

California Pest Rating Proposal

Anagyrus callidus Triapitsyn, Andreason & Perring

Hymenoptera: Encyrtidae

Current Rating: Q

Proposed Rating: D

Comment Period: **7/13/2020 through 8/27/2020**

Initiating Event:

An application was submitted for a permit for the release of *Anagyrus callidus* in California for the control of the mealybug *Maconellicoccus hirsutus*. Another species, *A. kamali*, was approved in 1999 for release to control this mealybug. Recent molecular work revealed the presence of a new species, *A. callidus*, in California and it was determined that both *A. callidus* and *A. kamali* have been released in California over the past 20 years (Andreason et al., 2019; T. Perring, per. comm.). *Anagyrus callidus* has not been rated. A pest rating proposal is needed.

History & Status:

Background: Adult *A. callidus* are tiny (0.5-2 mm in length) parasitic wasps (Andreason et al., 2019). All members of this genus are reported to parasitize mealybugs. Based on work with what were identified as the similar species *A. kamali*, the females of *A. callidus* are presumed to parasitize nymphs as well as adult females (Sagarra et al., 2001). Triapitsyn et al. (2019) provided evidence that *Anagyrus callidus* is native to Taiwan.

Andreason et al. (2019) report that *Planococcus ficus* was not parasitized by *A. callidus* in the laboratory. There is little other information available regarding host specificity. Andreason et al. (2019) report that some other *Anagyrus* species parasitize multiple species and genera of mealybugs.

Andreason et al. (2019) stated that *A. callidus* released in the Coachella Valley from 2015 to 2018 “successfully suppressed” *M. hirsutus* there.

Worldwide Distribution: *Anagyrus callidus* is presumed to be native to Taiwan and has become established in Mexico and the United States (California). It was released in Florida and may be present there (Triapitsyn et al., 2019).

Official Control: *Anagyrus callidus* is not known to be under official control in any country.

California Distribution: *Anagyrus callidus* is reported from Imperial and Riverside counties and was released in California at least as early as 2014 (Andreason et al., 2019).

California Interceptions: *Anagyrus callidus* has not been intercepted in California (California Department of Food and Agriculture).

The risk *Anagyrus callidus* poses to California is evaluated below.

Consequences of Introduction:

- 1) **Climate/Host Interaction:** The only known host of *A. callidus*, *M. hirsutus*, is known to be present in Imperial and Riverside counties, but if not controlled it could likely become more widely established in the warmer areas of California, as it is polyphagous. For the purpose of this proposal, the potential distribution in California of *A. callidus* will be presumed to be the same as that of *M. hirsutus*. Therefore, it 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:** Based on the evidence available, *A. callidus* is only known to attack one species of mealybug, *M. hirsutus*. Therefore, it receives a **Low (1)** 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:** *Anagyrus callidus* can fly. 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.** *Anagyrus callidus* is only known to attack *M. hirsutus*, a pest mealybug. It is not known to have any negative economic impacts. Therefore, it receives a **Low (1)** in this category.

Economic Impact:

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: Low

– **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.** *Anagyrus callidus* has been established in California for at least five years. There does not appear to be evidence that it has impacted native California mealybugs. There is no evidence that *A. callidus* parasitizes any mealybug species other than *M. hirsutus*. There are no native *Maconellicoccus* species in California. Therefore, *A. callidus* receives a **Low (1)** in this category.

Evaluate the environmental impact of the pest on California using the criteria below.

Environmental Impact:

- 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: Low (1)

- **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 *Anagyrus callidus*: Low (7)

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:** *Anagyrus callidus* is present in Imperial and Riverside counties. It receives a **Low (-1)** 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: Low (6)

Uncertainty:

Other *Anagyrus* species are reported to parasitize multiple genera of mealybugs. It is possible that *A. callidus* has a broader host range than what is reflected in the literature. If so, it could impact native California mealybugs.

Conclusion and Rating Justification:

Without effective biological control, *M. hirsutus* is expected to negatively impact yield of California crops and ornamentals (Leathers, 2018). *Anagyrus callidus* is currently established in California. It does not appear to pose any risk to California agriculture or environment and is considered an effective biological control agent. For these reasons, a “D” rating is justified.

References:

Andreason, S. A., Triapitsyn, S. V., Perring, T. M. 2019. Untangling the *Anagyrus pseudococci* species complex (Hymenoptera: Encyrtidae), parasitoids of worldwide importance for biological control of mealybugs (Hemiptera: Pseudococcidae): Genetic data corroborates separation of two new, previously misidentified species. *Biological Control* 129:65-82.

California Department of Food and Agriculture. Pest and damage record database. Accessed June 15, 2020:

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

Leathers, J. 2018. Pink hibiscus mealybug. *Maconellicoccus hirsutus* (Green). Accessed June 15, 2020: <https://blogs.cdfa.ca.gov/Section3162/?p=5290>

Sagarra, L. A., Vincent, C., and Stewart, R. K. 2001. Suitability of nine mealybug species (Homoptera: Pseudococcidae) as hosts for the parasitoid *Anagyrus kamali* (Hymenoptera: Encyrtidae). Florida Entomologist 84:112-116.

Triapitsyn, S. V., Andreason, S. A., Dominguez, C., and Perring, T. M. 2019. On the origin of *Anagyrus callidus* (Hymenoptera: Encyrtidae), a parasitoid of pink hibiscus mealybug *Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae). Zootaxa 4671:283-289.

Responsible Party:

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***Comment Period: 7/13/2020 through 8/27/2020**

***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.

Proposed Pest Rating: D