

## California Pest Rating Proposal for

*Xiphinema setariae* Luc 1958  
(syn. *Xiphinema vulgare* Tarjan, 1964)

dagger nematode

**Current Pest Rating: Q**

**Proposed Pest Rating: A**

Domain: Eukaryota, Kingdom: Metazoa,  
Phylum: Nematoda, Class: Adenophorea,  
Order: Dorylaimida, Family: Xiphinematidae

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**Comment Period: 04/26/2022 through 06/10/2022**

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### Initiating Event:

This nematode has not been through the pest rating system. It has been collected at the border stations multiple times on plants incoming from Florida. The risk to California from *Xiphinema setariae* is described herein and a permanent rating is proposed.

### History & Status:

**Background:** *Xiphinema* 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 other ectoparasitic, vermiform nematodes. Parthenogenesis, a form of reproduction that does not require males, is common in many, but not all species. Females lay eggs in 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 inserts the long stylet deep into the root while the body remains outside. The stylet punctures cell walls and during feeding, enzymes such as cellulases, pectinases, hemi-cellulases, and chitinases are secreted to digest plant cell contents. This destroys the root cells, resulting in malformed root tissues (Heve et al., 2018).

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There are over 250 species within the genus, and these have been divided into various groups and/or subgenera based mainly on morphological affinities. *Xiphinema* is a migratory ectoparasite of roots, adapted to feeding on woody plants. They are primarily problematic in biennial and permanent crops. The species are spread worldwide; some can vector nepoviruses which are directly damaging to important orchard, soft fruit and vine crops (Decraemer and Robbins, 2007).

*Xiphinema setariae* has also been known as *X. vulgare* Tarjan 1964. Using morphometric data in combination with the molecular evidence, Peraza-Padilla et al. (2016). showed that *X. setariae* and *X. vulgare* should be considered as a single taxon. The species name is derived from the host genus *Setaria*, broad-leaved bristle grass, which is native to south-eastern Africa. *Setaria* is cultivated as food or animal fodder outside its native range in tropical climates including in Florida. *Xiphinema setariae* is a common nematode in the Caribbean found in association with several crops, notably citrus (Hunt, 1977). It is not known to be a virus vector.

**Hosts:** Many tropical woody plants including monocots and dicots are hosts. *Bactris gasipaes* (peach palm), *Catharanthus roseus* (Madagascar periwinkle), *Citrus* sp., *Cocos nucifera* (coconut), *Codiaeum* sp. (croton), *Coffea arabica* (coffee) *Mangifera indica* (mango), *Musa* sp. (banana), *Oryza sativa* (rice), *Setaria megaphylla* (setaria), *Saccharum officinarum* (sugarcane), *Solanum lycopersicum* (tomato), *Theobroma cacao* (cacao), and *Psidium guajava* (common guava) (Nemaplex, 2010; Oliveirda 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, CABI CPC, 2020). The symptoms of plants in response to the feeding by *X. setariae* 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.

**Transmission:** 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:** *Xiphinema setariae* can cause substantial damage to an extensive range of crop plants by their direct feeding on plant root cells (Oliveira et al., 2003). In Florida, a grove of orange trees planted on swingle citrumelo rootstocks showed patches of stunted plants and in general had an unthrifty appearance. Root tips showed accentuated swellings and distortions, with large populations of *X. setariae* (= *X. vulgare*) in the soil (Leone et al., 1997). For rice and tomatoes in Venezuela, *X. vulgare* feeding resulted in roots with terminal swelling, cells with partially formed cell walls showing deep odontostyle damage, and dense hyperactive cytoplasm with amoeboid nuclei. The root tips were necrotized, and the cells were almost empty and appeared to be crushed (Leone et al., 1999).

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**Worldwide Distribution:** *Xiphinema setariae* is widespread in the Caribbean, Central and South America, and Florida, USA. There are reports in Africa (Mauritius, Ivory Coast, Surinam), and in Europe (Portugal) (Nemaplex, 1999; Peraza-Padilla et al., 2016; Cai et al., 2018).

**Official Control:** None

**California Distribution:** None

**California Interceptions:** There have been multiple interceptions at the California border stations on incoming plants in soil from Florida.

The risk *Xiphinema setariae* 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 establish in a larger but limited part of California.
- **High (3) likely to establish a widespread distribution in California.**

- 2) Known Pest Host Range:** *Xiphinema setariae* has a moderate host range (Nemaplex, 2010).

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:** The nematode's life cycle and increase are dependent on soil temperature and plant host. Long and short distance spread is mainly through infested soils accompanying plant stock, machinery, runoff and splash contaminated irrigation water, human and animal activity, and soil-contaminated clothing.

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.**
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**Economic Impact:** This nematode is a significant pathogen of citrus and other California crops including rice and tomatoes. It can move with irrigation water.

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

**Economic Impact: A, B, G**

- A. The pest could lower crop yield.**
- B. The pest could lower crop value (includes increasing crop production costs).**
- C. The pest could trigger the loss of markets (includes 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.**

- 4) Environmental Impact:** The impact of *Xiphinema setariae* on natural environments in California is not known. However, the infestations of the pest could affect cultural practices, home gardening, and ornamental plantings.

Evaluate the environmental impact of the pest to California using the criteria below

**Environmental Impact: 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: 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 setariae*: High**

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

-Low = 5-8 points

-Medium = 9-12 points

**-High = 13-15 points**

- 5) 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 are no records of this nematode from the environment in California.

***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 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:**

None

**Conclusion and Rating Justification:**

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

**References:**

Cai, R., Maria, M., Barsalote, E.M., Subbotin, S.A. and Zheng, J., 2018. Description of *Xiphinema hangzhouense* sp. n. (Nematoda: Longidoridae) from the rhizosphere of *Magnolia grandiflora* in Hangzhou, Zhejiang Province, China. *Nematology*, 20(1), pp.67-80.

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Chitambar, J. J., Westerdahl, B. B., and Subbotin, S. A. 2018. Plant Parasitic Nematodes in California Agriculture. In Subbotin, S., Chitambar J., (eds) Plant Parasitic Nematodes in Sustainable Agriculture of North America. Sustainability in Plant and Crop Protection. Springer, Cham.

Decraemer, W. and Robbins, R.T. 2007. The who, what and where of Longidoridae and Trichodoridae. Journal of Nematology 39, 295-297

Gaver, T.P., Truszkowski, A. and Duncan, L., 2011, December. A Summary of Nematode Soil Sampling Results from the Indian River Area in 2010–2011. In Proceedings of the Florida State Horticultural Society (Vol. 124, pp. 93-94).

Heve, W. K., Crow, W. T., and Mengistu, T. 2018. Dagger Nematodes. University of Florida IFAS [https://entnemdept.ufl.edu/creatures/nematode/dagger\\_nematode.htm](https://entnemdept.ufl.edu/creatures/nematode/dagger_nematode.htm) Accessed 3/21/2022

Hunt, D. J. 1977. Plant Parasitic Nematodes from the Windward Islands. PANS, 23: 402-411

Leone, A., Miano, V., Lamberti, F., Duncan, L.W., Rich, J.R. and Bleve-Zacheo, T., 1997. Cellular changes induced by *Xiphinema vulgare* in the roots of citrus and by *Xiphinema intermedium* in the roots of Bermuda grass. Nematologia mediterranea, pp.199-207.

Leone, A., Miano, V., Lamberti, F., Crozzoli, R. and Bleve-Zacheo, T., 1999. Defense response of rice and tomato to *Xiphidurus minor* and *Xiphinema vulgare* (NEMATODA, DORYLAEMIDA). Nematologia mediterranea, pp.101-109.

Nemaplex UC Davis Nemabase 2010. <http://Nemaplex.ucdavis.edu>. Accessed 3/20/22

Oliveira, C.M.G., Brown, D.J.F., Neilson, R., Monteiro, A.R., Ferraz, L.C.C.B. and Lamberti, F., 2003. The occurrence and geographic distribution of *Xiphinema* and *Xiphidurus* species (Nematoda: Longidoridae) in Brazil. Helminthologia, 40(1), pp.41-54.

Peraza-Padilla, W., Archidona-Yuste, A., Ferris, H., Zamora-Araya, T., Cantalapiedra-Navarrete, C., Palomares-Rius, J.E., Subbotin, S.A. and Castillo, P., 2017. Molecular characterization of pseudomonodelphic dagger nematodes of the genus *Xiphinema* Cobb, 1913 (Nematoda: Longidoridae) in Costa Rica, with notes on *Xiphinema setariae* Tarjan, 1964. European Journal of Plant Pathology, 148(3), pp.739-747.

## Responsible Party:

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**\*Comment Period: 04/26/2022 through 06/10/2022**

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**\*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](mailto:permits[@]cdfa.ca.gov).

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**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.
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**Proposed Pest Rating: A**

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