

## California Pest Rating Proposal for *Xanthomonas dyei* Young et al., 2010

**Current Pest Rating: Q**

**Proposed Pest Rating: C**

Domain: Bacteria; Phylum: Proteobacteria

Class: Gammaproteobacteria Order: Xanthomonadales

Family: Xanthomonadaceae

---

**Comment Period: 4/24/2020 through 6/8/2020**

---

### Initiating Event:

On June 13, 2019, agricultural inspectors from San Luis Obispo County submitted a sample of manzanita (*Arctostaphylos* sp.) collected during a regulatory nursery inspection. The inspectors reported that the plants had leaf spots. On July 12, 2019, CDFA plant pathologist Sebastian Albu at the Meadowview Plant Pest Diagnostics Center reported that *Xanthomonas dyei* was detected in culture from the leaf spots. His results were confirmed by PCR, DNA sequencing, and phylogenetic analysis. He noted that this pathogen has only been reported from host plants in New Zealand and Australia and is not known from North America. Cultures were sent to USDA's National Diagnostic lab in Beltsville Maryland on December 26, 2019. On February 26, 2020, phytobacteriologist Mark Nakhla confirmed the diagnosis with cPCR and sequencing. *Xanthomonas dyei* was assigned a temporary Q rating. The threat of this pathogen to California is described herein and a permanent rating is proposed.

### History & Status:

**Background:** *Xanthomonas* is a genus of phytopathogenic bacteria with many species that cause citrus canker, vascular wilts, and leaf spots, fruit spots, and blights of annual and perennial plants. Unlike other genera of phytopathogenic bacteria that typically occupy a diversity of ecological niches, almost all *Xanthomonas* species are plant pathogens and are found only in association with plants or plant materials. Some begin their association with their host plants as epiphytes, using surface polysaccharides and forming biofilms, then under favorable conditions progress to becoming pathogens. *Xanthomonas* spp. produce xanthomonadins, pigments that protect them from natural

---

light and give them yellow, pink, red, or purple colors in axenic culture. Most *Xanthomonas* species show a high degree of host specificity and some species are split into multiple pathovars to reflect that specificity (Agrios, 2005).

*Xanthomonas* spp. isolated in New Zealand over several decades from diseased endemic and introduced plants were investigated by Young et al. (2010) with multi-locus sequence analysis. Strains from the plant genera *Aralia*, *Diospyros*, *Dysoxylum*, *Eriostemon*, *Eucalyptus*, *Metrosideros*, and *Olea* formed a population distinct from all known *Xanthomonas* spp. based on unique fatty acid methyl ester profiles. Young et al. classified these as members of a new *Xanthomonas* species and gave them the name *Xanthomonas dyei* sp. nov. Two pathovars formerly classified as pathovars of *X. campestris* (pv. *eucalypti* and pv. *laureliae*) are now considered to be pathovars of *X. dyei*.

**Hosts:** *Arctostaphylos* spp. (manzanita), *Aralia* sp. (spikenard), *Diospyros kaki* (Japanese persimmon), *Dysoxylum spectabile* (kohekohe), *Eriostemon myoporoides* (syn= *Philothea myoporoides*) (long-leaf wax flower), *Eucalyptus* spp. (gum trees), *Laurelia novae-zelandiae* (Pukatea), *Metrosideros excelsa* (Pohutukawa), and *Olea europaea* (olive).

**Symptoms:** Pathogenicity testing was done in New Zealand by Young et al. (2010) including inoculation studies on three known hosts of *X. dyei*: *D. spectabile*, *L. novae-zelandiae*, and *M. excelsa*. Symptoms varied by isolate. On *Dysoxylum*, no symptoms were seen for an extended period, but later circular lesions were evident at the inoculation sites that formed shot-holes and extensive necrosis spreading into petioles. Infections on younger expanding leaves were small lesions that developed brown necrotic centers. Infections on mature leaves were not necrotic, but continued to expand as circular, water-soaked spots. On *Aralia*, *X. dyei* caused pin-point necrotic spots with chlorotic haloes that developed into small water-soaked, necrotic lesions. On *Diospyros* and *Eucalyptus*, symptoms began as small water-soaked lesions that expanded, becoming dark brown- to black irregular necrotic lesions with chlorotic haloes. Over time, the tissue in the lesions became desiccated and formed shot-holes. Strains from *Laurelia* were only able to infect that host, causing irregular water-soaked lesions, and strains from *Metrosideros* did not produce any symptoms on any host tested (including *Metrosideros*).

**Transmission:** Since little is known about transmission of *X. dyei*, this information is extrapolated from other disease caused by xanthomonads. Bacteria overseason in leaf, twig, and fruit canker lesions or as asymptomatic epiphytes in biofilms. During warm, rainy weather they multiply and ooze and, if splashed onto young tissues, bacteria enter through stomata or wounds. Bacteria infect older tissues only through wounds. Several cycles of infection can occur; therefore, plants often have lesions of many sizes and ages. Free moisture and strong winds seem to greatly favor the spread of the bacteria, especially when combined with high temperatures (Agrios, 2005).

**Damage Potential:** The reported damage from this pathogen in New Zealand is minor. *Xanthomonas dyei* caused leaf spotting and petiole blights. In San Luis Obispo County, it caused noticeable leaf spotting on manzanita.

**Worldwide Distribution:** New Zealand and United States (California).

---

**Official Control:** None.

**California Distribution:** Found at one location in San Luis Obispo County.

**California Interceptions:** None.

The risk *Xanthomonas dyei* would pose to California is evaluated below.

### Consequences of Introduction:

- 1) Climate/Host Interaction:** Although little is known specifically about *X. dyei*, xanthomonads are most successful in climates with high temperatures and high rainfall. Such conditions might only be found in the summer in California, and in situations where there is sprinkler irrigation, such as the nursery in San Luis Obispo.

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 hosts in multiple plant families.

Evaluate the host range of the pest.

**Score: 2**

- 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:** Xanthomonads can increase exponentially under favorable environmental conditions. They can spread naturally with wind and rain or with splashing from sprinklers. They are very susceptible to drying, and are unable to multiply without free water.

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 information is limited, *X. dyei* appears to be a leaf spotting xanthomonad, not a systemic wilt or canker-causing pathogen. However, many of the hosts are ornamentals and leaf spots may cause significant cosmetic damage.

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

**Economic Impact: 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: 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.

- 5) **Environmental Impact:** This pathogen was found causing leaf spotting on Manzanita in a nursery.

**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.
- 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 *Xanthomonas dyei* is 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'.** *Xanthomonas dyei* has been found at one nursery in San Luis Obispo County.

**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:**

As with any newly detected pathogen, the known host range may expand over time. With the limited available information, *X. dyei* does not appear to threaten any endangered species, however, this possibility cannot be excluded.

**Conclusion and Rating Justification:**

Based on the evidence provided above **the proposed rating for *Xanthomonas dyei* is C.**

**References:**

Agrios, G. N. 2005. Plant Pathology, 5th Edition. Elsevier Academic Press. 922 pg

Young, J. M., Wilkie, J. P., Park, D.-C., and Watson, D. R. W. 2010. New Zealand strains of plant pathogenic bacteria classified by multi-locus sequence analysis; proposal of *Xanthomonas dyei* sp. nov. Plant Pathology (2010) 59, 270–281.

---

## Responsible Party:

Heather J. Scheck, Primary Plant Pathologist/Nematologist, California Department of Food and Agriculture, 204 West Oak Ave, Lompoc, CA. Phone: 805-736-8050, [permits\[@\]cdfa.ca.gov](mailto:permits[@]cdfa.ca.gov).

---

**\*Comment Period: 4/24/2020 through 6/8/2020**

## **\*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](mailto: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**

---