cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Longidorus africanus Merny, 1966
Needle nematode

Current Pest Rating: C

Proposed Pest Rating: C

Kingdom: Animalia, Phylum: Nematoda,
Class: Adenophorea, Subclass: Enoplea,
Suborder: Dorylaimina; Superfamily: Dorylaimoidea,
Family: Longidoridae

Comment Period: 10/13/2021 through 11/27/2021

Initiating Event:

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

History & Status:

Background: The Longidoridae are a family of ectoparasitic nematodes including two subfamilies and six genera with hundreds of species. They care called "needle nematodes" because they are very long and slender; some are the longest phytopathogenic nematodes known, reaching up to 12 mm in length. In addition to having a very long and narrow body, they have an elongated axial spear called an odontostyle and an extension called an odontophore. They are found throughout the warmer and temperate regions of the world on a variety of hosts. Some are also vectors of nepoviruses.

In 1967, the *Longidorus africanus* was found in soils around the roots of stunted head lettuce in the Imperial Valley (Radewald et al., 1969). *Longidorus africanus* is native to the Middle East and it is possible that *L. africanus* arrived in California as early as 1912, with shipments of potted date palm (*Phoenix dactylifera*) offshoots imported to support the California date palm industry (Morton, 1987; Subbotin et al., 2015). Today it is known as a serious parasite not just of *Phoenix* palms, but also of crops in the desert areas of Southern California, including sorghum, barley, Bermuda grass, corn, wheat, cotton, okra, snap bean, lima bean, cucumber, cantaloupe, eggplant, and sugar beet (Chitambar et al., 2018). In a state-wide survey for certain exotic and economically important plant parasitic

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nematodes in California, CDFA also detected *L. africanus* populations associated with commercial cotton and oranges in the Imperial Valley (Dong et al., 2007).

Hosts: Abelmoschus esculentus (okra), *Allium cepa* (onion), *Avena sativa* (oat), *Beta vulgaris* (beet), *Bidens tripartita* (marigold-bur), *Brassica oleracea* (cabbage), *Capsicum annuum* (sweet pepper), *Citrullus lanatus* (watermelon), *Citrus* spp., *Cucumis melo* (melon), *C. sativus* (cucumber), *Cucurbita pepo* (squash), *Cynodon dactylon* (Bermuda grass), *Daucus carota* (carrot), *Ficus* sp., *Gossypium barbadense* (cotton), *G. hirsutum* (American cotton), *Helianthus annuus* (sunflower), *Hordeum vulgare* (barley), *Lactuca sativa* (lettuce), *Lolium perenne* (English ryegrass), *Medicago sativa* (alfalfa), *Mentha spicata* (spearmint), *Persea americana* (avocado), *Petunia hybrida* (garden petunia), *Phaseolus lunatus* (lima bean), *P. vulgaris* (bean), *Phoenix dactylifera* (date palm), *Pisum sativum* (pea), *Raphanus sativus* (radish), *Rosa* sp., *Solanum lycopersicum* (tomato), *S. melongena* (eggplant), *Sorghum bicolor* (great millet), *Spinacia oleracea* (spinach), *Triticum aestivum* (wheat), *Vitis* sp., *V. vinifera* (grapevine) (Nemaplex, 1999).

Symptoms: Infected date palms, grapevines, citrus and figs show general decline symptoms (Loof, 1982; Noruzi and Barooti, 2005; Tzortzakakis et al., 2014). These symptoms are not specific to nematode damage and are easy to confuse with other root pathogens or cultural problems related to irrigation or plant nutrition. Lettuce seedlings are attacked at the root tips, which become swollen and can have necrotic spots. Seedlings of lettuce and carrots can become severely stunted, often before the first true leaf develops (Radewald et al., 1969a). Serious seedling damage can occur at relatively low population levels in soil (Kolodge et al., 1986). Plants infected early cannot recover; they may never reach harvest-maturity. Root systems of older infected plants are greatly reduced in size.

Transmission: This nematode species can spread over short and long distances when transported in infested soils accompanying plant stock, farm machinery, runoff and splash contaminated irrigation water, human and animal activity and soil-contaminated clothing. It is also spread with the movement of infected nursery stock, including date palms moved from California to Florida (Subbotin et al., 2015).

Damage Potential: This nematode is well adapted to conditions in the southern California desert. The life cycle of *L. africanus* can be completed in seven weeks and this nematode can attain high population densities on susceptible seedling crops (Kolodge et al., 1986, 1987). The greatest economic significance is for fall-planted crops, such as lettuce and tomatoes, where soil temperatures exceed 28°C at planting time. Ploeg (1998), working in a Bermuda grass field, showed the chances of detecting this nematode were greatest in summer at depths of 60–90 cm. His field studies in the Imperial Valley showed a strong correlation between the vertical distribution of *L. africanus* and soil temperature, with high populations occurring in the heat of summer.

Worldwide Distribution: Greece, Iran, Israel, Saudi Arabia, South Africa, Spain, United States (Arizona, California, Florida) and Zimbabwe

Official Control: *Longidorus africanus* is on the USDA PCIT's harmful organism list for Honduras and Jordan. *Longidorus* spp. are on the list for Australia, Canada, China, Jordan, Nauru, Peru, Tunisia, and Turkey (USDA, 2021). *Longidorus africanus* is on the EPPO's A2 list for Jordan (EPPO, 2021).

California Distribution: *Longidorus africanus* occurs in desert regions of southern California in Imperial, Riverside, and San Diego counties

California Interceptions: There were two interceptions of *Longidorus* spp. in the 1980s at the Blythe border station with incoming plant shipments from Florida.

The risk *Longidorus africanus* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** This pathogen has been established in California for at least 50 and possibly more than 100 years. It is adapted to irrigated agriculture in the desert.

   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.

2) **Known Pest Host Range:** The host range is large including woody plants, grains, grasses, and herbaceous crops including vegetables.

   Evaluate the host range of the pest. **3**

   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:** This nematode is an ectoparasite, moving with soil, water, and infested host materials including palm nursery stock.

   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:** For long-lived perennial hosts such as palms, citrus and grapevines, this nematode causes general decline symptoms. Damage to seedling vegetables can be severe, especially in fall plantings when soils are very warm. It is a quarantine pest in a few countries.

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

Economic Impact: A, B, C, 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.

5) Environmental Impact: The host range of this nematode includes graminaceous plants, notably Bermuda grass, which is both a crop and a weed, and occurs statewide.

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

Environmental Impact: A, 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 *Longidorus africanus:* 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.

   This nematode is established in the southern California desert areas, including Imperial, Riverside and San Diego counties.

   Evaluation is 'Low'.

   Score: -1

   -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* ***= 12***

Uncertainty:

In the past, it seemed likely that this nematode would be restricted to the desert as it is adapted to warmer environments. Reports on grapevine and other hosts in Greece and Spain, more temperate areas, raise the possibility of this nematode moving to more northern or coastal areas, with more moderate soil temperatures.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for *Longidorus africanus* is C.

References:

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Responsible Party:

Heather J. Scheck, Primary Plant Pathologist/Nematologist, CDFA/PHPPS ECOPERS, 1220 N St Rm 221, Sacramento, CA 95814 Phone: (916) 654-1017, permits[@]cdfa.ca.gov.

***Comment Period: 10/13/2021 through 11/27/2021**

***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
