Fire risk report for *Anthoxanthum odoratum*

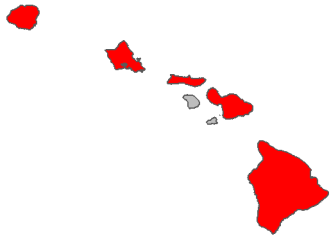
Full Species Name
Anthoxanthum odoratum L.

Family: Poaceae

Common names:
sweet vernalgrass

Synonyms:

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 1907

This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 14.

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 **0.31**.

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	Yes
Reported flammable*	Yes
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	"Thus for nearly two centuries moor burning has been a standard practice for maintaining the best production of forage for grazing animals, especially sheep and grouse (Lagopus lagopus scoticus). [they later list A. odoratum as part of the community]" Mallik, A. U., & Gimingham, C. H. (1983). Regeneration of heathland plants following burning. Vegetatio, 53(1), 45-58. ---------- "Three such communities are distinguished and are described in outline: Festuca ovina-Helictotrichon pratense grassland, Agrostis tenuis-Anthoxanthum odoratum grassland and Agrostis tenuis-Holcus lanatus grassland. Most of the observations and experiments reported have been made on the first of these communities, but in outline the conclusions reached can be applied to the other communities, In these communities spring fires occur sporadically and destroy most of the aboveground vegetation" Lloyd, P. S. (1968). The ecological significance of fire in limestone grassland communities of the Derbyshire Dales. The Journal of Ecology, 811-826.
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 whether this actually fueled the fire or was just the first species to recover. it doesn't seem the densities get high enough to promote fire in some of its native range ---------- "Therefore, restoration of grasslands is relatively fast. For example, following a grassland wildfire in Lithuania, it was reported that the perennial grass, Anthoxanthum odoratum L. (that dominates extensive lands across Eurasia), and the perennial herbaceous plant, Leontodon autumnalis L. (Moench) (a synonym of Scorzoneroides autumnalis L. (Moench), also widespread in Eurasia),recovered fully between 17 and 31 days after the fire" Stavi, I. (2019). Wildfires in grasslands and shrublands: A review of impacts on vegetation, soil, hydrology, and geomorphology. Water, 11(5), 1042.
Fire promoting plant in its introduced range (Same as Fire	Yes	"The fire potential of subalpine ecosystems is increasing because alien grasses, particularly sweet vernalgrass and

Promoting Native but within the species introduced range)		velvet grass, are invading the naturally discontinuous fuel bed" http://www.hear.org/books/apineh1992/pdfs/apineh1992III3smithtunison.pdf Smith, C. W., & Tunison, J. T. (1992). Fire and alien plants in Hawaii: research and management implications for native ecosystems. Alien plant invasions in native ecosystems of Hawaii: management and research. Cooperative National Park Resources Studies Unit, Honolulu, 394-408. --- #can't find references to this being fire promoting outside of HI
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	"Anthoxanthum odoratum L. (Sweet vernalgrass) This small, perennial bunchgrass forms extensive ground cover in open mesic and dry habitats at high elevations. It invades disturbed areas, preventing the reestablishment of native species. The seeds are dispersed by wind. Its cover increases after fire, but this increase appears to be the result of reduced competition rather than stimulation. It has not been evaluated for biological control" Smith, C. W. (1985). Impact of alien plants on Hawaii's native biota. Hawaii's terrestrial ecosystems: preservation and management, 180-250.
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Burning significantly increased flowering of Anthoxanthum odoratum in 1997, but that response has not been repeated with subsequent treatments (Table 6). Rather, the general trend has been for mowing to promote Anthoxanthum odoratum flowering compared to other treatments and to also promote flowering each year compared to the previous year's mowing response (Table 6). " Clark, D. L., & Wilson, M. V. (2000). Controlling woody vegetation in wetland prairies, 1994-1999. --- "Two years of treatments changed patterns in flowering of non-native grasses. Burning and mowing both significantly increased the number of inflorescences of Anthoxanthum odoratum compared to the decreases in the controls." Clark, D. L., & Wilson, M. V. (2001). Fire, mowing, and hand-removal of woody species in restoring a native wetland prairie in the Willamette Valley of Oregon. Wetlands, 21(1), 135-144. --- "[Table 1, cover increased from 0% prefire to 35% after 30 months]"

		Yeates, G. W., & Lee, W. G. (1997). Burning in a New Zealand snow-tussock grassland: effects on vegetation and soil fauna. New Zealand Journal of Ecology, 73-79. ---------- "Unfortunately, it has also been observed that the exotic grass Anthoxanthum odoratum (sweet vernal grass) can increase under a burning regime. " https://appliedeco.org/wp-content/uploads/Fernridge-RNA-2015-2.pdf Controlling exotic grasses while maintaining native plant communities in firemaintained wet prairies 2015 Matt A Brahm & Erin C. Gray
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	Yes	"The fire potential of subalpine ecosystems is increasing because alien grasses, particularly sweet vernalgrass and velvet grass, are invading the naturally discontinuous fuel bed" http://www.hear.org/books/apineh1992/pdfs/apineh1992III3smithtunison.pdf Smith, C. W., & Tunison, J. T. (1992). Fire and alien plants in Hawaii: research and management implications for native ecosystems. Alien plant invasions in native ecosystems of Hawaii: management and research. Cooperative National Park Resources Studies Unit, Honolulu, 394-408. ---------- #can't find references to this being fire promoting outside of HI
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"Annual burning within the Artillery Impact Zone has resulted in a significant alteration in the vegetation. Festuca idahoensis is merely a minor component, while the non-native Anthoxanthum aristatum and Hypochaeris radicata dominate. These effects are similar to many prairie fire studies throughout the American West." #IF it is dominant in an area burned annually, it must be flammable. Tveten, R. (1997). Fire effects on prairie vegetation Fort Lewis, Washington. Dunn and Ewing, 123-130.

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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