CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Xanthomonas arboricola pv. *juglandis* (Pierce 1901) Vauterin et al. 1995

Walnut blight

Pest Rating: C

Kingdom: Bacteria, Phylum: Proteobacteria,
Class: Gammaproteobacteria, Order: Lysobacterales,
Family: Lysobacteraceae

Comment Period: 10/25/2024 through 12/09/2024

Initiating Event:

This pathogen has not been through the pest rating process. The risk to California from *Xanthomonas arboricola* pv. *juglandis* is described herein and a permanent rating is proposed.

History & Status:

Background:

California leads the nation in walnut production, with trees grown on 400,000 acres and a 2022 crop value of $473M (CDFA Ag Stats). About a third of the crop is exported, and California walnuts account for three-quarters of the world trade of this nut. California's walnut industry is based on the species *Juglans regia*, commonly known as Persian or English walnut. Most walnuts are grown in the San Joaquin and Sacramento Valleys, with more than half of the acreage in San Joaquin, Stanislaus, Tulare, Butte, and Sutter counties. Two species of walnut are native to California; *Juglans californica* is native to Southern coastal California and *Juglans hindsii* is native to the Central Valley with populations along the coast from north of the Bay area to San Diego (Calflora, 2024).

Walnut blight was first observed on English walnut in California at the turn of the 20th century. Initially, the causal agent was designated as *Pseudomonas juglandi* (Pierce, 1901). Over decades, the pathogen was moved several times before being named *Xanthomonas juglandis* (Pierce) Dowson (1939). During the 1970s, the taxonomic status of nearly all species within the genus *Xanthomonas* were re-evaluated and they were assigned to species with pathovar names for host specificity. The walnut blight

pathogen was named *X. campestris* pv. *juglandis* and it was included in the approved list of bacteria by Dye (1978). Subsequently, Vauterin et al. (1995) reclassified all the xanthomonads and proposed transferring the walnut blight pathogen to a new species, *X. arboricola*, as *X. arboricola* pv. *juglandis*.

Most strains of *Xanthomonas arboricola* are pathogenic and highly specific to herbaceous or woody plants, with some considered to be nonpathogenic, low-virulent, or opportunistic pathogens. The species has been divided into nine pathovars according to their host ranges (Fischer-Le Saux et al., 2015). Among the pathovars, *corylina, juglandis* and *pruni* are the most virulent and economically important; each is a serious pathogen of fruit or nut trees (Garita-Cambronero et al., 2018).

Hosts: Juglans ailanthifolia (Japanese walnut), *Juglans californica* (Southern California black walnut), *Juglans cinerea* (butternut), *Juglans hindsii* (Northern California black walnut), *Juglandis mandshurica* (Manchurian walnut), *Juglans nigra* (black walnut), and *Juglans regia* (English or Persian walnut).

Symptoms: Walnut blight symptoms have been observed on all soft green tissues including shoots, leaves, rachis, petioles, buds, female flowers, catkins, and nuts (Belisario et al., 1999). Points of infection begin as translucent, water-soaked areas that develop into brown to blackish, greasy, necrotic areas. Lesions are initially circular but often expand into angular spots which are often surrounded by a yellow-green halo. Growing tissues may fold around lesions, giving the leaf a twisted appearance (CABI, 2024; Teviotdale et al., 1985).

The disease appears on catkins after their elongation in the spring. Affected florets turn black. Infected female flowers usually shrivel and drop from the tree. Fruits develop necrotic lesions and black, oily spots. If nuts are infected before shell hardening, they will shrivel, but if they are infected after shell hardening, the lesions are superficial. Many nuts fall prematurely, but the husk, shell, and kernel of others that reach full size are blackened and destroyed. Black, necrotic spots can appear on shoots, and the shoot tips will die back. Lesions may girdle the shoot, may be superficial involving only the bark, or may extend into the pith to form cankers which can exude a bacterial ooze. Bacteria can spread downwards inciting cankers or girdling the stem causing dieback of the distal portion (Lamichhane, 2014; CABI, 2024).

Transmission: Transportation of asymptomatic infected nursery material is the main method of accidentally introducing the inoculum into new areas with no history of the disease. Moisture, principally rainfall and hailstorms, as well as dew, fog, and sprinkler irrigation are necessary for infection and spread (Mulrean and Schroth, 1981; Teviotdale et al., 1985). Bacteria are easily splash dispersed from overwintering cankers. Windblown pollen can also be a source of inoculum (Lamichhane, 2014). Twig cankers are a source of inoculum for contaminating healthy buds.

Damage Potential: Walnut blight can be a devastating disease in areas with high relative humidity and precipitation. Significant economic damage occurs when the developing nuts are infected. *Xanthomonas arbicola* pv. *juglandis* overwinters primarily in dormant buds. Early leafing varieties are most severely affected, and the disease tends to be more severe in Northern California where spring conditions are cooler and wetter (Adaskaveg and Teviotdale, 2017).

Worldwide Distribution: Walnut blight occurs in Africa, America, Asia, Europe and Oceania, with particular importance in western and southern Europe and the western United States.
Africa: *South Africa, Zimbabwe*. America: *Argentina, Bermuda, Canada, Chile, Mexico, United States of America* (Alabama, Arkansas, California, Connecticut, Delaware, Georgia, Indiana, Kansas, Louisiana, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington), *Uruguay*. Asia: *China, India, Iran, Iraq, Israel, Jordan, Korea, Lebanon, Uzbekistan*. Europe: *Austria, Azerbaijan, Bulgaria, Denmark, France, Georgia, Germany, Greece, Hungary, Italy, Lithuania, Moldova, Netherlands, Poland, Portugal, Romania, Russia, Serbia, Slovenia, Spain, Switzerland, Turkey, Ukraine, United Kingdom*. Oceania: *Australia, New Zealand* (EPPO, 2024).

Official Control*: Xanthomonas arboricola* pv. *juglandis* is on the EPPO's A2 list for Jordan and a regulated non-quarantine pest for Switzerland and the United Kingdom (EPPO, 2024). It is on the USDA PCIT's harmful organisms list for Antarctica, Colombia, Ecuador, Japan, Jordan, Peru, the Republic of North Macedonia, and the Republic of Korea (USDA PCIT 2024).

California Distribution: Statewide

California Interceptions: none

The risk that *Xanthomonas arboricola* pv. *juglandis* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** There are detection records on native and non-native walnuts from all areas where the trees grow, along the coast and in the Central Valley and Sacramento Valley.

   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 be established 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 is highly specific to *Juglans*.

   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:** Bacterial pathogens can cause epidemics when climatic conditions are favorable, moving in wind-blown aerosols.

Evaluate the natural and artificial dispersal potential of the pest.

Score: 3

- 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:** Bactericide treatments are often required to reduce the damage to young trees, new growth, catkins, and nuts from walnut blight. Losses on some varieties can reach 50%.

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

Economic Impact: A, B

A. The pest could lower crop yield.
B. The pest could lower crop value (including increasing crop production costs).
C. The pest could trigger the loss of markets (including 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:** Specific impacts on native *Juglans* spp. have not been reported, despite the disease being present in the state for over 125 years. Private treatment programs are necessary in many parts of the state and for susceptible commercial varieties to reduce yield losses (Adaskaveg et al., 2000). It affects home/urban gardening and ornamental plantings (https://ipm.ucanr.edu/PMG/GARDEN/FRUIT/DISEASE/ID/idwalnutbli.html).

Evaluate the environmental impact of the pest on California using the criteria below.

Environmental Impact: 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: 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 *Xanthomonas arboricola* pv. *juglandis:* Medium

Add up the total score and include it here. **12**
-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 'High'.

Score: -3
-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 the 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* ***= 9***

Uncertainty:

none

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for ***Xanthomonas arboricola* pv. *juglandis* is C.**

References:

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***Comment Period: 10/25/2024 through 12/09/2024**

***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.

Pest Rating: C