# Fire risk report for *Cytisus scoparius*

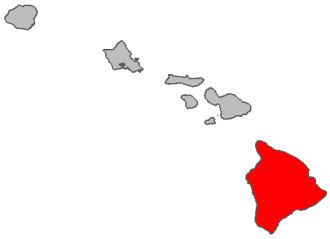
**Full Species Name**
*Cytisus scoparius* (L.) Link

**Family**: Fabaceae

**Common names:**
Scotch broom

**Synonyms:**

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 1909

This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 16.

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 | No Data |
| 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

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|---|---|---|
| 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?) | No Data | There is no information available on the fire regimes in which the brooms evolved in their native range. However, Scotch broom and Genista florida, a close relative of French broom, were early successional species following fire in their native range in Spain" https://www.fs.fed.us/database/feis/plants/shrub/cytspp/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?) | No | "There is no information available on the fire regimes in which the brooms evolved in their native range. However, Scotch broom and Genista florida, a close relative of French broom, were early successional species following fire in their native range in Spain [52]." https://www.fs.fed.us/database/feis/plants/shrub/cytspp/all.html#FIRE%20ECOLOGY |
| Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range) | Yes | "Where Scotch broom invades subalpine eucalypt woodland in Australia it forms a dense shrub layer, overtopping and depleting the grass layer, thus altering fuel structure such that fire intensities fueled by shrubs in the invaded community would likely be higher than those fueled by grasses in an uninvaded community [36]. Scotch broom invasions are also said to increase fire intensity and frequency in invaded Oregon white oak communities [23,138]. According to Tveten [138], where Scotch broom has invaded prairie and Oregon white oak woodlands on Fort Lewis in western Washington, it forms dense stands and increases fire hazard by creating extensive areas with large amounts of dead wood." https://www.fs.fed.us/database/feis/plants/shrub/cytspp/all.html#FIRE%20ECOLOGY |
| Regenerates after fire (Does the plant regrow after fire by any means? This includes resprouters, reseeders, and recruiters which dispersed into the area | Yes | "Observations indicate that Scotch broom regenerates after fire by seedling establishment and by stump-sprouting [17,36,108,110,130,137]. Several studies [36,97,110,138] indicate postfire germination of Scotch broom from the soil seed bank after fire (see Discussion and Qualification of Fire Effect). "Weedy outbreaks" of Scotch broom have been linked to fire in Australia [90]." |

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| within approximately one year post fire) | | https://www.fs.fed.us/database/feis/plants/shrub/cytspp/all.html#FIRE%20ECOLOGY<br>---<br>"Fire caused high levels of mortality in scotch broom (94 ± 12%)... Fire effects on seedling abundances were more pronounced for scotch broom seedlings (model effect size estimate ± SE estimate: 3.16 ± 0.85)"<br>#fire seems to kill adults, the population regenerates via seed<br>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. |
| Promoted by fire (Does the plant increase in abundance after a fire?) | Yes | "Broom, Sarothamnus scoparius, has been introduced into the area and dominates post-fire stands 3-4 years after establishment."<br>https://www.cabdirect.org/cabdirect/abstract/20083026853<br>Nemoto, M., Nakagoshi, N., Horie, H., & Nishimura, N. (1993). Allelopathic potential of broom (Sarothamnus scoparius) dominating post-fire stands in southwest Japan. In Proceedings I of the 10th Australian Weeds Conference and 14th Asian Pacific Weed Science Society Conference, Brisbane, Australia, 6-10 September, 1993 (pp. 333-338). Queensland Weed Society.<br>---<br>"Both black wattle and scotch broom suffered high adult mortality from fire, accompanied by enhanced germination. For such species, occasional fires can promote invasions while frequent fires can suppress them (Grace et al. 2000; DiTomaso et al. 2006)"<br>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 | "Flammability ranked as Low Flammability in Spring and Summer and Flammable in Autumn and Winter. it ranked Ulex the same way, so this seems to be an underestimate given that Ulex is typically regarded as extremely flammable. " |

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| | | Núñez-Regueira, L., Añón, J. R., & Castiñeiras, J. P. (1996). Calorific values and flammability of forest species in Galicia. Coastal and hillside zones. Bioresource technology, 57(3), 283-289.<br>---<br>"Ranked as "Moderate/high" in Table 1" https://link.springer.com/article/10.1007/s10021-017-0195-z/tables/1<br>Wyse, S. V., Perry, G. L., & Curran, T. J. (2018). Shoot-level flammability of species mixtures is driven by the most flammable species: implications for vegetation-fire feedbacks favouring invasive species. Ecosystems, 21(5), 886-900. |
| Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?) | Yes | "As of this writing (2005) there is no fire-related information available in the literature for striated broom All of the information presented here comes from research on Scotch broom. Because of their similar reproductive biology and ecology, it might be assumed that striated broom will have a similar relationship to fire as Scotch broom, but more research is needed to test this assumption. Also see French broom in FEIS for more information from fire studies on this closely related species." https://www.fs.fed.us/database/feis/plants/shrub/cytspp/all.html#FIRE%20ECOLOGY |

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

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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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