Fire risk report for *Melaleuca quinquenervia*

Full Species Name
Melaleuca quinquenervia (Cav.) S.T.Blake

Family: Myrtaceae

Common names:
paperbark
cajeput tree

Synonyms:

Known occurrences (as of 2020)

Year first documented as naturalized in Hawai'i: 1932

This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 15.

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 **0.53**.

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*	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	"Although melaleuca has evolved several adaptations that permit its exploitation of fire within the plant communities and ecosystems of southern Florida, the relationship between melaleuca and fire in its native habitats is unclear. Seasonal swamp forests and woodlands in northern Australia that are dominated by Melaleuca spp. are "adapted to regular fire" [89]," https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY
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	"However, Balciunas and Burrows [4] suggested that in eastern Australia it "is considered fire intolerant, and natural stands are confined to wetlands." https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY ---------- "the relationship between melaleuca and fire in its native habitats is unclear. Seasonal swamp forests and woodlands in northern Australia that are dominated by Melaleuca spp. are "adapted to regular fire" [89]," # contradictory https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	"Fire plays an important role in regulating the structure and function of plant communities in southern Florida [56,104]. According to Meskimen [48], "the ability of melaleuca to withstand fire cannot be questioned, and it is probable that its existence and perpetuation are actually favored by fire." Myers and Belles [54] also suggested "melaleuca's spread is facilitated by fire." https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY
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	"Postfire germination and seedling establishment: Melaleuca can yield a rapid and prodigious postfire seed rain that, coupled with postfire site conditions that are conducive to germination and seedling establishment, can subsequently establish sizable populations of melaleuca seedlings. Melaleuca is one of the 1st postfire species to colonize in many southern Florida habitats [52]." https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY

Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Fire plays an important role in regulating the structure and function of plant communities in southern Florida [56,104]. According to Meskimen [48], "the ability of melaleuca to withstand fire cannot be questioned, and it is probable that its existence and perpetuation are actually favored by fire." Myers and Belles [54] also suggested "melaleuca's spread is facilitated by fire." https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"Changes in aerial fuels resulting from melaleuca invasion, coupled with flammable bark that serves as ladder fuel, may also alter fire severity in ways that favor melaleuca. Wade [102] suggested that the combination of loose flammable bark and volatile foliage result in a high propensity for torching of melaleuca trees during fire. In addition, melaleuca frequently establishes extremely dense stands (several thousand stems/acre), making them highly susceptible to running crown fires [102,104]. Extensive areas of southern Florida contain major vegetation types that are primarily adapted to surface fire (see Myers [53]). However, as discussed above and below, melaleuca is well adapted to survive most fires regardless of severity." https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"Although melaleuca has evolved several adaptations that permit its exploitation of fire within the plant communities and ecosystems of southern Florida, the relationship between melaleuca and fire in its native habitats is unclear. Seasonal swamp forests and woodlands in northern Australia that are dominated by Melaleuca spp. are "adapted to regular fire" [89]," https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html#FIRE%20ECOLOGY

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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