California Pest Rating Profile for

Xiphinema brasiliense Lordello, 1951
Dagger nematode

Pest Rating: A

Domain: Eukaryota, Kingdom: Metazoa
Phylum: Nematoda, Class: Adenophorea
Order: Dorylaimida, Family: Longidoridae
Subfamily: Xiphinematinae

Comment Period: 09/12/2024 through 10/27/2024

Initiating Event:

This pathogen has not been through the pest rating process. The risk to California from *Xiphinema brasiliense* 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 like 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 the long stylet deep into it. 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 the root cells, resulting in malformed root tissues (Heve et al., 2018). There are over 250 species within the genus, and these have been divided into various groups and/or subgenera based mainly on morphological affinities. They are typically divided into two groups, namely *X. americanum*-group with approximately 50 species and non-*X. americanum*-group with approximately

150 species (Loof and Luc, 1990; Lamberti et al., 2000). *Xiphinema brasiliense* is in the non-*X. americanum*-group (Oliveira et al., 2003).

Xiphinema is a migratory ectoparasite of roots adapted to feeding on woody plants. They are primarily problematic in biennial and permanent crops. *Xiphinema* species are spread worldwide; some can vector nepoviruses, which are directly damaging to important orchard, soft fruit, and vine crops (Decraemer and Robbins, 2007; Taylor and Brown, 1997). Important dagger nematodes in California include *Xiphinema index, X. americanum, X. pachtaicum, X. rivesi, X. insigne* and *X. vuittenezi* (Chitambar et al., 2018).

Xiphinema brasiliense was first described by Lordello, in 1951, from a single female, associated with the rhizosphere of potatoes in Brazil. The description was expanded by Luc, 1981, who also described males. A species named *X. itanhaense* Carvalho, 1962 was also described from Brazil and later synonymized with *X. brasiliense* (Cohn and Sher, 1972).

Hosts: Citrus sp., *Gleichenia linearis* (false staghorn fern), *Mangifera indica* (mango), *Musa* sp. (banana), *Persea americana* (avocado), *Saccharum officinarum* (sugarcane), *Solanum tuberosum* (potato) (Luc, 1981; Alkemade and Loof. 1990; Fernandez Diaz-Silveira and Herrera, 1998; Zeng et al., 2016). In Brazil, they were found in association with *Prunus persica* (peach), *Euterpe edulis (*jucara palm*), Butia capitata* (jelly palm), and unidentified plants growing in cerrado areas, in the Amazon forest and other natural vegetation areas (Oliveira et al., 2003).

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 (Chitambar et al., 2018; Nemaplex, 2010). 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. It is not known if *Xiphinema brasiliense* can transmit nepoviruses.

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: Specific damage assessments have not been made for this species. It feeds at the at root tips causing swelling, stunting, and destruction of roots, which affects water and nutrient uptake from the soil. Since they have a wide host range, if they can vector nepoviruses they could induce diseases of economic importance, leading to yield losses that are greater than those that result from direct nematode-feeding damage alone (Sanfacon, 2008).

Worldwide Distribution: Africa: *Cote d'Ivoire, Nigeria, Sao Tome and Principe, Sri Lanka*. Asia: *China, India*. America: *Brazil, Guatemala, Guyana, Peru, Venezuela*. Oceana: *Australia* (CABI, 2024; Lamberti, 1995, Loof and Sharma, 1979; Cohn and Sher, 1973; Luc, 1981; Zeng et al, 2016; Cordero, 2003).

Official Control*: Xiphinema brasiliense* is a quarantine pest on the U.S. Regulated Plant Pest List https://www.aphis.usda.gov/plant-imports/regulated-pest-list. *Xiphinema* spp. is on the USDA's harmful organism list for Australia, Canada, China, Jordan, Nauru, and Tunisia (USDA PCIT, 2024).

California Distribution: none

California Interceptions: none

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

Consequences of Introduction:

1) **Climate/Host Interaction:** Similar to other dagger nematodes, this species 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:** *Xiphinema brasiliense* is reported associated with plants from diverse families, including hosts that are grown agronomically in California including potatoes, stone fruit, citrus, and palms.

   Evaluate the host range of the pest.

   Score: 3
   - 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:** A nematode's rate of reproduction is dependent on many factors including soil temperature and type, and available plant hosts. These have not been specifically studied for this species, but they have been found in multiple locations around the globe associated with agriculture and are likely to have significant reproduction or dispersal potential.

   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:** None have been reported for this species, but in this group, damage can be significant, especially if they are acting as virus vectors. All life stages can be moved with irrigation water. It is a US-regulated plant pest.

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

   Economic Impact: A, C, G
   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:** In Brazil, this nematode has been found in virgin forests and the Cerrado, a savanna eco-region. It is likely to find hosts in California environments. It is likely to have an impact in high population densities.

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

   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 *Xiphinema brasiliense:* High

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.

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) **13**

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information* ***= 13***

Uncertainty:

The economic impact of this nematode is largely unknown.

Conclusion and Rating Justification:

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

References:

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*Comment Period: 09/12/2024 through 10/27/2024

*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: A