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Research Article

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Pathogenicity of Root-Knot Nematode, *Meloidogyne incognita* in Green gram

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ABSTRACT

Investigation was carried out to find the pathogenic level of root-knot nematode, Meloidogyne incognita in green gram. Result of the pathogenicity test revealed that plant growth parameter was inversely proportional to the inoculum level of root-knot nematode, except fresh and dry weight of root. An initial inoculum level of 100 nematodes per kg of pot soil caused significant reduction in plant growth parameters and proved to be pathogenic to the green gram plants. Maximum galls and egg masses per root system were recorded in 100 and 1000 J_2 per kg of soil, which ultimately decreases at 10000 inoculum level. The nematode population in soil increases with increase in inoculum levels as well as nematode reproduction rate was inversely proportional to the nematode inoculum level.

Keywords*: Meloidogyne incognita, root-knot nematode, pathogenicity, Green gram, Vigna radiata.*

INTRODUCTION

Green gram (*Vigna radiata* L. Wilczek), commonly known as Mung bean or *Moong*, belonging to the family Leguminoceae and subfamily Papilionceae, is a herbaceous, annual crop, mostly grown under semi-arid and sub-tropical climate. The crop is believed to be native of India and Central Asia[12] and now widely grown in Southeast Asia, Africa, South America and Australia. In India, it is grown in almost all parts of the country such as Orissa, Maharashtra, Andhra Pradesh, Rajasthan, Madhya Pradesh, Bihar, Karnataka, Assam and Uttar Pradesh. India produces 14.76 million tons of pulses from an area of 23.63 million hectare, of which green gram occupies 14.0 per cent in total pulses area and contributes 7.0 per cent in total pulses production of India[1]. This crop suffers from a number of diseases caused by fungi, bacteria, virus and nematode which reduces it growth, subsequently the yield. Among them, the root-knot nematodes (*Meloidogyne* spp.) are considered as one of the most destructive pests of green gram limiting its production[5]. In India, the root-knot disease caused by *M. incognita* and *M. javanica* on green gram was first reported by Singh[6]. *M. incognita* is reported to be widely distributed in the pulse growing areas of the country and causes extensive loss in grain yield[3].

MATERIALS AND METHOD

Fifteen size earthen pots filled with sterilized sandy loam soil were planted with three mungbean seeds variety Pratap. The experiment comprises of four levels of nematode inoculums viz., 10, 100, 1000 and 10,000. Besides, a suitable check (without nematode) was maintained. Each treatment was replicated five times. One plant was retained after ten days of germination. Inoculations of freshly hatched juveniles were done through holes made around each seedling of ten days old. Pots were randomized completely and received usual greenhouse care in terms of nutrients and water. The experiment was terminated 45 days after inoculation and observations recorded on plant growth characteristics and nematode population.

Table 1. Effect of different inoculums levels of *Meloidogyne incognita* on plant growth parameters of green gram (Mean of 5 replications)

Inoculum level (J_2/kg soil)	Shoot length (cm)	Fresh shoot wt. (gm)	Dry shoot wt. (gm)	Root length (cm)	Fresh root wt. (gm)	Dry root wt. (gm)
0	**44.22_a**	**6.38_a**	**1.77_a**	**11.76_{ab}**	1.74_a	0.98_a
10	41.08_b	5.65_b	1.18_{bc}	$11.10_{ab,bc}$	1.30_b	0.81_b
100	39.02_c	4.59_c	$0.99_{bc,cd}$	10.10_{bc}	3.44_c	1.02_c
1000	29.12_d	2.64_d	$0.54_{cd,de}$	8.22_d	**5.45_d**	**2.33_d**
10000	21.12_e	0.61_e	0.18_{de}	3.48_e	1.05_e	0.39_e
C.D=0.05	0.394	0.109	0.394	1.061	0.047	0.020

Means followed by the same letter shown in subscript(s) are not significantly different

Table 2. Effect of different inoculums levels of *Meloidogyne incognita* on number of galls, egg masses and nematode population of green gram (Mean of 5 replications)

Inoculum level (J_2/kg soil)	No. of galls/ root system	No. of egg mass/ root system	Soil population / 200 cc of soil	Reproduction rate
0	-	-	-	-
10	40.20_a	22.40_a	52.46_a	**5.24**
100	133.40_b	43.80_b	282.56_b	2.82
1000	**164.60_c**	**53.60_c**	1312.45_c	1.31
10000	15.80_d	10.60_d	1560.87_d	0.15
C.D=0.05	2.949	1.514	10.53	

Means followed by the same letter shown in subscript(s) are not significantly different

RESULT AND DISCUSSION

Significant decrease in shoot length, shoot fresh and dry weights as well as root length were observed at 10 and above (Table 1). With the increased in inoculum level of J_2 of *Meloidogyne incognita*, there was a corresponding decrease in plant growth parameters except in root weight. Similar findings were also observed by Roy *et al*.[4] on egg plant and Kumar *et al*.[7] on cowpea.

Fresh root weight and dry weight, number of galls per root system and number of eggmass per root system were found to be increase with increased in inoculums level from 10 to 1000 but, decreased at 10,000 juveniles per root system (Table 2) which were similar to the findings of Borah[2] on green gram; Niranjan[8] on pea and Joymatidevi[9] on *Allium porum* and *Centralla asiatica.*

The highest galling and egg masses per root system was found at 1000 J_2/ plant (Table 2) which might be attributed to competition among the nematode juveniles for food and space showing confirmed result of Borah[2] on green gram; Sarmah and Sinha[10] on cowpea infested by *M.incognita.*

The nematode population in soil increased with increasing inoculum levels (up to 1000 J_2/plant) (Table 2) which were in confirmity with the results of Raut and Sethi[11] in soyabean and Sarmah and Sinha[10] on cowpea infested by *M. incognita*. However, Borah[2] reported that soil nematode population continued to increase upto the maximum inoculum level of 10000 J_2 per kg of soil on green gram.

The reproduction rate of *M. incognita* was inversely related to the inoculum levels and was maximum at lower level (10 J_2 /pot) and minimum in highest nematode (10000 J_2 /pot) inoculum. This might be due to competition of nematodes for host penetration, food and space. Lesser are the nematodes, lesser is the competition and therefore greater nematodes reproductive rate. This finding was similar to that of Borah[2] on green gram; Sarmah and Sinha[10] on cowpea; Joymatidevi[9] on *Allium porum* and *Centrella asiatica* and Kumar *et al.*[7] on cowpea infested with *M. incognita.*

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