CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Onopordum acanthium L., Scotch thistle; cotton thistle

Family: Asteraceae

Previous Pest Rating: A

Pest Rating: A as of 06/11/2022

Photo Credit: Steve Dewey, Utah State University, Bugwood.org

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Comment Period: 04/27/2022 through 06/11/2022

Initiating Event:

Onopordum acanthium. has previously been assigned an A-rating by the California Department of Food and Agriculture (CDFA), Plant Health and Pest Prevention Services, but has not undergone the current pest risk assessment procedure. *Onopordum acanthium* is designated as a noxious weed as defined by

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the California Food and Agricultural Code (FAC) Section 5004 and is listed in Title 3, California Code of Regulations (CCR), Section 4500.

History & Status:

Onopordum acanthium is a biennial thistle plant. During the first year of growth, the plant produces a large rosette of spiny leaves. The plant matures in the second year, developing a large and fleshy taproot and erect, branched, woody, ridged stems that can grow to 4 meters in height (Keil, 2006). Mature plant leaves are somewhat rectangular, up to approximately 1 meter long, with 8-10 pairs of triangular lobes, and are conspicuously spiny. Leaves and stems are usually covered with silvery-white hairs that give the plant a greyish appearance. Flowering is extensive in the second year. The flowers are purple or sometimes white, with corollas 22-25 mm long. The flowering heads are spheric and approximately 20 mm in diameter excluding the spines on the tips of the bracts. The one-seeded achene fruits are 4-6 mm long, grayish brown with black streaking, and prominently transversely wrinkled. The fruits initially bear a pappus of minutely barbed pink to reddish bristles at the apex, which falls off as a ring. Plants die after seed maturation, but the upright dry stems can persist for up to two years (DiTomaso and Keyser, 2013).

Worldwide Distribution

Onopodium acanthium is native to middle, eastern, southeastern, and southwestern regions of Europe, the Canary Islands, northern Africa, the Caucasus, and southwest and central Asia, including parts of the Indian subcontinent. The species has become naturalized in temperate Asia, Australia, New Zealand, northern Europe, South America (Argentina, Chile, Uruguay), and North America, including the Canadian provinces of Québec, Nova Scotia, Ontario, New Brunswick, and British Columbia. In the United States it is reported as naturalized in areas of the states of Connecticut, Indiana, Massachusetts, Michigan, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, Oklahoma, Wisconsin, Colorado, Idaho, Montana, Oregon, Washington, Wyoming, Alabama, Delaware, Florida, Kentucky, Maryland, Virginia, New Mexico, Texas, Arizona, California, Nevada, and Utah (Keil, 2006; USDA/GRIN, 2022; CABI, 2021).

Official Control:

Onopordum acanthium is listed on CCR Section 4500 as a noxious weed defined by California FAC Section 5004. The Department is mandated by California FAC, Division 1, Chapter 3, Section 403 to prevent the introduction and spread of noxious weeds. The species has a long history of official control under California noxious weed legislation dating back into the 1800's because it can severely degrade rangelands.

Onopordum acanthium and all other species of the genus *Onopordum* are listed as prohibited noxious weed seeds with no tolerances allowed in seed lots offered for sale, planting, or distribution in California (CCR Section 3855), and are prohibited from interstate shipments of agricultural commodities into California (Title 7, Code of Federal Regulations, Section 201.16[b]).

Onopordum acanthium is listed as a noxious weed and as a prohibited noxious weed seed in the states of Arizona, California, Colorado, Idaho, Nebraska, Nevada, Oklahoma, Utah, and Wyoming (NPB, 2020;

USDA/AMS, 2022). Agricultural seed shipments into these states that are contaminated with seeds of *Onopordum acanthium* are subject to quarantine or other regulatory actions (NPB, 2020).

California Distribution: *Onopordum acanthium* occurs in numerous northern and eastern counties of California, and in more limited areas of the Central Valley and the Coast Ranges from Humboldt to San Diego counties.

California Interceptions: Since 2003, there have been approximately 300 interceptions of *Onopordum acanthium* in agricultural shipments (primarily in alfalfa hay) at the California Border Inspection Stations. Most of these interceptions occurred at the Alturas Border Inspection Stations (over 230 interceptions) and the Truckee Border Inspection Station (35 interceptions) (CDFA/PDR Database, 2022). Seeds of the species have also been found in a commercial seed lot of radish seed offered for sale in California, resulting in a stop-sale order, and in feed grain shipments into the state.

Consequences of Introduction

1) **Climate/Host Interaction:** Score is **High (3)**
Onopordum acanthium is described as low-water tolerant and occurring at elevations between 1,280-2,030 meters above sea level (CalFlora, 2022). It is described as occurring in disturbed areas such as roads, trails, rangelands, gravel pits, pastures, forest clearings and abandoned croplands. It is also described as occurring in natural areas such as river and stream corridors. DiTomaso and Keyser, (2013) state that *Onopordum acanthium* is best suited to areas with high soil moisture during germination periods.

-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:** Score is **High (3)**
Onopordum acanthium can occur wherever general ecological conditions exist that are conducive to its survival.
- 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:** Score is **High (3)**
Onopordum acanthium flowering heads can produce up to 400 seeds each, with mature plants producing up to 50,000 seeds (Qaderi *et al,* 2002).

Onopordum acanthium seeds can disperse long distances by high winds, in contaminated soil, gravel, crop seed, and flood waters, on vehicles and farm machinery, and in animal feed (Cavers *et al*, 2011). *Onopordum acanthium* seeds have been recorded on animal fleece and to be viable after digestion by sheep and possibly birds (Shuster and Prather, 2003). Fruiting heads and other spiny plant parts can contaminate hay (DiTomaso and Keyser, 2013).

Onopordum acanthium seed dispersal occurs locally over several months due to a lengthy flowering and seed maturation period, and over multiple years due to long periods of seed viability in seed banks (Qaderi *et al*, 2002). Studies have shown variable seed dormancy periods due to localized conditions at the time of dispersal, such as soil type, seed depth, soil temperature, and moisture content, leading to intermittent patterns of germination and seedling emergence (CABI, 2021; Qaderi *et al*, 2002).

- 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:** Score is **High (3)**

Onopordum acanthium competes with, and decreases, desirable forage in infested pastures and rangelands. The sharp spines can deter livestock and wildlife grazing. Dense stands can create a natural barrier that prevents animals from moving between grazing sites (Shuster and Prather, 2003). Lengthy seed bank persistence can lead to difficulties with management and/or control in infested areas.

Due to the existing noxious weed and prohibited weed seed status of *Onopordum acanthium*, infested agricultural shipments are subject to loss of marketability or quarantine.

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:
- 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:** Score is **High (3)**

The environmental impact of *Onopordum acanthium* is high due to the potential displacement of native forage species, the degredation of native species' habitats, and the intensive control mechanisms (physical, chemical, and biological) required to eradicate or control this species (Cavers *et al*, 2011).

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:
- 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 *Onopordum acanthium* **High (15)**

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

1) Post Entry Distribution and Survey Information: Score is **Medium (2)**

The CalFlora, CCH and CDFA PDR Databases contain many records for the species from the northeastern counties of California and more sporadic localities in western and central California, dating back to 1958 in Modoc, Lassen, and Lake counties (CalFlora, 2022; CCH, 2022; CDFA PDR Database, 2022).

-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) Final Score: High (15-2=13)

Conclusion and Rating Justification:
Due to the High score of this analysis, the existing state noxious weed restrictions regulating interstate shipments and controlling the movement of *Onopordum acanthium* in other states, and to prevent the spread of *Onopordum acanthium* to new areas within California, an A-rating is recommended. The species has a long history of official control in California because it can severely degrade rangeland habitats.

Uncertainty:
Because of the long history of occurrence of the species in California and elsewhere in the western United States, there is little uncertainty about its risks to agriculture and the environment of the state.

References

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Responsible Party: Robert Price, Primary State Botanist; California Department of Food & Agriculture; Seed Laboratory and Herbarium; 3294 Meadowview Road, Sacramento, CA 95832; (916) 738-6700; permits@cdfa.ca.gov.

***Comment Period: 04/27/2022 through 06/11/2022**

***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.

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: A