Fire risk report for *Cirsium arvense*

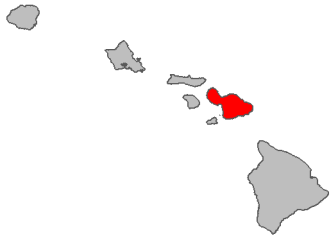
Full Species Name
Cirsium arvense (L.) Scop

Family: Asteraceae

Common names:
creeping thistle
Canada thistle
field thistle

Synonyms:

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 2016

This species has not yet been ranked by the Hawai'i Weed Risk Assessment program as of 2020.

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 **0.50**.

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	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*	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?)	No Data	#limited data available regarding this species in its native range
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	#limited data available regarding this species in its native range
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	"Canada thistle may change the fire ecology of the site in which it occurs by its abundant, flammable aboveground biomass. For example, in boreal wet-meadows, investigators suggest that Canada thistle has the potential to increase fire frequency and perhaps severity as a result of its abundant and readily ignited litter [100]." https://www.fs.fed.us/database/feis/plants/forb/cirarv/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 within approximately one year post fire)	Yes	"Fire kills the aboveground portion of Canada thistle plants, while the roots can survive severe fires [98,252]." https://www.fs.fed.us/database/feis/plants/forb/cirarv/all.html#FIRE%20ECOLOGY
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Canada thistle is slightly damaged to enhanced by fire [252]. It is likely to survive fire and sprout vegetatively from its extensive perennial root system (e.g., [64,67,98,145,151,213,252]) (also see Asexual reproduction), or colonize bare ground via seedling establishment after fire [3,56,122,138,158,190,219,242]. For example, in Yellowstone National Park, Canada thistle is

		rare in unburned forests but locally abundant in burned areas [48]. When sites supporting Canada thistle are burned, its response is variable, and may be affected by season of burn, burn severity, site conditions, and plant community composition and phenology before and after the fire. Existing research provides no clear correlations with these variables." https://www.fs.fed.us/database/feis/plants/forb/cirarv/all.html#FIRE%20ECOLOGY --- "Several studies have indicated the presence of Canada thistle in burned areas where it was absent from the prefire community and/or adjacent unburned areas (e.g., [138,158,163]). In Grand Teton National Park, Wyoming, Canada thistle did not occur in unburned forest and was not part of the initial postfire vegetation after a mixed-severity wildfire." https://www.fs.fed.us/database/feis/plants/forb/cirarv/all.html#FIRE%20ECOLOGY --- "Species of open habitats (often weeds) with different demands of soil fertility, such as Artemisia vulgaris, Anthriscus sylvestris, Cirsium arvense, Convolvulus arvensis, Oberna behen, Tanacetum vulgare, Vicia cracca, etc. were characteristic species of burnt abandoned lands." https://ecologicalprocesses.springeropen.com/articles/10.1186/s13717-018-0150-8 Khanina, L. G., Smirnov, V. E., Romanov, M. S., & Bobrovsky, M. V. (2018). Effect of spring grass fires on vegetation patterns and soil quality in abandoned agricultural lands at local and landscape scales in Central European Russia. Ecological Processes, 7(1), 38. --- "Among the 88 species, five (6%) displayed significant, positive change in response to repeated spring burns (Fig. 2; positive estimate with CI not overlapping zero), hence were promoted when subjected to this treatment compared to annual mowing (Vicia cracca, Cirsium arvense" Milberg, P., Fogelfors, H., Westerberg, L., & Tälle, M. (2018). Annual burning of semi-natural grasslands for conservation: winners and losers among plant species. Nordic Journal of Botany, 36(5), njb-01709.
Reported flammable (Is the species described	High	"Canada thistle may change the fire ecology of the site in which it occurs by its abundant, flammable aboveground

as being flammable, being a major wildfire fuel, or high fire risk?)		biomass. For example, in boreal wet-meadows, investigators suggest that Canada thistle has the potential to increase fire frequency and perhaps severity as a result of its abundant and readily ignited litter [100]." https://www.fs.fed.us/database/feis/plants/forb/cirarv/all.html#FIRE%20ECOLOGY
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	No	"Carduus spp., Cirsium spp., Silybum marianum Could be ladder fuels in open woodlands;" http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.468.2022&rep=rep1&type=pdf#page=31 # weak evidence; no specific species listed

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 Kevin Faccenda in 2020.

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