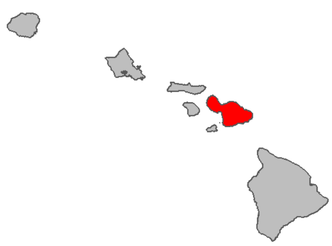
Fire risk report for *Flueggea virosa*

Full Species Name *Flueggea virosa* (Roxb. ex Willd.) Voigt
Family: Phyllanthaceae
Common names: Chinese waterberry white currant
Synonyms: *Securinega viros*
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 2001
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 7.
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 **low** fire risk in Hawai'i with a fire risk score of **0.16**.

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
Reported flammable*	No Data
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	[relatively frequent in fire prone habitat, apppendicies] https://www.researchgate.net/profile/Nyatwere_Mganga/publication/304712427_Plant_Species_Diversity_in_Western_Tanzania_Comparison_between_Frequently_Burnt_and_Fire_Suppressed_Forests/links/57849e5508aeca7daac4b802.pdf Mganga, N. D., & Lyaruu, H. V. (2016). Plant Species Diversity in Western Tanzania: Comparison between Frequently Burnt and Fire Suppressed Forests. Int. J. Pure App. Biosci, 4(3), 28-44. ---------------------------- "The site of the plots is mapped by Langdale-Brown (1960) as Hyparrhenia dissoluta- H.filipenda fire and grazing climax savanna. [lists F. virosa as occuring]" https://doi.org/10.1111/j.1365-2028.1977.tb00403.x Lock, J. M. (1977). Preliminary results from fire and elephant exclusion plots in Kabalega National Park, Uganda. African Journal of Ecology, 15(3), 229-232.
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	Yes	"Of the 38 species that emerged from the soil samples, 95% were annuals. Only two tree species that were Flueggea virosa (Roxb. ex Willd.) Baill. and Mitragyna inermis (Willd.) O. Ktze. germinated from soil samples taken in the control and the grazed plots at Laba,

dispersed into the area within approximately one year post fire)		espectively. At Tiogo, only Flueggea. virosa was recorded in soil samples from the burnt and grazed plots" Zida, D., Sanou, L., Diawara, S., Savadogo, P., & Thiombiano, A. (2020). Herbaceous seeds dominates the soil seed bank after long-term prescribed fire, grazing and selective tree cutting in savanna-woodlands of West Africa. Acta Oecologica, 108, 103607. ---------------------------- "Species that were not affected by burning and had low average values for volume include the following: A. suaveolens, D. cinerea, F. virosa, G. flavescens, L. bosciifolium, L. cinerium, S. tenuinervis, M. divaricatum, R. brevispinosum, V. hebeclada and V. haematoxylon in the Khamab Reserve" http://repository.nwu.ac.za/handle/10394/33859 Esterhuizen, A. (2019). The effect of fire on savanna vegetation dynamics in the semi-arid Molopo Bushveld region of the North-West Province, South Africa (Doctoral dissertation, North-West University (South Africa)).
Promoted by fire (Does the plant increase in abundance after a fire?)	No	"With regard to changes in woody species composition after a fire had occurred, approximately 36% of land users stated that A. suaveolens had increased, 57% stated that B. albitrunca had decreased, 29% stated that D. cinerea had increased and 50% stated that they were uncertain with regard to whether the grass E. rigida had increased or decreased. Most of the land users (53%) stated that F. virosa had decreased..." http://repository.nwu.ac.za/handle/10394/33859 Esterhuizen, A. (2019). The effect of fire on savanna vegetation dynamics in the semi-arid Molopo Bushveld region of the North-West Province, South Africa (Doctoral dissertation, North-West University (South Africa)). ---------------------------- "[Biomass decreased in site with 1 year fire return interval compared to an unburned control; figure 5]" https://doi.org/10.1890/14-1158.1 Pellegrini, A. F., Hedin, L. O., Staver, A. C., & Govender, N. (2015). Fire alters ecosystem carbon and nutrients but not plant nutrient stoichiometry or composition in tropical savanna. Ecology, 96(5), 1275-1285. ----------------------------

		"[density of F. virosa was about half that in annually burned areas compared to less frequently burned areas; appendix 1] https://core.ac.uk/reader/47112920 Devineau, J. L., Fournier, A., & Nignan, S. (2010). Savanna fire regimes assessment with MODIS fire data: their relationship to land cover and plant species distribution in western Burkina Faso (West Africa). Journal of Arid Environments, 74(9), 1092-1101.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	No Data	
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 Hawaiʻi 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 Hawaiʻi is available from the Hawaiʻi 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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