CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Pratylenchus hippeastri (Inserra et al., 2007)

Amaryllis lesion nematode

Domain: Eukaryota, Kingdom: Metazoa,

Phylum: Nematoda, Family: Pratylenchidae

Current Pest Rating: Q

Proposed Pest Rating: B

Comment Period: 12/17/2020 through 01/31/2021

Initiating Event:

In 2019, samples of roots and soil from a grape vineyard in Delano, Kern County, were submitted to the United States Department of Agriculture's Mycology and Nematology Genetic Diversity and Biology Laboratory in Beltsville, Maryland for identification. Both morphological observations and molecular analysis of DNA sequences showed that the nematodes recovered were *Pratylenchus hippeastri*. This detection was reported by Handoo et al. in 2020 as a first for California and a first host record for vineyard grown grapes. The risk to California from *Pratylenchus hippeastri* is described herein and a permanent pest rating is proposed.

History & Status:

Background: Lesion nematodes (*Pratylenchus* spp.) are widely distributed around the world with species adapted to specific habitats and hosts. In 2007, Inserra et al. described a new root-lesion nematode from amaryllis (*Hippeastrum* spp.) in Florida and named it *Pratylenchus hippeastri* n. sp. In 2010, de Luca et al. reported the presence of *P. hippeastri* in regulatory samples collected in bromeliad nurseries in Florida. These were new hosts and males were found for the first time (original samples were all female). In the same paper, they described two new and closely related species, *P. floridensis* n. sp. and *P. parafloridensis* n. sp. from grasses. They concluded that *P. hippeastri* was part of a species complex.

Hosts: Acer palmatum, *Amaryllis* sp., *Alcantarea* sp., *Guzmania* sp., *Hippeastrum* spp., *Malus domestica, Neoregelia* sp., *Vitis* sp., *Vriesia* sp.

Symptoms: When nematode populations are low to moderate, there may not be any visible aboveground symptoms. When there are high nematode populations, or if there is infection of young plants, symptoms include stunting and are similar to those associated with nutrient and water deficiencies, with eventual dieback. Darkened areas of dead tissue (lesions) can be seen on the surface of feeder roots and throughout the cortex of other underground plant parts and are the result nematode feeding. The lesions will turn from reddish-brown to black. As the nematodes continue to move internally and feed, the lesions may eventually girdle the roots. Other soilborne plant pathogens will invade the nematode-damaged tissues, and sometimes this can develop into synergistic disease complexes (Davis and MacGuidwin, 2000).

Transmission: Pratylenchus spp. are migratory endoparasites. All larval stages are worm-shaped (vermiform) and feed and move within plants, mainly roots. They spend their entire life cycle within root tissue or the rhizosphere soils of host plants. Infested plant root stock and associated soils are potential pathways for transportation, introduction, and spread. Contaminated irrigation or surface water running off infested fields can spread nematodes to non-infested fields, as can contaminated cultivation tools, equipment, and human activity (Davis and MacGuidwin, 2000).

Damage Potential: Pratylenchus hippeastri in moderate populations can reduce root growth and function, thereby causing reduction in plant growth and yield of host plants. This nematode is an important pest of amaryllis in Florida. It reduces plant vigor, flower yield, and bulb size. The amount of damage caused by this nematode to other hosts such as bromeliads is currently unknown (Crowe, 2012). Detections on *Malus* and *Vitis* were not correlated with any symptoms or damage (Wang et al., 2016; Handoo et al., 2020).

Worldwide Distribution: China, Japan, Italy, South Africa, United States (*California, Florida, Hawaii*) (Wang et al., 2016; DeLuca et al., 2010; Handoo et al., 2020; Inserra et al., 2007).

Official Control: none

California Distribution: This nematode has been found in a grape vineyard in Kern County

California Interceptions: There has been one interception of *P. hippeastri* with an incoming shipment of giant bromeliad, *Alcantarea* 'Julietta'. plants from Hawaii

The risk *Pratylenchus hippeastri* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** *Pratylenchus hippeastri* is likely to establish wherever its hosts can grow within California, and its hosts are widely grown.

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:** The host list of this nematode is expanding and now includes ornamentals and fruit trees plus grapevines.

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:** *Pratylenchus hippeastri* is spread over long distances primarily through infested planting stock and associated soils. Short-distance spread is through run-off irrigation water, infested and planting root stock, and movement of contaminated soil.

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.**

4) **Economic Impact:** Economic damage has been reported on amaryllis in Florida. *Pratylenchus* spp. cause direct damage to roots with their feeding behavior, and they can make plants more susceptible to attack from other pathogens.

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.

5) **Environmental Impact:** The impact of *Pratylenchus hippeastri* on natural environments has not been studied, however, the infestations of this root lesion nematode could affect home/urban gardening.

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 *Pratylenchus hippeastri:* Medium

Add up the total score and include it here. **11**
-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 'low'. USDA has confirmed the presence of *P. hippeastri* in Kern County

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* **= 10**

Uncertainty:

Pratylenchus hippeastri is a species complex group and subject to additional divisions and descriptions of new species. New hosts of *P. hippeastri* are still being identified. Some hosts (i.e. amaryllis and bromeliads) are widely traded commercially and are a potential source of introductions to new areas.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for *Pratylenchus hippeastri* is B.

References:

Crow, W. T. 2012. *Pratylenchus hippeastri*. Featured Creatures. EENY-546. http://entnemdept.ufl.edu/creatures/NEMATODE/amaryllis_nematode.htm

Davis, E. L., and MacGuidwin, A. E. 2000. Lesion nematode disease. Plant Health Instructor DOI: 10.1094/PHI-2000-1030-02.

De Luca, F., Troccoli, A., Duncan, L. W., Subbotin, S. A., Waeyenberge, L., Moens, M. and Inserra, R. N., 2010. Characterization of a population of *Pratylenchus hippeastri* from bromeliads and description of two related new species, P*. floridensis* n. sp. and *P. parafloridensis* n. sp. from grasses in Florida. Nematology, 12(6), pp.847-868.

Handoo, Z. A., Skantar, A. M., Kantor, M. R., Hafez, S. L. and Hult, M. N. 2020. Molecular and morphological characterization of the amaryllis lesion nematode, *Pratylenchus hippeastri* (Inserra et al., 2007), from California. Journal of Nematology, 52.

Inserra, R. N., Trocoli, A., Gozel, U., Bernard, E. C., Dunn, D., and Duncan, L. W. 2007. *Pratylenchus hippeastri* n. sp. (Nematoda: Pratylenchidae) from amaryllis in Florida with notes on *P. scribneri* and *P. hexincisus*. Nematology 9: 25-42.

Wang, H., Zhuo, K. and Liao, J., 2016. Morphological and molecular characterization of *Pratylenchus hippeastri*, a new record of root-lesion nematode associated with apple in China. Pakistan Journal of Zoology, 48(3).

Responsible Party:

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***Comment Period: 12/17/2020 through 01/31/2021**

***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: B