Fire risk report for *Hyparrhenia rufa*

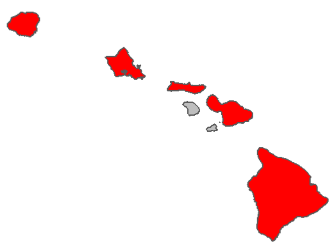
Full Species Name
Hyparrhenia rufa (Nees) Stapf

Family: Poaceae

Common names:
jaragua grass

Synonyms:

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai’i: 1939

This species has not yet been ranked by the Hawai'i Weed Risk Assessment program as of 2020.

View photos on Starr Environmental

View on Wikipedia

View occurrences on iNaturalist

View at Plants of Hawaii

View photos on Flickr

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Lowest risk ⇔ Highest risk

This species is likely a **high** fire risk in Hawai’i with a fire risk score of **0.61**.

This species was ranked by 49 managers on a scale of 'no risk', 'low risk', 'medium risk', or 'high risk'. The numerical score ranges from 0 to 1 with higher scores indicating more managers considered it a higher risk. A score of > .31 indicates high risk.

Summary of Fire ecology	
Native habitat fire proneness	Fire-prone
Fire promoting plant in its native range	Yes
Fire promoting plant in its introduced range*	Yes
Regenerates after fire	Yes
Promoted by fire	No Data
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	"[occured in control plots in a fire exlclusion study, implying that the habitat is fire prone although frequency of number of burns were not listed]" https://www.researchgate.net/profile/Craig_Morris2/publication/263116314_Effect_of_long-term_exclusion_of_fire_and_herbivory_on_the_soils_and_vegetation_of_sour_grassland/links/56ebf87008aee4707a3849ea.pdf Titshall, L. W., O'Connor, T. G., & Morris, C. D. (2000). Effect of long-term exclusion of fire and herbivory on the soils and vegetation of sour grassland. African Journal of Range and Forage Science, 17(1-3), 70-80.
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?)	Yes	"The site of the plots is mapped by Langdale-Brown (1960) as Hyparrhenia dissoluta H.filipenda fire and grazing climax savanna. In Langdale-Brown, Osmaston & Wilson (1964), it lies on the boundary between Dry Hyparrhenia grass savanna, and Combretum-Acacia-Hyparrhenia savanna. .... it appears that in this part of Uganda, where a relatively high rainfall promotes sufficient grass growth to give fierce annual fires, it is most unlikely that exclusion of animals alone would allow tree regeneration." https://doi.org/10.1111/j.1365-2028.1977 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 introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	"Hyparrhenia is well adapted to the climate in this part of Costa Rica, although it prospers only under annual burning. Moreover it is relatively intolerant of shade, appearing among trees only where fire runs through the forest frequently and forest grasses such as Oplismenus are not already established" Daubenmire, R. (1972). Ecology of Hyparrhenia rufa (Nees) in derived savanna in north-western Costa Rica. Journal of Applied Ecology, 11-23. ---------------------------- "Similar processes have been observed elsewhere in Hawai'i. In dry lowland areas and other seasonal submontane sites, the alien grasses Andropogon virginicus, Hyparrhenia rufa, Pennisetum setaceum, and Cenchrus ciliaris are abundant, e:nhance fire, and grow rapidly in

		response to it. In subalpine areas, the C 3 alien grasses H olcus lanatus and Anthoxanthum odoratum both add fuel and respond more rapidly to fire than do native species (149). " D'Antonio, C. M., & Vitousek, P. M. (1992). Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annual review of ecology and systematics, 23(1), 63-87.
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	"Within a very few days after the fire new basal shoots start to replace those killed by the burning (Fig. 1). The earlier the burn the more vigorous the growth of the new shoots, presumably in consequence of the greater supply of residual moisture in the soil." Daubenmire, R. (1972). Ecology of Hyparrhenia rufa (Nees) in derived savanna in north-western Costa Rica. Journal of Applied Ecology, 11-23.
Promoted by fire (Does the plant increase in abundance after a fire?)	No Data	
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"Starting shortly after the end of the rainy season (about 1 December 1969), fire will spread through a Hyparrhenia stand, feeding on the litter, unless the stand has been too heavily grazed to permit significant leaf senescence. At this time the ungrazed stand under study had accumulated litter to the extent of nearly 300 g/m2, oven dry." Daubenmire, R. (1972). Ecology of Hyparrhenia rufa (Nees) in derived savanna in north-western Costa Rica. Journal of Applied Ecology, 11-23.
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"The site of the plots is mapped by Langdale-Brown (1960) as Hyparrhenia dissoluta H.filipenda fire and grazing climax savanna. In Langdale-Brown, Osmaston & Wilson (1964), it lies on the boundary between Dry Hyparrhenia grass savanna, and Combretum-Acacia-Hyparrhenia savanna. .... it appears that in this part of Uganda, where a relatively high rainfall promotes sufficient grass growth to give fierce annual fires, it is most unlikely that exclusion of animals alone would allow tree regeneration." https://doi.org/10.1111/j.1365-2028.1977 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.

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 Hawaiʻi 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 Hawaiʻi is available from the Hawaiʻi 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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