

California Pest Rating Proposal for *Alternaria crassa* (Sacc.) Rands 1917

Current Pest Rating: Q

Proposed Pest Rating: C

Comment Period: **09/27/2019 through 11/11/2019**

Initiating Event:

On November 17, 2014, a Santa Barbara County Agricultural official submitted a leaf spot sample from a containerized angel's trumpet (*Brugmansia versicolor* 'Dusty Pink') collected during a regulatory nursery inspection in a commercial wholesale nursery. CDFA plant pathologist Suzanne Latham identified the fungal pathogen *Alternaria crassa* in culture from the leaf spots. A follow up sample was submitted from the same nursery block on December 19, 2014. From the second sample, PCR analysis of the actin and elongation genes showed it was a 100% match to published sequences from *Alternaria crassa*. Although previously reported on this host in Florida, this was a first detection of this fungus in California and it was assigned a temporary Q rating. The risk of this pathogen to California is assessed herein and a permanent pest rating is proposed

History & Status:

Background: Diseases caused by *Alternaria* spp. are among the most common encountered. They can affect leaves, stems, flowers, and fruits of annual plants, especially vegetables and ornamentals, but also woody tissues and trees. Their spores are present in the air and dust everywhere and are one of the most common fungal causes of hay fever allergies (Agrios, 2005). *Alternaria* spores can land and grow on dead plant tissues killed by other pathogens or abiotic diseases. Many species of *Alternaria* are mostly saprophytic, meaning they cannot infect living plant tissues directly and grow only on dead or decaying plant tissues, or at most on senescent or old tissues such as old petals, old leaves, and ripe fruit. Therefore, it is often difficult to decide whether an *Alternaria* sp. found on diseased tissue is the cause of the symptoms or a secondary contaminant (Agrios, 2005).

Brugmansia is a plant genus in the family Solanacearum. They are woody trees or shrubs having large, pendulous, and fragrant flowers with the common name of "angel's trumpet". *Brugmansia* is closely related to the genus *Datura* with the common name of "devil's trumpet". The two differ in that

Brugmansia are woody rather than herbaceous, and their flowers are pendulous rather than erect or nodding. *Brugmansia* fruit are spineless while *Datura* fruit have spines. *Brugmansia* and *Datura* are highly poisonous, and their consumption can cause respiratory depression, arrhythmias, hallucinations, psychosis and even death. Both are prized for their large scented flowers and are widely cultivated and widely available in the horticultural trade. Some species of *Datura* are weedy. Several *Datura* species are native to California including pricklyburr (*Datura innoxia*), Jimsonweed (*Datura wrightii*), and small datura (*Datura discolor*) (Calflora; 2019).

Both *Brugmansia* and *Datura* are recorded hosts for *Alternaria crassa* (Farr and Rossman, 2019; Nishikawa and Nakashima, 2013; Miller, 1997). This pathogen has been evaluated for its potential use as a mycoherbicide for the biological control of Jimsonweed (*Datura stramonium*) in the Southeastern United States (Boyette, 1986; Boyette et al., 1991).

Alternate names for *Alternaria crassa*: *Cercospora crassa* Sacc. 1877, *Alternaria capsici* E.G. Simmons 2000, *Macrosporium cookei* Sacc. 1886, *Alternaria cookei* (Sacc.) Bremer, Ismen, Karel, Özkan and M. Özkan 1948, *Cercospora crassa f. sonchi* Woron. 1917, *Cercospora crassa var. solani-nigri* C. Massal. 1900, *Cercospora daturae* Peck 1884 (1882), *Macrosporium daturae* Fautrey 1894, *Alternaria daturae* (Fautrey) Bubák and Ranoj. 1909 (Farr and Rossman, 2019).

Hosts: *Brugmansia* spp. (angel's trumpet), *Capsicum annum* (chili pepper), *Datura alba* (=D. metel, = D. chlorantha, =D. fastuosa) (devil's trumpet), *D. ferox* (large thorn-apple), *D. innoxia* (pricklyburr), *D. meteloides* (=D. discolor), *D. stramonium* (=D. tatula), *Nicandra physalodes* (shoo-fly), *Petunia x hybrida* (petunia), *Solanum nigrum* (European black nightshade), and *Solanum tuberosum* (potato) (Farr and Rossman, 2019; CABI CPC, 2019).

Symptoms: The symptoms observed on the *Brugmansia* leaves in Santa Barbara County were small, circular to oval, very dark brown spots with a yellow halo. Typical for *Alternaria* diseases, leaf spots can be circular or irregular and may grow to 1 cm or more in diameter. They are usually gray, gray-tan, brown or near black in color. Due to fluctuating environmental conditions, the growth rate of the pathogen is non-uniform and spots can develop into a target pattern of concentric rings as they expand. The leaf spots can be numerous and are often covered with fine, dark, fuzzy growth which is the mycelium, conidiophores, and the beaked, multi-celled conidia of the fungus. Some species of *Alternaria* can produce phytotoxins that diffuse into the host tissue in advance of the fungal growth and give the appearance that a yellow halo surrounds the leaf spot. Some *Alternaria* toxins affect many different plants, whereas others are host specific (Laemmlen, 2001; Agrios, 2005).

Transmission: *Alternaria* spp. survive as spores and mycelium in infected plant residues or with seeds. It can be seedborne (internal to the seed) or a seed-contaminant (external to the seed) and may attack seedlings, causing damping off diseases with stem lesions or collar rots (Halfon-Meiri, 1973). Periods of rain or heavy dew are necessary for the fungus to infect, grow, and produce spores. Spores can be wind-blown or splashed onto healthy tissues. Free water is necessary for spores to germinate and infect new leaves. (Laemmlen, 2001; Agrios, 2005).

Damage Potential: *Alternaria* generally attack the aerial parts of plant making them especially damaging to leafy vegetables and ornamentals. In wet conditions where disease pressure is high, spots may coalesce and become a leaf blight. Lower, senescent leaves are usually attacked first, but the disease progresses upward on to newer growth and makes affected leaves turn yellow, becoming senescent, and either dry up and droop or fall off (Agris, 2005).

Worldwide Distribution: Under this name and its synonyms, *Alternaria crassa* has been reported in the following areas: Europe: *Bulgaria, Croatia, Cyprus, Italy, Latvia, Romania, Macedonia, Poland, Portugal, Serbia*; Asia: *China, India, Israel, Japan, Myanmar, Nepal, Pakistan, Turkey, Taiwan*; North America: *United States* (Delaware, Florida, Illinois, Indiana, Iowa, Missouri, Oklahoma, South Dakota, Texas, Wisconsin), *Cuba*; Central America: *El Salvador*; South America: *Venezuela*; Africa: *Ghana, Kenya, Mozambique, Nigeria, South Africa, Sudan, Tanzania, Uganda, Zambia, Zimbabwe*; Oceania: *Australia, New Zealand* (Farr and Rossman, 2019; CABI-CPC, 2019; Nishikawa and Nakashima, 2013).

Official Control: None

California Distribution: Known only from Santa Barbara County, (see 'Initiating event'), however, *Alternaria* are not always identified to species.

California Interceptions: none.

The risk *Alternaria crassa* would pose to California is evaluated below.

Consequences of Introduction:

- 1) Climate/Host Interactions:** The development of *Alternaria* leaf spot diseases is highly dependent on rain or sprinkler irrigation. Lack of free water would be a limiting factor in the more arid parts of the state. Conditions are highly favorable along the CA coast in the winter months when rain and fog are frequent.

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:** The host range includes *Brugmansia, Datura*, and a few other members of Solanacearum including chilis and potatoes.

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: *Alternaria* produces large, multi-celled conidia that can be spread by rain and wind and can be seed born or seed contaminants. Disease can increase at an exponential rate under prolonged periods of leaf wetness.

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: *Alternaria* leaf spots are damaging to ornamentals and leafy vegetables. They can lower crop yield when there are a large number of infections. Preventative fungicide treatments may be required if the disease becomes severe.

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: There are native *Datura* spp. that are recorded hosts of this pathogen in other places. All are poisonous plants, and some are undesirable weeds.

Environmental Impact: A

- 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.
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- 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 *Alternaria crassa*:

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:** *Alternaria crassa* has been found at one nursery in Santa Barbara County, but an extensive survey has not been done.

Evaluation is 'Low'.

Score: -1 (score followed by bolded bullet)

- 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:**

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

Uncertainty:

The susceptibility of native California Daturas to *Alternaria crassa* is unknown.

Conclusion and Rating Justification:

Based on the evidence provided above **the proposed rating for *Alternaria crassa* is C.**

References:

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Responsible Party:

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***Comment Period: 09/27/2019 through 11/11/2019**

***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.

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.
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Proposed Pest Rating: C
