Fire risk report for *Urochloa brizantha*

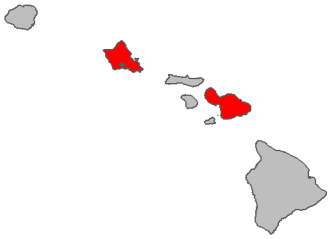
Full Species Name
Urochloa brizantha (Hochst. ex A.Rich.) R.D.Webster

Family: Poaceae

Common names:
beardgrass

Synonyms:
Brachiaria brizantha

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 1940

This species has been ranked by the Hawai'i Weed Risk Assessment program as Low Risk with a score of 2.

View photos on Starr Environmental

View on Wikipedia

View occurrences on iNaturalist

View at Plants of Hawaii

View photos on Flickr

0	.5	1
Lowest risk	⇔	Highest risk

This species is likely a **high** fire risk in Hawai'i with a fire risk score of **0.72**.

This species was ranked by our machine learning algorithm using the data presented on the next page. A predicted score of > .34 suggests the plant is a high fire risk.

Summary of Fire ecology	
Native habitat fire proneness	Fire-prone
Fire promoting plant in its native range	No
Fire promoting plant in its introduced range*	Yes
Regenerates after fire	Yes
Promoted by fire	No
Reported flammable*	High
Relative is flammable*	Yes

*These values were used by the model to predict fire risk

Detailed summary of Fire Ecology

Native habitat fire proneness (In any part of the plant's native range is its habitat described as fire prone due to natural or human caused fires?)	Fire-prone	"Melinis minutiflora and Urochloa brizantha are perennial grass species native to fire-prone tropical savannas in Africa. " Damasceno, G., & Fidelis, A. (2020). Abundance of invasive grasses is dependent on fire regime and climatic conditions in tropical savannas. Journal of Environmental Management, 271, 111016. https://doi.org/10.1016/j.jenvman.2020.111016 --- "hen enclosed, the grassland was composed of Hyparrhenia jilipendula (Hochst.) Stapf and H. rufa (Nees) Stapf up to 3 m tall, with Zmperata cylindrica (L.) P. Beauv. and Brachiaria brizantha Stapf forming a lower stratum up to 1 m high... Furthermore, during the dry season, the fire-protected plot was often the only unburnt area for miles around, and therefore probably received an excessive grazing load. " https://doi.org/10.1111/j.1365-2028.1977.tb00403.x Lock, J. M. (1977). Preliminary results from fire and elephant exclusion plots in Kabalega National Park, Uganda. African Journal of Ecology, 15(3), 229-232.
Fire promoting plant in its native range (Does the species act as a major fuel source, increase fire severity, frequency, or modify fuel bed characteristics within its native range?)	No	#uncertain - little data on its native range
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	"Fuel amount and fire intensity were higher in October than in July. At the individual plant level, U. brizantha moisture was higher than that of native species, however, temperatures reaching C600 "C at ground level were more frequent under U. brizantha tussocks than under native grasses." #less flammable than the natives, but still flammable http://ecologia.ib.usp.br/lepac/conservacao/Artigos/How_can_an_invasive_2014.pdf

		Gorgone-Barbosa, E., Pivello, V. R., Bautista, S., Zupo, T., Rissi, M. N., & Fidelis, A. (2015). How can an invasive grass affect fire behavior in a tropical savanna? A community and individual plant level approach. Biological Invasions, 17(1), 423-431.
Regenerates after fire (Does the plant regrow after fire by any means? This includes resprouters, reseeders, and recruiters which dispersed into the area within approximately one year post fire)	Yes	"However, the two species responded differently to fire occurrence: M. minutiflora decreased whereas U. brizantha was not affected by fires. Early-Dry and Late-Dry fire treatments enhanced the replacement of M. minutiflora by U. brizantha. We found that the influence of precipitation depended on the species: it reduced M. minutiflora but increased U. brizantha abundance. Lower monthly minimum temperatures decreased the abundance of both species. It directly reduced live M. minutiflora and increased dead U. brizantha biomass" Damasceno, G., & Fidelis, A. (2020). Abundance of invasive grasses is dependent on fire regime and climatic conditions in tropical savannas. Journal of Environmental Management, 271, 111016. https://doi.org/10.1016/j.jenvman.2020.111016 --- "U. Brizantha affects fire behavior and regenerates rapidly after fire, indicating that fire by itself could not be used to control this species" https://repositorio.unesp.br/bitstream/handle/11449/138106/barbosa_eg_dr_rcla.pdf?sequence=3#page=80 Barbosa, E. G. (2016). A relação entre fogo e uma gramínea invasora no Cerrado: O fogo pode ser utilizado como uma estratégia de controle?. Dissertation Universidade Estadual Paulista
Promoted by fire (Does the plant increase in abundance after a fire?)	No	"In all fire treatments, our analyses revealed that Urochloa brizantha dead biomass was reduced until the following dry season, when it returned to pre-fire values " Damasceno, G., & Fidelis, A. (2020). Abundance of invasive grasses is dependent on fire regime and climatic conditions in tropical savannas. Journal of Environmental Management, 271, 111016. https://doi.org/10.1016/j.jenvman.2020.111016 --- "None of the tested species had germination stimulated by the temperature or smoke. Both species of Urochloa [including U. brizantha] experienced decreased viability with

		increasing temperature, while seeds of native species and M. minutiflora tolerated heat shock up to 200 °C. " https://www.scielo.br/pdf/abb/v34n1/0102-3306-abb-34-01-185.pdf Gorgone-Barbosa, E., Daibes, L. F., Novaes, R. B., Pivello, V. R., & Fidelis, A. (2020). Fire cues and germination of invasive and native grasses in the Cerrado. Acta Botanica Brasilica, 34(1), 185-191. ---------- "Biennial fires in the late-dry season reduced the cover of U. brizantha, but not its biomass, while biennial fires in the middle of the late-dry season tended to facilitate invasion into new areas" #it seems it is only promoted by fire under specific circumstances https://www.scielo.br/pdf/abb/v34n1/0102-3306-abb-34-01-185.pdf Gorgone-Barbosa, E., Daibes, L. F., Novaes, R. B., Pivello, V. R., & Fidelis, A. (2020). Fire cues and germination of invasive and native grasses in the Cerrado. Acta Botanica Brasilica, 34(1), 185-191. ---------- "We compared germination percentage and the mean germination time among treatments using ANOVA. The treatments TF and F+TF had the highest germination values for both species. The results showed that fire per se could not stimulate seed germination, however, they suggest that a disturbance that produces a pattern of temperature fluctuation is able to break dormancy and enhance seed germination and, consequently, increase the Invasiveness of the study species. [U. mutica & U. brizantha]" https://www.scielo.br/pdf/abb/v30n1/0102-3306-abb-30-01-00131.pdf Gorgone-Barbosa, E., Pivello, V. R., Baeza, M. J., & Fidelis, A. (2016). Disturbance as a factor in breaking dormancy and enhancing invasiveness of African grasses in a Neotropical Savanna. Acta Botanica Brasilica, 30(1), 131-137.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"Within the experimental area we selected 16 individual patches dominated by each of the invasive grass species (at least 70% of cover by M. minutiflora or U. brizantha). Selected invaded patches varied in size (250 m2 to 2 ha) and in distance among them (5 m–100 m). In each patch, we established one 15 <U+FFFD>15 m plot. We randomly

		assigned each plot to one of four treatments: Control (C; unburned plots); Early-Dry (ED; burned in May 2014), Mid-Dry (MD; burned in July 2014), and Late-Dry season fire (LD; burned in October 2014). " #must be flammable if covering 70% of plot and then the plot burned. Damasceno, G., & Fidelis, A. (2020). Abundance of invasive grasses is dependent on fire regime and climatic conditions in tropical savannas. Journal of Environmental Management, 271, 111016. https://doi.org/10.1016/j.jenvman.2020.111016 --- "Fuel amount and fire intensity were higher in October than in July. At the individual plant level, U. brizantha moisture was higher than that of native species, however, temperatures reaching C600 "C at ground level were more frequent under U. brizantha tussocks than under native grasses." #less flammable than the natives, but still flammable http://ecologia.ib.usp.br/lepac/conservacao/Artigos/How_can_an_invasive_2014.pdf Gorgone-Barbosa, E., Pivello, V. R., Bautista, S., Zupo, T., Rissi, M. N., & Fidelis, A. (2015). How can an invasive grass affect fire behavior in a tropical savanna? A community and individual plant level approach. Biological Invasions, 17(1), 423-431.
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"Para grass can be burnt in the dry season and will recover. It is this ability to produce a bulk of fuel in the wet season when not grazed, together with subsequent hot fires that has caused para grass to be regarded as an environmental weed in ungrazed wetland environments in some countries." http://www.tropicalforages.info/index.htm Cook, B.G. et al. 2005. Tropical Forages: an interactive selection tool., SIRO, DPI&F(Qld), CIAT and ILRI. [Accessed 15 May 2019]

Text in quotes are direct quotes from the source
Text in square brackets was added by the assessor to clarify something or to summarize from a figure.
Text preceded by a “#” is comment from the assessor

The data presented were assembled from literature and database searches for each species using as much data as could be collected regarding the plant's fire ecology under natural conditions. Searches aimed to be exhaustive and consist of as much data as could be located in 2020. Our machine learning algorithm was trained on 49 species of plants which had their fire risk ranked by 49 managers in Hawai'i in November 2020. The model used a conditional random forest regression algorithm to predict scores for each species using the manager score as the response variable and the fire ecology traits of each plant as the predictor variables to generate a fire risk score. This trained model was then used to predict the fire risk for all species which were not ranked by managers. The model was calibrated such that it is 90% accurate at predicting high fire risk plants and 79% accurate at predicting low fire risk plants. This research and the resulting fire risk model has been published in the journal Biological Invasions by Kevin Faccenda and Curt Daehler (both at the University of Hawai'i at Mānoa).

Note that the analysis doesn't account for a plant species' spatial distribution, population density, or distinct climate and ecosystem conditions (which can also influence fire risk). The fire risk of these species are mostly under "worst case" environmental conditions where the climate is dry enough to maintain fire, but wet enough to allow for plant growth and fuel accumulation. The fire risk ranking should not be taken as a stand-alone risk metric in prioritizing weed control efforts. Rather, this information may also be useful for determining if a newly discovered species poses a potential fire threat in wildland areas.

More general information on the weed risks and ecology of non-native plants in Hawai'i is available from the Hawai'i Invasive Species Committee's Weed Risk Assessment database.

View more fact sheets at https://www.pacificfireexchange.org/weed-fire-risk-assessments

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Fact sheet prepared by Kevin Faccenda (faccenda@hawaii.edu) in November 2021. Data were prepared by Kevin Faccenda in 2020.

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