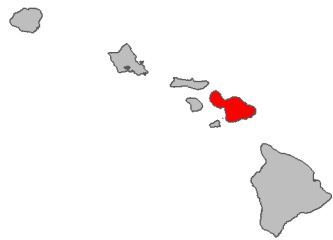


Fire risk report for *Carduus pycnocephalus*

Full Species Name <i>Carduus pycnocephalus</i> L.
Family: Asteraceae
Common names: Italian thistle
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 1986
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 **0.53**.

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	Fire-prone
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

<p>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?)</p>	<p>Fire-prone</p>	<p>"The vegetation of the area consists of the characteristic Mediterranean floristic components, the Aleppo pine dominating. The species prevailing in shrubby vegetation include Pistacia lent&w, Smilax aspera, Phillyrea media, Quercus cocci'era, Asparagus acutifolius, Lonicera implexa, Cistus incanus, Myrtus communis, Arbutus unedo, Arbutus adrachne, Erica arborea and Erica manipul\$ora; those prevailing in herbaceous vegetation include Rubia peregrina, Brachypodium retusum, Brachypodium pinnatum, Carduus pycnocephalus..."</p> <p>http://users.auth.gr/users/5/9/050495/public_html/files/eng/61%20Forest%20ecology%20and%20Managment.pdf</p> <p>Tsitsoni, T. (1997). Conditions determining natural regeneration after wildfires in the Pinus halepensis (Miller, 1768) forests of Kassandra Peninsula (North Greece). Forest ecology and management, 92(1-3), 199-208.</p>
<p>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?)</p>	<p>No</p>	
<p>Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)</p>	<p>Yes</p>	<p>"Cal-IPC (2004) say that in California C. pycnocephalus increases fire frequency and movement into the overstory of island scrub oak chaparral. Fire is carried into the oak overstory by the C. pycnocephalus midstory. This may or may not increase the threat compared to native vegetation or annual grasses in the same area, but C. pycnocephalus tend to grow taller and be a better fire ladder than other species."</p> <p>https://www.cabi.org/isc/datasheet/11260</p> <p>-----</p> <p>"Carduus pycnocephalus (b) can form large monotypic stands between and under oaks that can carry fire from the ground into the oak canopy."</p> <p>https://www.catalinaconservancy.org/userfiles/files/wildlife/oak_symposium/08-Knapp.pdf</p>

		Knapp, J. (2010). Catalina Island’s invasive plant management program, with an emphasis on invasion and protection of oak ecosystems. Oak ecosystem restoration on Catalina Island, California. Catalina Island Conservancy, Avalon, CA, 35-46.
Regenerates after fire (Does the plant regrow after fire by any means? This includes resprouters, reseeder, and recruiters which dispersed into the area within approximately one year post fire)	Yes	"Fire led to an increase in vegetation into annuals and ruderal species of plant vegetation, including <i>Coronilla scorpioides</i> , <i>Torilis leptophylla</i> , <i>Boissiera squarrosa</i> , <i>Taeniatherum crinitum</i> , <i>Onopordon carduchorum</i> , <i>Cirsium spectabile</i> and <i>Carduus pycnocephalus</i> . " https://dx.doi.org/10.22092/ijfpr.2013.3204 Mirdavoodi, H., Marvi Mohadjer, M. R., Zahedi Amiri, G., & Etemad, V. (2013). Disturbance effects on plant diversity and invasive species in western oak communities of Iran (Case study: Dalab Forest, Ilam). <i>Iranian Journal of Forest and Poplar Research</i> , 21(1), 1-15.
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	" Fire led to an increase in vegetation into annuals and ruderal species of plant vegetation, including <i>Coronilla scorpioides</i> , <i>Torilis leptophylla</i> , <i>Boissiera squarrosa</i> , <i>Taeniatherum crinitum</i> , <i>Onopordon carduchorum</i> , <i>Cirsium spectabile</i> and <i>Carduus pycnocephalus</i> . " https://dx.doi.org/10.22092/ijfpr.2013.3204 Mirdavoodi, H., Marvi Mohadjer, M. R., Zahedi Amiri, G., & Etemad, V. (2013). Disturbance effects on plant diversity and invasive species in western oak communities of Iran (Case study: Dalab Forest, Ilam). <i>Iranian Journal of Forest and Poplar Research</i> , 21(1), 1-15. ----- "Ranchers often burn hillside pastures in the fall to promote regrowth and to remove thistle [italian thistle] stubble, but burning my actually promote thistle growth" https://www.google.com/books/edition/Biological_Control_in_the_Western_United/IZh0gFJwx0UC?hl=en&gbpv=1&dq=%22Carduus+pycnocephalus%22+fire+OR+burn&pg=PA242&printsec=frontcover Goeden, R. D. (1995). 65/Italian Thistle. <i>Biological Control in the Western United States: Accomplishments and Benefits of Regional Research Project W-84, 1964-1989</i> , 3361, 242.
Reported flammable (Is the species described as being flammable,	High	"Because its height can reach 2 m, it can serve as a ladder fuel that brings fire in surface litter into oak canopies (McGinnis and Keeley 2011). <i>C. pycnocephalus</i> forms dense stands, often with 100% cover, which can increase fire

being a major wildfire fuel, or high fire risk?)		frequency and inhibit native seedling recruitment and survivorship (Parsons 1977)." http://scholarworks.csun.edu/bitstream/handle/10211.3/143842/Algiers_Thesis_20150507.pdf?sequence=2 Algiers Jr, J. (2015). RESISTING RE-ESTABLISHMENT OF INVASIVE PLANT SPECIES IN FUEL REDUCTION AREAS (Doctoral dissertation, California State University, Northridge).
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"Carduus spp., Cirsium spp., Could be ladder fuels in open woodlands" https://184.168.207.85/cnps/publications/fremontia/Fremontia_Vol38-No2-3.pdf#page=31 Lambert, A. M., D'antonio, C. M., & Dudley, T. L. (2010). Invasive species and fire in California ecosystems. <i>Fremontia</i> , 38(2), 29-36. ----- #Cirsium arvense is in a very closely related genus, and is highly flammable.

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>

Fact sheet prepared by Kevin Faccenda (faccenda@hawaii.edu) in November 2021. Data were prepared by Kevin Faccenda in 2020.

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