CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal

***Acalitus phloeocoptes* (Nalepa): Plum bud gall mite**

Only California origin; only associated with apricot, plum, and plum hybrids

Eriophyidae

Current Rating: A

Proposed Rating: B

Comment Period: 10/13/2020 – 11/27/2020

Initiating Event:

On February 12, 2019, galls of *Acalitus phloeocoptes*, a mite reported to infest stone fruit and almond trees and to kill almond trees in the Old World, were found on plum trees at an orchard in Morgan Hill, Santa Clara County, California. In March 2019, a pest rating proposal for this mite was posted for public comment. The proposed A-rating became final in April 2020. Since that time, this mite has been found in a total of seven counties in California. It has only been observed to affect in a minor way stone fruits in the genus *Prunus*; no galls have been found on almond trees. It is an appropriate time to re-assess the potential risk this mite poses to California. Therefore, a pest rating proposal is needed.

History & Status:

Background: *Acalitus phloeocoptes* is a gall-forming mite that is apparently restricted to the genera *Prunus* and *Cotoneaster*. The adult females are approximately 0.15 mm in length, white, and wormlike (Vacante, 2016). They disperse from galls in spring and crawl under bud scales, where they feed. This induces gall formation. The mites become enclosed by the galls, which enlarge and become woody through the course of the year. There are apparently multiple generations per year

(Jeppson et al., 1975). The mites overwinter in the galls, and in the spring, the galls split and adult female mites disperse.

In the Old World, damage has been reported on almond, apricot, and plum trees, but this mite is reported to cause more severe damage to almonds. Bud dieback and death of trees are reported in almonds (Kamali et al., 2016; Temreshev et al., 2016). Cherries are not reported to be attacked.

Recommended control methods include pruning infested shoots in winter and spraying pesticides. For example, in Spain, two sprayings of endosulfan proved effective, reducing infestation by 95% (Vacante, 2016). Also in Spain, Durán et al. (2006) found carbaryl and sulfur to be effective. Spraying needs to be synchronized with the spring emergence of adults and beginning of gall formation.

This mite is now widespread in the greater San Francisco Bay area. Galls have been found on apricot, plum, and plum hybrids. However, the galls appear to have little or no impact on stone fruit trees in this state. In addition, the California infestations of this mite do not appear to be affecting almond trees. Twenty-two almond trees, each one a different variety, were observed over an extended timeframe in an orchard in Santa Clara County that is heavily infested with *A. phloeocoptes*. Infested plum trees were present within a couple hundred feet of the almond trees. The almond trees were each inspected twice by CDFA and Santa Clara County personnel, once in 2019 and once in 2020, both at times when galls were visible on plum and pluot trees in the orchard. Not a single gall was ever found on an almond tree. In addition, a host specificity test was carried out at Dominican University in San Rafael, California. Plum branches with *A. phloeocoptes* galls were cut and transferred to healthy plum (five trees each of two varieties) and almond (five trees each of five varieties commonly grown in California) trees. All five trees of the Mariposa variety of plum became infested; galls were not found on any Santa Rosa plums or almond trees K. Suslow, pers. comm.). These galls became noticeable in July. Mites were verified as emerging from galls from February to April 2020. The plum trees flowered March through April and the almond trees flowered late April through May (K. Suslow, pers. comm.).

Eriophyid mites are minute and relatively understudied. There is the definite potential for cryptic species that could appear morphologically similar (at least to the extent they have been or can be observed with available optical or scanning electron microscopy) and cause similar symptoms but that could differ in host range. There is no direct data (for example, no observed morphological differences have been recognized and no sequence data is available) to support that this is the case with *A. phloeocoptes*. However, this possibility is supported by the apparent difference in feeding preference of the mites present in California compared to those reported in the literature for *A. phloeocoptes*. Currently, a purported *A. phloeocoptes* mite is already well-established in a fairly large area in California. Therefore, it is appropriate to reassess the threat the current infestation poses to the state, while still maintaining an A-rating for interceptions of potential invasive *A. phloeocoptes* mites from outside of California, as well as finds of this mite in California on hosts other than apricot, plum, and plum hybrids.

Worldwide Distribution: *Acalitus phloeocoptes* is known to be present in Southern and Central Europe and Asia Minor (including Lebanon and Syria) (Jeppson et al., 1975; Talhouk, 1977; Temreshev et al., 2018). In the United States, it was reported from Pennsylvania by Garman (1894), and in Ohio in 1960 (R. Ochoa, pers. comm.). It may also be present in China (Navia et al., 2010).

Official Control: *Acalitus phloeocoptes* is considered an A1 pest by Egypt and Chile and it is considered reportable by the United States Department of Agriculture (EPPO Global Database; USDA-APHIS).

California Distribution: *Acalitus phloeocoptes* has been found in seven San Francisco Bay area counties in California: Alameda, Contra Costa, Marin, San Mateo, Santa Clara, Santa Cruz, and Sonoma (California Department of Food and Agriculture). Galls observed in 2019 included old ones from at least the previous year, indicating the mite was present in California at least as early as 2017. An anecdotal report was received from Marin County suggesting that this mite may have been present there at least six years ago (2014) (S. Swain, per. comm.).

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

The risk *Acalitus phloeocoptes* poses to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** *Acalitus phloeocoptes* has been reported from areas with temperate and Mediterranean climates. This mite has been found attacking *Prunus* species that are planted widely in California. It has already been found in seven counties, and it is likely it could spread to a much larger portion of California. Therefore, it receives a **High (3)** 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:** *Acalitus phloeocoptes* is apparently restricted to two genera, *Prunus* and *Cotoneaster*. 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:** Female *Acalitus phloeocoptes* are reported to produce as many as 700-850 eggs and there are reportedly multiple generations per year. Dispersal of mites following splitting of the galls is reported to occur via wind and possibly even insects (Jeppson et al., 1975). Therefore, it receives a **High (3)** 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**. The California infestations of *A. phloeocoptes* do not appear to have impacted almonds even though they have had ample opportunity to do so. The impact to stone fruit has been minor and apparently limited to the presence of galls. Fruit production and general tree health do not appear to be impacted. However, the presence of this mite in California could lead to quarantines by other states or countries that grow *Prunus* species. Therefore, it receives a **Low (1)** in this category.

Economic Impact: 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: 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**. Infestations of this mite could trigger treatments by owners who object to the galls. Therefore, *A. phloeocoptes* receives a **Medium (2)** in this category.

Environmental Impact: D

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: Medium (2)

– 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 *Acalitus phloeocoptes*: Medium (10)

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:** *Acalitus phloeocoptes* is reported from seven counties in the San Francisco Bay area of California. 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: Medium (9)

Uncertainty:

It is possible that there may be, at present or in the future, a cryptic species of this mite found on stone fruit in California that could attack almonds. For example, if a mite capable of attacking both stone fruit and almond becomes introduced to California, it would be treated as lower-risk according to this proposal if it was found on stone fruit. There is a possibility that there is more than one species (i.e., cryptic species) currently identified as *A. phloeocoptes*, and that the infestations currently known in California, although morphologically similar to the true *A. phloeocoptes*, are actually another unrecognized species. In this case, the lack of observed feeding by these mites in California on almonds likely represents a true difference in feeding habits. Conversely, observed host differences between the current California infestation and those reported for *A. phloeocoptes* may be due to phenological differences of host trees in California. These mites disperse as the galls open up, which occurs when the host tree starts to grow in the spring. There could be a significant temporal gap between the infested plum trees in California and the as-yet-unknown window of susceptibility of the almond trees in California that have been exposed to the mites. If this is the case, the observed lack of galls on almonds may not reflect an actual inability to impact these trees but only a lack of opportunity. Shifts in bud break times or variation among trees or varieties could "bridge" this gap and allow attack of almonds.

Conclusion and Rating Justification:

Acalitus phloeocoptes is currently present in seven counties in California. It has not been reported to have a significant impact on the attacked trees (stone fruit in the genus *Prunus*), and it has also not been found to attack almonds. There is a high likelihood that there are multiple cryptic species

currently identified as *A. phloeocoptes*. Therefore, it is appropriate to consider the current infestation in California to be lower-risk relative to mites intercepted from outside the state or found on almond or other species of *Prunus* besides apricot and plum in the state, which may represent the *A. phloeocoptes* capable of attacking almond. For these reasons, a "B" rating is justified.

References:

California Department of Food and Agriculture (a). Pest and damage record database. Accessed September 22, 2020:
https://pdr.cdfa.ca.gov/PDR/pdrmainmenu.aspx

California Department of Food and Agriculture (b). California agricultural production statistics. Accessed
February 22, 2019:
https://www.cdfa.ca.gov/statistics/

Durán, J. M., Prats, T., De La Rosa, A., Sánchez, A., and Alvarado, M. 2006. Control de *Acalitus phloeocoptes* Nalepa (Acarina, Eriophyidae), eriófido de las agallas del ciruelo, en la Vega de Sevilla. Boletín de Sanidad Vegetal. Plagas 32:71-78.

EPPO Global Database. Accessed September 28, 2020:
https://gd.eppo.int

Garman, H. 1894. A plum twig gall produced by a mite. Kentucky Agricultural Experiment Station, Seventh annual report.

Jeppson, L. T., Keifer, H. H, and Baker, E. W. 1975. Mites Injurious to Economic Plants. University of California Press, Berkeley, California.

Kamali, H., Sirjani, M., and Bazoobandi, M. 2016. Biological characteristics of almond bud mite, *Acalitus*
phloeocoptes (Nalepa) (Acari: Eriophyoidea) in Khoresan-e-Razavi Province. Plant Pest Research 6:63-74.

Navia, D., Ochoa, R., Welbourn, C., and Ferragut, F. 2010. Adventive eriophyoid mites: A global review
of their impact, pathways, prevention and challenges. Experimental & Applied Acarology 51:225-255.

Talhouk, A. S. 1977. Contribution to the knowledge of almond pests on East Mediterranean countries.

VI. The sap-sucking pests. Zeitschrift für angewandte Entomologie 83:248-257.

Temreshev, I. I., Kopzhasarov, B. K., Slyamova, N. D., Beknazarova, Z. B., and Darubayev, A. A. 2018. First
records of invasive pests almond bud mite *Acalitus phloeocoptes* (Nalepa, 1890) (Acari, Trombidiformes,
Eriophyidae) in Kazakhstan. Acta Biologica Sibirica 4:6-11.

USDA-APHIS. U.S. regulated plant pest table. Accessed September 22, 2020: https://www.aphis.usda.gov/aphis/ourfocus/planthealth/import-information/rppl/rppl-table

Vacante, V. 2016. The handbook of mites of economic plants. CAB International. Wallingford, United Kingdom.

Responsible Party:

Kyle Beucke, 2800 Gateway Oaks, Suite #200, Sacramento, CA, 95833, 916-403-6741, permits[@]cdfa.ca.gov

*Comment Period: 10/13/2020 – 11/27/2020

*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: B