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Pathogenicity Potential of *Meloidogyne incognita* in Cowpea

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ABSTRACT

Pathogenic potential of *Meloidogyne incognita* with different inoculum levels i.e. 1000, 2000, 3000, 4000, 5000 larvae/pot capacity of 1 kg soil were tested in the net house of the Department. Observations were recorded on plant growth parameters no. of nodules, no. of root-knot galls and larvae population. Drastic reduction form 24.43% to 62.30% in average growth characters was recorded in the plants inoculated with the inoculum level of 5000 larvae/pot as compared with other inculum level . The final nematode population (J_2) of *M. incognita* also directly proportional to the initial inoculum level of cowpea crop. Gradual reduction in no. of bacterial nodulation of cowpea was observed with the increase of inoculum levels.

Key words: *Pathogenicity, Meloidogyne incognita, cowpea.*

Cowpea grain contains about 25% protein, making it extreamely valuable where many people cannot afford protein foods, such as meat and fish. According to FAO about 7.56 million tones of cowpea are produced world wide annually from as about 12.76% million hectares.

The root-knot nematode, *Meloidogyne incognita* caused the greatest grain yield loss on cowpea. Haider, *et. al*., 2003 reported on initial inoculum level of 100 juveniles of *M. incognita* per plant caused significant reduction (from 1.13 to 62.6%) in growth characters of lathyrus crop and proved to be pathogenic. Olowe, 2007 evaluated cowpea genotype for their reaction to *Meloidogyne incognita* host race 4, none of the resistant genotypes was superior to the standard control resistant cv. New era. *Meloidogyne* spp. are sedentary endoparasitic with a broad host range which includes economically, important crop species. Keeping in view of the above an attempt was made to know pathogenic potential of the high inoculum level of *M. incognita* in cowpea crop.

MATERIALS AND METHODS

Thirty earthen pots of 16 cm diameter were washed with water, previously disinfected with 4% formaldehyde and filled with autoclaved sterilized sandy soil@ 1kg/pot. Two seeds of genotype of cowpea (MTI) were sown in the centre of each pot. On germination (5-7 cm height), plants were thinned out to one / pot before inoculation of *Meloidogyne incognita* (J_2) larvae. The inoculum of *Meloidogyne incognita* (J_2) was collected form the infected roots of 3 months old cowpea plants. The infected root samples were thoroughly washed under tap water. The roots were cut into small pieces and grinded using grinder and 2nd stage juveniles were separated through series of sieves and collected in the beaker. *Meloidogyne incognita* was measured and blowing through the pipette to ensure uniform distribution of the population. One ml of the suspension was withdrawn with the help of pipette into counting dish and the population of juveniles (J_2) was counted under binocular, microscope *Meloidogyne incognita* larvae were inoculated@ 1000,2000, 3000,4000, 5000/ pot in plant rhizosphere after making a ring around the stem. Uninoculated plants served as control. Each treatment was replicated four times. The experimental pots were employed in completely randomized design (CRD) and were kept in net house at 24 -34^{0}C temperature. Ninety days after nematodes inoculated plants were depotted carefully and roots were washed to free of soil with water. Observations on plant height, weight, rhizobium nodulation and number of root-knot, final population of larvae /pot and reproduction rate (Pi) number were recorded. Finally, data were tabulated and subjected to statistical analysis using appropriate statistical procedures.

RESULTS AND DISCUSSION

Plant growth

The present study clearly established a negative relationship between the inoculum level of *Meloidogyne incognita* and the shoot length and weight of cowpea from 1000 J_2 / pot to 5000 J_2/ pot. At 45 DAI, highest reduction percentage of shoot length 62.3 cm in (T_5) and lowest 20.43 cm in (T_1) was recorded. At 90 DAI maximum reduction percentage of 72.31 was attained by T_5 followed by T_4 though minimum reduction percentage was attained by T_1 however there was no remarkable differentiate observed in T_1 and T_2.

Similarly at 45 DAI, highest reduction percentage of shoot weight was recorded in T_5(5000J_2/pot).

Likewise, at 90 d.a.i. , maximum reduction percentage of 95.5 was attained by T_5 followed by T_4. There was no remarkable difference observed in T_1 and T_3. Least reduction percentage of shoot weight 78.9 was recorded in T_2.

Root-Knots

Data of Table No.1 revealed that the percentage increase in number of root-knot per plant increased gradually with increasing the inoculum level of *M. incognita*. Highest percentage increase in root knots / plants was exhibited by T_5(5000J_2/ pot). The least percentage increased in number of

Table 1. Effect of *Meloidogyne incognita* on plant growth of cowpea 90 d.a.i

Treatment	Shoot length 45 d.a.i.	Reduction %	Shoot length 90 d.a.i.	Reduction %	Shoot wt 45 d.a.i.	Reduction %	Shoot wt 90 d.a.i.	Reduction %	No. of nodules
T_0 (Control)	71.3	0	121.0	0	18.2	0	51.6	0	16
T_1 (1000 larvae /plot)	53.8	24.4	58.5	51.6	14.6	19.8	8.7	83.1	11
T_2 (2000 larvae /plot)	43.2	39.4	59.7	50.6	12.8	29.7	10.8	78.9	13
T_3 (3000 larvae /plot)	48.1	32.6	77.7	35.7	14.3	21.5	7.9	84.6	6
T_4 (4000 larvae /plot)	41.0	42.5	48.5	59.9	8.9	50.7	5.5	89.3	8
T_5 (5000 larvae /plot)	26.0	62.3	33.5	72.3	4.5	75.2	2.3	95.5	4
S.Ed±	3.9	-	14.2	-	1.46	-	4.9	-	1.52
CD at 5%	8.2	-	29.5	-	3.04	-	10.3	-	3.14

root-knot was exhibited by T_1(1000J_2/ pot) which insignificantly different fromT_2 (2000 J_2/ pot). The inoculum levels, T_2 (2000J_2/pot) was significantly decreased the root gall no. from T_5 (3000J_2/ pot), However (T_4 and T_5) was found non significant different in root –knot galls formation.

Larval population

Data revealed that larval population of *M. incognita* gradually deceased with increasing the inoculum level of *M. incognita*. Significantly highest larval population was found in T_5 followed byT_5,T_4,T_3 and T_2. Among the treatments (T_4, T_3) and (T_2, T_1) were found non significant among each other. The rate of J_2 multiplication was found increased in T_1 followed by T_2.

Table 2. Inoculum levels of *M. incognita* on the development of root galls and larval population

Treatment	No of Root knot galls/ plant	Larvae/ 5g of root	Rate of multiplication
T_0 (Control)	0.0	00	0
T_1 (1000 larvae /plot)	52	4127	4.12
T_2 (2000 larvae /plot)	66	5937	2.96
T_3 (3000 larvae /plot)	132	8470	2.8
T_4 (4000 larvae /plot)	160	9060	2.3
T_5 (5000 larvae /plot)	178	11137	2.2
S.Ed±	17.7	598	-
CD at 5%	36.6	1241	-

Haider, *et. al.*, 2003 reported on initial inoculum levels of 100 juvenile of *M. incognita* / plant cause significant reduction in growth characters from 24.43% to 62.30% of pulse crops.

Rhizobium nodulation

Results showed that the gradual reduction of no. of bacterial nodules was observed with the increase of inoculum levels in cowpea crop. At the maximum inoculum level (5000 larvae/pot). Haider, *et. al.*, 2003 reported the reduction of bacterial nodules was observed in the inoculum level of 1000 larvae/pot.

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