

Taxon: *Urochloa humidicola* (Rendle) Morrone & Zuloaga

Family: Poaceae

Common Name(s): creeping signal grass
koronivia grass

Synonym(s): *Brachiaria humidicola* (Rendle)
Panicum humidicola Rendle

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 12 Feb 2018

WRA Score: 10.0

Designation: H(HPWRA)

Rating: High Risk

Keywords: Tropical Grass, Weedy, Palatable, Shade-Tolerant, Stoloniferous

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	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	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	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	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)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal		
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
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
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed]	[Apomictic cultivars available. Would increase ability to spread] "No breeding programs have been undertaken to date. Commercial cultivars, and at least half of the accessions studied to date, are aposporous apomicts. As a result there is limited variation among accessions. Cv. Tully is an apomictic hexaploid. Chromosome number $2n = 4x = 36$, $2n = 6x = 54$."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. 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, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 11 Feb 2018]	"Native Africa East Tropical Africa: Kenya ; Tanzania Northeast Tropical Africa: Ethiopia ; Sudan South Tropical Africa: Angola ; Malawi ; Mozambique ; Zambia ; Zimbabwe Southern Africa: Botswana ; Namibia ; South Africa KwaZulu-Natal, Transvaal West-Central Tropical Africa: Zaire"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 11 Feb 2018]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"Altitude range. 1000-2000 m."

Qsn #	Question	Answer
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"In its native range in equatorial Africa, grows at altitudes of up to 2,400 m asl . In exotic environments, B. humidicola is considered to be a grass for tropical lowland environments, but can extend to 1,000 m altitude and can be found in lowlands at latitudes up to 27°. Produces less cool season growth, but more hot season growth than B. decumbens . Poor frost tolerance ." [Elevation range exceeds 1000 m in tropical environments]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 11 Feb 2018]	"Native Africa East Tropical Africa: Kenya ; Tanzania Northeast Tropical Africa: Ethiopia ; Sudan South Tropical Africa: Angola ; Malawi ; Mozambique ; Zambia ; Zimbabwe Southern Africa: Botswana ; Namibia ; South Africa KwaZulu-Natal, Transvaal West-Central Tropical Africa: Zaire Naturalized Southern America Brazil: Brazil Caribbean: Puerto Rico Northern South America: French Guiana Western South America: Colombia ; Ecuador"
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Sudan, Kenya, Tanzania."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Grown widely in humid-tropical countries of South America, the Pacific Islands and south-east Asia, and in coastal regions of northern Australia."
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 11 Feb 2018]	"Naturalized Southern America Brazil: Brazil Caribbean: Puerto Rico Northern South America: French Guiana Western South America: Colombia ; Ecuador Cultivated Southern America Brazil: Brazil Caribbean: Trinidad and Tobago Western South America: Colombia"
	Stur, W. W., & Shelton, H. M. (1991). Review of forage resources in plantation crops of Southeast Asia and the Pacific. Pp. 25-31 in H.M. Shelton and W. W. Stur (eds). Forages for Plantation Crops. ACIAR Proceedings No. 32	"This species is widely used in Fiji and can be propagated easily by cuttings."

301	Naturalized beyond native range	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 11 Feb 2018]	"Naturalized Southern America Brazil: Brazil Caribbean: Puerto Rico Northern South America: French Guiana Western South America: Colombia ; Ecuador"
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2018. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 11 Feb 2018]	No evidence in Hawaiian Islands to date

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"B. humidicola is very aggressive. Its ability to spread rapidly and to form a dense bulk of herbage under light or no grazing prevents other species invading. This may also be related to its ability to inhibit nitrification. It is thus very useful for establishing a pasture in the humid tropics because it prevents the normal explosion of broad-leaved weeds. For the same reason, it is not compatible with most forage legumes, but can combine well with creeping legumes under moderate to high grazing pressures."

Qsn #	Question	Answer
	Pastures Australia. 2009. Humidicola. https://keys.lucidcentral.org/keys/v3/pastures/Html/Humidicola.htm . [Accessed 12 Feb 2018]	"Weed potential - Moderate. Evaluated with a medium weed risk by the Northern Territory Weed Risk Assessment method. Adapted to wet areas."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Listed as naturalized and/or a weed. Impacts unknown] " <i>Brachiaria humidicola</i> ... References: Brazil-W-255, South Africa-R- 121, Brazil-W-360, Brazil-W-407, Australia-N-368, Australia-W-54, Paraguay-I-987, Australia-N-354, Brazil-N- 1733, Bolivia-U-1753, Bolivia-N-1796, Colombia-N-1796, -I-, Australia-W-1977, Bhutan-W-1977, Bolivia-W-1977, Brazil- W-1977, Fiji-W-1977, Niue-W-1977, Vanuatu-W-1977."

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Weed potential - Can invade and then dominate multi-species pastures. Like many grasses, it has the potential to colonise disturbed sites, although its spread is predominantly from stolons and therefore slow."

304	Environmental weed	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Designated as an environmental weed with the following citation: Smith, N.M. (2002). Weeds of the Wet/Dry Tropics of Australia. (A Field Guide). The Environment Centre NT, Inc. Unable to confirm designation

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	" <i>Urochloa mutica</i> 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 1 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	[<i>Brachiaria mutica</i> = <i>Urochloa mutica</i>] "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."

401	Produces spines, thorns or burrs	n
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Qsn #	Question	Answer
	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] "Perennial, strongly stoloniferous, procumbent, slender, geniculate and rooting at the nodes, leaf blades broadly linear, leaf sheaths villous, silky inflorescence, spikelets in two rows, upper lemma shiny"

402	Allelopathic	Y
	Source(s)	Notes
	Stur, W. W., & Shelton, H. M. (1991). Review of forage resources in plantation crops of Southeast Asia and the Pacific. Pp. 25-31 in H.M. Shelton and W. W. Stur (eds). Forages for Plantation Crops. ACIAR Proceedings No. 32	"As with <i>B. decumbens</i> , a major difficulty is the maintenance of companion herbaceous legumes. On the other hand, its vigorous habit suppresses weed growth."
	Ribeiro, R. C., de Carvalho, M. G., Lopes, H. M., Rossiello, R. O. P., & Barbieri Junior, É. (2012). Allelopathic activity of the hydrolate and water decoction of <i>Brachiaria humidicola</i> (Rendle) plant parts on the germination of four tropical leguminous species. ISRN Agronomy, 2012: doi:10.5402/2012/838767	"Knowledge of allelopathic interactions between grasses and legumes can contribute for the successful establishment of mixed tropical pastures in Brazil. The purpose of this work was to evaluate the allelopathic effect of the hydrolate and water decoction of <i>Brachiaria humidicola</i> (Rendle) plant parts (root, shoot, and seeds) on four tropical forage legumes <i>Stylosanthes</i> spp. cv. Campo Grande, <i>Macrotyloma axillare</i> , <i>Calopogonium mucunoides</i> , <i>Desmodium ovalifolium</i> , and on lettuce (<i>Lactuca sativa</i> L.), this last species used as a sensitivity standard in allelopathic bioassays. The results obtained for roots and shoots showed, in the case of hydrolate, the highest inhibitory effect on germination rates of the receiving species, while seed hydrolates had a stimulating effect depending on the legume species. In contrast, water decoction extracts had the highest inhibitory effects on root and seed fraction, and the lowest on the shoot fraction. Regarding the receiving species, germination percentages of <i>M. axillare</i> showed higher tolerance to inhibitory effects of the aqueous extracts of <i>B. humidicola</i> , while <i>D. ovalifolium</i> showed the highest sensitivity."
	Pastures Australia. 2009. Humidicola. https://keys.lucidcentral.org/keys/v3/pastures/Html/Humidicola.htm . [Accessed 12 Feb 2018]	"Legumes: Is extremely competitive when established and will choke out legumes."

Qsn #	Question	Answer
	Souza Filho, A. P. S., Pereira, A. A. G., & Bayma, J. C. (2005). Allelochemical produced by the forage grass <i>Brachiaria humidicola</i> . <i>Planta daninha</i> , 23(1), 25-32	"The traditional methods of weed control in cultivated pasture do not meet society's present and future needs of protecting natural resources and life quality. An alternative to this problem could be the use of secondary metabolites produced by plants. These products present few risks to the environment and meet society interests. Therefore, this research was carried out to isolate, identify and characterize the allelopathic activity of chemical compounds produced by the forage grass <i>Brachiaria humidicola</i> . The allelopathic effects of the extracts, fractions and compound were tested on seed germination and root elongation of the weeds <i>Mimosa pudica</i> , <i>Senna obtusifolia</i> and <i>Senna occidentalis</i> . Germination bioassays were developed under 25 °C and a photoperiod of 12 hours. For root elongation, the bioassay conditions were 25 °C and photoperiod of 24 hours. Hydromethanolic extract was used as a source for isolating and identifying p-coumaric acid. The allelopathic effects were positively related to p-coumaric acid concentration, weed species and the evaluated parameter. Comparatively, <i>S. occidentalis</i> and <i>M. pudica</i> showed the greatest sensitivity to the allelopathic effects. For <i>S. obtusifolia</i> no allelopathic effects promoted by p-coumaric acid on seed germination or on root elongation could be detected under the concentration of 1.0 and 8.0 mg L ⁻¹ . Root elongation was more sensitive to p-coumaric acid allelopathic effects than seed germination."
	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	[Related species, <i>Urochloa mutica</i> , mildly allelopathic] "It has mild allelopathic activity (Chou and Young 1975)."

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	"Perennial, strongly stoloniferous, procumbent, slender, geniculate and rooting at the nodes," [Poaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Stur, W. W., & Shelton, H. M. (1991). Review of forage resources in plantation crops of Southeast Asia and the Pacific. Pp. 25-31 in H.M. Shelton and W. W. Stur (eds). Forages for Plantation Crops. ACIAR Proceedings No. 32	" <i>Brachiaria humidicola</i> is a strongly stoloniferous grass with an adaptation similar to <i>B. decumbens</i> , but it does particularly well on alkaline coralline soils (Macfarlane and Shelton 1986). It can withstand a higher stocking pressure than <i>B. decumbens</i> and, although less readily accepted by cattle, it has been reported to produce reasonable liveweight gains (Reynolds 1988)."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"ground cover, pasture grass, forage, palatable, grazed, high-yielding grass, useful for erosion control, can withstand very heavy grazing"
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"It is palatable when young, but of low palatability at maximum productivity (Roberts, 1970a, b)."

405	Toxic to animals	

Qsn #	Question	Answer
	Source(s)	Notes
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"ground cover, pasture grass, forage, palatable, grazed, high-yielding grass, useful for erosion control, can withstand very heavy grazing" [No evidence]
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	[Potentially] "Toxicity - Photosensitization has been recorded in horses grazing <i>B. humidicola</i> pasture for over 5 months, but is not common. Its low Ca concentration and high levels of oxalate may induce 'big head' disease (parathyroidism) in horses. Can be overcome by feeding of appropriate mineral supplements."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"Diseases. It is resistant to diseases. Pests. It has no serious insect pests. It is resistant to spittle bug (<i>Deois incompleta</i>) in the Brazilian humid tropics (Serrao et al., 1979)."
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Tolerant of, but not truly resistant to spittlebugs (<i>Aeneolamia</i> spp., <i>Deois</i> spp. and <i>Zulia</i> spp.); more tolerant than <i>B. decumbens</i> and recovers quickly making it useful in parts of South America, but can be badly attacked in the humid tropics of Brazil. In Brazil, accession IRI 409 favours spittlebug multiplication. Highly resistant to leaf-cutting ants (<i>Acromyrmex</i> spp. and <i>Atta</i> spp.), but can be severely attacked by striped grass worm (<i>Mocis latipes</i>). A leaf rust (<i>Uromyces setariae-italicae</i>), introduced from Africa, has attacked <i>B. humidicola</i> in Brazil, Colombia, Peru and Ecuador, and can lead to 100% loss of yield."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"Toxicity. No toxicity has been reported."
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	[Potentially toxic to animals. Unlikely to affect humans] "Photosensitization has been recorded in horses grazing <i>B. humidicola</i> pasture for over 5 months, but is not common. Its low Ca concentration and high levels of oxalate may induce 'big head' disease (parathyroidism) in horses. Can be overcome by feeding of appropriate mineral supplements."
	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

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Fire - <i>B. humidicola</i> is not often burned because frequent heavy grazing and humid climate reduce the chance of a build up of dry fuel. However, it will recover well from accidental fire." [Climate and grazing regimen may reduce fuel build up. Could potentially contribute to fuel load in fire prone habitats/climates]

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Grows best in full sunlight but has moderate shade-tolerant (e.g. as under mature coconut plantations). Less shade tolerant than <i>B. subquadriflora</i> and <i>Stenotaphrum secundatum</i> ."
	Stur, W. W., & Shelton, H. M. (1991). Review of forage resources in plantation crops of Southeast Asia and the Pacific. Pp. 25-31 in H.M. Shelton and W. W. Stur (eds). Forages for Plantation Crops. ACIAR Proceedings No. 32	"Table 3. Summary of adaptation of frequently occurring forages." [Brachiaria humidicola - Tolerance to shade - M = moderate]
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"tolerates shade and poor drainage, found in swampy sites, damp grassland"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Grows on a very wide range of soil types from very acid-infertile (pH 3.5), high Al soils, to heavy cracking clays, to high pH coralline sands. Grows well in infertile soils with low P levels, but will respond to N and P. Has a low Ca requirement. Tolerant of poor drainage and often found on seasonally wet clays in valley bottoms."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Perennial, strongly stoloniferous, procumbent, slender, geniculate and rooting at the nodes, leaf blades broadly linear, leaf sheaths villous, silky inflorescence, spikelets in two rows, upper lemma shiny"

412	Forms dense thickets	y
	Source(s)	Notes
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"Because of its dense growth it is difficult to establish legumes with it." ... "It forms a dense, somewhat woody mat layer beneath grazing level and effectively suppresses weeds (Roberts, 1970a, b)."

501	Aquatic	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	[Terrestrial] "Natural habitat. Valley grassland in moist situations, road verges, and vleis."
502	Grass	y
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 11 Feb 2018]	"Family: Poaceae (alt.Gramineae) Subfamily: Panicoideae Tribe: Paniceae Subtribe: Melinidinae"
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 11 Feb 2018]	"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
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Perennial, strongly stoloniferous, procumbent, slender, geniculate and rooting at the nodes, leaf blades broadly linear, leaf sheaths villous, silky inflorescence, spikelets in two rows, upper lemma shiny"
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 12 Feb 2018]	[No evidence. Widespread native & introduced ranges] "Native Africa East Tropical Africa: Kenya ; Tanzania Northeast Tropical Africa: Ethiopia ; Sudan South Tropical Africa: Angola ; Malawi ; Mozambique ; Zambia ; Zimbabwe Southern Africa: Botswana ; Namibia ; South Africa KwaZulu-Natal, Transvaal West-Central Tropical Africa: Zaire Naturalized Southern America Brazil: Brazil Caribbean: Puerto Rico Northern South America: French Guiana Western South America: Colombia ; Ecuador"

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Seed can be used for larger commercial plantings. Seed may be dormant for 6 months after harvest and so should be stored or acid-scarified before planting. Seed is broadcast at 2–8 kg/ha (depending on germination percentage) onto a well-prepared seedbed and lightly harrowed. Seed will decline in quality rapidly if stored inappropriately and poor seed quality has been the cause of many planting failures."

603	Hybridizes naturally	
	Source(s)	Notes
	Boldrini, K. R., Pagliarini, M. S., & Valle, C. D. (2010). Evidence of natural hybridization in <i>Brachiaria humidicola</i> (Rendle) Schweick.(Poaceae: Panicoideae: Paniceae). <i>Journal of Genetics</i> , 89(1), 91-94	[One accession suspected of originating from a natural hybrid] "This paper reports the unusual cytological behaviour during meiosis in one accession of <i>Brachiaria humidicola</i> from the Embrapa Beef Cattle germplasm collection." ... "The accession under analysis (H003, BRA004812) was collected in wild African savannas, in the region of Sidamo (Ethiopia)," ... "The cytological behaviour during microsporogenesis of H003 clearly suggests the occurrence of hybridization between two genitors of different ploidy levels, of an uncommon basic number and especially with different meiotic rhythms, mainly in the timing of anaphase."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Jungmann, L. et al. . (2010). Genetic diversity and population structure analysis of the tropical pasture grass <i>Brachiaria humidicola</i> based on microsatellites, cytogenetics, morphological traits, and geographical origin. <i>Genome</i> , 53(9), 698-709	" <i>Brachiaria humidicola</i> reproduces mainly by apospory, one of the types of apomixis defined by Nogler (1984). For <i>B. humidicola</i> , apomixis is facultative in most genotypes, and a meiotically derived sac may be present along with an aposporous sac in the same ovule or in different ovules of the same plant."
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Commercial cultivars, and at least half of the accessions studied to date, are aposporous apomicts. As a result there is limited variation among accessions. Cv. Tully is an apomictic hexaploid."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Zomlefer, W.B. 1994. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	[Family Description] "The reduced flowers are anemophilous, although pollen-gathering insects have been reported for some grass species (Soderstrom and Calderon 1971; Terrell and Batra 1984)."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes

Qsn #	Question	Answer
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"B. humidicola is favoured by many smallholders with grazing land because it establishes reliably and spreads rapidly from stem cuttings planted at 1 m x 1 m spacings. Larger areas can be planted by spreading stolons over cultivated soil and lightly incorporating with disc harrows." ... "Rarely naturalises from spread by seed but will spread well over short distances by stolons."
	Stur, W. W., & Shelton, H. M. (1991). Review of forage resources in plantation crops of Southeast Asia and the Pacific. Pp. 25-31 in H.M. Shelton and W. W. Stur (eds). Forages for Plantation Crops. ACIAR Proceedings No. 32	"Being intensely stoloniferous, it covers the ground well on red soils but is slow to colonize heavy black soils in Fiji." ... "Main attributes. Its strongly stoloniferous habit, with ability to root at the stolon nodes, covers the ground rapidly and competes particularly well with weeds."

607	Minimum generative time (years)	
	Source(s)	Notes
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	[Time to reproductive maturity unspecified] "A procumbent stoloniferous perennial with lanceolate leaf blades;" ... "It grows well in summer, and flowering does not normally commence till November in Fiji." ... "It is a shy seeder, and this factor alone contributes to its slow spread (Roberts, 1970a, b). The seed also has low viability."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Rarely naturalises from spread by seed but will spread well over short distances by stolons." [No evidence. Probably not, given limited seed production in cultivation]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Grown widely in humid-tropical countries of South America, the Pacific Islands and south-east Asia, and in coastal regions of northern Australia."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"It is a shy seeder, and this factor alone contributes to its slow spread (Roberts, 1970a, b). The seed also has low viability." ... "Main. deficiency. Its low seed production." [Would limit its ability to spread as a contaminant of other pasture crops & products]

704	Propagules adapted to wind dispersal	

Qsn #	Question	Answer
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Rarely naturalises from spread by seed but will spread well over short distances by stolons." [Unknown. Wind & gravity may aid in movement of seeds]
705	Propagules water dispersed	
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Rarely naturalises from spread by seed but will spread well over short distances by stolons." [Unknown. Water may aid in movement of seeds or stolon fragments]
706	Propagules bird dispersed	n
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Rarely naturalises from spread by seed but will spread well over short distances by stolons." [Unlikely. No evidence]
707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Rarely naturalises from spread by seed but will spread well over short distances by stolons." [Probably not. Limited seed production. No means of external attachment]
708	Propagules survive passage through the gut	
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 12 Feb 2018]	"Rarely naturalises from spread by seed but will spread well over short distances by stolons." ... "Only moderately palatable in comparison to many softer grasses, but readily eaten by cattle when kept short and leafy." [Unknown if viable seeds can be internally dispersed by grazing animals]
801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Seed can be hand harvested, stooked and threshed, or direct headed. Yields of 290 kg/ha pure seed have been recorded in hand harvested experimental plots in Colombia, and of 80–500 kg/ha in Brazil. In tropical Australia, yields of 200 kg/ha are typical under commercial conditions with direct machine heading, but experimental yields can exceed 500 kg/ha."

Qsn #	Question	Answer
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"Seed production and harvesting. It is a shy seeder, and this factor alone contributes to its slow spread (Roberts, 1970a, b). The seed also has low viability." ... "Main. deficiency. Its low seed production."
	Pastures Australia. 2009. Humidicola. https://keys.lucidcentral.org/keys/v3/pastures/Html/Humidicola.htm . [Accessed 12 Feb 2018]	"Seed production is limited at low latitudes. Expected Commercial seed yields in Queensland are 200 kg/ha. The main seed crop is harvested in the December - February period. A small secondary crop can be harvested in May when conditions are suitable. Timing of harvest is critical as the seed crop ripens over 2 - 3 days, and is shed rapidly. Any stress during the flowering period, particularly water stress, will result in no seed being set."

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Seed can be used for larger commercial plantings. Seed may be dormant for 6 months after harvest and so should be stored or acid-scarified before planting. Seed is broadcast at 2–8 kg/ha (depending on germination percentage) onto a well-prepared seedbed and lightly harrowed. Seed will decline in quality rapidly if stored inappropriately and poor seed quality has been the cause of many planting failures." ... "The large seed may be dormant for up to 9 months. Must be stored in low temperature and low humidity conditions to prevent seed quality decline, which can be severe."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Pastures Australia. 2009. Humidicola. https://keys.lucidcentral.org/keys/v3/pastures/Html/Humidicola.htm . [Accessed 12 Feb 2018]	"Herbicide susceptibility - Annual grasses can be controlled using low rates of Diuron. Tolerant of selective herbicides used to control broadleaf weeds."
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Spraying with glyphosate (3 l/ha of 36% a.i.) will give sufficient control to establish a pasture legume "

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. http://www.tropicalforages.info/index.htm . [Accessed 11 Feb 2018]	"Defoliation - Performs best under moderate to heavy grazing pressure due to its strongly stoloniferous growth habit. Will maintain good ground cover even under very heavy grazing. Under light grazing, the dense mat of decumbent leaves and stems, associated with humid conditions, forms a bulk of low quality herbage. Fire - <i>B. humidicola</i> is not often burned because frequent heavy grazing and humid climate reduce the chance of a build up of dry fuel. However, it will recover well from accidental fire."
	Skerman, P.J. & Riveros, F. 1990. Tropical Grasses. FAO, Rome	"Response to defoliation. It will withstand heavy defoliation."

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized in Puerto Rico & South America (no evidence in Hawaiian Islands to date)
- Aggressive, weedy grass with potential to outcompete other pasture species (esp. legumes)
- Other *Urochloa* species are invasive
- Allelopathic
- Photosensitization has been recorded in horses grazing *U. humidicola* pasture for over 5 months (uncommon)
- Shade tolerant
- Tolerates many soil types
- Forms a dense cover that excludes other vegetation
- Reproduces by seeds & vegetatively by stolons
- Several accessions are apomictic
- Dispersed & cultivated intentionally by people
- Tolerates grazing, defoliation & fire

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Palatable to grazing animals
- Aggressive growth suppresses other weedy species
- Low seed set may limit ability to disperse
- Seeds lose viability quickly
- Herbicides provide effective control