Taxon: Themeda villosa (Poir.) A. Camus **Family:** Poaceae

Common Name(s): greater tasselgrass
Lyon's grass
silky kangaroo grass

Synonym(s): Anthistiria villosa Poir.
Themeda gigantea subsp. villosa

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 7 Feb 2020

WRA Score: 14.0 **Designation:** H(Hawai'i) **Rating:** High Risk

Keywords: Perennial Grass, Noxious Weed, Pasture Weed, Pure Stands, Irritating Awns

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
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
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
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
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
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
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
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
302	Garden/amenity/disturbance weed		

Qsn #	Question	Answer Option	Answer
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*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
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
402	Allelopathic		
403	Parasitic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle		
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	y
502	Grass	y=1, n=0	y
503	Nitrogen fixing woody plant	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	n
603	Hybridizes naturally	y=1, n=-1	n
604	Self-compatible or apomictic		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
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
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
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
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m2)		

Qsn #	Question	Answer Option	Answer
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	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)		
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**
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	[Used, but not domesticated] "Young shoots produce a sweet vegetable; used against cough; young marrow used to prevent infection of fresh ear holes; internodes formerly used as shafts for dip pens; leaves for roofing; clumps used as living hedges. Ash used as fertiliser. Occasionally planted as an ornamental, but because it is fertile, it may spread and become weedy."

102	Has the species become naturalized where grown?	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	**Notes**
	WRA Specialist. (2020). 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. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Feb 2020]	"Native Asia-Temperate CHINA: China [Fujian Sheng, Henan Sheng, Hunan Sheng, Hubei Sheng, Guangdong Sheng, Guizhou Sheng, Guangxi Zhuangzu Zizhiqu, Hainan Sheng] Asia-Tropical INDIAN SUBCONTINENT: Bangladesh, Bhutan, India (n.e.), Nepal INDO-CHINA: Thailand MALESIA: Indonesia, Malaysia, Philippines Naturalized Asia-Tropical INDIAN SUBCONTINENT: Sri Lanka Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii]"

202	Quality of climate match data	High
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Feb 2020]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	[Elevation range exceeds 1000 m] "var. villosa… Habitat — Sunny roadsides, sandbanks, river banks, grass jungles, abandoned fields, sometimes dominant, Eucalypt savannah, 0–1700 m altitude." … "var. caudata… Habitat — Roadsides, grassy slopes, locally dominant on better soils, 10–1950 m altitude."
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2006. Flora of China. Vol. 22 (Poaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Elevation range exceeds 2200 m, demonstrating environmental versatility] "Hill slopes, forest margins, disturbed moist grassy places; 300–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangxi, Sichuan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, NE India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka (introduced), Thailand]."

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to southeastern Asia; in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites, 0-700 m, on Kaua'i, O'ahu, and Hawai'i. First collected on O'ahu in 1924 (Lee & Weller 121, BISH)."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Feb 2020]	"Native Asia-Temperate CHINA: China [Fujian Sheng, Henan Sheng, Hunan Sheng, Hubei Sheng, Guangdong Sheng, Guizhou Sheng, Guangxi Zhuangzu Zizhiqu, Hainan Sheng] Asia-Tropical INDIAN SUBCONTINENT: Bangladesh, Bhutan, India (n.e.), Nepal INDO-CHINA: Thailand MALESIA: Indonesia, Malaysia, Philippines Naturalized Asia-Tropical INDIAN SUBCONTINENT: Sri Lanka Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii]"

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	"Introduced elsewhere as an ornamental, e.g. Hawaii, Sri Lanka."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Global-XZW-85, Thailand-A- 12, United States of America-AE-654, Global-W-90, United States of America-N- 101, United States of America-N-301, North America-X-790, United States of America-N-839, United States of America- X-229, Global-A-1207, United States of America-N-1292, south and southeast Asia- A-1320, New Caledonia-I-1507, Vietnam- A-87, Nigeria-N-1796."

Qsn #	Question	Answer
301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to southeastern Asia; in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites, 0-700 m, on Kaua'i, O'ahu, and Hawai'i. First collected on O'ahu in 1924 (Lee & Weller 121, BISH)."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Feb 2020]	"Naturalized Asia-Tropical INDIAN SUBCONTINENT: Sri Lanka Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii]"

302	**Garden/amenity/disturbance weed**	
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[A weed of pastures and disturbed habitats. Managed in pastures. Palatable only when young, suggesting grass impacts pasture productivity] "Environmental impact: Forms tall, pure stands in pastures and disturbed areas. Awns irritating to humans and animals. Management: Sensitive to foliar application of glyphosate; application more effective if the grass is mowed and the regrowth treated. Intensive grazing of succulent regrowth also effective."

303	**Agricultural/forestry/horticultural weed**	**y**
	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	"Themeda villosa ... Perennial, tufted, very stout and solid, noxious weed species, invasive, young shoots sweet eaten as a salad, weed in rubber plantations"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Orchards & Plantations, Pastures"
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[A weed of pastures and disturbed habitats. Managed in pastures. Palatable only when young, suggesting grass impacts pasture productivity] "Environmental impact: Forms tall, pure stands in pastures and disturbed areas. Awns irritating to humans and animals. Management: Sensitive to foliar application of glyphosate; application more effective if the grass is mowed and the regrowth treated. Intensive grazing of succulent regrowth also effective."
	USDA NRCS. (2020). Hawaii State-listed Noxious Weeds. https://plants.usda.gov/java/noxious?rptType=State&statefips=15. [Accessed 7 Feb 2020]	Includes Themeda villosa (Poir.) A. Camus

304	**Environmental weed**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites"

Qsn #	Question	Answer
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Orchards & Plantations, Pastures"
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[Managed in pastures and disturbed areas] "Environmental impact: Forms tall, pure stands in pastures and disturbed areas. Awns irritating to humans and animals. Management: Sensitive to foliar application of glyphosate; application more effective if the grass is mowed and the regrowth treated. Intensive grazing of succulent regrowth also effective."

305	Congeneric weed	y
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Themeda quadrivalvis … Weed of: Pastures"
	Parsons, W.T. & Cuthbertson, E.G. 2001. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Themeda quadrivalvis] "Because of its extremely short, barely useful life and its ability to spread quickly, grader grass is a serious threat to productivity in both native grassland and sown pastures of semi-arid monsoonal regions of northern Australia. It also grows readily in young sugarcane, competing with the crop and significantly reducing yields. Grader grass can also be troublesome in lucerne and other legume seed crops and thrives on headlands. waste lands and roadsides where it becomes a hazard by reducing visibility on curves and at comers. Each grader grass seed carries an awn which, twisting when moistened. pushes the seed callus into the soil."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Robust perennials; culms tufted, stout, 20-40 dm tall, solid; culm base compressed, flabellate. Sheaths keeled, ± compressed, margins overlapping, glabrous; ligule membranous, ciliate; blades up to 150 cm long, up to 20 mm wide, glabrous, midrib white, prominent, margins and nerves scabrous on upper surface, apex acuminate, base narrowed to the sheath."

402	Allelopathic	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown. No evidence

403	Parasitic	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust perennials; culms tufted, stout, 20-40 dm tall, solid; culm base compressed, flabellate." [Poaceae (alt.Gramineae). No evidence]

404	Unpalatable to grazing animals	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Intensive grazing of succulent regrowth also effective." [Regrowth palatable]
	Ahmed, A. K. S., & Deb, D. (2019). Diversity in forage genetic resources of Assam and Ri-Bhoi district of Meghalaya. International Journal of Chemical Studies, 7 (2), 1620-1624	"Themeda villosa is a perennial grass, occurs in hill slopes, road sides and open places. Young leaves are eaten by animals."
	Sukumar, R. (2003). The Living Elephants: Evolutionary Ecology, Behaviour, and Conservation. Oxford University Press, New York, New York	[Palatability to elephants depends on stage of growth] "The palatability of various grasses during their different stages of growth is obviously important to elephants. In southern Indian deciduous forests, I found that the tall perennial grasses, such as Themeda and Cymbopogon, are sought after during the early wet months when they flush tender leaves, especially in patches where the dry grasses have burned. As the grasses grow and mature, their leaves turn increasingly fibrous and siliceous. Elephants then avoid consuming the abrasive leaves, but selectively consume the basal succulent stems." … "The tall grasses, such as Themeda, Imperata, and Cymbopogon are soft textured and maintain adequate levels of protein for herbivores during the early stages of growth with the onset of rains. With further growth and maturity, they become fibrous and siliceous. I found that the protein level in the basal portion consumed by elephants during the late wet season fell to much below the minimum 5% level needed by elephant for maintenance"

405	Toxic to animals	n
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Intensive grazing of succulent regrowth also effective." [Regrowth palatable. No evidence of toxicity]
	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] "Themeda villosa ... Perennial, tufted, very stout and solid, noxious weed species, invasive, young shoots sweet eaten as a salad, weed in rubber plantations"
	Ahmed, A. K. S., & Deb, D. (2019). Diversity in forage genetic resources of Assam and Ri-Bhoi district of Meghalaya. International Journal of Chemical Studies, 7 (2), 1620-1624	[No evidence] "Themeda villosa is a perennial grass, occurs in hill slopes, road sides and open places. Young leaves are eaten by animals."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Awns irritating to humans and animals."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"young shoots sweet eaten as a salad" [No evidence]

408	Creates a fire hazard in natural ecosystems	
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Forms tall, pure stands in pastures and disturbed areas." [Pure stands might carry fire during droughts or in dry conditions]
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	[Possibly no. Variety polyantha described as fire resistant, suggesting fire may not be carried by this grass] "Themeda villosa ... var. polyantha … Habitat — (Eucalypt) savannah, gravel bars in river, grass jungles, fire resistant, 0–1450 m altitude."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Ohwi, J. (1971). Contributions to the Flora of Southeast Asia V: Gramineae and Cyperaceae of Thailand. The Southeast Asian Studies 9(2): 194-219	[In sunny and open habitats] "Themeda villosa ... Loei: Phu Kradung, ca. 700 m alt., on dry ground in a sunny place, T 369. Nakhon Si Thammarat : at the lower elevation of Khao Luang, in an open grassy field at ca. 300 m alt., T 8529."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Occurs in open, high light environments] "in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites, 0-700 m, on Kaua'i, O'ahu, and Hawai'i" [Substrate requirements unknown]
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	"Sunny roadsides, sandbanks, river banks, grass jungles, abandoned fields, sometimes dominant," … "Lörzing (6630, BO) noted that it did not occur on peat but was plentiful on volcanic rock, whereby one might tell the geological formation from its occurrence."
	Keng, H., Chin, S.C. & Tan, H.T.W. (1998). The Concise Flora of Singapore: Monocotyledons, Volume 2. Singapore University Press, Singapore	[Sandy substrates] "Distributed from India to Australia; in unkept areas, often in sandy coastal places"

411	Climbing or smothering growth habit	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust perennials; culms tufted, stout, 20-40 dm tall, solid; culm base compressed, flabellate."

412	Forms dense thickets	y
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Forms tall, pure stands in pastures and disturbed areas. Awns irritating to humans and animals."

501	Aquatic	n
	Source(s)	**Notes**
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2006. Flora of China. Vol. 22 (Poaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Hill slopes, forest margins, disturbed moist grassy places; 300–2500 m."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial] "in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites, 0-700 m"
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	[Terrestrial] "Sunny roadsides, sandbanks, river banks, grass jungles, abandoned fields, sometimes dominant, Eucalypt savannah, 0–1700 m altitude."

502	Grass	y
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Feb 2020]	Family: Poaceae (alt.Gramineae) Subfamily: Panicoideae Tribe: Andropogoneae Subtribe: Anthristiriinae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Feb 2020]	Family: Poaceae (alt.Gramineae) Subfamily: Panicoideae Tribe: Andropogoneae Subtribe: Anthristiriinae

Qsn #	Question	Answer
504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust perennials; culms tufted, stout, 20-40 dm tall, solid; culm base compressed, flabellate."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2006. Flora of China. Vol. 22 (Poaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Hill slopes, forest margins, disturbed moist grassy places; 300–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangxi, Sichuan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, NE India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka (introduced), Thailand]."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Caryopsis reddish brown, fusiform, ca. 5 mm long."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop Dispersed by: Humans"

603	**Hybridizes naturally**	**n**
	Source(s)	**Notes**
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	"I have found no reports on hybridisations in Themeda."

604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	Connor, H. E. (1979). Breeding systems in the grasses: a survey. New Zealand Journal of Botany, 17(4): 547-574	[Facultative apomixis documented in genus] "Other genera in the Andropogoneae where pseudogamous somatic apospory has been demonstrated include Apluda, Capillipedium, Heteropogon, Themeda, and Sorghum." … "In Themeda australis, a facultative apomict (pseudogamous and aposporous), Evans & Knox (1969) also found that there was a tendency towards more apomictic embryo sacs in short days, and that long days promoted sexual reproduction. Pollen fertility was not affected by photoperiod. Anthers and stigmata are exserted simultaneously from the hermaphrodite floret in T. australis (Woodland 1964)."

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

Qsn #	Question	Answer
	Source(s)	**Notes**
	Zomlefer, W.B. 1994. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	"The reduced flowers are anemophilous" [Family description]

606	Reproduction by vegetative fragmentation	
	Source(s)	**Notes**
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2006. Flora of China. Vol. 22 (Poaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Perennial. Culms tufted, stout, 2–3.5 m tall, 1–2 cm in diam." [Unknown. Tufted culms, so probably no]

607	Minimum generative time (years)	2
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust perennials; culms tufted, stout, 20-40 dm tall, solid" [Estimated to be reproductive in 2+ years]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	**Notes**
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	"Habitat — Sunny roadsides, sandbanks, river banks, grass jungles, abandoned fields, sometimes dominant, Eucalypt savannah, 0–1700 m altitude."
	OANRP Staff. (2018). 2018 Status Report for the Makua and Oahu Implementation Plans. United States Army Garrison, Hawai'i Directorate of Public Works Environmental Division, Schofield Barracks, Hawai'i	[Occurs in a helicopter landing zone, suggesting human-facilitated transport] "Themeda villosa ... An unusual find for this location, however there are no known occurrences in the adjacent forest, and an invasion is unlikely. Control on LZ."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Occurs in heavily trafficked areas] "in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites"
	Pratt, L., Bio, K., & Jacobi, J. (2016). Survey of roadside alien plants in Hawaii Volcanoes National Park and adjacent residential areas 2001-2005. Hawai`i Cooperative Studies Unit, University of Hawai`i at Hilo, Hilo, HI	[Roadside] "Other species that were found along most of Highway 130 but have not yet established in the park were the trees Albizia chinensis (Chinese albizia) and Schefflera actinophylla (octopus tree) and the tall Lyon's grass Themeda villosa."
	WRA Specialist. (2020). Personal Communication	Thrives in disturbed habitats, including roadsides, which likely facilitates dispersal by vehicles or equipment used by humans

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	"Introduced elsewhere as an ornamental, e.g. Hawaii, Sri Lanka."

703	Propagules likely to disperse as a produce contaminant	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop Dispersed by: Humans"
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Occurs in dry to moist pastures and other disturbed sites on Kauai, Oahu, and Hawai'i" [A pasture weed. Could be spread as a grain contaminant]
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 7 Feb 2020]	"Weed: potential seed contaminant"

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	Keng, H., Chin, S.C. & Tan, H.T.W. (1998). The Concise Flora of Singapore: Monocotyledons, Volume 2. Singapore University Press, Singapore	"The awn remains attached to the grain; it twists and untwists hygroscopically helping to bury the grain."

705	Propagules water dispersed	y
	Source(s)	**Notes**
	Keng, H., Chin, S.C. & Tan, H.T.W. (1998). The Concise Flora of Singapore: Monocotyledons, Volume 2. Singapore University Press, Singapore	"The awn remains attached to the grain; it twists and untwists hygroscopically helping to bury the grain." [Water aids in seed burial in substrate]
	Veldkamp, J. F. (2016). A revision of Themeda (Gramineae) in Malesia with a new species from Laos. Blumea, 61(1), 29-40	[Sandbanks and river banks. Likely dispersed by water] "Habitat — Sunny roadsides, sandbanks, river banks, grass jungles, abandoned fields, sometimes dominant,"
	Rao, B. R. P., Reddy, A. M., Priyadarsini, P., Sadasivaiah, B., & Basha, S. K. (2012). Themeda villosa (Poiret) A. Camus, Tripogon trifidus Munro ex Stapf (Poaceae): new distributional records for South India. Journal of Economic and Taxonomic Botany, 36(2), 383-386	[Suggests potential dispersal by water] "Rare, along water courses and on exposed slopes."

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Keng, H., Chin, S.C. & Tan, H.T.W. (1998). The Concise Flora of Singapore: Monocotyledons, Volume 2. Singapore University Press, Singapore	"The awn remains attached to the grain; it twists and untwists hygroscopically helping to bury the grain."

Qsn #	Question	Answer
707	**Propagules dispersed by other animals (externally)**	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown, but awn may allow for attachment to fur] "second lemma I-nerved, hyaline, prolonged into a twisted pubescent awn up to 42 mm long, second palea lanceolate. nerveless, hyaline. Caryopsis reddish brown, fusiform, ca. 5 mm long."

708	**Propagules survive passage through the gut**	
	Source(s)	**Notes**
	Ahmed, A. K. S., & Deb, D. (2019). Diversity in forage genetic resources of Assam and Ri-Bhoi district of Meghalaya. International Journal of Chemical Studies, 7 (2), 1620-1624	"Themeda villosa is a perennial grass, occurs in hill slopes, road sides and open places. Young leaves are eaten by animals." [Unknown. Since young growth is most palatable, seeds may be rarely, if ever, consumed]

801	**Prolific seed production (>1000/m2)**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	O'Connor, T., & Pickett, G. (1992). The Influence of Grazing on Seed Production and Seed Banks of Some African Savanna Grasslands. Journal of Applied Ecology, 29(1), 247-260	[Unknown. Related species unlikely to form a persistent seed bank] "A simple model of the seed bank dynamics of the perennial grasses showed that because their seeds germinate readily and have a limited survival when in secondary dormancy, the seed bank size is determined primarily by the abundance of the species in the vegetation. Thus, the seed banks of Themeda and Heteropogon, which produce small numbers of seeds, can easily be eliminated by sustained grazing. This was also indicated by the distribution of these two species along the gradient of grazing history"

803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Sensitive to foliar application of glyphosate; application more effective if the grass is mowed and the regrowth treated."

Qsn #	Question	Answer
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching,L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[Like most grasses, regrows after mowing and grazing] "Sensitive to foliar application of glyphosate; application more effective if the grass is mowed and the regrowth treated. Intensive grazing of succulent regrowth also effective."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Unknown] "in Hawai'i naturalized in dry pastures, along roadsides, and other disturbed sites, 0-700 m,"

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Thrives in tropical climates
• Naturalized on Kauai, Oahu and Hawaii (Hawaiian Islands), Sri Lanka and probably elsewhere
• A disturbance and pasture weed, forming pure stands that may reduce productivity
• Hawaii State noxious weed
• Other Themeda species are invasive
• Forms pure stands
• Reproduces by seeds
• Seeds dispersed inadvertently in heavily trafficked areas, as a contaminant, by water and sometimes intentionally cultivated by people
• Resprouts after mowing and grazing

Low Risk Traits
• Unarmed, but with irritating awns
• Young growth palatable to grazing animals
• Non-toxic, and young shoots edible to people
• Herbicides provide effective control