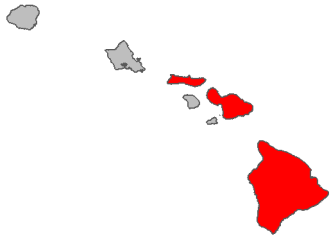
Fire risk report for *Ulex europaeus*

Full Species Name *Ulex europaeus* L.
Family: Fabaceae
Common names: gorse furze whin
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 1915
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 20.
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 **0.80**.

This species was ranked by 49 managers on a scale of 'no risk', 'low risk', 'medium risk', or 'high risk'. The numerical score ranges from 0 to 1 with higher scores indicating more managers considered it a higher risk. A score of > .31 indicates high risk.

Summary of Fire ecology	
Native habitat fire proneness	Fire-prone
Fire promoting plant in its native range	Yes
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	"Its natural distribution is predominantly across central and western Europe, where fire plays an important role in these and other shrublands" Anderson, Stuart, and Wendy Anderson. “Ignition and Fire Spread Thresholds in Gorse (Ulex Europaeus).” International Journal of Wildland Fire 19 (2010): 589–98. --- "In its native range on the western seaboard of continental Europe and the British Isles, common gorse often occurs as a dominant species in various heathland plant communities (see Habitat Types and Plant Communities). Fire in these heathlands is recurrent [25,34,80], and fire frequency dependent on fire severity." https://www.fs.fed.us/database/feis/plants/shrub/uleeur/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?)	Yes	"Fires in gorse, like other shrub fuels, can often burn at very high rates of spread and extreme fire intensities under levels of fire danger that would not be considered extreme in other fuel types such as forest and grass" Anderson, Stuart, and Wendy Anderson. “Ignition and Fire Spread Thresholds in Gorse (Ulex Europaeus).” International Journal of Wildland Fire 19 (2010): 589–98.
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	"Eleven people were killed in Bandon, OR, in 1936 by a fire propagated by a highly flammable invasive plant, gorse (Ulex europaeus), introduced from Europe (Simberloff 1996)." https://www.researchgate.net/profile/Melody_Keena/publication/258211524_Invasive_species_overarching_priorities_to_2029/links/544a7f010cf2d6347f400f13/Invasive-species-overarching-priorities-to-2029.pdf#page=98 Dix, M. E., Buford, M., Slavicek, J., Solomon, A. M., & Conard, S. G. (2010). Invasive species and disturbances: current and future roles of Forest Service research and development. A dynamic invasive species research vision: opportunities and priorities 2009–29, 91.
Regenerates after fire (Does the plant regrow after fire by any	Yes	"Common gorse responds to fire by sprouting from the basal stem region (coppicing) and by establishing from soil-

means? This includes resprouters, reseeders, and recruiters which dispersed into the area within approximately one year post fire)		stored seed [5,42,74,92,98,99]. Postfire regeneration of common gorse can be prolific and rapid [42,80,82]." https://www.fs.fed.us/database/feis/plants/shrub/uleeur/all.html#FIRE%20ECOLOGY
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Common gorse responds to fire by sprouting from the basal stem region and by establishing from seed in the soil seed bank [5,42,74,92,98,99]. Postfire regeneration of common gorse can be prolific and rapid [42,80,82]." https://www.fs.fed.us/database/feis/plants/shrub/uleeur/all.html#FIRE%20ECOLOGY --- "Burning increased seeding abundances more strongly for gorse (7.72 ± 0.44, $p < 0.05$" Sriramamurthy, R. T., Bhalla, R. S., & Sankaran, M. (2020). Fire differentially affects mortality and seedling regeneration of three woody invaders in forest–grassland mosaics of the southern Western Ghats, India. Biological Invasions, 1-12.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"Some studies have been carried out to determine ignition thresholds in shrub fuels. Guijarro et al. (2002) did laboratory ignition tests and found that crushed Ulex europaeus litter had one of the highest ignition frequencies, and rate of spread and combustion of the fuels tested....The ignition experiments showed that gorse fuels ignited easily under most conditions, apart from instances where fuels were saturated from precipitation." Anderson, Stuart, and Wendy Anderson. “Ignition and Fire Spread Thresholds in Gorse (Ulex Europaeus).” International Journal of Wildland Fire 19 (2010): 589–98.
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"More recently, Fernandes et al. (2008) determined thresholds for sustainability of surface fires in Pinus pinaster stands in northern Portugal with an understorey of Ulex minor, and found the moisture content of fine dead fuels to be highly significant." Anderson, Stuart, and Wendy Anderson. “Ignition and Fire Spread Thresholds in Gorse (Ulex Europaeus).” International Journal of Wildland Fire 19 (2010): 589–98.

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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