CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

***Anomala orientalis* (Waterhouse): Oriental beetle**

Coleoptera: Scarabaeidae

Previous Pest Rating: A

Pest Rating: A as of 03/10/2023

Comment Period: 01/24/2023 – 03/10/2023

Initiating Event:

Anomala orientalis is a serious pest that has been established in the northeastern United States since the early 1900s. It is not known to be established in California and it has not been through the current pest rating system. A pest rating proposal is needed.

History & Status:

Background: Adult *Anomala orientalis* measure 8-13 mm in length and are variable in color, from tan to black, but most commonly tan with dark markings. Adults are day and night-active, but they are most active for a few hours after sunset and may escape notice in an infested area (Choo et al., 2002; Friend, 1929). They feed on grass blades and flowers but are not considered to be serious pests, in contrast to adult Japanese beetles (Alm, 1996; Hinson, 2014). Adult hosts include **Asteraceae:** *Dahlia* spp.; **Fagaceae:** *Castanea crenata* (flowers); **Iridaceae:** *Iris* spp.; **Malvaceae:** *Alcea* spp.; **Poaceae:** unspecified species; **Polemoniaceae:** *Phlox* spp.; **Solanaceae:** *Petunia* spp. (Choo et al., 2002; Dunlap et al., 2016). Eggs are laid in mid to late summer in Connecticut (Friend, 1929). Sufficient moisture is reported to be critical to the survival and development of eggs, which will die if exposed to “air-dry” conditions (Friend, 1929). The larva is a typical C-shaped scarab “grub” that lives in the soil (Dunlap et al., 2016). They are similar to and can be confused with other scarab larvae of similar size, including Japanese beetle, in the absence of examination of microscopic characters

(Choo et al., 2002). They feed on roots of a wide variety of grasses and bushes, including **Berberidaceae:** *Nandina domestica*; **Bromeliaceae:** *Ananas comosus*; **Ericaceae:** *Vaccinium* sp. (cranberry); **Poaceae:** *Festuca* sp., *Lolium perenne*, *Saccharum officinarum*, *Zea mays*, *Zoysia matrella*; **Rosaceae:** *Fragaria x ananassa*, *Rubus* spp. (Dunlap et al., 2016; Hinson, 2014; Pemberton, 1964). In Ohio nurseries, larvae were found in the root zone (presumably feeding on the roots) of *Amelanchier canadensis* and *Malus sargentii* (Reding and Klein, 2007). Larvae are also reported to feed on dead organic matter, and can develop on this alone (Friend, 1929). *Anomala orientalis* typically has a one-year life cycle, with overwintering as larvae, but a two-year life cycle was reported for some in Ohio (Alm, 1996; Reding and Klein, 2007).

Anomala orientalis is a serious pest of turfgrass in lawns and golf courses (Alm, 1996; Choo et al., 2002). Symptoms of root damage of grass caused by larvae include "wilting in spite of soil moisture" (Bragard et al., 2020). In the case of golf courses, besides the direct damage from root feeding, there was additional damage caused by birds searching for the grubs (Choo et al., 2002). Densities as high as 1000 larvae per square yard were reported in Connecticut by Friend (1929). This beetle is also a pest of sugarcane in the Pacific. Feeding on sugarcane roots by larvae resulted in the death of plants (Pemberton, 1963 and 1964).

A large number of natural enemies of *A*. *orientalis* are known, including predaceous and parasitic insects and pathogenic fungi (CABI Compendium). Some of these have been introduced to Hawaii and the northeastern United States for control of this beetle.

Worldwide Distribution: The native range of *Anomala orientalis* is uncertain, but it may be Japan. It was introduced to the eastern United States in the early 1900s, likely in root balls of imported nursery stock (Hinson, 2014; Jackson and Klein, 2006). It is reported from: **Asia:** China, India, Japan, North Korea, Philippines, South Korea, Taiwan; **North America:** United States (from Massachusetts to South Carolina and west to Ohio); **Oceania:** Hawaii, Micronesia (Alm, 1996; Dunlap et al., 2016; Hinson, 2014).

Official Control: *Anomala orientalis* is listed as a quarantine or A1 pest by the following countries and organizations: Morocco, Southern Africa, Tunisia, Bahrain, Israel, Georgia, Moldova, Norway, Switzerland, Turkey, United Kingdom, European and Mediterranean Plant Protection Organization, and European Union (EPPO global database).

California Distribution: *Anomala orientalis* is not known to be in California. However, several reports on the citizen scientist web site iNaturalist could potentially be this species, although identification based on these images is not possible (A. Tishechkin, pers. comm.; iNaturalist). There are other species in the genus present in North America that could be easily confused with *A. orientalis*. If one or more of these reports are in fact *A. orientalis*, they are possibly hitchhikers that arrived on aircraft or other means. Another beetle with similar biology, Japanese beetle, is commonly trapped near airports in California.

California Interceptions: *Anomala orientalis* is intercepted frequently on aircraft and vehicles. It was trapped once in a high-risk Japanese beetle trap in Los Angeles County in 2021 (California Department of Food and Agriculture).

The risk *Anomala orientalis* poses to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** Infestations of Japanese beetle, which has similar biology and distribution in the northeastern United States, have occurred in California in the past, including in Sacramento and San Diego counties. Moisture will likely be a significant factor in limiting the areas in California at risk from *A. orientalis*, as the hot, dry summers typical of much of the state may not be suitable for survival of eggs and young larvae. Therefore, irrigated areas, including agricultural, residential, and recreational areas are probably more likely to be suitable habitat for

this beetle. With suitable moisture, much of the coast and valleys may be at risk. Therefore, *A. orientalis* receives a **Medium (2)** in this category.

– 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:** *Anomala orientalis* is polyphagous. Therefore, it receives a **High (3)** in this category.

– Low (1) has a very limited host range.

– Medium (2) has a moderate host range.

– High (3) has a wide host range.

3) **Pest Reproductive and Dispersal Potential:** Adult *A. orientalis* can fly. In addition, movement of plants with roots and soil (e.g., in pots) is probably the riskiest pathway for introduction (Bragard et al., 2020). Therefore, it receives a **Medium (2)** in this category.

– 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**. Significant impacts by *A. orientalis* appear to mainly occur with grasses, and they include death of plants and damage to significant areas of turf. Yield could be impacted and production costs could increase in turf nurseries, for example. This beetle is considered a quarantine pest in several countries. Therefore, it receives a **High (3)** in this category.

Economic Impact: A, B, 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: High

– 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**. *Anomala orientalis* is a well-known pest of lawns and may trigger treatments. Impacts on native plants do not appear to be reported, but this beetle is polyphagous and it is likely that some native species in California are suitable hosts and could be impacted. Therefore, *A. orientalis* receives a **High (3)** in this category.

Environmental Impact: A, D, 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: High (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 *Anomala orientalis*: 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:** *Anomala orientalis* is not known to be established in California. It receives a **Not established (0)** in this category.

–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.

Final Score:

7) The final score is the consequences of introduction score minus the post entry distribution and survey information score: High (13)

Uncertainty:

Anomala orientalis may be established in California. Several citizen scientist reports in the state include photographs showing beetles similar in appearance to this species. There are other species in the genus present in North American that could be confused with it. It appears unlikely, however,

that a large infestation of *A. orientalis* could go unnoticed for very long in California. Presumably a pest control person would eventually identify it or submit it for identification by the county or state. There is significant uncertainty regarding the potential for this species to establish in California. Moisture is reported to be very important for the survival of the eggs. This beetle may only be able to establish in limited portions of the state, or it may not be able to establish here at all. Even if it can establish in California, it is possible that the different climate or other factors may limit impacts. Lastly, *A. orientalis* is under some degree of control by natural enemies in the northeastern United States. It is not known if the beetle would be under greater or lesser control in California, and therefore if the pest potential may be lesser or greater in this state.

Conclusion and Rating Justification:

Anomala orientalis is a serious pest of grasses and other plants that is not known to be established in California. For these reasons, an "A" rating is justified.

References:

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Pemberton, C. E. 1964. Highlights in the history of entomology in Hawaii 1778-1963. Pacific Insects 6:689-729.

Reding, M. and Klein, M. 2007. Life history of oriental beetle and other scarabs, and occurrence of *Tiphia vernalis* in Ohio nurseries. Journal of Entomological Science 42:329-340.

Responsible Party:

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*Comment Period: 01/24/2023 – 03/10/2023

*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: A