California Pest Rating Profile for

Ipomoea aquatica Forssk.: water spinach, Family

Convolvulaceae

Pest Rating: C

Comment Period: CLOSED

Initiating Event:

Ipomoea aquatica is listed as a Federal noxious weed in the United States (USDA APHIS). It was intercepted at a residence in Los Angeles County and has been assigned a rating of Q by CDFA. A pest rating proposal is needed to assign a permanent rating to this species.

History & Status:

Background: Water spinach, *Ipomoea aquatica*, is a semiaquatic, tender trailing or floating vine with milky sap. It is annual to perennial but is killed by frost (Flora of China). The stems are thick and hollow or spongy and glabrous and produce roots at the nodes. Leaves are alternate on the stem and typically glabrous, with a petiole approximately 3-15 cm long and an ovate to lanceolate or arrow-shaped blade of similar length with a pointed tip. Flowers have a funnel-shaped united corolla, approximately 3-5 cm long and white, sometimes reddish-violet in the center, or less commonly pink to violet. The capsule fruit is ovoid to globose, smooth, and approximately 1 cm in diameter. One to four brownish seeds approximately 4-6 mm in length develop in the fruit and may be grayish pubescent or glabrous (FNWD, 2019). The species has two cultivated color forms in production, red-leaved and green-leaved (GISD, 2019).

Water spinach was introduced into the United States in Florida before the 1950s and has been repeatedly introduced into the country despite its federal listing as a noxious weed species. It has been found naturalized in Florida in canals and ditches and has invaded a number of lakes and has prompted active control efforts in that state (Florida DEP, 2003). It is esteemed as a leaf vegetable in Asian cuisines, and continues to be grown under controlled conditions in several states of the U.S. (Austin, 2007).

Worldwide Distribution: Water spinach is widely distributed in tropical and subtropical areas of the world. It is considered to be native and also widely cultivated in Africa, Asia, and Australasia (Flora of China; USDA NPGS GRIN database) and is also naturalized and cultivated in tropical areas of South and Central America and the Caribbean. In the United States it is naturalized and also cultivated in portions of Hawaii and Florida and is also grown as a specialty vegetable in other states or territories including California, Texas, and the U. S. Virgin Islands and to a lesser degree in more northern states such as Oregon, Washington, and New York (Austin, 2007; Harwood and Sytsma, 2003).

Official Control: Water spinach is a Federally listed noxious weed and thus is prohibited from importation into the United States or interstate transport without a valid permit (USDA APHIS). It has been reported as a harmful organism by Guatemala and Honduras (USDA APHIS PCIT). The species is listed as a noxious weed in Alabama, North Carolina, and Vermont, as an invasive aquatic plant pest in South Carolina, and as a prohibited aquatic plant in Florida (USDA NRCS PLANTS database). The species is subject to permit requirements for growing in Massachusetts and Texas (Chilton, 2017; Texas Invasives, 2019). In Texas the species was initially placed on a list of prohibited aquatic plants but after consultation with the Asian-American grower communities controlled growing was legalized using an exotic species permit process.

California Distribution: Water spinach, along with other specialty vegetables, has been reported being grown by farmers in Fresno County, California and has been sold at specialty packing houses and farmers markets in multiple areas of the state (Molinar, 2012). It has also been collected in cultivated situations in Orange County in 1981, in Yuba County in 1999, and Los Angeles County in 2019 (Consortium of California Herbaria; CDFA PDR database). It has also been reported from Lake County in 2008 and Sutter County in 2001 (Calflora, 2019; EDD Maps, 2019), but the plants were not found in recent reconnaissance of these areas.

California Interceptions: The plant has been found in cultivation as noted under California distribution.

The risk water spinach would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** 1) Water spinach is found in freshwater aquatic habitats. It is confined to tropical and subtropical habitats because of its susceptibility to frost. The species is found primarily in canals and ditches, but it also may invade edges of lakes. The species grows well in moist soil or in still to moderately flowing waters. It does not grow well when temperatures are below 23.9°C (GISD, 2019). Therefore, water spinach receives a **Low (1)** in this category.

   Evaluate if the pest would have suitable hosts and climate to establish in California.
   Score: **1**

- 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 water spinach does not require any one host, but grows wherever ecological conditions are favorable.

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:** Water spinach can reproduce both sexually by seeds and asexually by vegetative fragmentation and rooting at the nodes. The species can produce 175-245 seeds per plant during peak season (Patnaik, 1976). It flowers in the warm months in Florida, and seed formation continues into April with peak during January to March. Germination is poor under water and is improved if seeds are placed underground. Separated plants can be carried by water, animals, and humans to new areas, and movement of plants in California appears to be quite limited outside of intentional transport for purposes of cultivation. Vegetative portions of the plant including elongated stems and stem fragments facilitate local spread within bodies of water, but there is little evidence in California of the establishment of the plant outside of cultivation (Consortium of California Herbaria). Longer distance dispersal and introduction appears most likely to occur by vehicular movement or shipment of plant specimens for purposes of cultivation. Water spinach receives a **Medium (2)** in this category.

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:** Water spinach has economic benefits as a specialty vegetable crop esteemed in Asian cuisines. It has the ability to block canals and other small waterways due to its vegetative spread by floating stems, but its documented spread within California has been quite limited. Water spinach receives a **Low (1)** in this category.

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

Economic Impact: G

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:** Water spinach can be invasive in small bodies of water such as lakes and canals, and it can create floating mats of intertwined stems over the surface of the water, shading out native submersed plants. It may infest lakes, ponds, and river shorelines, and it can displace native plants important as food for fish and wildlife. It can also create dense canopies, making the water stagnant and producing breeding grounds for mosquitoes (Florida DEP, 2019). Therefore, it receives a **High (3)** 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 water spinach: Medium (10)

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**: *Ipomoea aquatica* has been found growing in limited areas of California but has not established in the state and 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* ***= Medium (10)***

Uncertainty:

It is unclear how widely the plant is being cultivated and transported within California, which could be mitigated by using a permitting system as has been successfully conducted in the state of Texas.

Conclusion and Rating Justification:

Water spinach has benefits to California as a specialty vegetable crop and has been grown in several counties of the state over a period of three decades or more without documentation of established naturalized populations in the state. This has also been the experience in the state of Texas, where plants have been grown for market under permit over the last two decades. Water spinach has the potential to block canals and other small waterways because of its spreading growth habit, but the likelihood of establishment outside of cultivation appears limited in California given that the climatic conditions in the state are much less appropriate to the species than those in southeastern states such as Florida. The plant is killed by frost, and its risk of escape from cultivation can be mitigated by growing under controlled conditions. Thus a rating of "C" is justified.

References:

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*Comment Period: CLOSED

*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.

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
