

# First Report of the Yellow Nutsedge Cyst Nematode, *Heterodera cyperi*, in Georgia, U.S.A.

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## Abstract

Soil samples collected during a survey for plant-parasitic nematodes in Tift County GA in summer 2017 were submitted for routine diagnosis of nematodes to the Extension Nematology Lab at the Department of Plant Pathology, University of Georgia, Athens, Georgia. Cyst nematodes recovered by centrifugal flotation technique were discovered in the samples from two research sites in a field with a history of tobacco and vegetable production. Cyst nematodes from tobacco (10 cysts/100 cm<sup>3</sup> of soil) and vegetable (2 cysts/100 cm<sup>3</sup> of soil) sites had similar morphological features. Morphology and morphometric measurements of the cysts and J2 (Fig. 1A–C) were in agreement with those of *Heterodera cyperi* (Golden et al., 1962; Romero and López-Llorca, 1996). Measurements of J2 ( $n = 12$ ) included the length (range = 443–494  $\mu\text{m}$ , mean = 467.4  $\mu\text{m}$ ) and width (18.3–24.4  $\mu\text{m}$ , 20.6  $\mu\text{m}$ ) of body, stylet (19.1–20.8  $\mu\text{m}$ , 20.3  $\mu\text{m}$ ), tail (61.6.0–66.4  $\mu\text{m}$ , 64.2  $\mu\text{m}$ ), body width at anus (11.9–14.1  $\mu\text{m}$ , 12.8  $\mu\text{m}$ ), and hyaline tail terminus (22.7–29.2  $\mu\text{m}$ , 26.3  $\mu\text{m}$ ). The lateral field of J2 had three lines. Cysts ( $n = 10$ ; Fig. 1C) were lemon-shaped, light to dark brown in color with protruding neck and vulval cone. The cysts had ambifenestrated vulval cone and no bullae was present. Morphometrics included body length excluding neck (370.5–714.4  $\mu\text{m}$ , 555.7  $\mu\text{m}$ ); body width (165.6–411.1  $\mu\text{m}$ , 310.9  $\mu\text{m}$ ); neck length (36.5–66.3  $\mu\text{m}$ , 49.8  $\mu\text{m}$ ); fenestra length (26.3–42.5  $\mu\text{m}$ , 35.8  $\mu\text{m}$ ), and fenestra width (19.1–31.5  $\mu\text{m}$ , 23.8  $\mu\text{m}$ ). DNA was extracted from single cysts ( $n = 3$ ) and internal transcribed spacer (ITS) of rRNA and partial cytochrome oxidase I (*COI*) genes were amplified with primers TW81/AB28 and Het-coxiF/Het-coxiR, respectively (Subbotin et al., 2001; Subbotin, 2015) and sequenced. The resulting sequences were deposited into the GenBank database (Accession no. MG825344 and MG857126) and also subjected to BLAST searches in the database. ITS sequence of *H. cyperi* showed 100% similarity (100% coverage) with that of a *H. cyperi* population from Spain (AF274388). *COI* sequence of *H. cyperi* showed 89% similarity (98% coverage) with that of *H. guangdongensis* (MF425735), and 88% similarity (83% coverage) with that of *H. elachista* (KC618473). The pathogenicity of *H. cyperi* was examined under greenhouse conditions using tobacco cv. K340, tomato cv. Tribute, cucumber cv. Thunder, and yellow nutsedge (*Cyperus esculentus* L.). 3-wk-old seedlings of the test plants were transferred into Deepot D25L cell containers (5-cm-diam.  $\times$  25.4-cm deep) filled with sterilized sand: soil mixture (1:2) and then inoculated with 1,000 eggs and J2 of *H. cyperi*. The plants were grown for 90 d in a greenhouse before examination of roots and extraction of cysts from the soil. Results showed that the nematode failed to reproduce on tobacco, tomato, and cucumber whereas white females and mature cysts of *H. cyperi* were observed on yellow nutsedge roots

(Fig. 1E). The results confirmed that yellow nutsedge was a host for the nematode, and tobacco, tomato, or cucumber were non-hosts. In the United States, *H. cyperi* was reported from Florida, North Carolina, and Arkansas (Subbotin et al., 2010) infecting *Cyperus* spp. Yellow nutsedge is considered a serious weed problem in many cropping systems including peanut, cotton, tobacco, and vegetable crops in the Southern United States. To our knowledge, this is the first report of *H. cyperi* infecting yellow nutsedge in Georgia.

### Key words

*Cyperus esculentus*, Detection, Georgia, *Heterodera cyperi*.

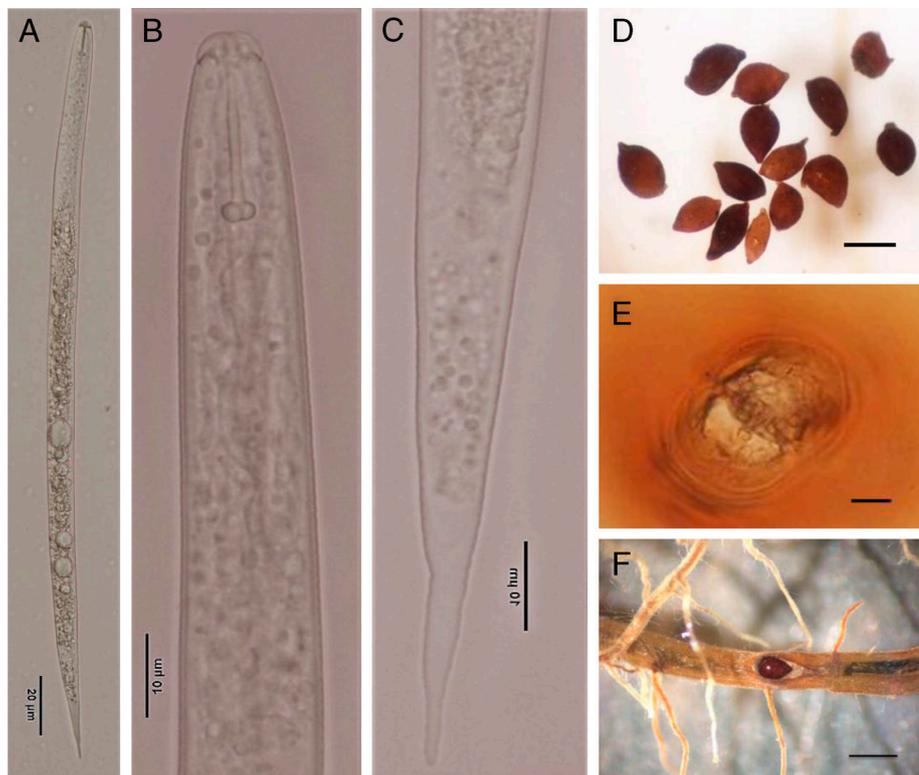


Figure 1: Photomicrographs of *Heterodera cyperi* from yellow nutsedge in Georgia. Whole body (A), the anterior region (B), and the posterior region (C) of J2. Cysts (D) recovered from the soil and the vulval cone of cyst with the ambifenestrated fenestra (E). A mature cyst (F) on the surface of yellow nutsedge root infected with the nematode.

## References

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