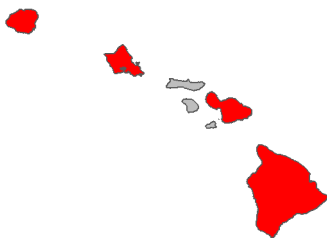


Fire risk report for *Setaria sphacelata*

Full Species Name <i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss
Family: Poaceae
Common names: South African pigeon grass
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 1979
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 19.
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 **low** fire risk in Hawai'i with a fire risk score of **0.32**.

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*	No
Regenerates after fire	Yes
Promoted by fire	Yes
Reported flammable*	Low
Relative is flammable*	No

*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	"No evidence of utilisation by large herbivores was noticed in this [<i>Imperata cylindrica</i>-<i>Setaria sphacelara</i>] community but termite activity is high during the dry season. However, heavy utilization was noticed after a fire" Bonyongou, M. C., Bredenkamp, G. J., & Veenendaal, E. (2000). Foodplain vegetation in the Nxaraga Lagoon area, Okavango Delta, Botswana. <i>South African Journal of Botany</i>, 66(1), 15-21. ----- "Most of these species flower in April or May just before the annual fires rage through the vegetation [referring to <i>Panicum</i> sp. aff. <i>porphyrrhizos</i> - <i>Setaria sphacelata</i> grassland]" Ellenbroek, G. A. (1987). Fire and the ecology of termitaria grasslands. In <i>Ecology and productivity of an African wetland system</i> (pp. 240-250). Springer, Dordrecht.
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	
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	No	
Regenerates after fire (Does the plant regrow after fire by any means? This includes resprouters, reseeder, and recruiters which dispersed into the area within approximately one year post fire)	Yes	"<i>Setaria</i> is a tropical grass species from Africa (Hacker and Jones, 1969) that was introduced in the region in the early 1950s (Gerique, 2010). It is more resistant to uncontrolled human-induced fires and best suited to the prevailing temperatures and high precipitations of the region (>750 mm a⁻¹) (Dwivedi and Kumar, 1999)" Potthast, K., Hamer, U., & Makeschin, F. (2012). In an Ecuadorian pasture soil the growth of <i>Setaria sphacelata</i>,

		but not of soil microorganisms, is co-limited by N and P. Applied Soil Ecology, 62, 103-114. ----- " Competition between <i>Setaria sphacelata</i> and <i>Pteridium aquilinum</i> about 4 weeks after a fire set by farmers for pasture amelioration. The soil between the tussocks is still covered with charcoal. Note that only the tips of the grass tussocks have been browsed by the cattle. [photo shows green setaria regenerating after fire]" https://www.soctropecol.eu/publications/pdf/9%201-2/Hartig,%20Beck,%202003.pdf Hartig, K., & Beck, E. (2003). The bracken fern (<i>Pteridium arachnoideum</i> (Kaulf.) Maxon) dilemma in the Andes of Southern Ecuador. <i>Ecotropica</i>, 9, 3-13. ----- "The pastures are usually burned during the drier months of the year, i.e., October to December. A few days after a fire, bracken and <i>Setaria</i> resprout more or less simultaneously, and the grass again produces the desired new leaves a little faster than the fern develops its leaves" https://www.soctropecol.eu/publications/pdf/9%201-2/Hartig,%20Beck,%202003.pdf Hartig, K., & Beck, E. (2003). The bracken fern (<i>Pteridium arachnoideum</i> (Kaulf.) Maxon) dilemma in the Andes of Southern Ecuador. <i>Ecotropica</i>, 9, 3-13. ----- "The top three species on the firebreak were <i>Eragrostis chloromelas</i> (17.7%), <i>Setaria sphacelata</i> (15.0%) and <i>Heteropogon contortus</i> (10.5%), making up 43.2% of the total basal cover. In contrast, the top three species on the unburnt control were <i>Setaria sphacelata</i> (28.3%), <i>Setaria incrassata</i> (9.6%) and <i>Trachypogon spicatus</i> (8.1%), making up 46% of basal cover" Skhosana, F. V. (2017). Fire-grazer interactions in a Highveld grassland in South Africa (Doctoral dissertation).
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Anyway, the expectation that early dry season burning is beneficial to species that are most productive during the early rainy season (<i>Setaria</i>) and detrimental to relatively late developing species such as <i>Panicum</i> could not be empirically substantiated. It has been observed that <i>Panicum</i> plants are still largely green when fires sweep the grasslands during the early dry season. As stated in 10.1, killing off of green leaves arrests the process of transfer of nutrients from aboveground parts to belowground parts,

		thereby reducing reserves for initial growth during the subsequent rainy season. If this suggestion is correct, delayed burning in the Panicum - Setaria grassland may result in a gradual shift in dominance of Setaria to dominance of Panicum. " Ellenbroek, G. A. (1987). Fire and the ecology of termitaria grasslands. In Ecology and productivity of an African wetland system (pp. 240-250). Springer, Dordrecht. ----- "n sites with South African pigeon grass (<i>Setaria sphacelata</i> var. <i>sericea</i>) (or several other weeds) present, fire should not be used in isolation as it is likely to promote growth and exacerbate existing infestations. For this weed and most of the others reviewed by this report, combinations of treatments that include fire and herbicide application will achieve the best outcomes" http://hotspotsfireproject.org.au/download/fire-weeds-and-native-vegetation-of-nsw.pdf Fire, Weeds and the Native Vegetation of New South Wales Mark Graham and Kevin Taylor A report prepared by the Hotspots Fire Project March 2018
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	Low	"In the unsprayed areas, the burn was slow and less hot and of course the setarias resprouted and then had to be sprayed again." http://fireandrestoration.org.au/fire-and-setaria-in-northern-nsw/
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	No	

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>

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

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