Fire risk report for *Salsola tragus*

Full Species Name *Salsola tragus* L.
Family: Amaranthaceae
Common names: Russian thistle tumbleweed
Synonyms: *Kali tragus*
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 1959
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	Uncertain
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

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?)	Uncertain	
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	#no English data for 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	"ire ecology: Russian-thistle aids in spreading fire. It burns easily because the stems are spaced in an arrangement that allows for maximum air circulation [61]. Also, dead plants contribute to fuel load by retaining their original shape for some time before decomposing [23]. The rolling action of the plant spreads prairie wildfire quickly." https://www.fs.fed.us/database/feis/plants/forb/salkal/all.html#FIRE%20ECOLOGY ---------- "Like the tumbleweed, it bounds over the prairies with a movement resembling that of the jack rabbit, traveling hundreds of miles, leaping over or breaking down fences, cart'ying fire before the wind, or endangering property by accumulating in heaps of inflammable material" http://albertostrumia.it/sites/default/files/SISRI/ScientificAmerican/journal/v71/n26/pdf/scientificamerican12291894-406.pdf HOFER, E. (1894). THE RUSSIAN THISTLE—A SCOURGE TO AGRICULTURE. Scientific American, 71(26), 406-406.
Regenerates after fire (Does the plant regrow after fire by any means? This includes resprouters, reseeders,	Yes	"Russian-thistle colonizes a burn when off-site, abscised plants blow across it, spreading seed" https://www.fs.fed.us/database/feis/plants/forb/salkal/all.html#FIRE%20ECOLOGY ----------

and recruiters which dispersed into the area within approximately one year post fire)		"The Department of Agriculture has recommended burning over «tubble and fields to destroy the seed, and we believe this to be very efficient as results show from some preliminary experiments made in the labratory. The dried calyx and attached parts burned slowly, but a small amount of fire caused them to crack, the embryo was thrown out in many cases. Oat of sixty-eight ^seeds none, so treated, germinated." #as other sources mention, it colonizes from off site https://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1186&context=bulletin Pammel, L. H. (2017). Botany of Russian Thistle. Bulletin, 3(26), 3.
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Russian-thistle colonizes a burn site within 1 to 3 years. It dominated a big sagebrush community in Idaho at postfire year 2, contributing 58 percent of the total community biomass [26]. On the Mesa Verde Plateau of Colorado, it codominated a burned area with Bigelow aster (Machaeranthera bigelovii) at postfire year 3 [22]. Once dominant, Russian-thistle retains dominance for an average of 1 more year. At postfire year 3 or 4, populations decline until further disturbance [61]." https://www.fs.fed.us/database/feis/plants/forb/salkal/all.html#FIRE%20ECOLOGY
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"The tendency of dead plants to aggregate against fencelines and buildings creates a fire hazard. Tumbling, ignited plants can spread fire, and may bounce across fire lines " https://www.fs.fed.us/database/feis/plants/forb/salkal/all.html#FIRE%20ECOLOGY --- "Prickly Russian thistle is also a fire hazard, with highly flammable standing dead plants and plants piled on fences, against buildings, and in gullies. There is also the risk of ignited plants tumbling over fire lines, preventing wildfire containment." https://plants.usda.gov/plantguide/pdf/pg_satr12.pdf Bernau, C.R. and E.P. Eldredge. 2018. Plant Guide for Prickly Russian Thistle (Salsola tragus L.). USDA-Natural Resource

		Conservation Service, Great Basin Plant Materials Center. Fallon, Nevada 89406.
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	" Typical landscapes are hillocksandy plains with wormwood-grassy and bushy vegetation. Under these conditions,wormwood-salsola (Artemisia / Salsola regida) vegetation is characteristic and does not form closed grass stands. In valleys of the drying rivers and in crevices of hills there are small meadows. The climate is rather droughty: cold and low-snow winters and dry and hot summers. Fires occur frequently. S" #likely flammable if dominant member in a often burned community https://www.researchgate.net/profile/C-Ronde/publication/44159421_Fire_situation_in_South_Africa/links/56d7f39f08aee1aa5f75d240/Fire-situation-in-South-Africa.pdf#page=210 Khaidarov, K., & Arkhipov, V. 3.4. 4 Fire Situation in Kazakhstan. FRA 2000, 210.

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.

This research was funded by the Department of the Interior Pacific Islands Climate Adaptation Science Center. The project described in this publication was supported by Grant or Cooperative Agreement No.G20AC00073 to Curt Daehler from the United States Geological Survey. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Geological Survey. Mention of trade names or commercial products does not constitute their endorsement by the Pacific Islands Climate Adaptation Science Center or the National Climate Adaptation Science Center or the US Geological Survey.