Fire risk report for *Hyparrhenia hirta*

Full Species Name
Hyparrhenia hirta (L.) Stapf

Family: Poaceae

Common names:
common thatching grass
Coolatai grass

Synonyms:

Known occurrences (as of 2020)

Year first documented as naturalized in Hawai'i: 1962

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

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	Yes
Fire promoting plant in its introduced range*	Yes
Regenerates after fire	Yes
Promoted by fire	Yes
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	"At URF, frequent fire resulted in short, diverse grassland weakly dominated by a range of grass species, including Themeda triandra, Tristachya leucothrix and Hyparrhenia hirta." https://doi.org/10.1111/jvs.12130 Kirkman, K. P., Collins, S. L., Smith, M. D., Knapp, A. K., Burkepile, D. E., Burns, C. E., ... & Wragg, P. D. (2014). Responses to fire differ between S outh A frican and N orth A merican grassland communities. Journal of Vegetation Science, 25(3), 793-804.
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	"An experimental fire was conducted in July and September 2009 on five (replica) delimited square areas (50 × 50 cm) in two different grassland types, dominated by Hyparrhenia hirta (L.) Stapf (Hh) and Ampelodesmos mauritanicus (Desf.) T. Durand & Schinz (Am). " #if habitat dominated by this burned, it must be fire promoting Novara, A., Gristina, L., Rühl, J., Pasta, S., D'Angelo, G., Mantia, T. L., & Pereira, P. (2013). Grassland fire effect on soil organic carbon reservoirs in a semiarid environment. Solid Earth, 4(2), 381-385. https://www.researchgate.net/profile/Paulo_Pereira17/publication/258107674_Grassland_fire_effect_on_soil_organic_carbon_reservoirs_in_a_semiarid_environment/links/00463526f91c75a8ba000000/Grassland-fire-effect-on-soil-organic-carbon-reservoirs-in-a-semiarid-environment.pdf
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	"Exotic perennial grasses are known to change the fuel load of native and sown pasture grass communities (New South Wales Office of Environment and Heritage 2014). Some consider that H. hirta increases the fuel load of grasslands and pastures, producing hotter fires. These fires result in more damage to native plant species, while H. hirta is able to recover more quick" https://hdl.handle.net/1959.11/17599 Chejara, V. K., Kristiansen, P., Sindel, B. M., Johnson, S. B., Whalley, R. D. B., & Nadolny, C. (2015). The biology of Australian weeds 64.'Hyparrhenia hirta'(L.) Stapf. Plant Protection Quarterly, 30(1), 2-11.

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	"This study shows that the reproductive potential, i.e. the seed bank densities and subsequent emergence of H. hirta is increased under annual burning" https://repository.up.ac.za/bitstream/handle/2263/53495/Ford_Effects_2016.pdf?sequence=1 Ford, M. (2015). The effects of fire and grazing management on unpalatable climax grasslands dominated by Cymbopogon validus and Hyparrhenia hirta (Doctoral dissertation, University of Pretoria).
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Anecdotal evidence suggests that fire may actually aid in spreading and increasing the density of Coolatai Grass [H. hirta] through a positive feedback cycle. Fire can reduce the bulk of grassy weeds, but it can also increase the rate of invasion and density of grasses such as Cenchrus ciliaris, Eragrostis curvula and Ehrharta calycina (Milberg and Lamont 1995; McFarland and Mitchell 2000; Butler and Fairfax 2003). Coolatai Grass has similarities with these fireadapted species, such as a dense tussock that may insulate new shoots from fire (McFarland and Mitchell 2000). The interactions between fire and Coolatai Grass and possible management options require investigation. " L. McArdle c. Nadolny, S., & M. Sindel, b. (2004). Invasion of native vegetation by Coolatai Grass Hyparrhenia hirta: impacts on native vegetation and management implications. Pacific Conservation Biology, 10(1), 49. https://doi.org/10.1071/pc040049 --- "This study shows that the reproductive potential, i.e. the seed bank densities and subsequent emergence of H. hirta is increased under annual burning." https://repository.up.ac.za/bitstream/handle/2263/53495/Ford_Effects_2016.pdf?sequence=1 Ford, M. (2015). The effects of fire and grazing management on unpalatable climax grasslands dominated by Cymbopogon validus and Hyparrhenia hirta (Doctoral dissertation, University of Pretoria).
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"The community appear to remain in statis as H. hirtaq dominates for extendes period (10 to 30 year).... [describes areas which are annually burned, if the species is dominant it must be flammable]" https://repository.up.ac.za/bitstream/handle/2263/53495/Ford_Effects_2016.pdf?sequence=1 Ford, M. (2015). The effects of fire and grazing management on unpalatable climax grasslands dominated

		by Cymbopogon validus and Hyparrhenia hirta (Doctoral dissertation, University of Pretoria).
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"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.

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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