Fire risk report for *Swietenia mahagoni*

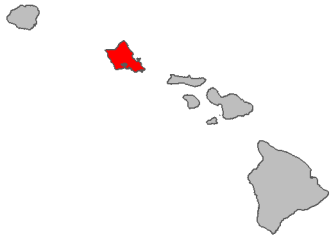
Full Species Name
Swietenia mahagoni (L.) Jacq.

Family: Meliaceae

Common names:
West Indian mahogany
Cuban mahogany

Synonyms:

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 2014

This species has been ranked by the Hawai'i Weed Risk Assessment program as Low Risk with a score of 2.

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 **low** fire risk in Hawai'i with a fire risk score of **0.25**.

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	no data
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	"In contrast to the high hammocks of the Miami Rock Ridge are the low hammocks found on the marl prairies of the extreme southern Everglades These are characterized by one of two species mahogany Swietenia mahagoni which cannot tolerate long hydroperiods as can bayhead species or the rare paurotis palm Acoelorrhaphe wrightii These low hammocks are surrounded by moats which in conjunction with the sparse surrounding vegetation and its long hydroperiod protect them from fire except during prolonged droughts No evidence of past fires has been found in these low hammocks Craighead sectioned two unscarred mahogany trees after they were blown down in hurricane Donna and estimated their age at 225 years" https://www.google.com/books/edition/Fire_in_South_Florida_Ecosystems/9y6AMbAuwVUC?hl=en&gbpv=1&bsq=%22Swietenia%20mahagoni%22 Wade, D. D., Ewel, J. J., & Hofstetter, R. H. (1980). Fire in south Florida ecosystems (Vol. 17). Southeastern Forest Experiment Station. --- "In subtropical South Florida, fragments of fire-dependent, globally imperiled pine rockland forest are scattered throughout urban areas. To determine the effects of recent fire frequency, major soil type, and fragment size on species composition, we measured understory vascular plant presence and cover in 162 plots distributed among 16 publicly-owned pine rockland preserves in 1995 and 2003. [appendix lists S. mahogoni as occurring in their fire prone study sites]" http://www.naturalareas.org/docs/v28_4_08_pp380_394.pdf Maschinski, Joyce. “Patterns of Plant Composition in Fragments of Globally Imperiled Pine Rockland Forest: Effects of Soil Type, Recent Fire Frequency, and Fragment Size.” Natural Areas Journal 28.4 (2008): 379–394. Web. --- "If protected from fire, West Indies mahogany will invade adjacent forest occupied by the Pinus elliotii Englm - Serenoa repens (Bertr.) Small type (8)."

		https://www.fs.fed.us/global/iitf/pubs/sm_iitf046%20%20(7).pdf Francis, J. K. (1991). Swietenia mahagoni Jacq, West Indies Mahogany: Meliaceae, Mahogany family. US Department of Agriculture, Forest Service, Southern Forest Experiment Station, Institute of Tropical Forestry. SO-ITF-SM-46 --- #conflicting accounts about its fireproneness, 2 souces say it should be protected from fire, one says it grows in a fire tollerant habitat, listing as fire prone as to err on the side of caution.
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, reseeders, and recruiters which dispersed into the area within approximately one year post fire)	Yes	"Mahoganies are canopy-emergent forest trees reaching heights of 30–50 m and stem diameters of 1–3 m [20]. Like other high-value Meliaceae (e.g., closely related Khaya and Entandrophragma spp. from central African forests; [22]) they form elegant, straight boles whose wood is prized for its strength, rot resistance, workability, and appearance [24]. Although light demanding when small, they can tolerate floods, hurricanes, and fire disturbances when mature [20]." https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0018790 Norghauer, J. M., Martin, A. R., Mycroft, E. E., James, A., & Thomas, S. C. (2011). Island invasion by a threatened tree species: evidence for natural enemy release of mahogany (Swietenia macrophylla) on Dominica, Lesser Antilles. PLoS One, 6(4), e18790. ---

		"However, there is sufficient information on the regeneration ecology of mahogany to indicate that under natural conditions this species regenerates in essentially even-aged stands after catastrophic disturbances destroy many or most trees, and, in the case of fires and flooding, saplings and seedlings as well. Adult mahoganies tend to survive these events, and regenerate by shedding seed onto the resulting gaps or clearings." 1996. Snook, L.K. Catastrophic disturbance, logging and the ecology of mahogany (Swietenia macrophylla King): grounds for listing a major tropical timber species in CITES. Botanical Journal of the Linnean Society. 122(1): 35–46.
Promoted by fire (Does the plant increase in abundance after a fire?)	no data	#likely, see regenerates after fire section, but not explicit enough to consider this as yes.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	Low	#with how important of a timber tree this is and how much literature exists about it, it would have certainly be described flammable if it was so. Therefore, calling it low flammability in the absences of that info.
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

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

This research was funded by the Department of the Interior Pacific Islands Climate Adaptation Science Center. The project described in this publication was supported by Grant or Cooperative Agreement No.G20AC00073 to Curt Daehler from the United States Geological Survey. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Geological Survey. Mention of trade names or commercial products does not constitute their endorsement by the Pacific Islands Climate Adaptation Science Center or the National Climate Adaptation Science Center or the US Geological Survey.