Fire risk report for *Jatropha gossypiifolia*

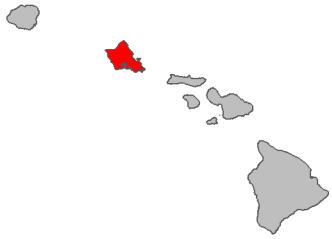
Full Species Name
Jatropha gossypiifolia L.

Family: Euphorbiaceae

Common names:
cotton-leaved jatropha

Synonyms:

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 1950

This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 18.

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	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*	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?)	Non Fire-prone	"Bellyache bush is generally absent from grasslands, forests and woodlands that are burnt regularly. Fire often fails to penetrate riparian vegetation and this probably favours survival of bellyache bush." #this is in australia, not native habitat https://www.daf.qld.gov.au/__data/assets/pdf_file/0010/59338/IPA-BellyacheBush-PSA.pdf Csurshes S.M. (1999) Bellyache bush (Jatropha gossypiifolia) in Queensland. PEST STATUS REVIEW SERIES - LAND PROTECTION BRANCH
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	#see flammability section "Monotypic stands supress seedling recruitment of native species, reducing biodiversity and impacting fire regimes due to reduced fuel load " https://people.csiro.au/-/media/People-Finder/M/K/Kerri-Moore/ATLASTBIOLOGICALCONTROLOFBELLYACHEBUSH.pdf Taylor, D. B., Snow, E. L., Moore, K., & Dhileepan, K. (2017). At last, Biological control of Bellyache bush. In 14th Queensland Weed Symposium.
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	"The first fire significantly ($P < 0.05$) reduced the original bellyache bush plant density by 76% (from 10 750 plants/ha to 2580 plants/ha). A second fire a year later extended the kill rate (8 months after the second burn) to 92%, with a residual plant population of 860 Plants/ha. Monitoring for a longer period would confirm the results obtained with the second burn. The relative sensitivity to fire was juvenile > mature > old. In contrast, seedling emergence was significantly ($P < 0.05$) increased after burning. Emergence in burnt plots over the wet season following the first fire

		was 2.7-fold that in unburnt controls. Even with high mortality during the subsequent periods, seedling density in burnt plots at the end of the study averaged 368 000 per ha compared with 40 000 per ha in the unburnt controls" https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.625.6460&rep=rep1&type=pdf Bebawi, F. F., & Campbell, S. D. (2002). Impact of fire on bellyache bush (Jatropha gossypiifolia) plant mortality and seedling recruitment. Tropical Grasslands, 36(3), 129-137. --- "These results suggest that while bellyache bush seeds are susceptible to fire, many are buried beyond the reach of lethal temperatures. Therefore, viable seeds will be available for post-fire recruitment and other measures, such as chemical control, may need to be employed in conjunction with burning." Bebawi, F. F., & Campbell, S. D. (2002). Effects of fire on germination and viability of bellyache bush (Jatropha gossypiifolia) seeds. Australian Journal of Experimental Agriculture, 42(8), 1063. https://doi.org/10.1071/ea01125
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"The first fire significantly ($P < 0.05$) reduced the original bellyache bush plant density by 76% (from 10 750 plants/ha to 2580 plants/ha). A second fire a year later extended the kill rate (8 months after the second burn) to 92%, with a residual plant population of 860 Plants/ha. Monitoring for a longer period would confirm the results obtained with the second burn. The relative sensitivity to fire was juvenile > mature > old. In contrast, seedling emergence was significantly ($P < 0.05$) increased after burning. Emergence in burnt plots over the wet season following the first fire was 2.7-fold that in unburnt controls. Even with high mortality during the subsequent periods, seedling density in burnt plots at the end of the study averaged 368 000 per ha compared with 40 000 per ha in the unburnt controls" https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.625.6460&rep=rep1&type=pdf Bebawi, F. F., & Campbell, S. D. (2002). Impact of fire on bellyache bush (Jatropha gossypiifolia) plant mortality and seedling recruitment. Tropical Grasslands, 36(3), 129-137.
Reported flammable (Is the species described as being flammable,	Low	"While exposure of bellyache bush to such high temperatures failed to ignite stems, it caused them to ooze caramelised latex and blister profusely. Such responses are not surprising, given the high sugar concentration (24%

being a major wildfire fuel, or high fire risk?)		sucrose) in its latex (Bebawi and Campbell 2002c). Mortality of bellyache bush was quite variable over the site and was directly related to the available fuel load when the fire was lit. As such, prefire grazing management that allows a buildup of fuel should maximise the level of mortality" https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.625.6460&rep=rep1&type=pdf Bebawi, F. F., & Campbell, S. D. (2002). Impact of fire on bellyache bush (Jatropha gossypiifolia) plant mortality and seedling recruitment. Tropical Grasslands, 36(3), 129-137. ---------- "Cut bellyache bush stems can retain high moisture content well into the dry season (Table 1). In addition, over 50% of cut stems re-sprouted leaves during the dry season although it is not yet known if these resprouted stems can re-establish as plant" #only burned after it was cut and cured https://www.researchgate.net/publication/273767420_The_Control_of_Bellyache_Bush_Jatropha_gossypifolia_Monocultures_-_Properties_of_a_Bellyache_Bush_Burn Guterres, A. da C., et al. "The control of bellyache bush (Jatropha gossypifolia) monocultures-properties of a bellyache bush burn." Proceedings of the 16th Australian Weeds Conference, Cairns Convention Centre, North Queensland, Australia, 18-22 May, 2008. Queensland Weed Society, 2008.
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.

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