 8-10 mm wide. Two to five racemes, 2-5 cm long with a broad ciliate rachis and 4-mm-long spikelets (Napper, 1965). The erect stems arise from a long, stoloniferous base and root down from the lower nodes producing a dense sward (Loch, 1978)"

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"Distribution. Native to Africa and now widespread in the tropics and subtropics."

Qsn #	Question	Answer
602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Sotomayor-Rios, A. & Pitman, W. D.(Eds.). (2000). Tropical Forage Plants: Development and Use. CRC Press, Boca Raton, FL	"Brachiaria decumbens (signalgrass) is a decumbent, stoloniferous, and rhizomatous apomictic perennial, which is well adapted to the humid tropical areas but does not tolerate flooding. It is readily established from seed and forms a dense ground cover that is tolerant of heavy grazing."

603	**Hybridizes naturally**	**n**
	Source(s)	**Notes**
	De Souza-Kaneshima, A. M. et al. (2010). Meiotic behaviour in the first interspecific hybrids between Brachiaria brizantha and Brachiaria decumbens. Plant Breeding, 129(2), 186-191	[Artificial hybrids produced, but natural hybrids unlikely due to apomictic breeding system] "Hybridization in the genus Brachiaria is a complex undertaking due to apomixis and polyploidy. The two major species: Brachiaria brizantha and Brachiaria decumbens are predominantly tetraploid and apomictic. Natural sexual compatible genotypes were not identified."

604	**Self-compatible or apomictic**	**y**
	Source(s)	**Notes**
	Sotomayor-Rios, A. & Pitman, W. D.(Eds.). (2000). Tropical Forage Plants: Development and Use. CRC Press, Boca Raton, FL	"Brachiaria decumbens (signalgrass) is a decumbent, stoloniferous, and rhizomatous apomictic perennial, which is well adapted to the humid tropical areas but does not tolerate flooding."

605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"it is an obligate aposporous apomict"

606	**Reproduction by vegetative fragmentation**	**y**
	Source(s)	**Notes**
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed]	"Plants may form a loose tuft and can also spread outwards via creeping stems (i.e. stolons)."
	Skerman, P.J. & Riveros, F. (1990). Tropical Grasses. FAO, Rome	"The erect stems arise from a long, stoloniferous base and root down from the lower nodes producing a dense sward (Loch, 1978)"

Qsn #	Question	Answer
607	**Minimum generative time (years)**	**1**
	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 4 Jan 2022]	"U. decumbens seed in Australia and Brazil can be produced by direct heading with high-capacity harvesters capable of handling the large bulk of decumbent leaves which hold fallen seed. At 16° S in Brazil, seed can be harvested 35–44 days after flowering, with 2 harvests per year (early and late in the wet season). High seed yields of 400–1,000 kg/ha are common in Brazil and Australia, but seed yields are commonly poor at latitudes close to the equator."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**n**
	Source(s)	**Notes**
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed]	"The seeds may be dispersed by water and animals, and in contaminated agricultural produce (e.g. pasture seeds)." [Possibly, but not identified as an important vector]

703	**Propagules likely to disperse as a produce contaminant**	**y**
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Ornamental, Pasture Dispersed by: Humans, Escapee"
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed 4 Jan 2022]	"This species reproduces by seed and also vegetatively via its creeping stems (i.e. stolons). The seeds may be dispersed by water and animals, and in contaminated agricultural produce (e.g. pasture seeds)."

704	**Propagules adapted to wind dispersal**	**n**
	Source(s)	**Notes**
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed 4 Jan 2022]	"The seeds may be dispersed by water and animals, and in contaminated agricultural produce (e.g. pasture seeds)."

705	**Propagules water dispersed**	**y**
	Source(s)	**Notes**
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed 4 Jan 2022]	"The seeds may be dispersed by water and animals, and in contaminated agricultural produce (e.g. pasture seeds)."

Qsn #	Question	Answer
706	**Propagules bird dispersed**	**n**
	Source(s)	**Notes**
	Queensland Government. (2022). Weeds of Australia. Urochloa decumbens. https://keyserver.lucidcentral.org/weeds. [Accessed 4 Jan 2022]	"The seeds may be dispersed by water and animals, and in contaminated agricultural produce (e.g. pasture seeds)."

707	**Propagules dispersed by other animals (externally)**	**y**
	Source(s)	**Notes**
	Rebolo, I. F., Zirondi, H. L., Fidelis, A., & Christianini, A. V. (2021). Native ants help to spread an invasive African grass in the Cerrado. Biotropica: DOI: 10.1111/btp.13035	"Urochloa decumbens is an African grass that is invading the tropical savannas from Central South America, the Cerrado (top). The copious seed production is harvested by fungus-growing ants such as M. goeldii (Attini) that carries seeds to their nests. Some seeds are discarded intact around ant nest entrances in native Cerrado (right panel). These seeds are viable and can germinate (lower panel), potentially contributing to the spread of the invasive grass into native Cerrado"

708	**Propagules survive passage through the gut**	**y**
	Source(s)	**Notes**
	Gardener, C.J., McIvor, J.G. & Jansen, A. (1993). Survival of Seeds of Tropical Grassland Species Subjected to Bovine Digestion. Journal of Applied Ecology 30(1): 75-85	"The perennial grasses with seed which survived digestion (i.e. Brachiaria decumbens, Cynodon dactylon, Axonopus affinis, Paspalum notatum and Pennisetum clandestinum) have similar characteristics. All are creeping rhizomatous or stoloniferous species better adapted to more humid conditions, and all form short dense swards or lawns under heavy grazing or mowing. In the first four species, the seed heads are carried on short stalks above the sward, making it difficult for cattle to reject the seed when grazing the foliage. Similarly, fallen seed tends to lodge in foliage and be eaten later."

801	**Prolific seed production (>1000/m2)**	**y**
	Source(s)	**Notes**
	Dantas-Junior, A. B., Musso, C., & Miranda, H. S. (2018). Seed longevity and seedling emergence rate of Urochloa decumbens as influenced by sowing depth in a Cerrado soil. Grass and Forage Science, 73(3), 811-814	"Seedling emergence of 74% is considered high, especially in areas that have a high density of U. decumbens such as abandoned pastures, where the seed density may reach 8,600 seeds/m2 (Pancera, 2011). For a U. decumbens pasture area undergoing natural regeneration, Martins, Almeida, Fernandes, and Ribeiro (2008) reported a seed bank density of 858 seeds/m² for soil depth of up to 5.0 cm."

Qsn #	Question	Answer
	Xavier, R. O., Christianini, A. V., Pegler, G., Leite, M. B., & Silva-Matos, D. M. (2021). Distinctive seed dispersal and seed bank patterns of invasive African grasses favour their invasion in a neotropical savanna. Oecologia, 196(1), 155-169	[May reach densities in excess of 1000 seeds/m2 in some conditions] "Urochloa decumbens may produce a large amount (over 400 kg ha−1) of relatively large seeds, which typically remain viable in the soil for a short period (Dantas-Junior et al. 2018)." ... "Table 2 Seed traits, seed limitation values and average (± standard deviation) abundance of African and seven of the most representative native grass species in the established vegetation, seed rain and seed bank of grassland and savanna sites in southeastern Brazil" [Seed rain (seeds m−2.year) - Urochloa decumbens - Grassland = 4 ± 13 seeds m−2.year; Savanna = 576 ± 1079 seeds m−2.year]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	**Notes**
	Dantas-Junior, A. B., Musso, C., & Miranda, H. S. (2018). Seed longevity and seedling emergence rate of Urochloa decumbens as influenced by sowing depth in a Cerrado soil. Grass and Forage Science, 73(3), 811-814	[No seeds germinated after 5 months] "Urochloa decumbens (Signal grass) is an African grass species that is widely used in Brazil for pasture formation, and it has a high potential for invading natural areas. This study evaluated the longevity of U. decumbens seeds in the soil seed bank and the emergence rates of seedlings from different depths. In the greenhouse (natural light; ~25°C), seeds were sown at depths of 0, 1, 2 or 3 cm, in trays filled with sterile soil, to assess seedling emergence. Seeds sowed on the soil surface began to germinate 3 days after sowing. Seeds sowed at depths of 2 and 3 cm germinated 5 days after sowing. No seedlings emerged after 15 days. The seedling emergence rate was 74 ± 7% with no significant difference between sowing depths. In the field, seed longevity was evaluated by burying 60 replicates of 100 seeds at a soil depth of 2–3 cm, in a Cerrado area in the IBGE Ecological Reserve, Brasilia. From September 2016 to April 2017, five samples were retrieved monthly to assess seed viability. In September, the viability was 68%, declining to 3% in October; by February, viable seeds were no longer recorded. As U. decumbens flowers in several episodes throughout the year, a soil survey may result in a misleading interpretation of the formation of a permanent soil seed bank."

803	Well controlled by herbicides	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 4 Jan 2022]	"Tolerates pre-emergence application of atrazine when establishing in weedy cultivation land. Controlled using glyphosate at 1.5–2.9 kg a.i./ha."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	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 4 Jan 2022]	[Tolerates heavy grazing and fire] "Very tolerant of heavy grazing. The leaf area recedes showing some bare soil under lower rainfall conditions but the stolons persist. Shading reduces tolerance of heavy grazing. Persistent under regular cutting, but very frequent cutting results in prostrate leaf growth which is difficult to harvest." ... "Usually not subjected to regular burning because leaf is normally heavily grazed or harvested before fires occur. However, U. decumbens can be burnt during the dry season and recovers rapidly from stolons and seed with the onset of rains."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Sotomayor-Rios, A. & Pitman, W. D.(Eds.). (2000). Tropical Forage Plants: Development and Use. CRC Press, Boca Raton, FL	[The presence of the two-lined spittlebug in Hawaii may act as a limiting factor for this grass] "Brachiaria decumbens Stapf (signalgrass) is a low to moderately high growing perennial, rhizomatous/stoloniferous grass that has the same general area of adaptation as B. brizantha. B. decumbens has lower forage quality than does B. brizantha. Signalgrass was the first of this genus to be widely used in Brazil, but its susceptibility to spittlebug attack caused growers to change to B. humidicola."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad climate suitability
• Thrives and spreads in regions with tropical climates
• Naturalized on Kauai, Oahu, Molokai, Kahoolawe, Hawaii (Hawaiian Islands) and elsewhere
• A weed of gardens, parks, roadsides, disturbed sites, waste areas, creek-banks (i.e., riparian areas), open woodlands and plantation crops
• An environmental weed, impacting native vegetation in Brazil and Australia
• Other Urochloa species are invasive
• Allelopathic
• Potentially toxic or harmful to grazing animals under certain growing conditions
• Tolerates many soil types
• Forms a dense cover that can exclude other vegetation
• Reproduces by seeds and stolons
• Apomictic
• Seeds dispersed by water, animals, as a produce contaminant, by ants, and intentional cultivation
• Prolific seed production
• Tolerates heavy grazing and fire

Low Risk Traits
• Despite naturalization, negative impacts have not been reported from the Hawaiian Islands to date
• Unarmed (no spines, thorns, or burrs)
• Palatable to grazing animals
• Seeds lose viability after 5 months (do not form a persistent seed bank)
• Herbicides may provide effective control