cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Bitylenchus maximus (Allen, 1955) Siddiqi, 1986
Stunt nematode

Current Pest Rating: none

Proposed Pest Rating: C

Kingdom: Animalia, Phylum: Nematoda,
Class: Secementea, Order: Tylenchida,
Superfamily: Tylenchoidea, Family: Tylenchidae,
Subfamily: Telotylenchinae

Comment Period: 06/06/2023 through 07/21/2023

Initiating Event:

This nematode has not been through the pest rating process. The risk to California from *Bitylenchus maximus* is described herein and a permanent pest rating is proposed.

History & Status:

Background:

The "stunt nematodes" are one of the largest groups of plant-parasitic nematodes and include species in the genera *Bitylenchus, Merlinius, Quinisulcius,* and *Tylenchorhynchus* (Family: Tylenchidae). Species reproduce mainly by amphimixis (fertilization by female and male) producing eggs, three juvenile stages, and adults, although in some populations, males are rare or even absent. These nematodes usually inhabit the soil-root region of plants and feed as obligate migratory ectoparasites of roots using a stylet (sword-like hollow tooth) to feed on epidermal cells. All motile juvenile and adult stages feed (Siddiqi, 2000). Stunt nematodes damage the roots of field and vegetable crops. Once damaged, plants become exposed to many destructive soilborne microorganisms and pathogens. Several species have been reported to damage crops, and *Bitylenchus maximus* has been described as causing damage on corn (Barker, 1974).

Bitylenchus was proposed as a subgenus of *Tylenchus* by Filipjev (1934). It was synonymized with *Tylenchorhynchus* (Filipjev, 1936) until Jairajpuri (1982) resurrected *Bitylenchus* as a subgenus within

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Tylenchorhynchus. Gómez Barcina et al. (2000) recognized *Bitylenchus* as a valid genus again and provided a detailed description.

Morphological and morphometrics studies of members of the subfamily Telotylenchinae have long been problematic because there is an almost continuous range of features within populations of the same species, as well as amongst species. The 18S rRNA internal transcribed spacer (ITS), and D2–D3 expansion segments of the 28S rRNA gene sequences have been shown to be useful diagnostic markers for the characterization of species (Subbotin et al., 2006) and these methods support phylogenetic relationships. Recent work by Azizi et al. (2022) confirms that *Bitylenchus* should be seen as valid Telotylenchinae genus related to, but distinct from, *Tylenchorhynchus*.

Hosts: Stunt nematodes are associated with the roots of a wide range of plants including tobacco, cotton, oats, and corn as well as other agricultural crops, fruit trees, ornamentals, nursery stock, forest trees and shrubs, desert shrubs, grasses, and weeds. The host status of associated plants is not always well known.

Symptoms: General plant damage associated with *Bitylenchus* spp. includes stunting of the root system which is expressed aboveground by yellowing of foliage, stunted top growth, and sometimes wilt and defoliation (Maggenti, 1981).

Transmission: The main mode of long and short distance spread of soil born nematodes is through artificial means: movement of nematode-contaminated soil, run-off and irrigation water, cultivation tools, equipment and any human activity that can move soils or plants with roots from infested to non-infested sites.

Damage Potential: Generally, stunt nematodes are considered mild pathogens of plants and are common associates of plant roots (Maggenti, 1981). However, plant damage caused by high populations of stunt nematodes may be more significant in small-area plant productions and/or containerized crops in nursery, residential and local situations than in large acreages and environments such as, pastures, parks, and cultivated fields. Crop losses under field conditions are not often reported; however, under experimental conditions, reductions in root and plant growth have been demonstrated. Crop damage under field conditions may be difficult to assess as stunt nematodes are often mixed with other genera and/or two or more stunt nematode species occurring together.

Worldwide Distribution: This species was described from the United States (New York) and Canada, and later reported from various locations in Europe (France, Germany, Netherlands, Poland, Spain), and Asian (Pakistan and Turkey) (Allen, 1955; Anderson, 1977; Brzeski, 1977; Dao, 1970; Maqbool and Shahina, 1987; Gómez Barcina et al., 1992; Saltukoglu, 1974; Scotto La Massese and Du Merle, 1978; S'Jacob et al., 1959; Sturhan, 1966; Thorne and Malek, 1968; Yildiz et al., 2012; Zancada and Bello, 1981).

Official Control: None

California Distribution: Likely widespread; over the past several decades, the stunt nematodes were rarely differentiated to species level by CDFA Nematologists mainly due to i) the common occurrence and wide distribution of member species within California, ii) no state enforced regulatory action required subsequent to their detection, and iii) greater demands of time involved in diagnosing high risk and other nematode species considered to be of greater economic importance than those belonging to this group. There is one official detection in Santa Clara County from a residential property.

California Interceptions: None

The risk *Bitylenchus maximus* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:**

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 establish in a larger but limited part of California.
- High (3) likely to establish a widespread distribution in California.

Risk is Medium (2) – Bitylenchus maximus *could likely establish throughout the State, wherever susceptible hosts are grown.*

2) **Known Pest Host Range:**

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.

Risk is medium (2) – Bitylenchus *spp. are known to be associated with diverse plant species. However, the host status of associated plants is not always known.*

3) **Pest Reproductive Potential:**

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.

Risk is High (3) – The main mode of long and short distance spread through artificial means: movement of contaminated soil, run-off and irrigation water, cultivation tools, equipment and any human activity that can move soils from infested to non-infested sites. Increase in reproduction rates depends on the plant species parasitized.

4) Economic Impact:

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

Economic Impact: A

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: **1**

- 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.

Risk is Low (1) –Generally, Bitylenchus *spp. are considered mild pathogens of plants. However, under high population levels in residential, nurseries and other small-area plantings, infections could result in lowered crop yield.*

5) Environmental Impact:

Evaluate the environmental impact of the pest to 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: 2
- Low (1) causes none of the above to occur.
- Medium (2) causes 1 of the above to occur.
- High (3) causes 2 or more of the above to occur.

Risk is Medium (2) – The impact of stunt nematodes on natural environments is most likely not significant as these species are already widespread without causing apparent detriment to ecological balances and processes, however, heavy infestations of spiral nematodes could affect home/urban gardening.

Consequences of Introduction to California for *Bitylenchus maximus:* Medium

Add up the total score and include it here. **10**
-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 'high'.

Score: -3
-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* ***= 7***

Uncertainty:

None

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for ***Bitylenchus maximus*** **is C.**

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Responsible Party:

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*Comment Period: 06/06/2023 through 07/21/2023

*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: C