

California Pest Rating Proposal for

Talaromyces flavus (Klöcker) Stolk & Samson 1972

≡ *Talaromyces vermiculatus* (P.A. Dang.) C.R. Benj. 1955

Current Pest Rating: None

Proposed Pest Rating: D

Comment Period: 11/22/2019 through 1/6/2020

Initiating Event:

A seed company applied to the USDA for a permit to move mycelia and spores of the fungus *Talaromyces flavus*, a potential biological control agent, from Arizona to a location in Monterey County, California to conduct field research. CDFA has an opportunity to comment on Federal permits before they are issued and to require additional state permit conditions when appropriate. The risk to California from *Talaromyces flavus* is reviewed herein and a permanent rating is proposed.

History & Status:

Background:

Benjamin (1955) first described the genus *Talaromyces* for teleomorphic *Penicillium* species with *T. vermiculatus* (P.A. Dang.) C.R. Benj. (= *T. flavus* (Klöcker) Stolk & Samson 1972) as the generic type. The genus was characterized by having soft ascocarps with a cleistothecial wall of interwoven hyphae and typically yellow ascomata, with ovate to globose asci containing mostly spiny ascospores (Yilmaz et al., 2014). Other synonyms for this fungus include *Gymnoascus flavus* Klöcker 1902, *Penicillium dangeardii* Pitt 1980 [1979], and *Penicillium vermiculatum* P.A. Dang 1907 (Farr and Rossman, 2019). This fungus has frequently been isolated from soil and it has also been isolated on decomposing organic materials (Domsch et al., 1980).

Talaromyces flavus is a fungal antagonist that has been used experimentally as a biocontrol agent of soil-borne pathogens such as *Verticillium dahliae*, *V. albo-atrum*, *Rhizoctonia solani*, and *Sclerotinia sclerotiorum* (Marois et al., 1984; Punja, 2001; Brunner et al., 2005; Gohel et al., 2006). It can suppress Verticillium wilt of tomato, potato, aubergine, cotton, eggplant, cucumber, and olives (Naraghi et al., 2010a, Naraghi et al., 2010b, Fahima and Henis, 1997, Naraghi et al., 2012, Tjamos et al., 1991). In addition to being a direct antagonist of pathogen infection, *Talaromyces flavus* is also reported as a parasite of the sclerotia of *Rhizoctonia solani* and *Sclerotinia sclerotiorum* (McLaren et al., 1982). It also has growth stimulant effects on potato and cotton; root length, plant height, plant fresh weight, and plant dry weight were all improved post inoculation (Naraghi et al., 2012).

Talaromyces flavus antagonizes soil pathogens by producing cell wall-degrading enzymes, such as β 1,3-, β -1,4- and β -1,6-glucanases, cellulase and chitinase (Madi et al., 1997). In addition, *T. flavus* antagonizes *Verticillium dahliae* by parasitism and antibiosis. Microsclerotia of *V. dahlia* were suppressed by a culture filtrate of *T. flavus* and this effect was attributed to the action of glucose oxidase. Glucose oxidase retards hyphal growth and kills microsclerotia of *V. dahliae* in vitro (Stosz et al., 1996).

Hosts: Isolated from soil and plant debris, associated with a variety of plants post-harvest and from tree roots (Farr and Rossman, 2019).

Symptoms: None

Transmission: The fungus reproduces with spores that can move with soil, water, and plant surfaces, including seeds and roots.

Damage Potential: None

Worldwide Distribution: Cosmpolitan: Europe, Asia, North America, Oceana (Farr and Rossman, 2019)

Official Control: None.

California Distribution: None

California Interceptions: None.

The risk *Talaromyces flavus* would pose to California is evaluated below.

Consequences of Introduction:

- 1) Climate/Host Interaction:** This fungus has been isolated from soil and associated with plant material worldwide in a range of climates. It's likely that many parts of California will have a suitable climate.
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Evaluate if the pest would have suitable hosts and climate to establish in California.

Score: 3

- 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: This fungus is not known to be a pathogen of any plants.

Evaluate the host range of the pest.

Score: 0

- 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 fungus reproduces with spores that can move with soil and water, plus on the surface of plant parts including seeds and roots, but it is not a pest.

Evaluate the natural and artificial dispersal potential of the pest.

Score: 0

- 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: As a fungal antagonist and with an ability to parasitize sclerotia of pathogens, it is hoped that this fungus will have a positive effect on fields where it is inoculated. In this context, there should be no negative economic impact

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

Economic Impact: None

- 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: 1

- **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.
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5) Environmental Impact: This is a cosmopolitan fungus isolated from soil. It might be a weak decomposer of organic matter. No negative environmental impact has been reported.

Environmental Impact: Low

- 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: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 *Talaromyces flavus*: Low

Add up the total score and include it here. **5**

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

6) Post Entry Distribution and Survey Information: This fungus is known to be in the United States but there are no records from California

Evaluation is 'not established'.

Score: 0

- 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: 5

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information = 5*

Uncertainty:

None

Conclusion and Rating Justification:

Based on the evidence provided above **the proposed rating for *Talaromyces flavus* is D.**

References:

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Responsible Party:

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***Comment Period: 11/22/2019 through 1/6/2020**

***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 [plant.health\[@\]cdfa.ca.gov](mailto:plant.health[@]cdfa.ca.gov).

Comment Format:

- ❖ Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.
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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
