

California Pest Rating Proposal for

Solanum cardiophyllum Lindl.: heartleaf nightshade, Family Solanaceae

Current Pest Rating: A

Proposed Pest Rating: C

Comment Period: 09/27/2019 through 11/11/2019

Initiating Event:

This species has been included on the CDFA noxious weed list and a rating proposal has not been previously conducted.

History & Status:

Background: Heartleaf nightshade, a Mexican species in the potato clade of *Solanum* (section *Petota*), is an herbaceous perennial plant up to 0.8 meters in height with small edible tubers. The odd-pinnate compound leaves have 1-4 pairs of lateral leaflets and a larger terminal leaflet (Spooner et al., 2004; Solanaceae Source). Inflorescences are 2 to 3-forked cymes with 4-24 flowers. The flowers have a cream-white united corolla, ca. 1.3-1.5 cm in diameter, terminating in five acuminate lobes. The berry fruits are globose and light greenish, approximately 1 cm or less in diameter. The seeds are approximately 2 mm in length, with mucilaginous hair-like cell walls on the surface. The species is used locally in Mexico as a vegetable for its edible tubers, and has been grown in the United States to a limited degree as an experimental organism for germplasm or crop research (Rodriguez et al., 1995; Spooner and Hijmans, 2001). It can occur in agricultural field settings as well as natural open or forested habitats in its native range in Mexico (Spooner et al., 2004). It has been found as a weed in tomato fields in Yolo County, California in 1969, but there is no documentation of its persistence or any further spread within the state (Consortium of California Herbaria; Calflora database).

Worldwide Distribution: Heartleaf nightshade is native to Mexico, primarily in the central and southern states from Jalisco to Oaxaca (Spooner et al., 2004; Solanaceae Source). It is not mapped for the United States (USDA PLANTS database) except for reports from Yolo County, California as an escaped experimental plant in 1969.

Official Control: The species has not been subject to official government control except at the time of its discovery in tomato fields in the area of the University of California at Davis in 1969. It was placed on the California CCR 4500 List as an “A” rated noxious weed. It is not under official control elsewhere.

California Distribution: Heartleaf nightshade has not been reported for California since the initial finds in tomato fields in a small portion of Yolo County in 1969 (Consortium of California Herbaria) and is not mapped by the Calflora database for the state.

California Interceptions: There are no documented introductions to California beyond the initial reports in 1969 (Consortium of California Herbaria; CDFA PDR database).

The risk heartleaf nightshade would pose to California is evaluated below.

Consequences of Introduction:

- 1) **Climate/Host Interaction:** 1) Climate/Host Interaction: The species is not established in the United States but might be climatically appropriate to southern and central California given adequate water in agricultural settings. It receives a **Medium (2)** in this category.

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

Score: 2

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

- 2) **Known Pest Host Range:** Risk is **High (3)** as this species does not require a host.

Evaluate the host range of the pest.

Score: 3

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

- 3) **Pest Dispersal Potential:** Fruits or seeds of heartleaf nightshade are potentially able to be dispersed by birds or vehicles including farm equipment, but the species is not known as a seed lot contaminant in the United States. **Low (1)** in this category.

Evaluate the natural and artificial dispersal potential of the pest.

Score: 1

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

- 4) Economic Impact:** Heartleaf nightshade could possibly occur as an agricultural weed in California if it escaped from research plantings in a university setting, but these plantings have been very limited and can be secured in greenhouses. The species has economic value as a germplasm contributor for potato breeding and as a potential specialty crop. The species scores **Low (1)** in this category.

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

Economic Impact: A

- A. The pest could lower crop yield.**
- B. The pest could lower crop value (includes increasing crop production costs).
- C. The pest could trigger the loss of markets (includes quarantines).
- 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: 1

- **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:** The species does not have known unsecured source populations in the United States and was readily controlled in the limited past occurrence in Yolo County. Therefore, it receives a **Low (1)** in this category.

Environmental Impact:

- 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:

- **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 heartleaf nightshade: Low (8)

Add up the total score and include it here.

-Low = 5-8 points

-Medium = 9-12 points

-High = 13-15 points

- 6) **Post Entry Distribution and Survey Information:** This plant has not been reported as currently occurring in California. It receives a score of **not established (-0)** in this category.

Score: -0

-Not established (0) Pest never detected in California or known only from incursions.

-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 introduction score minus the post entry distribution and survey information score:

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information = Low (8)*

Uncertainty:

The range of natural habitats appropriate to the species in California is uncertain given differences in the rainfall regime between the state of California and central Mexico.

Conclusion and Rating Justification:

Heartleaf nightshade is a species of utility as a germplasm resource in potato breeding, and does not appear to present significant risks as long as it is grown under contained settings to mitigate the risk of escape. It appears to be relatively straightforward to control should it ever again be introduced into field settings in California, and thus a rating of C is justified.

References:

California Department of Food and Agriculture. Pest and Damage Record database (PDR). Accessed August 23, 2019: <https://pdr.cdfa.ca.gov/PDR/pdrmainmenu.aspx>

Consortium of California Herbaria. Accessed August 23, 2019: <http://ucjeps.berkeley.edu/consortium>

Rodriguez, A., O. Vargas, E. Villegas and D. M. Spooner. 1995. Wild potato (*Solanum* sect. *Petota*) germplasm collecting expedition to Mexico in 1993, with special reference to *Solanum bulbocastanum* Dunal and *S. cardiophyllum* Lindley. *Potato Research* 38: 47-52.

Solanaceae Source. *Solanum cardiophyllum*. Contributed by D. Spooner. Accessed August 23, 2019. <http://solanaceaesource.org>

Spooner, D. M., & R. J. Hijmans. 2001. Potato systematics and germplasm collection, 1989-2000. *Amer. J. Potato Res.* 78: 237-268.

Spooner, D. M., R. G. van der Berg, A. Rodríguez, J. Bamber, R. J. Hijmans, and S. I. Lara-Cabrera. 2004. Wild potatoes (*Solanum* section *Petota*; Solanaceae) of North and Central America. *Syst. Bot. Monogr.* 68: 1-209.

USDA Agricultural Research Service. National Plant Germplasm System. Germplasm Resources Information Network (GRIN). Accessed August 23, 2019. <https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysimple.aspx>

USDA NRCS PLANTS database. Accessed August 23, 2019: <https://plants.sc.egov.usda.gov>

Responsible Party:

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***Comment Period: 09/27/2019 through 11/11/2019**

***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 [plant.health\[@\]cdfa.ca.gov](mailto:plant.health[@]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.
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Proposed Pest Rating: C
