

EFFECT OF NEEM EXTRACTS ON MORTALITY OF *MELOIDOGYNE INCOGNITA* JUVENILE

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Root-knot nematode is one of the major limiting factors affecting plant growth. Natural products are used as safer alternative to control root knot nematode. An experiment was carried out *in vitro* to test the Neem plant extract. Different concentration of shade-dried leaves, bark and seeds of Neem were tested for mortality of *Meloidogyne incognita* juveniles. With the increase in concentration and exposure period, there was increase mortality rate of Juveniles. Neem seed (5 ml concentration) proved to be the most effective among plant parts used *viz.* bark, leaves, and seed. Neem bark was the least effective among the three.

Keywords : *Meloidogyne incognita*; Mortality; Plant extract.

The root-knot nematode, *Meloidogyne incognita* is a universal problem due to its polyphagous nature and has more than 3000 host species. Almost all the nematicidal chemicals are costly and harmful to human health. Modern agriculture moves to adopt more environment friendly practices. There is increasing interest in the use of biopesticides that are pest specific and non toxic to human and beneficial organisms. Extract of plant product contain nematicidal compound. Thousand of plant possessing insecticidal properties are known today¹. Use of Neem and neem product has been advocated for the management of root-knot nematode by many workers^{2,3}. Nematicidal phytochemicals are generally safer for the environment and human health⁴. Therefore, the present investigation was carried out to see the nematicidal effect of different plant parts of Neem on mortality of *M. incognita* juveniles.

Preparation of extracts - The Neem (*Azadirachta indica*) plant parts *viz.* bark, leaves, seeds were shade dried and then oven dried at 60°C for overnight, powder of plant parts were prepared by using a mixer or blender. The bark, leaves and seeds powder of 5 gm were soaked in 50 ml water for 2 days. The extracts were filtered through muslin cloth. The extracts were centrifuged at 4000 rpm for 10 min and were filtered through Whatman No. 1 filter paper. The filtered extracts served as stock solution for preparing different dilutions and were stored in refrigerator. Different dilutions *viz.* (5ml, 2.5ml, 2ml, 1.5ml, 1ml, 0.50 ml, 0.25 ml) of each Neem plant part extracts were prepared by adding the required amount of distilled water. The

sterilized distilled water served as control.

Effect of extracts on juvenile mortality of *M. incognita* - Seven dilution *viz.* (5 ml, 2.5 ml, 2 ml, 1.5 ml, 1 ml, 0.50 ml, 0.25 ml) were prepared from stock solution. Five ml of each plant part extracts were prepared by adding the required amount of distilled water were taken in sterile beaker of 50 ml capacity. Two hundred freshly hatched second stage juveniles (J_2) of *M. incognita* were transferred in beaker. Equal number of J_2 was also transferred to separate beaker containing sterilized water to serve as control. Three replicates were taken completely randomized design (CRD). Observation of both live and dead nematodes were made at 24 hrs, 48 hrs, 72 hrs, 96 hrs and 120 hrs after inoculation.

The mortality of *M. incognita* juveniles increased with the increase in concentration of stock solution of all the bark, leaves, seeds treatments (Table 1, 2 & 3). Mortality again increased with the increase in exposure period. Maximum mortality per cent was observed in Neem seed having 5 ml concentration (Table 3). Neem seed gave the best results. Exposure of 120 hrs of seed gave the best results among all the plant part used (Table 1, 2&3).

Cumulative percent mortality of *M. incognita* was maximum in Neem seed extract and minimum in Neem bark extract which could be due to the fact that Neem bark does not possess sufficient active ingredients which are nematicidal. Neem leaves and Neem seed having more concentrated nematicidal/nematostatic properties.

Table 1. Effect of Neem bark (aqueous) extract on Juveniles Mortality of *Meloidogyne incognita* at different time intervals. (Mean of three replicates)

S.No.	Concentration	% Juveniles Mortality at different exposure period					
		24 hrs.	48 hrs.	72 hrs.	96 hrs.	120 hrs.	Mean
1.	(0.25 ml)	0	13	15.7	18	22.4	13.8
2.	(0.50 ml)	0	16.2	18.9	25.5	32.3	18.5
3.	(1 ml)	13.2	22.1	36.8	43.1	51.4	33.3
4.	(1.5 ml)	21.4	38.2	52.4	60.1	68.4	48.1
5.	(2 ml)	31.8	41.2	58.4	63.2	74.3	53.78
6.	(2.5 ml)	38.4	52.1	66.2	76.1	82.1	62.9
7.	(5 ml)	80	86.06	88.4	91.46	92.7	87.7
8.	Control	0	0	0	0	0	0
	Mean	23.1	33.60	42.1	47.1	52.9	

Table 2. Effect of Neem leaves (aqueous) extract on Juveniles Mortality of *Meloidogyne incognita* at different time intervals. (Mean of three replicates)

S.No.	Concentration	% Juveniles Mortality at different exposure period					
		24 hrs.	48 hrs.	72 hrs.	96 hrs.	120 hrs.	Mean
1.	(0.25 ml)	2.4	16.7	21.2	31.4	39.6	22.2
2.	(0.50 ml)	6.9	18.2	28.1	38.2	47.3	27.7
3.	(1 ml)	13.8	28.6	40.2	47.9	59.5	38.0
4.	(1.5 ml)	26.4	42.4	53.2	61.1	75	51.6
5.	(2 ml)	47.7	56.7	70.2	80.6	90	69.0
6.	(2.5 ml)	73.5	83.8	89.4	97.2	100	38.78
7.	(5 ml)	94.7	99.4	100	100	100	98.8
8.	Control	0	0	0	0	0	0
	Mean	33.17	43.22	50.2	57.05	75.12	

Table 3. Effect of Neem seed (aqueous) extract on Juveniles Mortality of *Meloidogyne incognita* at different time intervals. (Mean of three replicates)

S.No.	Concentration	% Juveniles Mortality at different exposure period					
		24 hrs.	48 hrs.	72 hrs.	96 hrs.	120 hrs.	Mean
1.	(0.25 ml)	8.2	19.4	38.0	46.1	52.4	32.8
2.	(0.50 ml)	16.9	29.6	46.3	51.5	67.4	42.3
3.	(1 ml)	29.2	41.4	52.5	65.1	78.1	53.2
4.	(1.5 ml)	42.0	57.2	70.1	77.4	86.3	66.6
5.	(2 ml)	72.5	79.3	86.3	91.0	97.1	85.2
6.	(2.5 ml)	80.4	96.7	100	100	100	95.4
7.	(5 ml)	79	100	100	100	100	99.8
8.	Control	0	0	0	0	0	0
	Mean	43.5	52.9	61.6	66.3	72.6	

Aqueous extract of Neem plant materials were reported earlier to cause nematode mortality⁵. Leaf extract of *A. indica* significantly increased the *M. incognita* juvenile mortality⁶. Haseeb *et al.*⁷ reported that *A. indica* seeds powder was found effective against *M. incognita*. Neem products (Kernel, leaf, bark extract) are known to possess nematicidal activity against nematode population^{8,9}. The present study also revealed that the mortality rate increased with increased exposure period and concentration as reported by Siddiqui and Alam¹⁰. Singh and Sitaramaiah¹¹ and Khan *et al.*¹² reported that the nematostatic and nematicidal properties of Neem products might be due to azadirachtin as an active principles and toxic chemicals present in them, which could have nematicidal/nematostatic effect. It was responsible for mortality of *M. incognita* juveniles and commercialized for low cost management of nematode.

Acknowledgement

Authors are highly grateful to Head, PG Department of Botany Govt. College, Kota for providing necessary facilities.

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