



THE FIRST REPORT OF ROOT-KNOT NEMATODE ON *CESTRUM NOCTURNUM* IN NINAWA, IRAQ

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Abstract

Night-blooming jasmine *Cestrum nocturnum* is one of the common ornamental plants in Iraq. It is widely planted in the house gardens, public gardens and nurseries. A survey was carried out during 2019 to assist the host range of *Meloidogyne* spp. in ornamental plants. Samples were collected from house gardens, public gardens and nurseries in Ninawa governorate - Iraq. The root-knot nematode was identified by the root symptoms and the presence of females and egg mass. Nematode species was identified depending on the adult female perineal pattern. The most common symptoms of the infected plants were stunting, foliage yellowing, lack of vigor and wilt during the hot summer. Nematode infection was indexed depending on the root galling using a 0-5 scale. Root-knot density and severity were estimated according to both natural and artificial infection. House and public gardens have a higher infection percentage than nurseries (10.4, 1.9) while the severity is higher in nurseries (0.142, 0.35). According to the best of the researchers' knowledge, this is the first report of *Meloidogyne javanica* on night-blooming jasmine in Iraq.

Key words: root-knot nematode, *Cestrum nocturnum*, *Meloidogyne javanica*.

Introduction

Night-blooming jasmine *Cestrum nocturnum* L. is a perennial ornamental plant, which is originally found in western India and also, naturally in south Asia. It is an evergreen woody shrub that grows in light, moist sandy soils (Druse, 2019). It belongs to the Solanaceae family, one of the most important hosts of the root-knot nematode *Meloidogyne* spp. Worldwide (Karajeh, 2015). In Ninawa governorate- Iraq, *Meloidogyne javanica* is one of the most root-knot species infecting plants including solanaceae family members (Al-Kubaicy and Al-Sabe'a, 2014). In Iraq, night-blooming jasmine is one of the most common ornamental plants, because of the flower's fragrance during the night, the beauty of the shrub, as well as, the tolerance of the local climatic conditions. The high demand for planting in house and public gardens makes it an important host to spread the root-knot nematode from place to another during transporting the infected plants. The wide geographical distribution, wide family range and breaking resistance, in combination with fungi and bacteria (in complex diseases) have caused a significant economic loss in crops, vegetables, trees,

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ornamental plants and herbs (Ralmi *et al.*, 2016).

Materials and Methods

A project survey was carried out during 2019 to assist the host range of *Meloidogyne* spp. in ornamental plants in different locations in Ninawa governorate - IRAQ. Night-blooming jasmine samples were collected from house gardens, public gardens and nurseries. Samples which were randomly selected from house and public gardens were 100 and those collected from seedling propagation and sale nurseries were also 100. Each sample contains roots with the surrounded soil 10-40 cm depth. The samples were placed in plastic bags and kept at 5°C for extraction. The diagnosis of root-knot nematode was based on pathological symptoms of plant roots. Root samples were washed with tap water to remove the soil. Primary and secondary roots were tested under stereomicroscope to confirm the presence of females and egg masses. Eggs suspension was obtained from the infected root samples and small root pieces were placed in a container of 500 ml with 200 ml of 0.5% NaOCI for 4 min with shaking (Hussey and Barker, 1973). The females were extracted by teasing the tissue under stereo microscopy and identified according to the general

morphological characteristics of the mature females. The species was identified according to the morphological characteristics of the perineal pattern presented by (JEPSON, 1987). This study was carried out in the laboratory of the College of Agriculture and Forestry - University of Mosul.

- **Pathogenicity Test:** Natural and artificial infections were performed using the common vegetative propagation method in the propagation of night-blooming jasmine plants. The natural infection was carried out by cultivation healthy cuts in the early spring in natural infected soil. In artificial infection, the cuts were planted in 2 kg pots. Each plant was contaminated with 5000 eggs by placing egg suspension in four holes around the stem. Plants were lifted after four months of inoculation for nematode investigation.

- **Root-knot Gall Index:** root knot severity was assessed using the flowing root-knot gall index of 1 to 5 degrees 0 = lack of knots, 1 = 1-2 knots, 2 = 3-10 knots, 3 = 11-30 knots, 4 = 31-100 and 5 = more than 100 knots on total plant roots (Quesenberry *et al.*, 1989).

- **Statistical Analysis:** Data were statistically analyzed using (t-test) were $p < 0.05$ using SAS version 9.0.

Result

The infection percentage of the collected samples from the house and public gardens exceeded 25% from the total tested plants, but 20% of the propagation plants samples in nurseries were infected. According to T-test at ($P = 0.05$), the infection percentage in house gardens was 10.4, which was significantly different from the infection percentage in nurseries (1.9). Disease intensity in house gardens was 0.142, which was significantly different from the disease intensity 0.35 in nurseries.

- **Signs and Symptoms:** In general, the symptoms of the infected plants did not differ from other common symptoms of root-knot nematodes such as wilt, yellowing and poor vigor. Different root-knot sizes and numbers of the main and sub roots were observed in all tested plants. Some small lesions were also observed in some infected



Fig. 1: Root Galling Symptoms on Night-blooming Jasmine Roots.

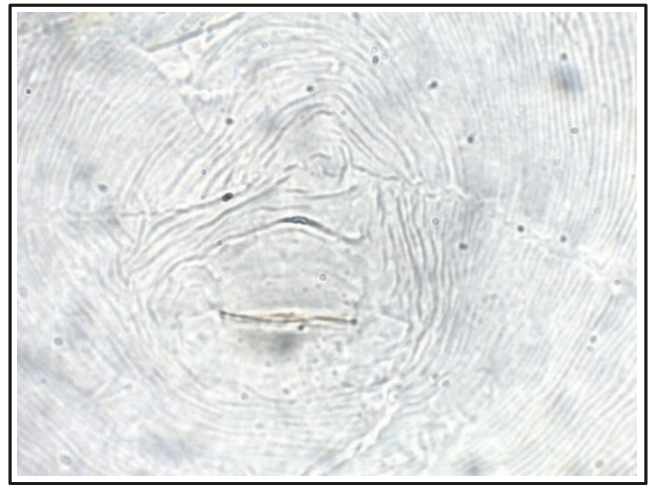


Fig. 2: The Perineal Pattern of the *Meloidogyne javanica* under the Light Microscopy 400x.

roots. Root galling indexing ranged from 3 to 4 according to the root-knot index (Quesenberry *et al.*, 1989).

- **Perineal Pattern:** The adult female perineal pattern (Fig. 2) shows rounded shape (oval), two distinct lateral lines, the perineal pattern is divided into dorsal and ventral regions. The dorsal lines with a coarse straight to wavy lines with a low circular arc, the vulva and anus opening are characteristic and close together and the tail end is clear. (Eisenback *et al.*, 1981); (Tuminem *et al.*, 2015); (Aydinli and Mennan, 2016).

- **Pathogenicity Test:** Both natural and artificial infection were tested to improve the nematode pathogenicity. In both infection methods, the symptoms were seen on all main and sub roots. Plants in natural contaminated soil showed a typical symptom with high incidence and severity. According to the T-test $p < 0.05$, the natural infection was significantly different from the artificial infection 2.6 and 2.3 respectively. In this respect, we noticed that root-knot size was bigger in artificial infection.

Discussion

Sedentary endoparasite root knot nematode *Meloidogyne Javanica* has a wide distribution and family host range worldwide (Escobar and Fenoll, 2015). In Iraq, it is considered one of the most common species; especially, in Ninawa governorate, causing significant economic vegetables and crop losses (Al-Kubaicy and Al-Sabe'a, 2014). Many researchers have reported serious damage to ornamental plants, including Night-blooming jasmine, caused by *M. javanica* (Suresh *et al.*, 2017) and (Ali *et al.*, 2014). Root galls are developed as a juvenile esophageal gland protein's secretion during the formation of the feeding site. The damage of the infected roots leads to minimizing water, nutrient

absorption and limits the root systems. Roots malfunction will cause chlorotic foliage and foliar wilt with overall stunting of growth. It could also break the resistance, or could increase the susceptibility of the plant to be attacked by other pathogens such as bacteria and fungi (Singh, 2020). High root gall index 3-5 reflexes the susceptibility of the night-blooming jasmine to the *Meloidogyne javanica*. The symptoms of the infected roots do not differ from those of the solanaceae family members. The nematode infects both main and sub roots. Root-knot index (3-5) shows that the night-blooming jasmine is sensitive to *M. javanica*. The high incidence of the root-knot infection in house and public gardens is due to the transfer of the infected plants and buying plants from the infected nurseries. According to the infection percentage result, the ornamental plant offers active infection spreading methods, due to the lack of knowledge about disease symptoms during the transplant of the infected plant materials among gardens. To the best of our knowledge, this is the first recording of the genus *Meloidogyne javanica* on Night-blooming jasmine in Iraq.

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