

# Occurrence of Root-Knot and Reniform Nematodes in Ornamental Plants Grown in Aligarh Muslim University Campus, India

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## Abstract

An extensive survey of about 50 ornamental plants growing in A.M.U. campus were carried out to find out the infection of root-knot (*Meloidogyne* spp.) and reniform nematodes (*Rotylenchulus reniformis*). Out of 50 species of ornamental plants studied, 29 species of these plants were found to be infected with root-knot nematodes (*Meloidogyne* spp.) and 15 species were infected with reniform nematode (*Rotylenchulus reniformis*). The highest percentage of infection of root-knot nematodes was observed in *Impatiens balsamina* (100%) and reniform nematode was observed in *Hibiscus rosa-sinensis* (56%). Among the *Meloidogyne* spp. the highest percentage of infection of *M. incognita* was observed in *Pseuderanthemum atropurpureum* (80%) whereas, the highest percentage of infection of *M. javanica* and *M. arenaria* was observed in *Mirabilis jalapa* (72%) and *Celosia cristata* (28%).

## Keywords

Root-Knot Nematode, Reniform Nematode, Ornamental Plants

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## 1. Introduction

Survey of plants parasitic nematodes not only gives us the opportunity to improve the understanding of the distribution of parasitic nematodes throughout the area, but it also provides additional education to growers on the importance of nematodes. Plant parasitic nematodes are responsible for serious injuries in roots and shoots of ornamental plants, reducing its beauty and consequently its economic value. In USA, losses in ornamentals due to nematodes were estimated to the tune of \$60 million annually [1]. Sasser and Freckman (1987) [2] reported that throughout the world in the ornamental crops, plant parasitic nematodes are responsible for 11.1% losses.

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Among the plant parasitic nematodes, *Meloidogyne* spp. causes serious damage to ornamental and foliage plants. Next to Root knot nematodes (*Meloidogyne* spp.), the reniform nematode (*Rotylenchulus reniformis*) is one of the most important plant parasitic nematodes inflicting losses to various crops in the different agro-climatic zones of India [3]. Keeping in view the importance of ornamental plants, a survey was therefore, carried out to ascertain the occurrence of root-knot and reniform nematodes in ornamental plants.

## 2. Material and Methods

Soil samples (about 1 kg) were taken from the rhizosphere of ornamental plants with the help of trowel from the depth of about 6 - 9 inches. Sampling were done randomly from 10 - 12 different places and their sub-samples were mixed together to obtain a composite sample. Roots of the plants were carefully lifted along with soil samples and placed in a separate polythene bags and labelled with details of host. The nematodes from each soil samples were extracted by Cobb's sieving and decanting method followed by Baermann funnel technique [4]. The nematode present in the suspension were identified and population of nematode was also estimated. The species of *Meloidogyne* were identified on the basis of perineal pattern morphology as proposed by the Hartman and Sasser [5]. For the extraction of nematodes from roots, roots were washed and cut into small pieces and then macerated in an electricity operated waring blender containing 100ml water. The blender was operated for 10 - 15 seconds and macerate thus obtained was collected in a beaker. Later on, it was filter through a 25 mesh sieve and the filtrate was examined for nematodes under the stereomicroscope. The percentage infection of root knot nematodes and average no. of galls/root system of ornamental plants were calculated. Similarly, the percentage of infection of reniform nematodes and no. of females/root system of plant were also calculated.

## 3. Results and Discussion

It is evident from the data presented in **Table 1** that reniform nematode (*Rotylenchulus reniformis*) and three species of root-knot nematodes viz. *M. incognita*, *M. javanica* and *M. arenaria* were found to be associated with different ornamental plants grown in A.M.U campus. Out of 50 species studied, 29 species of ornamental plants were found to be infected with root-knot nematodes. The highest percentage of infection of root-knot nematodes was observed in *Impatiens balsamina* (100.0) and the lowest in *Cosmos bipinnatus* (14.0). Out of 29 plants infected with *Meloidogyne* spp., 27 plants were found to be infected with *M. incognita* followed by 20 and 9 plants infected with *M. javanica* and *M. arenaria* respectively. Among the *Meloidogyne* spp. the highest percentage of infection caused by *M. incognita* was observed in *Pseuderanthemum atropurpureum* (80.0) and the lowest in *Dianthus caryophyllus* (5.0) whereas the highest percentage of infection of *M. javanica* and *M. arenaria* was observed in *Mirabilis jalapa* (72%) and *Celosia cristata* (28%) and the lowest in *Phlox drummondii* (7%) and *Althea rosea* (6%) respectively. The maximum no. of galls produced by *M. incognita*, *M. javanica* and *M. arenaria* were observed in *Pseuderanthemum atropurpureum* (102.4), *Impatiens balsamina* (70.2) and *Celosia cristata* (37.0) respectively.

Similarly, in case of *Rotylenchulus reniformis*, only 15 species of ornamental plants were found to be infected with reniform nematode. The highest percentage of infection of *R. reniformis* was observed in *Hibiscus rosa-sinensis* (56.0) and the lowest in *Althea rosea* (22). Moreover, the highest no. of females of reniform nematode/root system was recorded in *Dahlia variabilis* (62), and the lowest in *Althea rosea* (22).

Scanning of literature revealed that there are some ornamentals which are recorded as new hosts of *Meloidogyne* spp. viz., *M. incognita* (*Iberis amara*, *Plumeria alba*), *M. javanica* (*Althea rosea*, *Amaranthus caudatus*, *Bryophyllum pinnatum*), *M. arenaria* (*Dianthus caryophyllus*, *Helianthus annuus*, *Hibiscus rosa-sinensis*) from India. The result presented in **Table 1** clearly showed that out of 15 plants, 8 plants (*Chrysanthemum indicum*, *Hibiscus rosa-sinensis*, *Jasminum sambac*, *Kochia scoparia*, *Rosa indica* and *Thevetia peruviana*) were already known as hosts for reniform nematode whereas, out of 8, the 4 plant viz, *Calendula officinalis*, *Dianthus caryophyllus*, *Impatiens balsamina* and *Petunia hybrida* were recorded as new hosts for reniform nematode from India. Further, it is interesting to note that 3 plants viz. *Althea rosea*, *Coleus blumei* and *Plumeria alba* had not been recorded as hosts for reniform nematode from the world so far.

It can be concluded from the result that there was a direct correlation between degree of infection and the numbers of females per root system in ornamental plants except in case of *Hibiscus rosa-sinensis* and *Kochia scoparia*. The frequencies of occurrence of root-knot and reniform nematodes in ornamental plants were recorded as 58% and 30% respectively. Thus the present investigations have clearly indicated that the association

**Table 1.** Occurrence of root-knot and reniform nematodes in ornamental plants grown in A.M.U. campus.

Ornamental plants	Families	Percentage of plant infected with <i>Meloidogyne</i> spp.			Total	Percentage of plant infected with <i>Rotylenchulus reniformis</i>	No. of females per root system
		<i>M. incognita</i>	<i>M. javanica</i>	<i>M. arenaria</i>			
<i>Acalypha wilkesiana</i> L.	Euphorbiaceae	64.0 (78.4)	24.0 (400)	-	88.0	-	-
<i>Althea rosea</i> L.	Malvaceae	56.0 (32.0)	14.0 (68.0)	6.0 (18.2)	76.0	8.0	22
<i>Amaranthus caudatus</i> L.	Amaranthaceae	24.0 (23.0)	20.0 (29.0)	16.0 (12.0)	60.0	-	-
<i>Antirrhinum majus</i> L.	Scrophulariaceae	32.0 (42.2)	16.0 (20.1)	-	48.0	-	-
<i>Bougainvillea spectabilis</i> wild	Nyctaginaceae	34.0 (64.2)	24.0 (324)	-	58.0	-	-
<i>Bryophyllum pinnatum</i> Lam.	Crassulaceae	10.0 (21.2)	36.0 (57.0)	-	46.0	-	-
<i>Calendula officinalis</i> L.	Asteraceae	48.0 (36.0)	17.0 (24.2)	-	65.0	12.0	27
<i>Callistemon lanceolatus</i> DC.	Myrtaceae	49.0 (32.2)	-	-	49.0	-	-
<i>Canna indica</i> L.	Cannaceae	51.0 (42.0)	20.0 (34.0)	-	71.0	-	-
<i>Celosia cristata</i> L.	Amaranthaceae	45.0 (50.0)	24.0 (22.0)	28.0 (37.0)	97.0	-	-
<i>Chrysanthemum indicum</i> L.	Asteraceae	32.0 (26.2)	-	-	32.0	24.0	23
<i>Coleus blumei</i> Benth.	Lamiaceae	68.0 (64.0)	-	-	68.0	32.0	45
<i>Cosmos bipinnatus</i> Cav.	Asteraceae	-	14.0 (24.9)	-	14.0	-	-
<i>Dahlia variabilis</i> Desf.	Asteraceae	41.0 (40.2)	-	-	41.0	44.0	62
<i>Delphinium ajacis</i> L.	Ranunculaceae	-	-	25.0 (33.0)	25.0	-	-
<i>Dianthus caryophyllus</i> L.	Caryophyllaceae	5.0 (25.0)	9.0 (24.2)	27.0 (22.0)	41.0	29.0	40
<i>Helianthus annuus</i> L.	Asteraceae	12.0 (32.2)	24.0 (24.0)	8.0 (24.4)	44.0	21.0	24
<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	16.0 (44.4)	17.0 (26.0)	7.0 (13.3)	40.0	56.0	51
<i>Iberis amara</i> L.	Cruciferae	20.0 (26.2)	-	20.0 (13.0)	20.0	-	-
<i>Impatiens balsamina</i> L.	Balsaminaceae	48.0 (92.0)	32.0 (70.2)	-	100.0	52.0	48
<i>Jasminum sambac</i> L.	Oleaceae	16.0 (20.2)	56.0 (44.0)	-	72.0	28.0	30
<i>Kochia scoparia</i> (L.) Roth.	Chenopodiaceae	40.0 (84.2)	24.0 (52.0)	-	64.0	42.0	33
<i>Mirabilis jalapa</i> L.	Nyctaginaceae	24.0 (62.2)	72.0 (40.0)	-	96.0	-	-
<i>Petunia hybrida</i> Hort.	Solanaceae	32.0 (26.2)	17.0 (20.0)	12.0 (21.2)	49.0	55.0	60
<i>Phlox drummondii</i> Hook.	Polemoniaceae	17.0 (22.0)	7.0 (18.2)	-	36.0	-	-
<i>Plumeria alba</i> Tourn.	Apocynaceae	16.0 (32.0)	-	-	16.0	26.0	25
<i>Pseuderanthemum atropurpureum</i> L. Acanthaceae		80.0 (102.4)	-	80.0	--	-	-
<i>Rosa indica</i> L.	Rosaceae	40.0 (32.2)	33.2 (26.0)	-	73.0	22.0	32
<i>Thevetia peruviana</i> K. Schum.	Apocynaceae	-	-	-	--	40.0	46
<i>Tropaeolum majus</i> L.	Tropaeolaceae	24.0 (32.0)	-	-	24.0	-	-

of phyto-nematodes is highly pathogenic in nature. Therefore, their occurrence in high densities may pose a serious threat to some ornamental plants. Hence, it needs immediate attention of the growers and researchers.

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