DISEASE NOTES

First Report of the Stubby Root Nematode *Paratrichodorus allius* on Sugar Beet in Minnesota

G. P. Yan,
M. Khan,
D. Huang,
X. Lai, and
Z. A. Handoo

Affiliations

- G. P. Yan
- M. Khan
- D. Huang
- X. Lai , North Dakota State University, Department of Plant Pathology, Fargo, ND 58108-6050
- Z. A. Handoo , USDA-ARS, Nematology Laboratory, Beltsville, MD 20705.

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Stubby root nematodes are migratory ectoparasites that feed on roots, transmit tobraviruses, and cause significant crop loss (**Mojtahedi and Santo 1999**). In June 2015, three soil samples from a sugar beet field near Felton, Clay Co., MN, were submitted to the Nematology Laboratory at North Dakota State University for nematode assay. The soil texture was sandy, the current sugar beet cv. was BTS 8337, and the field was previously planted with wheat in 2014. Nematodes were extracted from 100 cm^3soil using the sugar centrifugal flotation method. Plant-parasitic nematodes were identified and counted to genus based on morphology. One of the samples was found to contain stubby root nematodes (60 per 100 cm^3 soil). From August to November 2015, 10 soil samples were collected from the same field; five of them from an area with small and stunted plants, and five from an area with healthy plants. Nematodes were extracted, and all five samples from the area of stunted plants contained stubby root nematodes at 40 to 200 (avg. 95) per 100 cm^3 soil. The five samples from healthy plants had no stubby root nematodes. Other nematode genera recovered from these samples included *Pratylenchus*, *Paratylenchus*, *Helicotylenchus*, and *Tylenchorhynchus*. Individual stubby root nematodes were hand-picked and examined morphologically and molecularly for species identification. The specimens were identified as *Paratrichodorus allius* (Jensen 1963) Siddiqi 1974 according to morphological and morphometric characteristics (**Decraemer 1980**). Morphological measurements of adult females (*n* = 7) included body length (range = 532.0 to 785.0 µm, mean = 695.6 µm), onchiostyle (42.0 to 45.0, 43.6), body width (40.0 to 52.0, 45.4), anterior end to basal bulb (115.0 to

155.0, 130.0), a (12.6 to 17.4, 15.4), b (4.1 to 6.0, 5.2), and V (48.4 to 58.4%, 53.0%). The anus and caudal pores were subterminal. Observations of female morphological characters critical for identification were: vaginal sclerotization rod-like/oval well separated, onchiostyle 42 to 45 µm, absence of lateral body pores, and small ventral pharyngeal overlap. DNA was extracted from single nematodes (*n* = 6) in 20 µl of extraction buffer. The D2/D3 region of 28S rRNA, two segments of 18S rRNA, and ITS1 rDNA were amplified with primer pairs D2A/D3B, SSUF07/SSUR26, 18S965+18S18P, and BL18/5818, respectively (**Ye et al. 2015**; **Riga et al. 2007**). The two segments of 18S rRNA sequences (GenBank Accession Nos. KT892733 and KT892734, 846 bp and 751 bp, respectively) were 100% identical with one population of *P. allius* (AJ439572) from Washington, and had 99% or less similarity with other *Paratrichodorus* spp. Sequence (KT892735, 776 bp) from the ITS1 rDNA was 97% homologous with one population of *P. allius* (KJ934124) from North Carolina, but had no significant similarity with other *Paratrichodorus* spp. The 28S D2/D3 sequence (KT892732, 738 bp) was less than 91% homologous with other *Paratrichodorus* spp., but *P. allius*sequence data were not available. The combination of the molecular tests confirmed the identity as *P. allius*. Problems with infestations of stubby root nematodes on sugar beet have been confined to parts of Europe, California, and Idaho. To our knowledge, this is the first report of *P. allius* from a sugar beet field in Minnesota.