Fire risk report for *Spartium junceum*

Full Species Name   *Spartium junceum* L.
Family: Fabaceae
Common names: Spanish broom
Synonyms:
Known occurrences (as of 2020)
Year first documented as naturalized in Hawai'i: 1956
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 12.
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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0            I        .5                        1
Lowest risk           ⇔           Highest risk
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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	Fire-prone
Fire promoting plant in its native range	Yes
Fire promoting plant in its introduced range*	No
Regenerates after fire	Yes
Promoted by fire	Yes
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?)	Fire-prone	"In the Mediterranean Basin, shrublands are among the most fire-prone vegetation types due to their high fine fuel particle content, short-lived fuel moisture content in summer and high volatile organic compound concentrations (Pellizzaro et al. 2007; Santana et al. 2011)" Castagneri, D., Esposito, A., Bovio, G., Mazzoleni, S., Seneca, U., Catalanotti, A. E., & Ascoli, D. (2013). Fuel vertical structure affects fire sustainability and behaviour of prescribed burning in Spartium junceum shrublands. Annals of forest science, 70(8), 863-871.
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	"S. junceum tall shrublands represent high hazard formations due to their elevated fuel load, mostly in fine fuel fractions. Vertical discontinuity among fuel strata limits fire propagation in mild weather conditions. Winter–spring prescribed burning cannot eliminate S. junceum shrublands, but do create shrub cover discontinuity. As S. junceum has fire-adapted morphological traits, a single burn is insufficient to control it." Castagneri, D., Esposito, A., Bovio, G., Mazzoleni, S., Seneca, U., Catalanotti, A. E., & Ascoli, D. (2013). Fuel vertical structure affects fire sustainability and behaviour of prescribed burning in Spartium junceum shrublands. Annals of forest science, 70(8), 863-871.
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 dispersed into the area within approximately one year post fire)	Yes	"[Seed germination rate increases from 44% to 100% after heat treatment, table 1]" https://www.researchgate.net/profile/Costas_Thanos/publication/258125975_Post-fire_regeneration_of_hardseeded_plants_Ecophysiology_of_seed_germination/links/0deec52713da4d4fab000000.pdf Doussi, M. A., & Thanos, C. A. (1994, November). Post-fire regeneration of hardseeded plants: ecophysiology of seed germination. In Proceedings of the 2nd International

		Conference on Forest Fire Research (Vol. 2, pp. 1035-1044). Coimbra.
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Spanish broom is especially invasive in southern California chaparral after fire" https://www.fs.fed.us/database/feis/plants/shrub/spajun/all.html -------------------------- [Seed germination rate increases from 44% to 100% after heat treatment, table 1] Doussi, M. A., & Thanos, C. A. (1994, November). Post-fire regeneration of hardseeded plants: ecophysiology of seed germination. In Proceedings of the 2nd International Conference on Forest Fire Research (Vol. 2, pp. 1035-1044). Coimbra. https://www.researchgate.net/profile/Costas_Thanos/publication/258125975_Post-fire_regeneration_of_hardseeded_plants_Ecophysiology_of_seed_germination/links/0deec52713da4d4fab000000.pdf -------------------------- ". A few years after hot fires in El Dorado County there is a noticeable solid stand of broom in burned areas (Mobley 1954). In New Zealand lowland scrub areas which are periodically burned contain both broom and gorse (Johnson 1982). " https://www.invasive.org/gist/esadocs/documnts/sparjun.pdf Hoshovsky, M. ELEMENT STEWARDSHIP ABSTRACT for Spartium junceum. The Nature Conservancy
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"S. junceum tall shrublands represent high hazard formations due to their elevated fuel load, mostly in fine fuel fractions. Vertical discontinuity among fuel strata limits fire propagation in mild weather conditions. Winter–spring prescribed burning cannot eliminate S. junceum shrublands, but do create shrub cover discontinuity. As S. junceum has fire-adapted morphological traits, a single burn is insufficient to control it." Castagneri, D., Esposito, A., Bovio, G., Mazzoleni, S., Seneca, U., Catalanotti, A. E., & Ascoli, D. (2013). Fuel vertical structure affects fire sustainability and behaviour of prescribed burning in Spartium junceum shrublands. Annals of forest science, 70(8), 863-871.
Relative is flammable (Does a plant in the	No	monotypic genus

same genus meet the Reported Flammable criteria?)		

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 Hawaiʻi 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.