California Pest Rating Profile for

Turnip yellow mosaic virus

Pest Rating: B

Kingdom: Viruses and viroids,
Category: Riboviria, Category: Orthornavirae,
Phylum: Kitrinoviricota, Class: Alsuviricetes, Order:
Tymovirales, Family: Tymoviridae

Comment Period: 07/25/2025 through 09/08/2025

Initiating Event:

This pathogen has not been through the pest rating process. It is an important pathogen for export seed certification programs. The risk to California from Turnip yellow mosaic virus is described herein, and a permanent rating is proposed.

History & Status:

Background: Turnip yellow mosaic virus (TYMV) is the type member of the genus Tymovirus. Tymoviruses are readily transmissible by mechanical inoculation and they invade all main tissues of the host. Some tymoviruses are weakly seed-transmissible and are also spread by beetles, which serve as low-efficiency local vectors. Generally, they have narrow host ranges. Infection induces vesicles at the periphery of chloroplasts and, to a lesser degree, in mitochondria, resulting in characteristic aggregates of swollen and modified chloroplasts. Empty virion shells sometimes accumulate in the nuclei (Lefkowitz et al., 2017).

TYMV is a small spherical virus that possesses a monopartite positive-strand RNA genome (Matthews, 1973). It is highly stable outside the host, with virions persisting on plant debris, tools, and surfaces for extended periods. TYMV is primarily found in Europe, but has also been reported in Brazil, Japan, the Philippines, Australia, and New Zealand. The host range is limited to brassicas (CABI, 2025).

Hosts: Brassica oleracea var. *viridis* (collards), *Brassica rapa* subsp. *oleifera* (turnip rape), *Brassica pekinensis* (Napa cabbage/Chinese cabbage), *Eruca vesicaria* (purple-vein rocket), *Raphanus sativus* (radish), and *Sinapis alba* (white mustard) (Matthews, 1980).

Symptoms: TYMV induces chlorotic local lesions and systemic bright yellow mosaic symptoms on cruciferous hosts such as Chinese cabbage. Infected plants exhibit bright yellow to yellow-green mosaic mottling and often show chlorotic lesions on the lower leaves. Vein clearing was also seen on several hosts. In infected cells, chloroplasts develop numerous 50–60-nm diameter vesicles along their peripheries via invagination of both their outer membranes, and then become swollen, rounded, vacuolized and clumped together in groups forming chloroplast aggregates. In contrast, in the healthy cells, the chloroplasts are oblong-shaped and evenly distributed (Li et al., 2016; Prod'homme, et al., 2001).

Transmission: The virus is transmitted in the field by species of *Phyllotreta* and *Psylliodes* (flea-beetles) (Coleoptera: Chrysomelidae) (Markham and Smith, 1949). There are species from both genera that are common in California. The mustard beetle (*Phaedon cochleariae*) (Coleoptera: Chrysomelidae) and its larvae can also transmit TYMV, but this beetle is not known to be in California. Transmission is thought to be a mechanical process, with the stable viral particles spread as the beetles feed (Dixon and Dixon, 1981; Matthews and Ralph, 1967).

Long-distance transmission is with infected seed. Seed transmission was evaluated in the whole seeds and seedlings of Chinese cabbage (*Brassica pekinensis*) by Alfaro-Fernández et al., 2016. They found that the proportion of whole seeds infected with TYMV was 0.15% from 3 Spanish-origin seed lots. Seed-to-seedling transmission rate ranged from 2.5% to 2.9%. While these rates are low, they are sufficient to pose a risk in regulated seed production systems. TYMV is environmentally stable and can persist on contaminated surfaces, increasing mechanical transmission risk.

Damage Potential: TYMV causes a bright yellow mosaic on the leaves, which reduces consumer acceptance. Infected cabbage plants have significantly reduced survival, growth, and reproduction. They are more likely to die as seedlings; they are shorter with a smaller leaf area and number. They also show a greater amount of damage from herbivory and are less likely to flower. They produce fewer pods and have a lower total seed output (Maskell et al, 1999).

Worldwide Distribution: Asia: *Japan, Philippines*. Europe: *Czechia*, *Germany, Hungary, Italy, Spain, Turkey, United Kingdom*. Oceania: *Australia, New Zealand*. South America: *Brazil*.

Official Control*:* Turnip yellow mosaic virus is not currently listed as a regulated pest (EPPO, 2025; USCA PCIT, 2025). It is not a regulated pest in the United States but export seed programs monitor for TYMV presence.

California Distribution: none

California Interceptions: none

The risk that Turnip yellow mosaic virus would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** This pathogen is likely to be found wherever its hosts can grow.

   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 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 limited to brassicas.

   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:** TYMV can only reproduce within the cells of its hosts. It can be spread mechanically, with beetle feeding, and with infected seeds.

   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 virus causes yield loss, loss of quality, and reduces seed production. Beetles are vectors. It is a pest of concern for CDFA's export seed programs.

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

   Economic Impact: A, B, C, E

   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:** There are CA native plants that are members of the Brassicaceae. Their status as potential hosts of TYMV is unknown.

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

Environmental Impact:

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 the Introduction to California for Turnip yellow mosaic virus*:* Medium

Add up the total score and include it here. **11**
-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 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* ***= 11***

Uncertainty:

Plants infected with TYMV in Europe are often co-infected with Turnip mosaic, a potyvirus. Co-infection can increase yield loss, and it can be difficult to separate the impact of the two viruses on yield when they co-occur.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for **Turnip yellow mosaic virus is B.**

References:

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Responsible Party:

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*Comment Period: 07/25/2025 through 09/08/2025

*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: B