Figure 1: Sun spurge (*Euphorbia helioscopia*). Photo: Dr. Amedej Trnkoczy

California Pest Rating Proposal for

Euphorbia helioscopia L.: sun spurge

Family: Euphorbiaceae

Pest Rating: B

Comment Period: 10/16/2020 through 11/30/2020

Initiating Event:

Euphorbia helioscopia (sun spurge) is currently Q-rated. A permanent pest rating proposal is required to support an official pest rating.

History & Status:

Background: Sun spurge is an annual herb from 10 to 50 cm tall and with few or no hairs. The lower leaves are alternate and finely toothed, while the upper leaves near the inflorescence are whorled in groups of five (Keil et al., 2013). Each leaf is simple, obovate to spoon-shaped, and 1 to 4 cm long (Riina et al., 2016). The floral glands (in groups of 4) are small (< 1 mm) and unlobed, without petal-like appendages (Keil et al., 2013). The whole floral group resembles a single, lime green flower (NatureGate, 2020). The capsule fruits are smooth and hairless. The seeds are dark brown to blackish, subovoid, and approximately 2 to 2.5 mm long, with a fine netlike ornamentation (Keil et al., 2013; Riina et al., 2016). The seed has a lipid-rich caruncle at one end, which is an elaiosome (oil body) that helps attract ants for seed dispersal (Pahlevani et al., 2015). The root system is a single sloping or branched taproot that can extend to 80 cm deep (CABI, 2019).

Sun spurge is found mainly in annual grasslands, exposed riverbeds and banks, and heavily disturbed and nitrified places such as road margins, abandoned crop fields and grazing lands, and dump sites (Castroviejo et al., 2007; CABI, 2019).

The scientific name for sun spurge, *helioscopia* means “sunwatcher” from the Greek *helios*, “sun” and *skopein*, ”to watch”. Botanists gave sun spurge this name due to its tendency to turn its flowering stems towards the sun (NatureGate, 2020). Sun spurge grows and reproduces in the open throughout the warmer months in temperate regions and throughout the year in warmer areas.

The leaves and stems of the sun spurge exude a white latex when injured. This latex can be irritating to the skin for livestock and people. The plant may be toxic to livestock, but since it is unpalatable it is seldom eaten in quantities sufficient to cause poisoning (CABI, 2019). While sun spurge is not listed specifically, the *Euphorbia* species are listed on the website of the California Poison Control Center. *Euphorbia* plants are rated as a skin irritant and a moderate poison that can cause illness if ingested, but they are not life-threatening (California Poison Control System, 2019).

Worldwide Distribution: Sun spurge is native to Europe, northern Africa, the Canary Islands, and many parts of western, central, and eastern Asia including the Middle East and Arabian Peninsula, the Indian sub-continent, and temperate and tropical eastern Asia (including China, Vietnam, Japan, Korea, and Taiwan). It is widely naturalized in many temperate parts of the world including southern Australia, New Zealand, South Africa, Argentina, and Chile (CABI, 2019; USDA/GRIN, 2020).

In North America, it is found as invasive in several Canadian provinces. In the United States, sun spurge has become naturalized in the eastern states from Georgia to Maine, Louisiana, Texas, the upper Midwest, and sporadically westward to the Pacific Northwest and California (Riina et al., 2016).

Official Control: Sun spurge is not controlled as a noxious weed in any state or country. However, it has been listed as a quarantined pest in both Mexico and Brazil. Both of these countries require certain commodities (rice, carrot seed) to have phytosanitary certificates listing the commodity as free from seed contamination with *Euphorbia helioscopia*.

California Distribution: Sun spurge has been found sporadically in at least nine coastal or near coastal California counties: Humboldt, San Francisco, San Mateo, Santa Cruz, Santa Clara, San Luis Obispo, Los Angeles, Orange, and San Diego (CalFlora, 2020; Consortium of California Herbaria, 2020). There is also one collection from Inyo County in extreme eastern California. The Santa Clara population is a significant-sized new population found in a park in San Jose in March 2019 (CDFA PDR, 2020).

California Interceptions: Border interceptions have not been reported, but collections were made in greenhouse or nursery settings in Contra Costa County in 1978 and Yolo County in 1982 (Consortium of California Herbaria).

The risk **sun spurge** would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** Sun spurge is prevalent in the temperate areas of the world. It is found primarily in annual grasslands and in disturbed areas. *Euphorbia* species are drought tolerant, so sun spurge could potentially grow in much of California. Therefore, sun spurge receives a **High (3)** in this category.

   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 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 weeds do not require any one host, but grow 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:** The number of seeds per plant is relative low but there are several ways the sun spurge seeds are dispersed. The ripe fruits of the sun spurge split explosively at maturity to scatter the seeds around the plant, from where they may be futher spread by inclusion in hay and straw or by irrigation and flood waters (CABI, 2019). The seeds may also be spread by ants in a process called myremecochory. The elaiosome on the seed is designed to attract ants. The ants drag the seed into their nest to feed on the lipid-rich elaisome and then abandon the seed intact and viable in a safe site for germination (Pahlevani, et al., 2015). Sun spurge 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:** In areas of the world where sun spurge is common, it can be a nuisance weed of gardens and field crops. The presence of sun spurge in cereal grains and row crops can lower crop yields and, in some cases, could trigger quarantines. As noted previously, sun spurge may be toxic to livestock, but since it is unpalatable it is seldom eaten in quantities sufficient to cause poisoning (CABI, 2019). Sun spurge receives a **Medium (2)** in this category.

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

Economic Impact: A, C

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: **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:** Sun spurge is primarily a weed of cultivated and disturbed areas. Therefore, it could impact home gardens and there is some anecdotal evidence that it has done so. In addition, in Australia, which has a similar climate to California, it has been found to invade natural areas

(Biosecurity Queensland, 2016). In Spain, it is noted that its natural habitat is annual grasslands (Castroviejo et al., 2007). Therefore, sun spurge receives a **High (3)** in this category.

Environmental Impact: A, 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: 3
- 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 sun spurge*:* High (13)

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**: Pest is currently limited to the coastal areas of California, though it stretches from Humboldt County in the north, to San Diego County in the south (CCH, 2019). It receives a **Medium (-2)** in this category.

Score: -2
-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 (11)***

Uncertainty:

Sun spurge is a well-established weed of cultivation, but the degree to which it can invade natural areas is not well documented. It has been found in both Humboldt County in far northern California and in Los Angeles County in southern California dating back to the 1930s (Consortium of California Herbaria), but has spread relatively slowly since that time. Also, there is some uncertainty on the effect of the dry climate of California on the spread of sun spurge. The euphorbia family is drought resistant, but there is not a lot of information regarding sun spurge itself.

Conclusion and Rating Justification:

Sun spurge appears to be reasonably well-adapted to invade large areas of California, particularly cultivated areas. Based on its potential to invade home gardens and to interfere with agriculture and its toxicity, a "B" rating is justified.

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***Comment Period: 10/16/2020 through 11/30/2020**

***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: B
