CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Xiphinema bricolense Ebsary, Vrain & Graham 1989

Dagger nematode

Current Pest Rating: none

Proposed Pest Rating: A

Kingdom: Animalia, Phylum: Nematoda,
Class: Enoplea, Order: Dorylaimida,
Family: Longidoridae

Comment Period: 06/01/2026 through 07/16/2026

Initiating Event:

This pathogen has not been through the pest rating process. The risk to California from *Xiphinema bricolense* is described herein, and a permanent rating is proposed.

History & Status:

Background:

Xiphinema Cobb, 1913 is an important genus of longidorid nematodes, recognized by a long slender body and a long, spear-like feeding apparatus called an odontostylet. The odontostylet has no stylet knobs but rather has flanges, which support and anchor the base. There is a guiding ring in the middle that holds the long stylet in position. Dagger nematodes have six life stages, and the life cycle is similar to that of other ectoparasitic, vermiform nematodes. Parthenogenesis, a form of reproduction that does not require males, is common in many species. Females lay eggs in the soil. Juveniles hatch from eggs and molt four times, increasing in size with each molt until they become adults. All stages, except eggs, attack and feed on the roots of the host plants. The nematode remains outside the root but inserts its long stylet deep inside. The stylet punctures cell walls, and during feeding, enzymes such as cellulases, pectinases, hemicellulases, and chitinases are secreted to digest plant cell contents. This destroys root cells, resulting in malformed root tissues (Heve et al., 2018).

Dagger nematodes are migratory ectoparasites of roots. They are primarily problematic in biennial and permanent crops. *Xiphinema* species are spread worldwide; some can vector viruses, which are very damaging to important orchards, small fruit, and vine crops (Decraemer and Robbins, 2007; Taylor and

Brown, 1997). There are over 250 species within the genus *Xiphinema*, and these have been divided into various groups and/or subgenera based mainly on morphology. The majority can be separated into two large groups: the *X. americanum*-group with approximately 55 species and the non-*X. americanum*-group with approximately 150 species. *Xiphinema bricolense* is in the *X. americanum*-group, along with *X. americanum* and *X. californicum* (Loof and Luc, 1990; Lamberti et al., 2000; Gutiérrez-Gutiérrez et al., 2012; Archidona-Yuste et al., 2016; Nemaplex, 2010; Castillo, 2026).

The species was described from a population recovered from an apple orchard in Vernon, British Columbia, Canada (Ebsary et al., 1989). Other detections of *X. bricolense* have mostly been made in vineyards (Graham et al., 1988) and with rare findings in peach and apple orchards in the Okanagan and Similkameen valleys (Vrain and Yorston, 1987) in British Columbia. It was therefore concluded that grapevine is a more suitable host for *X. bricolense* than fruit trees (Taylor and Brown, 1997). Many databases describe a detection from Washington, but the citation given, Brown et al. (1994), does not include any samples from Washington.

There is a report of *X. bricolense* identified morphometrically from *Juncus* sp. in Marin County. The specimen was collected by CDFA Nematologist R. T. Robbins between 1971 and 1978 and was preserved in 2% formalin until 1990 (Cho and Robbins, 1991). It is very difficult to identify any species from the *X. americanum* group using morphology only. Presently, CDFA uses molecular diagnostic tools to confirm identification of *Xiphinema* species, and this record from Cho and Robbins would not be considered verified by today's standard. *Xiphinema bricolense* has not been detected in California since the 1970s.

Hosts: Malus domestica (apple), *Prunus persica* (peach), and *Vitis vinifera* (grapevine) (EPPO, 2026).

Symptoms: *Xiphinema* spp. can be found feeding on many types of woody and herbaceous plants, including fruit trees and turf, where, at high densities, they can cause considerable economic damage. The symptoms of plants in response to the feeding by *Xiphinema* spp. include poor growth and/or stunting of the plant, yellowing, or wilting of the foliage, and damaged or reduced root systems, including root necrosis, lack of feeder or secondary roots, and occasional tufts of stubby rootlets (Chitambar et al., 2018; Nemaplex, 2010).

Transmission: The movement of infected rooted plants and soil (including nursery stock), cultural practices that result in the movement of infected soil to clean, non-infected sites, and contaminated irrigation water can all transmit dagger nematodes to new areas (Chitambar et al., 2018).

Damage Potential: Dagger nematodes feed at the root tips, causing swelling, stunting, and destruction of roots, which affects water and nutrient uptake from the soil. *Xiphinema bricolense* is a nepo virus vector, with adults and juvenile stages able to transmit (Griesbach and Maggenti, 1989). Tomato ringspot virus (ToRSV) (Nepovirus) (Brown et al., 1994) is an important pathogen of small fruit, tree fruit, and vines (Taylor and Brown, 1997). Tomato ringspot virus is widespread in North America. Despite the name, it is of minor importance to tomatoes. However, it infects many other hosts and causes particularly severe losses on perennial woody plants, including fruit trees and brambles. It has a C-rating in California https://blogs.cdfa.ca.gov/Section3162/wp-content/uploads/2020/06/Tomato-

ringspot-virus-PRP-ADA.pdf. Tomato ringspot virus causes decline of *V. vinifera* cultivars and *Vitis* sp. hybrids; symptoms include delayed spring growth, mottling and malformation of leaves, severe stunting of vines, and poor fruit set (Allen et al., 1982).

Worldwide Distribution: Canada (*British Columbia*)

Official Control*: Xiphinema bricolense* is on the USDA PCIT's Harmful Organism list for Albania, Antarctica, Egypt, Eurasian Customs Union, European Union, Georgia, Morocco, Republic of North Macedonia, Taiwan, and the Republic of Türkiye (USDA, 2026). It is on the EPPO's A1 list for the Eurasian Economic Union, the European Plant Protection Organization, Georgia, Switzerland, Türkiye, and the United Kingdom. It is on the A2 list for Egypt and is a Quarantine pest in the European Union and Morocco (EPPO, 2026).

California Distribution: none

California Interceptions: none

The risk that *Xiphinema bricolense* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** This nematode is likely to establish in a range of climates in a variety of soils, from light to heavy, wherever its hosts can grow.

   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:** In B.C., this nematode has been recorded on apple, peach, and grape.

   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:** Females lay hundreds of eggs in moist soils. Natural spread via movement through soil is at most 1 m/year. Long-distance movement is with infested soil and water runoff.

   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: The importance of *X. bricolense* is linked to its capacity to vector ToRSV, which is important mainly on fruit crops. ToRSV has a wide host range. It is a quarantine pest for many countries.

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: This nematode has a moderate host range. Establishment could trigger treatment programs and alter management practices in vineyards, orchards, and nursery systems where virus transmission is a concern. It could trigger treatments in areas where it is of quarantine significance or poses a risk of spreading viruses.

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 *Xiphinema bricolense:*

Add up the total score and include it here. **13**
-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.

   There is one record from California from a specimen collected in the 1970s. It has not been detected since. The original specimens were identified only by morphology, which is notoriously difficult.

   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* ***= 13***

Uncertainty:

Because it has been so difficult to distinguish between *Xiphinema* species based on morphology, some proportion of the historical detections of *X. americanum* in California could be *X. bricolense*. If it is shown through official samples that *X. bricolense* is present in California, especially if it is widespread, the rating may be changed.

Conclusion and Rating Justification:

Based on the evidence provided above, the proposed rating for ***Xiphinema bricolense*** **is A.**

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***Comment Period: 06/01/2026 through 07/16/2026**

***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.

Proposed Pest Rating: A