

California Pest Rating Profile for

Puccinia carthami Corda
(Syn = *Puccinia calcitrapae* var.
centaureae)

safflower rust

Pest Rating: C

Kingdom: Fungi, Phylum: Basidiomycota,
Subphylum: Pucciniomycotina, Class: Pucciniomycetes,
Order: Pucciniales, Family: Pucciniaceae

Comment Period: 06/30/2025 through 08/14/2025

Initiating Event:

This pathogen has not been through the pest rating process. It is a pest of concern for export seeds. The risk to California from *Puccinia carthami* is described herein, and a permanent rating is proposed.

History & Status:

Background:

Safflower (*Carthamus tinctorius*) is an annual thistle-like plant in the sunflower family. It is native to Asia, the Middle East, and Africa. Initially grown for dyes extracted from flowers, the predominant use now is for oil extracted from seeds. Seed meal is a by-product of safflower oil production and is used as livestock feed.

California leads the nation in safflower production with 51,000 acres and a value of \$36M ([CDFA Ag Stats, 2023](#)). Safflower can be grown in most parts of California, but production has historically focused on irrigated areas of the San Joaquin Valley and the Sacramento Valley. The Tulare basin also has important acreage.

Rust caused by *Puccinia carthami* is an important disease of safflower in the western United States. *Puccinia carthami* is an autoecious fungus that does not need an alternate host. It completes its entire life cycle on safflowers.

Hosts: The hosts of safflower rust are in the genus *Carthamus*, the distaff thistles. *Carthamus calvus* (bald safflower), *C. criticus* (smooth distaff thistle), *C. dentatus* (toothed distaff thistle), *C. glaucus* (glaucus safflower), *C. lanatus* (wooly distaff thistle), *C. oxyacantha* (jeweled distaff thistle), *C. persicos* (Persian safflower), *C. tenuis* (slender safflower), and *C. tinctorius* (safflower) (Farr and Rossman, 2025).

Symptoms: *Puccinia carthami* causes a foot and root disease of safflower which is a less common etiology for rust fungi. Seedlings are infected by soilborne teliospores. Longitudinal cracking of the epidermal and cortical tissues, due in part to the adventitious roots emerging at the points of infection, is very prevalent. The first symptoms begin on very young plants in the six- to eight-leaf stage as foliar discoloration and wilting. Seedlings often die suddenly without any external signs of attack. Stems and roots develop internal teliospores. Upon the death of the plant, these spores return to the soil. Leaves develop chestnut-brown pustules on both sides of the leaves, yielding urediniospores and teliospores. Girdling lesions are a typical symptom on the stems of older plants and affected stems can break under the force of rain or wind. Internal sporulation is most common in cortical tissue but occasionally occurs in the stele of mature plants (Schuster and Christiansen, 1952; Deadman et al., 2005; CABI, 2025).

Transmission: Infected plants produce two types of spores, pycnia (stage 0) and aecia (stage I), that lead to the production of urediniospores (stage II). The urediniospores cause repeating cycles of infection throughout the summer, spreading the disease to other safflower plants. At the end of the growing season, teliospores (stage III) are formed again, allowing the fungus to overwinter with plant debris in the soil.

The sudden and widespread dissemination of the pathogen shortly after safflower introduction on a commercial scale in Nebraska was attributed to seed transmission. In greenhouse experiments, infection was also induced by soil infestation with diseased leaves. Seed treatment failed to eliminate the foot and root rot phases of the disease when infection proceeded from the soil, indicating that over-wintered inoculum may be important to transmission to new crops (Schuster and Christiansen, 1952).

Damage Potential: Seedling rust, initiated by sporidia from germinating soilborne or seedborne teliospores, reduces stand and may preclude monocultures of safflower (Klisiewicz, 1977). Infected seedlings become girdled and die. The fungus reduces seed quality and causes pre-emergence death, seedling death, and diseased seedlings. Aeciospores are responsible for foliar infections, which cause severe yield losses, especially when infections occur before flowering is complete (Urie et al., 1968). *Puccinia carthami* is a quarantine pest in some places and is important for export seed certification (EPPO, 2025; USDA-PCIT, 2025).

Worldwide Distribution: Africa: *Egypt, Ethiopia, Kenya, Morocco, Sudan*. Americas: *Canada, Chile, Mexico, United States*. Asia: *China, India, Iran, Israel, Japan, Korea, Oman, Pakistan, Thailand, Uzbekistan*. Europe: *Bulgaria, Cyprus, Finland, Greece, Italy, Malta, Norway, Poland, Portugal, Romania, Turkey, United Kingdom*. Oceania: *Australia, New Zealand* (Farr and Rossman, 2025).

Official Control: *Puccinia carthami* is on the EPPO's A1 list for Brazil. It is on the USDA PCIT's harmful organisms list for Brazil, Colombia, and Israel (USDA-PCIT, 2025).

California Distribution: Butte, Colusa, Kern, San Joaquin, Solano, Sutter, Yolo, and Yuba counties (CDFA PDR database, 2025; French, 1989).

California Interceptions: One interception at the Yermo Border Station with a driver from Utah.

The risk that *Puccinia carthami* would pose to California is evaluated below.

Consequences of Introduction:

- 1) **Climate/Host Interaction:** It is likely to be found wherever its hosts can grow

Evaluate if the pest would have suitable hosts and climate to establish in California.

Score: 3

- Low (1) Not likely to establish in California, or likely to establish in very limited areas.
- Medium (2) may be able to be established in a larger but limited part of California.
- **High (3) likely to establish a widespread distribution in California.**

- 2) **Known Pest Host Range:** The host range is limited to the genus *Carthamus*.

Evaluate the host range of the pest.

Score: 1

- **Low (1) has a very limited host range.**
- Medium (2) has a moderate host range.
- High (3) has a wide host range.

- 3) **Pest Reproductive Potential:** *Puccinia carthami* uses multiple types of spores to reproduce, with inoculum both soilborne and airborne.

Evaluate the natural and artificial dispersal potential of the pest.

Score: 2

- Low (1) does not have high reproductive or dispersal potential.
- **Medium (2) has either high reproductive or dispersal potential.**
- High (3) has both high reproduction and dispersal potential.

- 4) **Economic Impact:** This disease can cause significant yield loss and can be seedborne.

Evaluate the economic impact of the pest on California using the criteria below.

Economic Impact: A, C

- A. The pest could lower crop yield.**
 - B. The pest could lower crop value (including increasing crop production costs).
 - C. The pest could trigger the loss of markets (including quarantines).**
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- D. The pest could negatively change normal cultural practices.
- E. The pest can vector, or is vectored, by another pestiferous organism.
- F. The organism is injurious or poisonous to agriculturally important animals.
- G. The organism can interfere with the delivery or supply of water for agricultural uses.

Economic Impact Score: 2

- Low (1) causes 0 or 1 of these impacts.
- **Medium (2) causes 2 of these impacts.**
- High (3) causes 3 or more of these impacts.

5) Environmental Impact: This disease can affect ornamental varieties of safflowers.

Evaluate the environmental impact of the pest on California using the criteria below.

Environmental Impact: E

- A. The pest could have a significant environmental impact, such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.
- B. The pest could directly affect threatened or endangered species.
- C. The pest could impact threatened or endangered species by disrupting critical habitats.
- D. The pest could trigger additional official or private treatment programs.
- E. **The pest significantly impacts cultural practices, home/urban gardening, or ornamental plantings.**

Environmental Impact Score: 2

- Low (1) causes none of the above to occur.
- **Medium (2) causes one of the above to occur.**
- High (3) causes two or more of the above to occur.

Consequences of Introduction to California for *Puccinia carthami*: Medium

Add up the total score and include it here. **10**

- Low = 5-8 points
- Medium = 9-12 points**
- High = 13-15 points

6) Post-Entry Distribution and Survey Information: Evaluate the known distribution in California. Only official records identified by a taxonomic expert and supported by voucher specimens deposited in natural history collections should be considered. Pest incursions that have been eradicated, are under eradication or have been delimited with no further detections should not be included.

Evaluation is 'high'.

Score: -3

- Not established (0) Pest never detected in California or known only from incursions.
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-Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).

-Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.

-High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.

7) The final score is the consequences of the introduction score minus the post-entry distribution and survey information score: (Score)

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information = 7*

Uncertainty:

none

Conclusion and Rating Justification:

Based on the evidence provided above, the proposed rating for *Puccinia carthami* is **C**.

References:

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Responsible Party:

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***Comment Period: 06/30/2025 through 08/14/2025**

***NOTE:**

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at [permits\[@\]cdfa.ca.gov](mailto:permits[@]cdfa.ca.gov).

Comment Format:

- ❖ Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

Example Comment:

Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to "Climate/Host Interaction" here.]

- ❖ Posted comments will not be able to be viewed immediately.
- ❖ Comments may not be posted if they:

Contain inappropriate language which is not germane to the pest rating proposal;

Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;

Violates agency regulations prohibiting sexual harassment or other forms of discrimination;

Violates agency regulations prohibiting workplace violence, including threats.

- ❖ Comments may be edited prior to posting to ensure they are entirely germane.
- ❖ Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.

Pest Rating: C
