Diseases Caused by Nematodes

First Report of *Meloidogyne incognita* on Mulberry in Saudi Arabia

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The genus *Morus* comprises many species (Suttie 2012). The species *Morus alba* is one of the most popular mulberry species worldwide. In October 2020, numerous mulberry trees presented chlorotic leaves and stunted growth with severe root galling in a private compound in the Riyadh region, Saudi Arabia. The infected roots showed galls, which are typical symptoms of infection by root-knot nematodes (RKNs). Infected roots were dissected, and males and females were extracted from roots while second stage juveniles (J2s) were extracted from both soil and egg masses. Morphological and morphometrical features were documented. Perineal patterns of females, males, and J2s were studied using a compound microscope. The endoparasitic females had pearly shaped bodies with projecting neck. Stylet knobs were rounded and set off and the shape of the cone distinctly curved. The posterior perineal had a dorsally high square arch. Striae patterns were zig-zag or forked along the lateral lines. Males were vermiform and the head cap flat to concave. Mostly conus of stylet was longer than shaft. Stylet knobs were prominent, set off, flat, and usually greater in width than length. Males had a bluntly rounded tail, spicules were slightly curved, and gubernaculum was crescentic. The J2s were vermiform, and stylet knobs were prominent and rounded shape. The J2s' tails had a transparent area with an obtuse tip. The morphological measurements (means and range) of the perineal patterns of females ($n = 4$) were: length of vulval slit (LVS) = 22.5 (21.5 to 23.4) μm , anus to vulval slit (AVS) = 22 (21.8 to 22.1)

μm , and anus length (AL) = 7.7 (7.5 to 7.8) μm . The males' ($n = 16$) measurements were: length (L) = 1,136 (1,116 to 1,159) μm ; a (total body length/greatest body width) = 34.8 (33 to 37.1); body width = 32.7 (31.2 to 33.8) μm ; stylet length = 25.6 (24.7 to 27.3) μm ; dorsal esophageal gland orifice (DGO) = 2.9 (2.6 to 3) μm , tail length = 7.1 (6.5 to 7.8) μm , c (total body length/tail length) = 161 (143.1 to 175); spicules length = 30.8 (26 to 33.8) μm ; gubernaculum = 9.7 (9.1 to 10.4) μm . The J2 ($n = 11$) measurements were: L = 395 (378 to 405) μm ; a = 26.2 (24.3 to 28.4); c = 8.6 (8.2 to 9.2); head end to metacarpus valve = 53 (49.4 to 54.6) μm ; excretory pore to head end = 78 (72.8 to 80) μm , stylet length = 10.7 (10.4 to 11.7) μm ; body width = 15.1 (14.3 to 15.6) μm ; tail length = 45.8 (44.2 to 49.4) μm ; hyaline tail terminus length = 12.5 (10.4 to 13) μm . Both the morphological and morphometrical features of the perineal pattern of the females, males, and J2s match the original description of *Meloidogyne incognita* (Kofoed and White, 1919) Chitwood, 1949 (Eisenback and Hirschmann 1981; Taylor and Netscher 1974). To perform Koch's postulates, mulberry plants maintained in pots were inoculated with 2,500 J2s and eggs of the original population of *M. incognita* using five replicates. After 2 months, all inoculated plants had galled roots typical of RKNs. Reproduction factor value was 6.4. The noninoculated plants did not present galls in the roots. These results confirmed the nematode's pathogenicity on mulberry. To the best of our knowledge, this is the first report that *M. incognita* was identified as a parasite of mulberry (*Morus alba*) in Saudi Arabia and the world, while *Meloidogyne hispanica* was reported on mulberry trees in Iran (Shokoohi et al. 2016). This report sheds some light on this new problem to direct the attention of farmers and home gardeners to take action to manage this newly identified problem.

References:

- Eisenback, J. D., and Hirschmann, H. 1981. J. Nematol. 13:513.
- Shokoohi, E., et al. 2016. Australas. Plant Dis. Notes 11:16.
- Suttie, J. M. 2012. Plant Production and Protection. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Taylor, D. P., and Netscher, C. 1974. Nematologica 20:268.

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