CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Paratylenchus hamatus Thorne& Allen, 1950
Fig pin nematode

Current Pest Rating: none

Proposed Pest Rating: C

Kingdom: Animalia, Phylum: Nematoda,
Class: Chromadorea, Order: Rhabditida,
Family: Paratylenchidae

Comment Period: 11/09/2026 through 12/24/2026

Initiating Event:

This nematode has not been through the pest rating process. The risk posed by *Paratylenchus hamatus* to California is described herein, and a permanent rating is proposed.

History & Status:

Background:

Members of the genus *Paratylenchus* are commonly known as 'pin nematodes'. Pin nematodes are the smallest plant parasitic nematodes that attack plants. Adult females found in mint average 0.4 mm (0.016 inches). Species reproduce, producing eggs, four juvenile stages (J1, J2, J3, and J4), and adults. The J1 juvenile stage is produced within the egg and undergoes a molt before the egg hatches to release J2. Males and J4 preadults do not feed. These nematodes inhabit the soil-root region of plants and feed on roots as obligate sedentary ectoparasites. Feeding by adults is limited to epidermal cells and the base of root hairs. Juveniles may feed far out on the root hairs (Maggenti, 1981). The nematodes move sluggishly, and females become more sluggish after feeding. The life cycle takes about 23 days. The non-feeding preadult of Paratylenchus is the most resistant stage that comprises about 90% of stages found in winter. They can survive for up to four years in the absence of a host. Apparently, molting to the adult stage occurs in the presence of stimulatory substances emitted by suitable host roots (Mai et al., 1996; Maggenti, 1981).

The genus comprises several species, and in California, species diversity is high and yet to be determined. Morphological identification of some species is difficult, and therefore, diagnostics of

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Paratylenchus spp. can be based on rRNA gene sequences, which are reliable genetic markers (Van den Berg et al., 2014). *Paratylenchus hamatus* was first described from soil associated with fig roots in Merced County in 1950 but may have originated somewhere else (Thorne and Allen, 1950). It is widespread in California, mainly associated with woody plants.

Hosts: Anethum graveolens (dill), *Apium graveolens* var. *dulce* (celery), *Arctostaphylos* sp. (manzanita), *Asparagus officinalis* (asparagus), *Bambusa* sp. (bamboo), *Beta vulgaris* (beet), *Bolboschoenus americanus* (three-square bulrush), *Brassica oleracea* var. *botrytis* (cauliflower), *B. oleracea* var. *gemmifera* (Brussels sprouts), *Camellia* sp. (camellia), *Castanea dentata* (American chestnut), *Chrysanthemum* sp. (chrysanthemum), *Citrus* sp. (citrus), *Cucurbita* sp. (squash, pumpkin), *Cynodon dactylon* (Bermuda grass), *Dahlia* sp. (dahlia), *Daucus carota* var. *sativus* (carrot), *Dianthus caryophyllus* (carnation), *Eucalyptus* sp. (eucalyptus), *E. tereticornis* (forest red gum), *Euonymus* sp. (spindle tree), *Ficus carica* (common fig), *Fragaria chiloensis* (beach strawberry), *Fraxinus* sp. (ash), *Gladiolus* sp. (gladiolus), *Gossypium hirsutum* (upland cotton), *Hordeum vulgare* (barley), *Hydrangea* sp. (hydrangea), *Ilex* sp. (holly), *Iris* sp. (iris), *Juglans* sp. (walnut), *Lathyrus odoratus* (sweet pea), *Lens culinaris* (lentil), *Magnolia* sp. (magnolia), *Malus sylvestris* (apple, crabapple), *Medicago sativa* (alfalfa), *Mentha* × *gentilis* (red mint), *M.* × *piperita* (peppermint), *M. spicata* (spearmint), *Musa* sp. (banana), *Oryza sativa* (rice), *Persea americana* (avocado), *Petroselinum crispum* (parsley), *Phaseolus* sp. (bean), *Picea* sp. (spruce), *Pinus* sp. (pine), *Pisum sativum* (pea), *Polypodiaceae* (polypody ferns), *Populus* sp. (poplar), *Prunus armeniaca* (apricot), *P. avium* (sweet cherry), *P. domestica* (European plum), *P. dulcis* (almond), *P. persica* (peach), *P. persica* var. *nectarina* (nectarine), *Prunus* sp. (stone fruits), *Pyracantha* sp. (firethorn), *Pyrus communis* (European pear), *Quercus* sp. (oak), *Rosa* sp. (rose), *Rubus. vitifolius* (bramble), *Rubus* sp. (blackberry), *Saintpaulia* sp. (African violet), *Saxifraga* sp. (saxifrage), *Solanum tuberosum* (potato), *Syringa* sp. (lilac), *Vitis berlandieri* × *V. riparia* (grape), *V. berlandieri* × *V. rupestris, V. champinii* (Champin grape), *V. riparia* (riverbank grape), *V. riparia* × *V. rupestris*, *V. rupestris* (sand grape), *V. rupestris* × *Muscadinia rotundifolia*, *V. solonis* × *V. riparia*, *V. vinifera* (European grape), *Vitis* sp. (grape), and *Yucca* sp. (yucca) (Nemaplex, 2010).

Symptoms: Symptoms associated with *P. hamatus* are general and nonspecific and may include stunting, chlorosis, reduced root development, and decreased aboveground growth. High nematode populations can produce shallow, localized lesions on grapevine roots, although substantial damage to established grapevines has not been consistently demonstrated. In celery, pin nematode infestations have been associated with stunted and chlorotic plants (Ferris, 2026). Experimental inoculation of mint with *P. hamatus* resulted in reduced plant growth and delayed flowering. In greenhouse experiments, dry plant weights of susceptible mint species were reduced by approximately 20-24% relative to uninoculated plants (Faulkner, 1964). Riga et al. (2008) reported stunting, chlorosis, and reduced growth of peas and lentils associated with *P. hamatus* and two *Pratylenchus* species. Greenhouse inoculation experiments confirmed adverse effects on plant growth, but field losses involving mixed nematode populations cannot be attributed exclusively to *P. hamatus*.

Transmission: Paratylenchus hamatus is a soil-inhabiting ectoparasite. Natural dispersal occurs through movement within the soil and may be facilitated by water movement and soil displacement. Long-distance dispersal is expected to occur primarily through the movement of contaminated soil, infested

rooted plants, nursery stock, agricultural equipment, and other materials carrying soil containing nematodes (Chitambar et al., 2018).

Damage Potential: The economic importance of *P. hamatus* varies among host plants and growing conditions. Crop decline in figs was described by Thorne and Allen (1950). Faulkner (1964) demonstrated pathogenicity to mint, including reduced plant biomass and delayed development, plus increased winter damage. Riga et al. (2008) reported reduced growth of peas and lentils following experimental inoculation with *P. hamatus*, demonstrating that the species can adversely affect herbaceous crops. In California vineyards, *P. hamatus* may occur in substantial numbers without obvious adverse effects on mature vines. High populations have occasionally been associated with damage to young grapevine roots, but a consistent relationship between nematode population density and vineyard yield loss has not been established (Radski and Radewald, 1958; Ferris, 2026).

Worldwide Distribution: There are reports from North America, Europe, Asia, and Oceania. Many historical distribution records are based on morphological identification, and some require confirmation because of the taxonomic complexity. Australia, Belgium, Canada, Cyprus, Germany, Iran, Pakistan, Portugal, Spain, and the United States (California and Idaho) (Thorne and Allen, 1950; Abivardi, 1970; Riga et al., 2008; Singh et al., 2021; Alvarez-Ortega et al., 2023; Ghaderi et al., 2014; Philis, 2003; Rosmaninho et al., 2022; Shahina et al., 2019; Clavero-Camacho et al., 2021).

Official Control: *Paratylenchus hamatus* is on the USDA PCIT's Harmful Organisms list for Brazil and Venezuela (USDA PCIT, 2026).

California Distribution: Butte, Fresno, Glenn, Kern, Kings, Los Angeles, Merced, Napa, Riverside, San Diego, San Joaquin, Santa Barbara, Santa Clara, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Tulare, Yolo, and Yuba counties (CDFA PDR database, 2026).

California Interceptions: none

The risk that *Paratylenchus hamatus* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** Suitable hosts are cultivated throughout much of California; although detailed climate limits are not established, the documented distribution and host associations support the potential for establishment across a substantial portion of the state.

   Evaluate if the pest would have suitable hosts and climate to establish in California.

   Score: **3**

   - Low (1) Not likely to be established 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:** This nematode has been associated with plants from several botanical families.

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:** This species reproduces in association with plant roots, and its development and production depend on host and environmental suitability. Local dispersal is limited by these nematodes' small size, but artificial movement is via soil and rooted plants.

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 reproductive and dispersal potential.

4) **Economic Impact:** Potential economic impacts include lower productivity and additional management costs in susceptible production systems. Widespread economic losses in California orchards and vineyards have not been demonstrated or described in the 75 years since its first detection.

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

Economic Impact: A, B

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: 2

- 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:** This nematode has been established for many decades. The available literature does not demonstrate significant effects on biodiversity or natural plant communities. Although ornamental plants and home orchards may serve as hosts, there is insufficient species-specific evidence of impacts.

Evaluate the environmental impact of the pest on 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: 1

- 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 *Paratylenchus hamatus:* 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 '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 is 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)

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information* ***= 8***

Uncertainty:

There is significant uncertainty in the relationship between nematode population density and crop damage. Although pathogenicity has been experimentally demonstrated, these findings should not be extrapolated directly to all California crops associated with the species.

Conclusion and Rating Justification:

Based on the evidence provided above, the proposed rating for ***Paratylenchus hamatus*** **is C.**

References:

Abivardi, C. 1970. Occurrence of *Paratylenchus hamatus* on citrus in Iran and its sensitivity to two nematicides under laboratory conditions. Plant Disease Reporter, 54(12), 1085–1088.

Álvarez-Ortega, S., Subbotin, S.A., Wang, K.-H., Stanley, J.D., Vau, S., Crow, W. and Inserra, R.N. 2023. Morphological and molecular diversity among pin nematodes of the genus *Paratylenchus* (Nematoda: Paratylenchidae) from Florida and other localities and molecular phylogeny of the genus. Plants, 12(15), 2770. https://doi.org/10.3390/plants12152770

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.

Clavero-Camacho, I., Cantalapiedra-Navarrete, C., Archidona-Yuste, A., Castillo, P. and Palomares-Rius, J.E. 2021. Remarkable cryptic diversity of Paratylenchus spp. (Nematoda: Tylenchulidae) in Spain. Animals, 11(4), 1161. https://doi.org/10.3390/ani11041161

Faulkner, L.R. 1964. Pathogenicity and population dynamics of *Paratylenchus hamatus* on *Mentha* spp. Phytopathology, 54(3), 344–348.

Ferris, H. 2026. *Paratylenchus hamatus*. Nemaplex, University of California, Davis. Available at: https://nemaplex.ucdavis.edu/taxadata/G099S1.aspx

Ghaderi, R., Kashi, L. and Karegar, A. 2014. Contribution to the study of the genus *Paratylenchus* Micoletzky, 1922 sensu lato (Nematoda: Tylenchulidae). Zootaxa, 3841(2), 151–187. https://doi.org/10.11646/zootaxa.3841.2.1

Mai, W. F., P. G. Mullin, H. H. Lyon, and K. Loeffler. 1996. Plant parasitic nematodes - a pictorial key to genera. Fifth Edition. Comstock Publishing Associates, a division of Cornell University Press, Ithaca and London. 277 p.

Maggenti, A. 1981. General nematology. Springer-Verlag New York Heidelberg Berlin. 372 p.

Philis, J. (2003). Controlling parasitic nematodes in an established vineyard in Cyprus. Nematologia Mediterranea, 31(1), 61–63. Available at: https://journals.flvc.org/nemamedi/article/view/86728

Raski, D.J., and Radewald, J.D. 1958. Symptomology of certain ectoparasitic nematodes on roots of Thompson seedless grape. Plant Disease Reporter 42:941-943.

Riga, E., Porter, L.D., Mojtahedi, H. and Erickson, D. 2008. *Pratylenchus neglectus, P. thornei*, and *Paratylenchus hamatus* nematodes causing yield reduction to dryland peas and lentils in Idaho. Plant Disease, 92(6), 979. https://doi.org/10.1094/PDIS-92-6-0979B

Rosmaninho, T., Mota, M., Inácio, M.L., Eisenback, J.D. and Gutiérrez-Gutiérrez, C. 2022. Six first reports of pin nematodes from Portugal, with an update of the systematics, genetic diversity, and phylogeny of the genus *Paratylenchus* (Nematoda: Tylenchulidae). Horticulturae, 8(4), 343. https://doi.org/10.3390/horticulturae8040343

Shahina, F., Nasira, K., Firoza, K. and Erum, Y.I. 2019. Overview of the nematode fauna of Pakistan. Pakistan Journal of Nematology, 37(2), 171–243. https://doi.org/10.18681/pjn.v37.i02.p171-243

Singh, P.R., Karssen, G., Couvreur, M., Subbotin, S.A. and Bert, W. 2021. Integrative taxonomy and molecular phylogeny of the plant-parasitic nematode genus *Paratylenchus* (Nematoda: Paratylenchinae): Linking species with molecular barcodes. Plants, 10(2), 408. https://doi.org/10.3390/plants10020408

Thorne, G. and Allen, M.W. 1950. *Paratylenchus hamatus* n. sp. and *Xiphinema index* n. sp., two nematodes associated with fig roots, with a note on Paratylenchus anceps Cobb. Proceedings of the Helminthological Society of Washington, 17(1), 27–35.

USDA Phytosanitary Certificate Issuance and Tracking System, Phytosanitary Export Database (PExD) Harmful Organisms Database Report. *Paratylenchus hamatus*. Accessed 10/20/2026.

van den Berg, E., Tiedt, L.R. and Subbotin, S.A. 2014. Morphological and molecular characterisation of several *Paratylenchus* Micoletzky, 1922 (Tylenchida: Paratylenchidae) species from South Africa and the USA, together with some taxonomic notes. Nematology, 16(3), 323–358. https://doi.org/10.1163/15685411-00002769

Responsible Party:

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***Comment Period: 11/09/2026 through 12/24/2026**

***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
