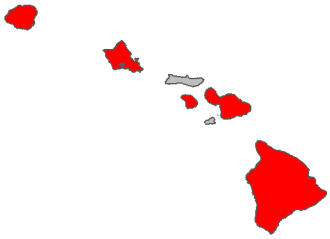
Fire risk report for *Morella faya*

Full Species Name *Morella faya* (Aiton) Wilbur
Family: Myricaceae
Common names: firetree
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 1960
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 17.
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 **0.50**.

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	Non 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*	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?)	Non Fire-prone	"Morella faya is native to the Canary Islands, Madeira, and the Azores (Wagner et al. 1999). The Climate in its native range in the Canary Islands is typically mediterranean with wet winters and dry summers. The average temperatures in the Azores in 21 C (84 F) in the summer and 14.5 C (58 F) in the winter. The climate on Madeira is intermediate. Rainfall in this region increases with altitude, similar to Hawai'i, and varies between 750 and 2,500 mm (30-98 in) and highlands are usually covered in clouds and mist (Binggeli 1998). In the Azores, M. faya is the main species in the lowlands to regenerate on old lava flows. Near 600 m (1,968 ft) in the Azores, M. faya is a codominant in the canopy and is distributed up to 900 m (2,953 ft) with poor regeneration under canopy (Binggeli 1998)." http://hear.org/starr/hiplants/reports/pdf/morella_faya.pdf Starr, Forest, Kim Starr, and Lloyde Loope. "Morella Faya." U.S. Geological Survey--Biological Resources Division, March 2003. ---------- "Fires on the Canary Islands occur mostly in pine forests, being mature laurel forests not particularly fire prone [39]. Most of them have an anthropic origin (whether by negligence or provoked), representing natural fires only a 0.8% [later lists M. faya as occuring in habitat]" Hernández-Hernández, R., Castro, J., Arco-Aguilar, D., Fernández-López, Á., & González-Mancebo, J. M. (2017). Post-fire salvage logging imposes a new disturbance that retards succession: the case of bryophyte communities in a Macaronesian laurel forest. Forests, 8(7), 252.
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	"Invasion of the nitrogen-fixing tree Myrica faya into grass dominated sites in Hawaii is likely to decrease the rate of fire spread, because Myrica typically maintains higher fuel moisture than the dominant native grasses. Furthermore, in closed stands, the moisture content of Myrica leaf litter can be very high because of the high relative humidity in the subcanopy, which reaches 50% to 60% (Tim Tunison, Hawaii Volcanoes National Park, Honolulu, personal communication, 14 October 2003).However, extreme drought conditions could change these relationships." Brooks, M.L./D'Antonio, C.M./Richardson, D.M./Grace, J.B./Keeley, J.E./DiTomaso, J.M./Hobbs, R.J./Pellant, M./Pyke, D.. 2004. Effects of Invasive Alien Plants on Fire Regimes. BioScience. 54(7): 677-688. ---------- #not introduced outside of HI. No data expected.
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	"... lantana (Lantana camara), koa haole (Leucaena leucocephala), faya tree (Myrica faya), and Java plum (Syzygium cumini), resprout vigorously [after fire]" https://www.researchgate.net/profile/Clifford_Smith5/publication/202000884_Fire_and_alien_plants_in_Hawaii_research_and_management_implications_for_native_ecosystems/links/5cafae6e299bf120975f7851/Fire-and-alien-plants-in-Hawaii-research-and-management-implications-for-native-ecosystems.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. ---------- "Twice-burned sites are, however, being invaded by the nitrogen-fixing tree Morella faya" D'Antonio, C. M., Hughes, R. F., & Tunison, J. T. (2011). Long-term impacts of invasive grasses and subsequent fire in seasonally dry Hawaiian woodlands. Ecological Applications, 21(5), 1617-1628. ---------- "The fire killed almost all individuals of the so-called “obligate seeder species”, and shrubs such as Chamaecytisus proliferus and Cistus symphytifolius, which withstand fires through the germination of their seed bank (Thanos & Georghiou, 1988), but it destroyed only the aerial parts of the so-called “resprouter species”, whose

		individuals possess the ability to resprout, either from the root crown through basal stems (Erica and Myrica) or from the trunk through epicornic stems (Pinus) after fire (Climent et al., 2004b)." https://www.researchgate.net/profile/Eduardo_Garcia-del-Rey/publication/232690805_Effects_of_Wildfire_on_Endemic_Breeding_Birds_in_a_Pinus_canariensis_Forest_of_Tenerife_Canary_Islands/links/0c960526e4564cad7f000000.pdf Garcia-Del-Rey, E., Otto, R., Fernández-Palacios, J. M., Gil Munoz, P., & Gil, L. (2010). Effects of wildfire on endemic breeding birds in a Pinus canariensis forest of Tenerife, Canary Islands. Ecoscience, 17(3), 298-311.
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"the TB [twice burned] habitat was the most invaded by Morella faya of all habitats. M. faya is a nitrogen-fixing tree. Its success as a seedling is influenced by light availability and it may do poorly within dense grass (Lipp 1994). Indeed, it was least common on the OB [old burn] transects" D'Antonio, C. M., Hughes, R. F., & Tunison, J. T. (2011). Long-term impacts of invasive grasses and subsequent fire in seasonally dry Hawaiian woodlands. Ecological Applications, 21(5), 1617-1628.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	Low	"D'Antonio (2000) suggests that the low flammability and low litter production of firetree (Morella faya, Myricaceae) may reduce the spread of understory fires in Hawaiian woodlands, disrupting a recent grass-fire cycle associated with exotic grass invasion" Mandle, Lisa, Jennifer L. Bufford, Isabel B. Schmidt, and Curtis C. Daehler. "Woody exotic plant invasions and fire: reciprocal impacts and consequences for native ecosystems." Biological Invasions 13, no. 8 (2011): 1815-1827 --- #no references suggest that this plant is highly flammable.
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"Myrica cerifera (southern bayberry or waxmyrtle) is one of the most common shrubs in the longleaf pine/bluestem forest type in the West Gulf Coastal Plain. During controlled burns, individual plants can burn intensely because the wax coated foliage and fruits are very flammable... However, Myrica cerifera is adapted to survival on frequently burned longleaf pine sites by resprouting vigorously from the root collar."

		Haywood, J. D., Pearson, H. A., Grelen, H. E., & Popham, T. W. (2000). Effects of date and frequency of burning on southern bayberry (Myrica cerifera) in central Louisiana. Texas Journal of Science 52(4): 33-42) --- "highly flammable" https://www.fs.fed.us/psw/publications/documents/psw_gtr203/psw_gtr203_010haywood.pdf

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 Ronja Steinbach and Kevin Faccenda in 2020.

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