cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Coniella granati (Sacc.) Petr. & Syd. 1927 [1926]

Pomegranate stem canker and fruit rot

Current Pest Rating: none

Proposed Pest Rating: C

Kingdom: Fungi; Phylum: Ascomycota

Class: Sordariomycetes; Order: Diaporthales

Family: Schizoparmeaceae

Comment Period: 3/16/2020 through 4/30/2020

Initiating Event:

In May 2019, the USDA APHIS requested information about the status of several pomegranate pests in response to an information request they received from Colombia. One of the pests of concern was the fungal pathogen *Pilidiella granati*. Although CDFA has not received an official sample of this fungus, there are reports from University of California Plant Pathologists showing that it is established in multiple counties. The risk of *Coniella* (=*Pilidiella) granati* to California is evaluated herein and a permanent pest rating is proposed.

History & Status:

Background: California is the largest producer of pomegranates (*Punica granatum*) in the US with over 30,000 acres. (CDFA, 2018). Commercial pomegranates are almost exclusively grown in the southern San Joaquin Valley. Pomegranates are subtropical fruits, but they can acclimate to Mediterranean climates and can withstand freezes to -12°C. Long hot growing seasons are necessary for fruit development, making the San Joaquin Valley an ideal place of production (UC Davis, 2020). Pomegranates are also grown in home orchards and as ornamental hedges statewide. The USDA hopes to develop a draft operation plan to further the cause of obtaining market access in Colombia for California pomegranates.

Older names and synonyms for this fungal pathogen are *Phoma granati*, *Macrophoma granati*, *Cytoplea granati*, *Pilidiella granati*, *Phoma versoniana*, *Zythia versoniana*, *Anthasthoopa simba*, and *Coniella simba*. In the past, conidial pigmentation was used as a character to separate *Pilidiella* (hyaline to pale brown conidia) from *Coniella* (dark brown conidia). In recent years, however, the two genera have been regarded as synonymous, giving the older name *Coniella* taxonomic priority (van Niekerk et al., 2003; Alvarez et al., 2016).

Hosts: Caesalpinia pulcherrima (peacock flower), *Anogeissus acuminate* (Axlewood), *Citrus* spp.*, Punica granatum* (pomegranate), *Vitis Vinivera* (grape) (Farr and Rossman, 2020).

Symptoms: *Coniella granati* can cause disease on multiple parts of its hosts, but the diseases most widely reported are pomegranate fruit rots, both pre-and postharvest. Tziros and Tzavella-Klonari (2008) describe how symptoms first appear as small brown lesions on the fruits that increase in size, eventually producing abundant pycnidia on the entire rind. Thomidis (2014) showed that *C. granati* could be isolated from preharvest rotted pomegranate fruits lacking the cracking symptom commonly observed in Greece. Fruits with symptoms of dry rot and fruit mummification are described from Florida (KC and Vallad 2016) and California (Adaskaveg and Michailides, 2018).

Leaf spots with concentric margins are described from pomegranate trees in Florida (Kc and Vallad, 2016). Disease symptoms on leaves were small, necrotic, angular lesions that started at the leaf tip and expanded towards the proximal end leading to desiccation and premature shedding of leaves. Similar to what occurs on fruits, infected leaves also develop abundant gritty, black, pycnidial bodies that spread throughout the leaf surface (Ram and Sharma, 2013).

In China, twig necrosis caused by *Coniella granati* (Chen et al., 2014) has resulted in the decline and eventual death of young pomegranate shoots and branches. Jabnoun-Khiareddine et al. (2018) described the presence of cankers, and abundant black and solitary pycnidia on diseased twigs and shoots associated with marginal leaf browning, resulting in the dieback of one or multiple pomegranate branches.

Coniella granati also causes decay of the stem and crown. Crown rot (Celiker et al., 2012, Thomidis and Exadaktylou, 2010), occurs on pomegranates with initial symptoms of wilting and dieback of the branches, similar to Phytophthora crown rot, and with necrotized crown tissue. Pollastro et al. 2016 showed that crown rot-affected pomegranates suffered stunting, small, yellowish leaves, decline, and eventually death. An extensive brown-black wood discoloration was observed in longitudinal sections and affected up to 50% of the cross-sectional area on trees in southern Italy. In California, *C. granati* is frequently isolated (62 - 70% incidence) from trees expressing symptoms of cankers, chlorotic foliage, and premature death (Michailides et al., 2010).

Transmission: In orchards, the pathogen overwinters as pycnidia with viable spores and mycelia in stem cankers and rotten fruit (mummies) on the trees, residual pruning debris, and desiccated leaves (Jabnoun-Khiareddine et al., 2018; Uysal et al., 2018). *Coniella. granati* can overwinter on small, split,

and misshapen fruit that are not harvested and left in the orchard, also known as mummies (Adaskaveg and Michailides, 2010). Fruit left in the field supports the growth and sporulation of the pathogen for the next spring season. Spores are spread from the pycnidia by wind and wind-blown rain. Fruit infection occurs through wounds (e.g., insect exit holes, bird pecks, thorn punctures, and natural cracking). Infections, however, can spread by contact from infected fruit to healthy fruit in packed boxes, similar to other post-harvest fungi. The pathogen can also be isolated from symptomless bark of the trunk, branches, and shoots. (Adaskaveg and Michailides, 2018).

Damage Potential: Tziros and Tzavella-Klonari (2008) showed affected fruits rotted completely during storage causing yield losses of up to 50%. Thomidis (2014) isolated *C. granati* from 60% of the preharvest rotted pomegranate fruits lacking the cracking symptom observed in Greece, while Cintora-Martínez et al. (2017) observed that fruit rot was present on 60 to 85% of pomegranate fruits in an orchard in Mexico. In India, *C. granati* can rot pomegranate fruits within a week of infection, causing drastic reductions in yield as well as reductions in the marketability of the fruit, with losses up to 80% (Mahadevakumar et al., 2019). Palou et al. (2010) reported that *Penicillium* spp. and *C. granati* can co-occur and cause more significant postharvest fruit rot of pomegranate than separately. Under storage conditions, Michailides et al. 2010 showed that infected fruit could spread *C. granati* to healthy fruit approx. 50% of the time and this process does not require wounding.

Twig dieback and fruit rot were observed on about 10% and 30% of the pomegranate trees, respectively, causing losses in China (Chen et al., 2014). Pollastro et al. 2016 and Mirzaei and Rezaei Nia (2013) describe severe crown rot decline and damage by the pathogen as it rapid spread to new pomegranate orchards.

Worldwide Distribution: Armenia, Brazil, China, Cyprus, Greece, India, Iran, Italy, Japan, Korea, Mexico, Myanmar, Netherlands, Pakistan, South Africa, Spain, Tunisia, Turkey, Ukraine, United States (California, North Carolina, Florida) (CABI-CPC; 2020; EPPO; 2020; Farr and Rossman; 2020).

Official Control: none

California Distribution: Fresno, Kern, and Madera counties.

California Interceptions: None

The risk *Coniella granati* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** This pathogen occurs in other parts of the world with climates like California.

   Evaluate if the pest would have suitable hosts and climate to establish in California.
   Score: **2**

- 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:** There are five hosts in five families: two are ornamental trees, one is a fruiting tree (citrus), one is a fruiting shrub (pomegranate) and one is a fruiting vine (grape).

Evaluate the host range of the pest.

Score: 1
- 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 Potential:** The pathogen spreads with asexual conidiospores that are wind or rain-splash dispersed.

Evaluate the natural and artificial dispersal potential of the pest.

Score: 2
- 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:** Although it appears to be a serious pathogen in some parts of the world, it is considered a disease of minor economic importance in California (Adaskaveg and Michailides, pers. comm.).

Evaluate the economic impact of the pest to California using the criteria below.

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: **2**
- 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:** The pathogen overwinters on fruit mummies and with prunings left in the orchard making sanitation important in disease management.

Environmental Impact: 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: 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 *Coniella granati:* Medium

Add up the total score and include it here. **9**

-Low = 5-8 points
-**Medium = 9-12 points**
-High = 13-15 points

6) **Post Entry Distribution and Survey Information**: Evaluate the known distribution in California. Only official records identified by a taxonomic expert and supported by voucher specimens deposited in natural history collections should be considered. Pest incursions that have been eradicated, are under eradication, or have been delimited with no further detections should not be included.

Evaluation is 'low'. This disease has been reported in three counties in the Central Valley by the University of California (Michailides et al., 2010)

Score: -1

-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.

7) **The final score is** the consequences of introduction score minus the post entry distribution and survey information score: (Score)

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information* **= 8**

Uncertainty:

None

Conclusion and Rating Justification:

Based on the evidence provided above **the proposed rating for *Coniella granati* is C.**

References:

Adaskaveg, J. E., and Michailides, T. J. 2018. *Coniella* Stem Canker and Fruit Rot. *Coniella* (=*Pilidiella*) *granati.* Pest Management Guidelines / UC Statewide IPM Program (UC IPM). https://www2.ipm.ucanr.edu/agriculture/pomegranate/Coniella-Stem-Canker-and-Fruit-Rot/

Alvarez., L. V., Groenewald, J. Z., and Crous, P. W. 2016. Revising the Schizoparmaceae: *Coniella* and its synonyms *Pilidiella* and *Schizoparme*. Studies in Mycology. Vol 85: pg 1-34

Celiker, N. M., Uysal, A., Cetinel, B., and Poyraz, D. 2012. Crown rot on pomegranate caused by *Coniella granati* in Turkey. Australas. Plant Dis. Notes 7, 161–162.

CDFA California agricultural statistics review. 2018. https://www.cdfa.ca.gov/statistics/PDFs/2017-18AgReport.pdf

Chen, Y., Shao, D. D., Zhang, A. F., Yang, X., Zhou, M. G., and Xu, Y.L. 2014. First Report of a Fruit Rot and Twig Blight on Pomegranate (*Punica granatum*) Caused by *Pilidiella granati* in Anhui Province of China. Plant Dis. 98, 695.1–695.1.

Cintora-Martínez, E. A., Leyva-Mir, S. G., Ayala-Escobar, V., Ávila-Quezada, G. D., Camacho-Tapia, M., and Tovar-Pedraza, J. M. 2017. Pomegranate fruit rot caused by *Pilidiella granati* in Mexico. Australasian Plant Dis. Notes 12: 4

Farr, D. F., and Rossman, A.Y. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Retrieved February 11, 2020, from https://nt.ars-grin.gov/fungaldatabases/

Hebert, T. T., Clayton, C. N. 1963. Pomegranate fruit rot caused by *Coniella granati*. Plant Disease Reporter 47, 222–3.

Jabnoun-Khiareddine, H., Ibrahim, N., Abdallah, R. A. B., Mars, M, Kthiri, Z., and Daami-Remadi, M. *Coniella granati* (Saccardo) a New Potential Threat to Pomegranate (*Punica granatum* L.) in Tunisia Causing Twig Dieback and Fruit Rot. J Plant Pathol Microbiol 2018, 9:9. DOI: 10.4172/2157-7471.1000450

KC, A. N., and Vallad, G. E. 2016. First report of *Pilidiella granti* causing fruit rot and leaf spots on Pomegranate in Florida. Plant Disease Vol. 100 No. 6

Levy, E., Elkind, G., Ben-Arie, R. and Ben-Zeev, I. S. 2011.First report of *Coniella granati* causing pomegranate fruit rot in Israel. Phytoparasitica 39, 403–405.

Mahadevakumar, S., Shreenidhi, M., and Janardhana, G. R. 2019. First report of *Coniella granati* associated with dieback and fruit rot of pomegranate (*Punica granatum* L.) in India. Journal of Plant Pathology 101:787

Mirzaei, S., and Rezaei Nia, R. 2013. First report of *Pilidiella granati* on pomegranate as crown rot in Lorestan province. Iran. J. Plant Path., Vol. 49, No. 3, 2013:121

Michailides, T. J., Puckett, R. and Morgan, D. 2010. Pomegranate decay caused by *Pilidiella granati* in California. Phytopathology 100, S83.

Mincuzzi, A., Garganese, F., Ippolito A., and Sanzani, S. M. 2016. First report of *Pilidiella granati* causing postharvest fruit rot on pomegranate in Southern Italy. Journal of Plant Pathology 98 (2), 369-377

Mirabolfathy, M., Groenewald, J. Z., and Crous, P. W. 2012. First Report of *Pilidiella granati* Causing Dieback and Fruit Rot of Pomegranate (*Punica granatum*) in Iran. Plant Dis. 96, 461–461.

Palou, L., Guardado, A., and Montesinos-Herrero, C. 2010. First report of *Penicillium* spp. and *Pilidiella granati* causing postharvest fruit rot of pomegranate in Spain. New Disease Reports 22, 21

Pollastro, S., Dongiovanni, C., Gerin, D., Pollastro, P., Fumarola, G., De Miccolis Angelini, R. M. and Faretraet, F. 2016. First Report of *Coniella granati* as a Causal Agent of Pomegranate Crown Rot in Southern Italy. Plant Dis. 100, 1498–1498.

Ram V, Sharma IM (2013) Hitherto unrecorded diseases of pomegranate from Himachal Pradesh. Plant Dis Res 28: 94-96.

Tekiner, N., Kotan, R, Tozlu, E, and Dadaşoğlu, F. 2020. Biological Control of *Coniella granati* Saccardo in Pomegranate. Universal Journal of Agricultural Research 8.1 18 - 24. doi: 10.13189/ujar.2020.080103.

Thomidis, T. 2014. Fruit rots of pomegranate (cv. Wonderful) in Greece. Australas. Plant Pathol. 43, 583–588.

Thomidis, T. 2015. Pathogenicity and characterization of *Pilidiella granati* causing pomegranate diseases in Greece. European Journal of Plant Pathology. Vol 141. Issue 1. Pp 45-50.

Thomidis, T., and Exadaktylou, E. 2011. First report of *Pilidiella granati* on pomegranate with symptoms of crown rot in the prefecture of Xanthi, Greece. Plant Disease 95:79-2

Tziros, G. T, Tzavella-Klonari, K. 2008. Pomegranate fruit rot caused by *Coniella granati* confirmed in Greece. Plant Pathology 57, 783.

UC Davis Fruit and Nut Research and Information. Pomegranate resources. Accessed 2/12/2020 http://fruitandnuteducation.ucdavis.edu/fruitnutproduction/Pomegranate/

Uysal, A., Kurt, S., Soylu, E. M., Kara, M. and Soylu, S. 2018. Morphology, pathogenicity and management of *Coniella* fruit rot (*Coniella granati*) on pomegranate. Turkish Journal of Agriculture - Food Science and Technology, 6(4): 471-478, 2018

Van Niekerk, J. M., Groenewald, J. Z., Verkley, G. J. M., Fourie, P. H., Wingfield, M. J., and Crous, P. W. 2004. Systematic reappraisal of *Coniella* and *Pilidiella*, with specific reference to species occurring on *Eucalyptus* and *Vitis* in South Africa Mycol. Res. 108 (3): 283–303.

Yang, X., Hameed, U., Zhang, A-F., Zang, H-Y., Gu, C-Y., Chen, Y., and Xu, Y-L. 2017. Development of a nested-PCR assay for the rapid detection of *Pilidiella granati* in pomegranate fruit. Sci. Rep. 7, 40954.

Responsible Party:

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*Comment Period: 3/16/2020 through 4/30/2020

*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: C
