Fire risk report for *Cryptostegia grandiflora*

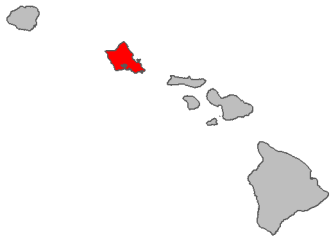
Full Species Name
Cryptostegia grandiflora Roxb. ex R.Br.

Family: Apocynaceae

Common names:
rubber vine

Synonyms:

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 2009

This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 28.

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 **high** fire risk in Hawai'i with a fire risk score of **0.50**.

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*	Yes
Regenerates after fire	Yes
Promoted by fire	No
Reported flammable*	High
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	"In its native range of south-west Madagascar, C. grandiflora occurs as a riverine plant, especially as a climber in the upper storey of gallery forests. It is also found as a sprawling shrub along gullies, creeks, as well as disturbed areas such as roadside ditches where run-off water accumulates, around waterholes and at the edge of coastal salt marshes (Marohasy and Forster, 1991).. . Establishment in the dry areas is favoured by a leaf litter cover and the absence of fires" https://www.cabi.org/isc/datasheet/16378
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)	Yes	"Fire has significant potential as a tool in the management of C. grandiflora wberever adequate grass fuel can be attained." Grice, A. C. (1997). Post-fire regrowth and survival of the invasive tropical shrubs Cryptostegia grandiflora and Ziziphus mauritiana. Australian Journal of Ecology, 22(1), 49-55. ---------- "Rubber vine (Cryptostegia grandiflora), a woody vine from Madagascar that is invasive in Australia, promotes crown fires by functioning as a ladder fuel (Grice et al. 2008) while reducing the frequency of low-intensity ground fires by suppressing grasses (Grice 1997)." Mandle, L., Bufford, J. L., Schmidt, I. B., & Daehler, C. C. (2011). Woody exotic plant invasions and fire: reciprocal impacts and consequences for native ecosystems. Biological Invasions, 13(8), 1815-1827.
Regenerates after fire (Does the plant regrow after fire by any means? This includes	Yes	"A single fire in the middle of the dry season affected the survival and vegetative growth of two important shrub species, Cryptostegia grandiflora and Ziziphus mauritiana. The fire killed about 96% of small plants (height < 100 cm),

resprouters, reseeders, and recruiters which dispersed into the area within approximately one year post fire)		80% of medium-sized plants and 45% of large plants (height > 200 cm) of C. grandiflora" Grice, A. C. (1997). Post-fire regrowth and survival of the invasive tropical shrubs Cryptostegia grandiflora and Ziziphus mauritiana. Australian Journal of Ecology, 22(1), 49-55. --- "s. Late-season fires promoted higher mortality of rubber vine (96%) than early season fires (77%), with rubber vine in subriparian habitats more susceptible (90% mortality) than that growing in riparian areas (68% mortality). On average, fire mortality increased from 32% after the first fire up to 86% following 2 fires....No rubber vine seeds were detected in the germinable seed bank of either burnt or unburnt plots." #regenerates fine after one fire, starts to die significantly after multiple fires https://doi.org/10.1071/ea01047 Bebawi, F. F., & Campbell, S. D. (2002). Australian Journal of Experimental Agriculture, 42(1), 43.
Promoted by fire (Does the plant increase in abundance after a fire?)	No	"Fire has significant potential as a tool in the management of C. grandiflora wberever adequate grass fuel can be attained." Grice, A. C. (1997). Post-fire regrowth and survival of the invasive tropical shrubs Cryptostegia grandiflora and Ziziphus mauritiana. Australian Journal of Ecology, 22(1), 49-55. https://doi.org/10.1071/ea01047 Bebawi, F. F., & Campbell, S. D. (2002). Australian Journal of Experimental Agriculture, 42(1), 43.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"vigorous grass growth under dense infestation . . . has provided fuel for fires" #showing that it can burn, but does not do so generally without other flammable species Vogler, Wayne, and Andrea Lindsay. “The Impact of the Rust Fungus Maravalia Cryptostegiae on Three Rubber Vine (Cryptostegia Grandifl Ora) Populations in Tropical Queensland.” Thirteenth Australian Weeds Conference “Threats Now and Forever,” 2002, 180–82) --- "High shrub, small tree and rubber vine tower biomass within riparian landscapes, constituted much greater combustible fuel loads than grass fuels. Cryptostegia grandiflora in particular was observed to be highly

		flammable and may have had higher-intensity fires than other canopy fuels based on flame height. Cryptostegia grandiflora tower and canopy ignition/scorch was common in riparian habitats." Radford, I. J., Grice, A. C., Abbott, B. N., Nicholas, D. M., & Whiteman, L. (2008). Impacts of changed fire regimes on tropical riparian vegetation invaded by an exotic vine. Austral Ecology, 33(2), 151-167. ---------- "Rubber vine (Cryptostegia grandiflora), a woody vine from Madagascar that is invasive in Australia, promotes crown fires by functioning as a ladder fuel (Grice et al. 2008) while reducing the frequency of low-intensity ground fires by suppressing grasses (Grice 1997)." Mandle, L., Bufford, J. L., Schmidt, I. B., & Daehler, C. C. (2011). Woody exotic plant invasions and fire: reciprocal impacts and consequences for native ecosystems. Biological Invasions, 13(8), 1815-1827.
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 Ronja Steinbach and Kevin Faccenda in 2020.

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