

California Pest Rating Proposal

Spathius galinae Belokobylskij and Strazanac: a parasitoid wasp

Hymenoptera: Braconidae

Current Rating: Q

Proposed Rating: D

Comment Period: **03/25/2024 – 05/09/2024**

Initiating Event:

Spathius galinae has been released in the eastern United States in an effort to control emerald ash borer (EAB). EAB is now present in Oregon and it is therefore more likely to invade California. In order to prepare for an introduction of EAB in California, potential biological control agents are being assessed. Insects, by statute, are considered plant pests in California, and, in addition, biological control agents have the potential to impact agriculture and environment. Therefore, a pest rating proposal is needed.

History & Status:

Background: *Spathius galinae* is a parasitoid wasp, the larvae of which feed externally on emerald ash borer (EAB), *Agrilus planipennis*, larvae in tunnels made by the EAB larvae. One *S. galinae* life cycle is reported to take approximately 29 days (Duan et al., 2014).

Fifteen potential alternate host species (in addition to EAB) insect species were tested (mostly cerambycids and buprestids) in their respective hosts in choice and no-choice tests, including six *Agrilus* species besides EAB. Only *A. auroguttatus* (in red oak) was parasitized, at 41 versus 71% parasitism compared to EAB in a no-choice test (Gould and Duan, 2013 in USDA, 2015). *Agrilus*

auroguttatus is a pest in southern California: <https://blogs.cdfa.ca.gov/Section3162/wp-content/uploads/2022/08/Agrilus-auroguttatus.pdf>

Spathius galinae is not limited to attacking hosts in ash trees. Besides parasitizing *A. auroguttatus* in red oak (described above), it was found to parasitize EAB larvae in white fringetree (*Chionanthus virginicus*) at comparable or higher rates than EAB larvae in ash (Ragozzino et al., 2021). White fringetree is in the same family as ash (Oleaceae).

In 2015, the USDA issued a decision and finding that there are no significant impacts (including to non-target insects) anticipated to result from field release of *S. galinae* in the Contiguous United States (USDA, 2015).

Spathius galinae has been widely released in the eastern United States and it is established and parasitizing EAB there. Parasitism rates as high as 49% were reported in Connecticut (Duan et al., 2019).

Worldwide Distribution: *Spathius galinae* is native to Asia and it has been introduced in the eastern United States. The reported distribution includes the following: **Asia:** South Korea, Russian Federation; **North America:** United States (Connecticut, Michigan, New York) (Duan et al., 2020; Quinn et al., 2021).

Official Control: *Spathius galinae* is not known to be under official control.

California Distribution: *Spathius galinae* is not known to be present in California (California Department of Food and Agriculture, 2023).

California Interceptions: *Spathius galinae* has not been intercepted in California (California Department of Food and Agriculture, 2023).

The risk *Spathius galinae* poses to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** For the purpose of determining the potential range of this wasp in California, it will be assumed that EAB, the most favorable known host of *S. galinae*, is established in the state. EAB is expected to be capable of establishing widely in California. This is based on the wide distribution of ash trees in the state and the extensive distribution of EAB in the eastern United States. In southern California, *A. auroguttatus* is present and this is a potential field host (although results of that no-choice experiment does not necessarily mean that *A. auroguttatus* would be parasitized in the field. There would likely be a host and suitable climate present over much of California. *Spathius galinae* is widely established in the eastern United States, and it is presumed that the climate of a significant portion of California would be suitable (see Uncertainty below). Therefore, *S. galinae* 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:** *Spathius galinae* is only known to parasitize two species of *Agilus*. 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:** *Spathius galinae* flies and could be moved in EAB-infested wood. 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:** *Spathius galinae* is only known to parasitize two species of *Agrilus*; one of these is a pest in southern California and the other is not yet in California but is considered to pose a severe threat to the state. The two known hosts are not known to provide any economic benefit to California and population reduction may be an economic benefit. 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:** California has at least 31 species of *Agrilus*. Host specificity testing involved six species in this genus besides EAB. Only EAB and *A. auroguttatus* (in a no-choice test) were parasitized. No non-*Agrilus* insects were parasitized. This suggests that *S. galinae* is not restricted to EAB but also that it is selective. It appears unlikely that *S. galinae* would have significant impacts on native *Agrilus* in California. Presence of EAB in the state would likely have

negative impacts on the environment. The high rate of parasitism of EAB by *A. galinae* in eastern states suggest it may be an effective control agent of EAB in California as well. *Spathius galinae* may also provide some level of control against *A. auroguttatus*, a non-native pest in the state. Therefore, *A. galinae* receives a **Low (1)** in this category.

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 *Spathius galinae*: 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:** *Spathius galinae* 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 the introduction score minus the post-entry distribution and survey information score: Low (7)

Uncertainty:

There is some uncertainty regarding the potential host range of this wasp and its potential to control EAB if it became established in California. This wasp is not known to be established in any area with a Mediterranean climate.

Conclusion and Rating Justification:

Spathius galinae appears unlikely to pose a threat to California. Based on limited host specificity testing, it appears to be limited to the genus *Agrius* and selective within that genus to EAB and one other tested species. EAB is a pest that poses a clear threat to California's natural environment and street trees. The potential benefits of *S. galinae* appear to greatly outweigh the risk it may pose to the state.

References:

California Department of Food and Agriculture. Pest and damage record database. Accessed May 22, 2023.

Duan, J. J., Bauer, L. S., Van Driesche, R., Schmude, J. M., Petrice, T., Chandler, J. L., and Elkinton, J. 2020. Effects of extreme low winter temperatures on the overwintering survival of the introduced larval parasitoids *Spathius galinae* and *Tetrastichus plannipennisi*: Implications for biological control of emerald ash borer in North America. *Journal of Economic Entomology* 113:1145-1151.

Duan, J. J., Van Driesche, R. G., Crandall, R. S., Schmude, J. M., Rutledge, C. E., Slager, B. H., Gould, J. R., Elkinton, J. S. 2019. Establishment of early impact of *Spathius galinae* (Hymenoptera: Braconidae) in the Northeastern United States. *Journal of Economic Entomology* 112:2121-2130.

Duan, J. J., Watt, T. J., and Larson, K. 2014. Biology, life history, and laboratory rearing of *Spathius galinae* (Hymenoptera: Braconidae), a larval parasitoid of the invasive emerald ash borer (Coleoptera: Buprestidae). *Journal of Economic Entomology* 107:939-946.

Gould, J. R. and Duan, J. J. 2013. Petition for release of an exotic parasitoid, *Spathius galinae* Belokobylskij & Strazanac, for the biological control of the emerald ash borer, *Agilus planipennis* Fairmaire. Submitted to the USDA.

Quinn, N. F., Gould, J. S., Rutledge, C. E., Fassler, A., Elkinton, J. S., Duan, J. J. 2021. Spread and phenology of *Spathius galinae* and *Tetrastichus planipennisi*, recently introduced for biocontrol of emerald ash borer (Coleoptera: Buprestidae) in the northeastern United States. *Biological Control* <https://doi.org/10.1016/j.biocontrol.2021.104794>

Ragozzino, M., Duan, J. J., Salom, S. 2021. Responses of two introduced larval parasitoids to the invasive emerald ash borer (Coleoptera: Buprestidae) infesting a novel host plant, white fringe tree: Implications for biological control. *Biological Control* <https://doi.org/10.1016/j.biocontrol.2021.104672>

United States Department of Agriculture, Animal and Plant Health Inspection Service. 2015. Field release of the parasitoid *Spathius galinae* for the biological control of the emerald ash borer (*Agilus planipennis*) in the Contiguous United States. Environmental assessment.

Responsible Party:

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***Comment Period: 03/25/2024 – 05/09/2024**

***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.

Proposed Pest Rating: D