

First Report of Northern Root-Knot Nematode, *Meloidogyne hapla*, Parasitic on Oaks, *Quercus brantii* and *Q. infectoria* in Iran

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Abstract: Root-knot nematodes (RKN) are the most serious plant parasitic nematodes having a broad host range exceeding 2,000 plant species. *Quercus brantii* Lindl. and *Q. infectoria* Oliv are the most important woody species of Zagros forests in west of Iran where favors sub-Mediterranean climate. National Botanical Garden of Iran (NBGI) is scheduled to be the basic center for research and education of botany in Iran. This garden, located in west of Tehran, was established in 1968 with an area of about 150 ha at altitude of 1,320 m. The Zagros collection has about 3-ha area and it has been designed for showing a small pattern of natural Zagros forests in west of Iran. Brant's oak (*Q. brantii*) and oak manna tree (*Q. infectoria*) are the main woody species in Zagros collection, which have been planted in 1989. A nematological survey on Zagros forest collection in NBGI revealed heavily infection of 24-yr-old *Q. brantii* and *Q. infectoria* to RKN, *Meloidogyne hapla*. The roots contained prominent galls along with egg sac on the surface of each gall. The galls were relatively small and in some parts of root several galls were conjugated, and all galls contained large transparent egg masses. The identification of *M. hapla* was confirmed by morphological and morphometric characters and amplification of D2-D3 expansion segments of 28S rRNA gene. The obtained sequences of large-subunit rRNA gene from *M. hapla* was submitted to the GenBank database under the accession number KP319025. The sequence was compared with those of *M. hapla* deposited in GenBank using the BLAST homology search program and showed 99% similarity with those KJ755183, GQ130139, DQ328685, and KJ645428. The second stage juveniles of *M. hapla* isolated from Brant's oak (*Q. Brantii*) showed the following morphometric characters: (n = 12), L = 394 ± 39.3 (348 to 450) µm; a = 30.9 ± 4 (24.4 to 37.6); b = 4.6 ± 0.44 (4 to 5.1); b' = 3.3 ± 0.3 (2.7 to 3.7), c = 8.0 ± 1 (6.2 to 10.3), c' = 5.3 ± 0.8 (3.5 to 6.3); Stylet = 12.1 ± 0.8 (11 to 13) µm; Tail = 50 ± 5.6 (42 to 57) µm; Hyaline 15 ± 1.8 (12 to 18) µm. Oak manna, *Q. infectoria* population of second stage juveniles clearly possessed short body length and consequently other morphometric features were less than those determined for *Q. brantii* population, and these features were: (n = 12), L = 359.0 ± 17.3 (319 to 372) µm; a = 28.6 ± 3 (22.8 to 31); b = 5.0 ± 0.3 (4.8 to 5.2); b' = 3.3 ± 0.2 (3 to 3.6), c = 8.1 ± 0.5 (7.4 to 8.8), c' = 4.7 ± 0.5 (3.9 to 5.2); Stylet = 11.4 ± 0.7 (10 to 12) µm; Tail = 44 ± 1.8 (42 to 47) µm; Hyaline 12 ± 1.7 (10 to 15) µm. To date two species of *Meloidogyne*, *M. querciana* Golden, 1979 and *M. christiei* Golden and Kaplan, 1986 have been reported to parasitize oaks (*Quercus* spp.) from the United States of America. *M. querciana* was found on pin oak *Quercus palustris* in Virginia. The oak RKN infected pine oak, red oak, and American chestnut heavily in greenhouse tests (Golden, 1979). The other species *M. christiei* was described from turkey oak and *Q. laevis* in Florida, which has monospecific host range (Golden and Kaplan, 1986). Both of these RKN species seem to be restricted to the United States of America and have not been reported from other place. According to our knowledge this is the first report of occurrence of *M. hapla* on *Q. brantii* and *Q. infectoria* in the world. This study includes these two oak species to the host range of RKN, *M. hapla* for the world and expands the information of RKN, *M. hapla* host ranges on oaks.

Key words: detection, diagnosis, Iran, *Meloidogyne hapla*, National Botanical Garden of Iran, oak.

LITERATURE CITED

- Golden, A. M. 1979. Descriptions of *Meloidogyne camelliae* n. sp. and *M. querciana* n. sp. (Nematoda: Meloidogynidae) with SEM and host range observations. *Journal of Nematology* 11:175–189.
- Golden, A. M., and Kaplan, D. T. 1986. Description of *Meloidogyne christiei* n. sp. (Nematoda: Meloidogynidae) from oak with SEM and host range observations. *Journal of Nematology* 18:533–540.

Received for publication January 1, 2015.

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This paper was edited by Zafar Handoo.