CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Xanthomonas oryzae pv. *oryzicola* (Fang et al. 1957) Swings et al. 1990

bacterial leaf streak of rice

Pest Rating: A

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

Comment Period:2/25/2026 through 04/11/2026

Initiating Event:

This pathogen has not been through the pest rating process. It is an important pathogen for export seed certification for rice and is on the USDA's Select Agent list of highly regulated plant pathogens. The risk to California from *Xanthomonas oryzae* pv. *oryzicola* is described herein, and a permanent rating is proposed.

History & Status:

Background:

Rice is grown on approximately 500,000 acres in California. Production is concentrated in the Sacramento Valley, where approximately 95% of California rice is grown, with the balance in a few counties of the northern San Joaquin Valley. The total value of rice production in 2023 was just short of $1B (CDFA Ag Statistics). California rice production yields can exceed 10,000 lbs./acre, which is 20% above the U.S. average. Over 90% of the rice acreage in California is planted to medium grain varieties, with limited area planted to short and long grain varieties. California is unique among the U.S. rice-producing states in its geography, climate, and environmental regulations. The growing season is characterized by a Mediterranean climate with negligible rainfall, high solar radiation, and relatively cold night-time temperatures.

Bacterial leaf streak of rice has been found in many rice-producing areas and is particularly destructive in Asia during the heavy rains of the monsoon season. It has similar symptoms to bacterial blight of

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rice, caused by a closely related pathogen, *X. oryzae* pv. *oryzae*. Bacterial leaf streak was first observed in the Philippines in 1918 (Reinking, 1918). When it was found in China in 1957, it was described as bacterial leaf streak of rice, and the causal bacterium was cultured and named *Xanthomonas oryzicola* (Fang et al., 1957). *Xanthomonas oryzicola* was reclassified several times in later years, but on the basis of a polyphasic taxonomic study, Swings et al. (1990) placed both bacterial leaf streak and bacterial blight as pathogenic varieties within the species *Xanthomonas oryzae* as *X. oryzae* pv. *oryzicola* and *X. oryzae* pv. *oryzae* respectively.

A third group of *X. oryzae*, referred to as Xo-USA, is found in Louisiana and Texas, causing very weak disease symptoms that resemble bacterial blight, are genetically distinct from either pv. *oryzae* or pv. *oryzicola* and currently have no pathovar designation.

The main risk of introduction is via imported rice seed used for breeding purposes (germplasm). Milled rice poses a negligible risk because hulls are removed, and endosperm infection is very rare. Importing rice for planting (seed/paddy rice) from Asia into the U.S. is heavily restricted by the USDA to prevent the introduction of foreign diseases. While commercial consumption rice is frequently imported, seeds require strict adherence to APHIS regulations.

Xanthomonas oryzae (all strains and pathovars) are on the USDA Plant Protection and Quarantine (PPQ) Select Agents and Toxins list. Inclusion on this list means a pathogen or toxin has been identified as a severe threat to U.S. agriculture, crops, or forests. These regulated agents require strict compliance, including registration, specialized security, and oversight by APHIS for possession, use, or transfer (https://www.selectagents.gov/sat/list.htm).

If *X. oryzae* pv. *oryzicola* was to be detected in California, actions that may be taken include regulatory measures to quarantine infected or potentially infected production areas, stopping the movement of infected or potentially infected articles in commerce, and control measures, which may include host removal and destruction, and/or ensuring adherence to required sanitary practices. APHIS could impose quarantines and regulatory requirements to control and prevent the interstate movement of quarantined or regulated articles, working in conjunction with states to impose these actions parallel to state regulatory actions that restrict intrastate movement (Recovery plan for *Xanthomonas oryzae*, 2013).

Hosts: The major host is *Oryza sativa* (rice). Additional hosts include: *Brachiaria lata* (koyo), *Digitaria horizontalis* (Jamaican crabgrass), *Echinochloa colonum* (jungle rice), *Eleusine indica* (goosegrass), *Leersia hexandra* (southern cutgrass*), Leptochloa mucronata* (red sprangletop), *Oryza barthii* (African wild rice), *O. glaberrima* (African rice), *Oryza latifolia* (broadleaf rice), *O. longistaminata* (red rice), *Oryza minuta* (dwarf wild rice), *Oryza officinalis* (wild rice), *O. rufipogon* (brownbeard rice), *P. scrobiculatum* (Kodo millet), *Paspalum vaginatum* (seashore paspalum), *Rottboellia cochinchinensis* (itch grass), *Zizania aquatica* (annual wild rice*), Zizania palustris* (northern wild rice), and *Zoysia japonica* (zoysiagrass) (EPPO, 2026).

Symptoms: *Xanthomonas oryzae* pv. *oryzicola* enters the host plant through stomata or leaf lesions caused by insects, heavy rain, and/or wind. It multiplies in the apoplast of mesophilic parenchyma cells

and spreads actively in the intercellular spaces. It causes linear water-soaked to necrotic leaf streaks, without entering the vascular tissues (Mew, 1993). With strong cell-wall degrading (cellulose) activity, *X. oryzae* pv *oryzicola* is different from *X. oryzae* pv. *oryzae,* which mainly infects the plant via hydathodes (water pores, connected to vascular tissue), multiplies and spreads mainly in the vascular tissue. Separating the two diseases based on symptoms is not recommended. Amber to orange-colored exudates may form on the leaves also become a secondary source of inoculum as they are spread by precipitation or by dry wind (Mew, 1993; Mew et al., 1993; Ou, 1985).

Transmission: Previously infected rice stubble may also serve as a source of inoculum, and the bacteria can overwinter on alternate hosts (Mew et al., 1987). It has been reported to survive in leaves in the soil for 1 to 3 months, depending on humidity and soil properties. Infected leaf straw may also serve as a source of inoculum. People walking through a field or moving equipment may also move inoculum. *Xanthomonas oryzae* pv. *oryzicola* can be isolated from the rice seed coat and has been reported to be seed transmitted (Fang et al., 1957; Mew, 1993). The bacteria can survive for up to 5 months in seeds stored at 15-30 °C. Seed transmission is efficient when seedlings are grown under conditions of high humidity (Devadath, 1984). Movement between leaves and plants occurs as the bacteria are blown by strong winds or splashing rains, or as leaves rub against one another. The bacteria may also be present in asymptomatic tissue, passively multiplying for a quorum to initiate the synthesis of virulence factors and start a pathogenic function (Verdier et al., 2012).

Damage Potential: Bacterial leaf streak is important in some areas during very wet seasons and where nitrogen fertilization levels are high. It does not usually reduce yields if low levels of nitrogen fertilization are applied (Ou, 1985; Mew, 1987). In Southern China, epidemics of *X. oryzae* pv. *oryzicola* have reduced yield by 10-20% and in some cases reaching up to 40% losses (Cai et al., 2017). Severe disease is more common in the early stages of growth; older plants become more resistant. High grain losses are rare because plants have time to recover after a disease outbreak. Losses of up to 30% have been reported in India. Disease can cause reductions in grain quality, including brittle, broken kernels (Ou, 1985).

Worldwide Distribution: **Africa:** Burkina Faso, Burundi, Cote d'Ivoire, Guinea, Kenya, Madagascar, Mali, Nigeria, Senegal, Tanzania, and Uganda. **Asia:** Bangladesh, Cambodia, China, India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Taiwan, Thailand, and Vietnam. **Europe:** the Netherlands, the Russian Federation, and Slovenia. **Oceania:** Australia (EPPO, 2026).

Official Control*: Xanthomonas oryzae* pv. *oryzae* is on the EPPO's A1 list for Argentina, Azerbaijan, Brazil, Eurasian Economic Union, Egypt, European Plant Protection Organization, European Union, Iran, Kazakhstan, Paraguay, Serbia, Switzerland, Türkiye, Ukraine, Uruguay, and Uzbekistan; the A2 list for Comité de Sanidad Vegetal del Cono Sur, and Inter-African Phytosanitary Council; a quarantine pest in China, Mexico, Morocco, and the United States of America, and a regulated non-quarantine pest in Guinea (EPPO, 2026). It is on the USDA PCIT's harmful organisms list for Albania, Algeria, Antarctica, Argentina, Azerbaijan, Brazil, China, Colombia, Costa Rica, Ecuador, Egypt, Eurasian Customs Union, European Union, Honduras, Republic of Korea, Madagascar, Mexico, Morocco, Namibia, Paraguay,

Peru, Serbia, South Africa, The Republic of Türkiye, United Kingdom, Venezuela, and Uruguay (USDA PCIT, 2026).

California Distribution: none

California Interceptions: none

The risk that *Xanthomonas oryzae* pv. *oryzicola* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** *Xanthomonas oryzae* pv. *oryzicola* thrives in warm, humid, and wet environments, particularly in tropical and sub-tropical regions, though it can also occur in wet temperate climates. Conditions in the Sacramento and San Joaquin valleys are not thought to be conducive to disease development.

   Evaluate if the pest would have suitable hosts and climate to establish in California.

   Score: **1**
   - 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 includes small grains and grasses.

   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:** Under favorable conditions, bacterial pathogens that are spread by wind and rain can reproduce exponentially. The disease is also spread by seed and transplants.

   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:** This disease causes losses to plants directly and through lowering grain quality. It is a significant quarantine pest for the United States.

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

Economic Impact: A, B, C

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: **3**
- 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 can overwinter on alternate hosts, including some grasses that are widespread in rice-growing areas. Detections would trigger a regulatory response, including crop destruction. The pathogen, once introduced, could persist on native grasses (CABI, 2026).

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

Environmental Impact: A, D

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 oryzae* pv. *oryzae:* 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 '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 consequence 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* ***= 12***

Uncertainty:

none

Conclusion and Rating Justification:

Based on the evidence provided above, the proposed rating for ***Xanthomonas oryzae*** **pv.** ***oryzicola*** **is A.**

References:

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Responsible Party:

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***Comment Period: 2/25/2026 through 04/11/2026**

***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: A
