

California Pest Rating Proposal

Veronicella cubensis (L. Pfeiffer): Leatherleaf slug

Gastropoda: Veronicellidae

Pest Rating: A

Comment Period: **05/07/2024 – 06/21/2024**

Initiating Event:

Veronicella cubensis was found in a greenhouse in Los Angeles County in January 2023. A pest rating proposal is needed.

History & Status:

Background: *Veronicella cubensis* is a large (reaching over four inches in length) slug. The color ranges from cream white to various shades of brown, with two black or brown stripes on the upper surface (Robinson and Hollingsworth, 2009). It is reported to be nocturnal (Cuban slug, 2023). This slug feeds on leaves, flowers, stems, fruit, and bark, both in living plants as well as discarded material (e.g., cull piles) (Cuban slug, 2023; Robinson and Hollingsworth, 2009). It is a generalist, as is the case with slugs generally, and it has been reported to feed on a wide range of agricultural plants, including *Musa*, *Brassica*, *Artocarpus altilis*, *Manihot esculenta*, *Citrus*, *Coffea*, *Capsicum*, and *Solanum melongena*. It is considered a serious pest on various Pacific Islands (Cuban slug; Robinson and Hollingsworth, 2009). On the island of Rota, in the Northern Mariana Islands, losses on farms due to this slug are reported to range up to 70% and farms have been abandoned (Robinson and Fields, 2010).

This slug, like many other slugs and snails, is known to carry the rat lungworm (*Angiostrongylus cantonensis*), which causes eosinophilic meningitis (Kim et al., 2014; Robinson and Hollingsworth, 2009). In Hawaii, the rate of rat lungworm infection in *V. cubensis* is reported to vary. For example, Kim et al. (2014) found 3% of the slugs infected and Hollingsworth and Robinson (2012) found 24% to be infected. Over 100 specimens of *V. cubensis* from the infestation in the greenhouse in Los Angeles County have been examined and rat lungworm has not been found in them.

Worldwide Distribution: *Veronicella cubensis* is thought to be native to Cuba. Its distribution includes: **Caribbean:** Barbados, Cuba, Dominica, Puerto Rico, the West Indies; **Oceania:** Widespread, including American Samoa and Hawaii (Kim et al., 2016; Robinson et al., 2009; Robinson and Hollingsworth, 2009).

A single specimen (additional trips to the site reportedly did not result in further finds) was found at a plant store in Santa Barbara, California in 2006 (Mc Donnell et al., 2008). It is plausible that this find represented a “hitchhiker” on a plant shipped from an infested area, possibly Hawaii.

Official Control: *Veronicella cubensis* is considered reportable by the United States Department of Agriculture (U.S. regulated plant pest table).

California Distribution: *Veronicella cubensis* is not known to be established in the environment in California.

California Interceptions: *Veronicella cubensis* was found infesting a greenhouse in Los Angeles County in January 2023. It is occasionally intercepted on various plant products, including taro (California Department of Food and Agriculture, 2023).

The risk *Veronicella cubensis* poses to California is evaluated below.

Consequences of Introduction:

- 1) **Climate/Host Interaction:** *Veronicella cubensis* is a generalist and it would likely find suitable hosts over much of California. Regarding climate, the known distribution of this slug appears limited to tropical/sub-tropical areas. Therefore, if the slug is able to establish in California, it may be limited to certain areas, including the southern coast and greenhouses and residential and agricultural settings elsewhere in the state. Therefore, *V. cubensis* 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:** *Veronicella cubensis* is a generalist. 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:** *Veronicella cubensis* is intercepted on plant material. 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.** This slug is considered a pest of agriculture. It could increase production costs, reduce yield, and change cultural practices (e.g., because it is a known vector of rat lungworm) in

California. It is considered reportable by the USDA. It is known to vector the rat lungworm. Therefore, it receives a **High (3)** in this category.

Economic Impact: A, B, C, D, E

- 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.** *Veronicella cubensis* could trigger treatments by land owners, including the use of non-specific molluscicides. It seems unlikely that this slug could establish over a large portion of the state, and it seems to pose a relatively low risk to the environment except for perhaps limited areas on the southern coast. Therefore, *V. cubensis* receives a **High (3)** in this category.

Environmental Impact: 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 *Veronicella cubensis*: 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:** *Veronicella cubensis* 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:

Veronicella cubensis may be established in California. However, this appears relatively unlikely as this slug is large and distinctive and it would likely be recognized by a malacologist as not a known member of the state's fauna. It is possible that this primarily tropical slug would not be able to establish outdoors in California.

Conclusion and Rating Justification:

Veronicella cubensis is a slug that is considered to pose a risk to agriculture (including greenhouses and gardens) and human health in California. It is not known to be established in the environment in the state. For these reasons, an "A" rating is justified.

References:

Cuban slug. Accessed February 16, 2023:

https://www.ctahr.hawaii.edu/haraa/slugs_5_2014pressq.pdf

California Department of Food and Agriculture. Pest and damage record database. Accessed January 11, 2023:

<https://pdr.cdfa.ca.gov/PDR/pdrmainmenu.aspx>

Kim, J. R., Hayes, K. A., Yeung, N. W., and Cowie, R. H. 2014. Diverse gastropod hosts of *Angiostrongylus cantonensis*, the rat lungworm, globally and with a focus on the Hawaiian Islands. PLoS ONE 9:1-10.

Kim, J. R., Hayes, K. A., Yeung, N. W., and Cowie, R. H. 2016. Identity and distribution of introduced slugs (Veronicellidae) in the Hawaiian and Samoan Islands. Pacific Science 70:477-493.

Mc Donnell, R. J., Hansen, A., Paine, T. D., and Gormally, M. J. 2008. A record of the invasive slug *Veronicella cubensis* (Pfeiffer, 1840) in California. The Veliger 50:1-2.

Robinson, D. G. and Fields, A. 2010. The leatherleaf slugs (Family Veronicellidae). Regional Workshop Mollusk Pests of Economic Importance. Zamorano, Honduras.

Robinson, D. G. and Hollingsworth, R. G. 2009. Survey of slug and snail pests on subsistence and garden crops in the islands of the American Pacific: Guam, and the Northern Mariana Islands; The Federated States of Micronesia; and American Samoa, with special reference to Samoa.

Robinson, D. G., Hovestadt, A., Fields, A., and Breure, A. S. H. 2009. The land Mollusca of Dominica (Lesser Antilles), with notes on some enigmatic or rare species. Zoologische Mededelingen, Leiden: 83:615-650.

U.S. regulated plant pest table. Accessed February 13, 2023:
<https://www.aphis.usda.gov/aphis/ourfocus/planthealth/import-information/rppl/rppl-table>

Responsible Party:

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***Comment Period: 05/07/2024 – 06/21/2024**

***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](mailto: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