CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal

***Toumeyella parvicornis* (Cockerell): pine tortoise scale**

Hemiptera: Coccidae

Current Rating: A

Proposed Rating: B

Comment Period: 11/18/2022 – 01/02/2023

Initiating Event:

Toumeyella parvicornis was found on a pine tree at a residence in San Diego County in September 2021. Following a pest rating proposal that year, it was assigned an A-rating. This scale was found at another location in San Diego County approximately 10 miles from the previous site and it appears to be infesting a significant area. A new pest rating proposal is needed.

History & Status:

Background: *Toumeyella parvicornis* is a soft scale that feeds on pine trees (*Pinus* spp.). The shape of the adult female is variable and dependent on the part of the tree it has settled on. Those on shoots or twigs are more hemispherical, and those on needles are more elongate (Clarke, 2013). Development time is dependent on climate. In cooler areas, there may be one generation per year and immature female scales overwinter. In warmer climates, there can be up to four overlapping generations per year, for example three generations per year were reported in southern Italy (Clarke, 2013; Garonna et al., 2018; Hamon and Williams, 1984; McKinley, 2019).

Toumeyella parvicornis is reported to feed on *Pinus banksiana*, *P. sylvestris*, *P. strobus*, *P. nigra*, *P. radiata*, *P. resinosa*, *P. contorta*, *P. mugo*, *P. virginiana*, *P. elliotti*, *P. echinata*, *P. caribaea*, *P. pinaster*, and *P. pinea* (California Department of Food and Agriculture; Clarke, 2013; Garonna et al.,

2018). *Pinus halapensis* (Aleppo pine) was reported to be resistant by Garonna et al. (2018), but an unofficial report in California suggests it may be a host.

Toumeyella parvicornis is reported to cause reduced growth, dieback, tree mortality, and reduced cone production (Garonna et al., 2018; Malumphy et al., 2012). Sooty mold that grows on honeydew impacts photosynthesis. Significant impacts in some situations appear to be limited to young trees (Wilkinson and Chellman, 1979).

This scale is a common pest of pine trees in the eastern United States and Canada (Cheung, 2011). It is a significant pest of Christmas trees in Louisiana and North Carolina, for example (McKinley, 2019; Oliver and Chapin, 1988). Oliver and Chapin (1988) describe foliage blackened by sooty mold and deformed by damage and indicate that damaged trees are unfit for sale as Christmas trees. In a slash pine plantation in Florida, Wilkinson and Chellman (1979) reported that growth (height) of trees infested by *T. parvicornis* was reduced by 40%; these scales were apparently being tended by red imported fire ant (*Solenopsis invicta*). In the Turks and Caicos Islands, this scale caused mortality of the endemic pine tree species *P. caribaea* var. *bahamensis* and caused the complete loss of these trees from some areas (Malumphy et al., 2012).

In infested areas of San Diego County, this scale is associated with heavy honeydew and sooty mold. Needles of infested pine are blackened and unsightly. Significant dieback was observed in some trees, but in some cases, scales were not observed so it is not possible to attribute this impact to the scale with certainty (B. Cass, pers. comm.). Sooty mold was associated with infestations on Monterey pines (*P. radiata*) at a nursery in Santa Barbara County (R. Casey, pers. comm.).

In some cases, predators and parasitoids appear to limit this scale to acceptable levels, at least in larger trees (Hamon and Williams, 1984). Ladybird beetle (Coccinellidae) larvae were observed and parasitoid attacks were evident on infested trees in San Diego County (B. Cass, pers. comm.). Chemical control is difficult and treatments must target the crawler stage (McKinley, 2019). Cooper and Cranshaw found that imidacloprid soil treatments controlled this scale on lodge-pole pine. Clarke et al. (1992) suggested bifenthrin may provide effective control. Aphelinid wasps that are known to attack this scale include species in the genera *Coccophagus* and *Metaphycus* (Clarke, 2013; Garonna et al., 2018).

Worldwide Distribution: *Toumeyella parvicornis* is native to the eastern United States and Canada. It is reported from Canada, Mexico, United States (most states east of the Mississippi River and also west to North Dakota, Colorado, and Texas) (Cheung, 2011; Clarke, 2013). It has been introduced to Italy, the Caribbean, and California (California Department of Food and Agriculture; Garonna et al., 2018).

Official Control: *Toumeyella parvicornis* is not known to be under official control anywhere.

California Distribution: *Toumeyella parvicornis* has been found on stone pine (*Pinus pinea*) trees at two residential areas approximately 10 miles apart in San Diego County in 2021 and 2022 (California Department of Food and Agriculture). At one of these sites, multiple infested trees were observed over a distance of approximately one mile (B. Cass, pers. comm.).

California Interceptions: *Toumeyella parvicornis* has been found on *P. radiata* and unidentified pines at nurseries in Santa Barbara and San Diego counties (California Department of Food and Agriculture).

The risk *Toumeyella parvicornis* poses to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** *Toumeyella parvicornis* is found in areas representing cool temperate, Mediterranean, and tropical climate. It feeds on a wide variety of *Pinus* species, including at least one native species (*P. radiata*) and one ornamental species (*P. pinea*) widespread in the state. It could likely establish widely in California, and it is already established in San Diego County. Therefore, *T. parvicornis* 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:** *Toumeyella parvicornis* is only known to feed on pines. 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:** *Toumeyella parvicornis* has multiple, overlapping generations in warm climates. It can likely spread through movement of infested plant material. 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**. *Toumeyella parvicornis* is reported to be a significant pest of pines, including those grown for Christmas trees. Ornamental pines grown in California (e.g., *P. pinea*, *P. mugo*, and *P. sylvestris*) are known hosts and nursery production of these trees could be impacted (R. Price, pers. comm.). Yield of salable trees could be decreased and treatment costs could increase. Therefore, it receives a **Medium (2)** in this category.

Economic Impact: A, B

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: Medium

– 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**. *Toumeyella parvicornis* is known to impact a wide variety of pine trees. At least one species native to California, *P. radiata*, is a reported host and heavy infestations have been reported on this tree at a nursery. This and other native pine species may be impacted in the environment of California. The loss of native pines over large areas in the Turks and Caicos Islands is evidence of ecosystem-level impacts. This scale is known to cause significant damage to, and sometimes kill, pines that are grown in California as ornamentals, and impacts are already being reported in San Diego County. Therefore, *T. parvicornis* 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 *Toumeyella parvicornis*: Medium (12)

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:** *Toumeyella parvicornis* is established in San Diego County. 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 (11)

Uncertainty:

There are no ongoing surveys for *T. parvicornis* except for very limited ones around known infested sites in San Diego County, so it is possible that this scale is more widely established in California. One native California pine, *P. radiata*, is a known host, but the impacts to this species are not known. It is

not known if other native California pines will be attacked, although the diversity of known hosts suggests it is likely.

Conclusion and Rating Justification:

Toumeyella parvicornis is a severe pest of pines that has been shown to have economic and environmental impacts in its native and introduced range. It is established in San Diego County and eradication does not appear to be feasible. The most significant impacts so far appear to be limited to stone pine, but this may change as the scale continues to spread. For these reasons, a "B" rating is justified.

References:

California Department of Food and Agriculture. Pest and damage record database. Accessed October 20, 2022: https://pdr.cdfa.ca.gov/PDR/pdrmainmenu.aspx

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Clarke, S. R. 2013. Pine tortoise scale. United States Department of Agriculture Forest Insect & Disease Leaflet 57:1-9.

Cooper, D. and Cranshaw, W. 1996. Pine tortoise scale, soil treatment trial, 1995. Arthropod Management Tests 21:376.

Garonna, A. P., Foscari, A., Russo, E., Jesu, G., Somma, S., Cascone, P., and Guerrieri, E. 2018. The spread of the non-native pine tortoise scale *Toumeyella parvicornis* (Hemiptera: Coccidae) in Europe: a major threat to *Pinus pinea* in Southern Italy. iForest 11:628-634.

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Malumphy, C., Hamilton, M. A., Manco, B. N., Green, P. W. C., Sanchez, M. D., Corcoran, M., and Salamanca, E. 2012. *Toumeyella parvicornis* (Hemiptera: Coccidae), causing severe decline of *Pinus caribaea* var. *bahamensis* in the Turks and Caicos Islands. The Florida Entomologist 95:113-119.

McKinley, C. 2019. Pine tortoise scale. Accessed September 30, 2021: https://content.ces.ncsu.edu/pine-tortoise-scale

Oliver, A. D. and Chapin, J. B. 1988. An integrated pest management system for Louisiana Christmas tree growers. Louisiana Agricultural Experiment Station Bulletin 793:1-30.

Wilkinson, R. C. and Chellman, C. W. 1979. *Toumeyella* scale, red imported fire ant, reduce slash pine growth. The Florida Entomologist 62:71-72.

Responsible Party:

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***Comment Period: 11/18/2022 – 01/02/2023**

***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.

Proposed Pest Rating: B