CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Bruchus pisorum (L.), pea seed beetle

Coleoptera: Chrysomelidae

Previous Pest Rating: C

Pest Rating: C as of 08/06/2023

Comment Period: 06/22/2023 through 08/06/2023

Initiating Event: Per Title 3, California Code of Regulations (CCR), Section 3162, this pest rating proposal is required to support a permanent pest rating for *Bruchus pisorum.*

History & Status:

Background:

Bruchus pisorum (pea weevil) is a seed-feeding beetle with a rounded, globular shaped body and long legs. The vestiture is yellowish brown with a white and dark brown or black pattern made from tiny setae (Kingsolver, 2004). The end of the abdomen is visible beyond the wing coverings (CABI, 2022). Adults are approximately four to seven mm long and approximately 2.5 mm wide. Larvae are white, C-shaped grubs with reduced legs. Larvae of *Bruchus pisorum* develop inside pea (*Pisum sativum*) seeds.

Worldwide Distribution:

Bruchus pisorum likely originated from central Asia [or northwestern Africa (Ethiopia) (Larson and Brindley, 1938)] and has spread throughout the world (Voice et al., 2022). *Bruchus pisorum* is found in most temperate areas of Asia, Europe, North Africa, and Australia (CABI, 2022) and in North America. *Bruchus pisorum* is found is the United States in the states of Alabama, California, Colorado, Connecticut, District of Columbia, Florida, Georgia, Idaho, Kansas, Kentucky, Massachusetts, Michigan, Minnesota, Missouri, Mississippi, North Carolina, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, South Carolina, South Dakota, Texas, Utah, and Washington, and in Canada in the provinces and territories of Alberta, British

Colombia, Manitoba, Ontario, New Brunswick, Newfoundland and Labrador, Nova Scotia, Prince Edward Island, Quebec, and Saskatchewan (Kingsolver, 2004).

Official Control: *Bruchus pisorum* is listed as a Harmful Pest by the countries of Brazil, Guatemala, Morocco, Mozambique, Nicaragua, Panama, Taiwan. Shipments destined to these countries may be subject to phytosanitary restrictions pertaining to *Bruchus pisorum* (USDA/PCIT/PExD, 2023).

California Distribution: The CDFA PDR Database contains four California records of *Bruchus pisorum* detections from 1987-1999 in field grown *Pisum sativum*. Collections were made in Santa Clara, Siskiyou (2), and San Luis Obispo counties (CDFA PDR Database, 2023).

California Interceptions: The CDFA PDR Database contains two records of interceptions of *Bruchus pisorum* on incoming shipments of peas (*Pisum sativum*) from Oregon and Washington, from 1997 and 2009, respectively (CDFA PDR Database, 2023).

Consequences of Introduction

1) **Climate/Host Interaction:** Score is **High (3)**
   Per Voice et al. (2022), *Bruchus pisorum* adults overwinter in shrubs, plant debris, tree bark, fence posts and out-buildings adjacent to pea fields and will emerge from diapause to feed on pollen and flowers of *Pisum sativum* plants in the spring. Adults may also overwinter inside seeds and emerge from infested seeds either in the fall or spring (Larson and Brindley, 1938).

   Adults primarily feed on *Pisum sativum*. However, reports suggest they may also feed on *Lathyrus sativus*, *Pisum elatius, Vicia* sp., and *Vigna radiata* var. *radiata*. (Kingsolver, 2004). Larson and Brindley (1938) observed adults living for up to two years in Idaho. Per Reddy and Sharma (2018), the optimal temperature for development of larvae and pupae is 32–41°C, and air temperatures greater than 40°C cause significant mortality.

   Per (UC/ANR/SAREP, 2021), the field pea, *Pisum sativum*, is especially adapted to the interior valleys and to the foothills of California. The 'Austrian Winter' variety is a winter annual in most of California but can be grown during the summer in cool coastal areas.

   -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 **Low (1)**
Bruchus pisorum is known to feed on plants in one family, Fabaceae.
- 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)**
Bruchus pisorum can be moved long distances in shipments of stored peas (Larson and Brindley, 1938).

Adult female *Bruchus pisorum* must feed on pollen from *Pisum sativum* in order to be able to lay eggs, and oviposition can only occur on green plant tissue in the field (not on dried, stored peas) (Kingsolver, 2004). A single female may lay between 100 to 700 orange-yellow eggs per year (Voice et al., 2022). From any remaining infested pods in infested areas, adult *Bruchus pisorum* will emerge and fly up to 12 meters above the ground, travelling up to five kilometers, to seek shelter for overwintering purposes (Voice et al., 2022).

Evaluate the natural and artificial dispersal potential of the pest.
- 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)**
Bruchus pisorum females lay eggs on the surface of young *Pisum sativum* seed pods. The larvae burrow through the pod wall, enter the developing seed and feed extensively (CABI, 2022). Infested seeds can lose up to 25% of their weight, are prone to shattering during harvest, have reduced germination rates, and can be considered unfit for human consumption (Voice et al., 2022; Sharma and Gadi, 2018). Fully-grown larvae will prepare a circular exit hole, 3-5 mm in diameter, from which the adult emerges (CABI, 2022). Adult emergence can occur where dried peas are stored (Kingsolver, 2004), and can result in pea loads being rejected at delivery (CABI, 2022).

CABI (2022) reports that live larvae, pupae, adults and the excrement of *Bruchus pisorum* contain a naturally occurring organic compound (cantharidin) that may be dangerous to human health and to some domestic animals.

Peas (including bulk) produced in Monterey County in 2021 had a total value of approximately $29,500,000.00 (Monterey County Crop Report, 2021). Gaskell (1997) notes that statistics for edible-pod pea (snow peas, sugar peas (*Pisum sativum* var. *saccharatum*), and the sugar snap type (*Pisum sativum* var. *macrocarpum*) were reported for San Luis Obispo and Santa Barbara counties for 1994-1996, however, “pea” is currently included in the miscellaneous vegetable crop category San Luis Obispo, Santa Barbara, and Colusa

counties. Field pea (*Pisum sativum* L. ssp. *arvense*) can be grown for forage, hay, and silage. Field pea can also be grown as a cover crop and used as green manure (Pavek, 2012).

Management of *Bruchus pisorum* can include early harvest of peas (CABI, 2022), discing and removal any plant debris following harvest to eliminate overwintering adults, and planting *Bruchus pisorum*-resistant pea varieties (UC/IPM, 2017)

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 **Medium (2)**

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 *Bruchus pisorum*: **Medium (12)**

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

6) **Post Entry Distribution and Survey Information**: Score is **Medium (-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) **Final Score: Medium (12-2=10)**

Uncertainty:
None.

Conclusion and Rating Justification:
Due to the economic impacts of controlling *Bruchus pisorum,* a C-rating is recommended.

References

California Department of Food and Agriculture(CDFA), California Agricultural Statistics Review (Crop Report), 2020-2021.
https://www.cdfa.ca.gov/Statistics/PDFs/2021_Ag_Stats_Review.pdf
Accessed May 4, 2023

California Department of Food and Agriculture (CDFA), Plant Pest Diagnostics Branch, Pest and Damage Record (PDR) Database. Accessed May 3, 2023

Commonwealth Agricultural Bureaux International (CABI) Digital Library, 2022. *Bruchus pisorum* (pea weevil) Technical Factsheet. Accessed May 3, 2023:
https://plantwiseplusknowledgebank.org/doi/10.1079/pwkb.species.9907

Gaskell, M. 1997. Edible-pod pea production in California. Publication Number 7233. University of California, Cooperative Extension. Accessed May 4, 2023:
https://anrcatalog.ucanr.edu/pdf/7233.pdf

Kingsolver, J. M. 2004. Handbook of the Bruchidae of the United States and Canada (Insecta, Coleoptera). U.S. Department of Agriculture Technical Bulletin

1912:1-636 Accessed May 3, 2023:
https://www.ars.usda.gov/is/np/Bruchidae/BruchidaeVol1.pdf

Larson, A. O. and Brindley, T. A., 1938. Biology of the pea weevil in the Pacific Northwest with suggestions for its control on seed peas. United States Department of Agriculture Technical Bulletin 599. (No. 1488-2016-124305). Accessed May 3, 2023:
https://scholar.google.com/scholar?q=Larson+et+al.+(1938)+pea+weevil&hl=en&as_sdt=0&as_vis=1&oi=scholart#d=gs_cit&t=1685035267892&u=%2Fscholar%3Fq%3Dinfo%3ARcAdUDKYPyEJ%3Ascholar.google.com%2F%26output%3Dcite%26scirp%3D0%26hl%3Den

Monterey County Crop and Livestock Report, 2021. Monterey County, Office of the Agricultural Commissioner. Accessed May 4, 2023:
https://www.co.monterey.ca.us/home/showpublisheddocument/113214/637970560105830000

Pavek, P. L. S. 2012. Plant guide for pea (*Pisum sativum* L.). United Stated Department of Agriculture, Natural Resources Conservation Service, Pullman, WA. Accessed May 3, 2023:
https://plants.usda.gov/DocumentLibrary/plantguide/pdf/pg_pisa6.pdf

Sharma, A. and Gadi R. L. 2018. Biology, ecology, and management of the pea weevil, *Bruchus pisorum* (Coleoptera: Chrysomelidae). Annals of the Entomological Society of America 111 Accessed May 3, 2023:
https://www.researchgate.net/publication/320383454_Biology_ecology_and_management_of_the_pea_weevil_Bruchus_pisorum_Coleoptera_Chrysomelidae

University of California, Agriculture and Natural Resources, Statewide Integrated Pest Management Program (UC/IPM). 2017. How to Manage Pests in Gardens and Landscapes, Pea weevil—*Bruchus pisorum*. Accessed May 3, 2023:
https://ipm.ucanr.edu/PMG/GARDEN/VEGES/PESTS/peaweevil.html

University of California (UC), Agriculture And Natural Resources (ANR), Sustainable Agriculture Research and Education Program (SAREP), 2021. Cover Crops Database, field pea. Accessed May 4, 2023:
https://sarep.ucdavis.edu/covercrop/fieldpea

United States Department of Agriculture (USDA), Phytosanitary Certificate Issuance and Tracking System (PCIT), Phytosanitary Export Database (PExD). Accessed May 4, 2023:
https://pcit.aphis.usda.gov/PExD/faces/ViewPExD.jsf

Voice, D.G., MacLellan, R., Russell, A. *et al*. 2022.The eradication of pea weevil *Bruchus pisorum* (L.) (Coleoptera: Chrysomelidae) from New Zealand. CABI Agric Biosci 3, 31. Accessed May 3, 2023: https://doi.org/10.1186/s43170-022-00093-8

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***Comment Period: 06/22/2023 through 08/06/2023**

***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: C