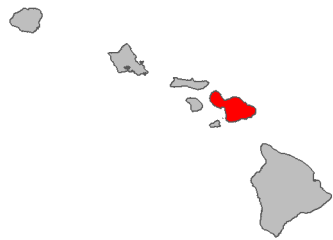


Fire risk report for *Pinus patula*

Full Species Name <i>Pinus patula</i>
Family: Pinaceae
Common names: Jelecote pine Mexican weeping pine pino triste
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 1999
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 13.
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	<p>"Patula pine occurs naturally in the Mexican States . . in its natural range, patula pine is generally found in the warm to cool regions, often in moist upper mountain valleys . . "</p> <p>https://www.fs.fed.us/global/iitf/pubs/sm_iitf054%20%20(5).pdf</p> <p>-----</p> <p>"It is an invasive species of both fire-climax grasslands and woodland in exotic situations where climatic conditions are close to those found in its natural range."</p> <p>https://www.cabi.org/isc/datasheet/41682</p>
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	#limited data regarding this species in its native range, most data are from plantations.
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	<p>"P. patula seedlings and saplings have a thin bark and have a reputation for being very sensitive to fire damage. Fire precautions tend to vary with the risk of combustion. In Angola . . . fifteen metre fire-breaks are constructed round any 20 hectare block of planting"</p> <p>#fire breaks would not be constructed if the species was not fire promoting</p> <p>Wormald, T. "Pinus Patula." Department of Forestry, Commonwealth Forestry Institute, University of Oxford, Tropical Forestry Papers, 7 (1975): 1–239.</p> <p>-----</p> <p>"The resultant litter build up can have important implications on nutrient cycling, by immobilizing nutrients, and can pose a wild fire hazard"</p> <p>https://doi.org/10.2989/10295920509505222</p> <p>Bird, T. L., & Scholes, M. C. (2005). Prescribed under-canopy burning in Pinus patula plantations of the Mpumalanga highveld: The effects of fire on tree growth. The Southern African Forestry Journal, 204(1), 3–13.</p>
Regenerates after fire (Does the plant regrow)	Yes	"Trees are thin barked and thus very susceptible to scorching damage by fire"

after fire by any means? This includes resprouters, reseeder, and recruiters which dispersed into the area within approximately one year post fire)		<p>https://www.fs.fed.us/global/iitf/pubs/sm_iitf054%20%20(5).pdf</p> <p>Gillespie, A. J. (1992). <i>Pinus patula</i> Schiede and Deppe. <i>Patula pine</i>. Pinaceae. Pine family. USDA Forest Service, Southern Forest Experiment Station, Institute of Tropical Forestry; 5 p.(SO-ITF-SM; 54).</p> <p>-----</p> <p>"A low level (3 dead trees in sample of 360) of mortality occurred [after fire]"</p> <p>#mature trees survive fires fine</p> <p>https://doi.org/10.2989/10295920509505222</p> <p>Bird, T. L., & Scholes, M. C. (2005). Prescribed under-canopy burning in <i>Pinus patula</i> plantations of the Mpumalanga highveld: The effects of fire on tree growth. <i>The Southern African Forestry Journal</i>, 204(1), 3–13.</p>
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	<p>"Natural regeneration of <i>f. patula</i> which can be profuse after a fire, a windblow or clearfelling can be a problem"</p> <p>https://ora.ox.ac.uk/objects/uuid:1ccd84f8-f371-4c73-b36a-5fb40ff5f24a/download_file?file_format=pdf&safe_filename=TFP07.pdf&type_of_work=Working+paper</p> <p>Wormald, T. "Pinus Patula." Department of Forestry, Commonwealth Forestry Institute, University of Oxford, <i>Tropical Forestry Papers</i>, 7 (1975): 1–239.</p>
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	<p>"Fire precautions tend to vary with the risk of combustion."</p> <p>#implying the tree is combustible</p> <p>https://ora.ox.ac.uk/objects/uuid:1ccd84f8-f371-4c73-b36a-5fb40ff5f24a</p> <p>Wormald, T. "Pinus Patula." Department of Forestry, Commonwealth Forestry Institute, University of Oxford, <i>Tropical Forestry Papers</i>, 7 (1975): 1–239.</p> <p>-----</p> <p>"Litter accumulation, as measured by litter depth, ranged from 39 to 121 mm"</p> <p>#can produce insane amounts of flammable litter</p> <p>Dames, J. F., Scholes, M. C., & Straker, C. J. (1998). Litter production and accumulation in <i>Pinus patula</i> plantations of the Mpumalanga Province, South Africa. <i>Plant and Soil</i>, 203(2), 183-190.</p> <p>-----</p>
Relative is flammable (Does a plant in the same genus meet the	Yes	<p>"Its invasive capacity can vary depending on the type of vegetation and may be facilitated by fire (Richardson et al., 1994), which is commonly experienced in forests and</p>

Reported Flammable criteria?)		woodlands dominated by P. pinaster due to its highly flammable resinous needles which accumulate under the canopy " https://doi.org/10.1016/j.foreco.2020.118042 Etten, Eddie van, C. Anne Belen, and María Calviño-Cancela. "Invasion Patterns of Pinus Pinaster in South-West Australia in Relation to Fire, Vegetation Type and Plantation Management." Forest Ecology and Management 463 (2020): 118042.
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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 Ronja Steinbach and Kevin Faccenda in 2020.

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