

EFFECT OF LEAF EXTRACTS ON THE MORTALITY OF MELOIDOGYNE INCOGNITA

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Abstract: Studies were conducted to evaluate the nematicidal property of water extracts obtained from some commonly available weed/plant leaves against 2nd stage juveniles of *Meloidogyne incognita*. Of the sixteen plants tested 100 per cent mortality was observed with *Moringa pterigosperma* and *Momordica charantia* at 1:5 dilution after 24 hours whereas with *Leucas aspera* 100 per cent mortality was observed only after 48 hours in the same dilution. Hundred per cent mortality of juveniles was observed with *M. pterigosperma* after 72 hours at 1:10 dilution also.

Leaf extracts of certain plants are known to have nematicidal or nematostatic properties against several plant parasitic nematodes (Khanna, 1991; Hussaini, *et al.*, 1996; Nandal and Bhatti, 1983; Krishnamurthy *et al.*, 1989; Saxena *et al.*, 1990). The present work is an attempt to study the nematicidal potential of extracts of some locally available weeds/plants against 2nd stage juveniles of the root-knot nematode, *Meloidogyne incognita* (Kofoed and White) Chitwood.

MATERIALS AND METHODS

Leaf extracts were prepared by grinding 10 g each of fresh tender leaves in 20 ml distilled water using pestle and mortar. In order to remove plant debris extracts were filtered through a four ply muslin cloth and then centrifuged at 4000 rpm for 10 minutes. The supernatant was filtered through Whatman's filter paper No 1. The extract thus prepared was kept in 250 ml Erhlenmeyer flasks in refrigerator for 24 hours and was taken as stock solution for evaluating nematicidal property. From the stock solution different dilutions (1:5, 1:10 and 1:100) were prepared by adding required quantity of distilled water. Second stage juveniles kept in distilled water served as control. Hundred each of freshly hatched second stage juveniles of *M. incognita* were transferred to cavity block containing one ml of different concentrations of aqueous extract. Cavity blocks were kept in BOD incubator at $28 \pm 1^\circ\text{C}$. There were three replicates for each dilution. Observations were recorded on live and dead nematodes after 24, 48 and 72 hours and per cent mortality was calculated.

RESULTS AND DISCUSSION

Of the sixteen plant extracts tested 100 per cent mortality was observed with *Moringa pterigosperma* and *Momordica charantia* at 1:5 dilution after 24 hours, whereas with *Leucas aspera* 100 per cent mortality was observed only after 48 hours at the same dilution. With *M. pterigosperma* extract per cent mortality increased from 96.7 at 48 hours at the same dilution. With *M. pterigosperma* extract per cent mortality increased from 96.7 at 48 hours to 100 at 72 hours even at 1:10 dilution.

The per cent mortality was also high in *Manihot utilissima* (86.6%), *Murraya konigii* (73.3%), *Phyllanthus niruri* (73.3%), *Erythrina indica* (70.0%) and *Thevetia nerifolia* (70.0%) after 24 hours at 1:5 dilution.

The mortality was found to differ significantly between different plant extracts at all the three intervals tried (24, 48 and 72) (Table 1, 2 and 3). In the case of *L. aspera* mortality was found to be

93.3% after 24 hours at 1:5 dilution. As the exposure period increased mortality increased to 100 per cent in the same dilution. Similarly *Manihot utilissima* extract shows 86.6 per cent mortality at 1:5 dilution after 24 hours which increased to 96.7 at the same dilution after 48 hours. Further improvement in efficacy was noticed even when exposure period increased beyond 72 hours.

The per cent mortality was found to be lowest in *Thespesia populnea* (10.0%) followed by *Calotropis gigantea* (13.3%), *Calophyllum inophyllum* (26.7%), *Glycosmis pentaphylla* (36.7%) and *Jatropha curcas* (36.0). In the case of the leaf extracts *Thespesia populnea* and *Piper longum* the mortality was low even after 3rd day.

Effect of treatment, dilution and treatment x dilution interaction were found to be statistically significant in the analysis done for the data recorded after 24, 48 and 72 hours. In general, number of larvae dead in dilution 1: 5 was 59 (after 24 hours) 67.7 (after 48 hours) and 72.9 (after 72 hours).

Desai *et al.*, 1973 tried extracts of *M. charanti* fruit skin and got 72.5% kill but in the present study with leaf extracts 100% mortality of *M. incognita* larvae was observed. With *L. aspera* leaf extracts Hussaini *et al.*, (1996) reported 98.6% mortality of *M. incognita* J2 larvae at 1:2 dilution after 24 hours whereas in this study it was 93.3% mortality at 1:5 dilution after 24 hours.

The extracts of *M. pterigosperma*, *M. charantia* and *L. aspera* were found to have nematocidal properties. This finding is important from the point of view of controlling plant parasitic nematodes without the use of nematicides in view of the environmental pollution likely to cause. However, studies are to be continued to find out the active principal involved in it and also to find out the effect of these leaves in controlling nematodes when they are incorporated into the soil as green manure, at the same time the limitation will be their availability in large quantities to use them as green manure.

Table 1. *In-vitro* effect of leaf extracts on the mortality of second stage juveniles of *M. incognita* (Av. of three replicates)

Plants tried	Percentage mortality after 24 hr			Mean
	1:5	1:10	1:100	
<i>Bauhinia tomentosa</i>	56.7	13.3	0	23.3
<i>Calophyllum inophyllum</i>	26.7	20.0	0	15.6
<i>Calotropis gigantea</i>	13.3	3.3	0	5.6
<i>Erythrina indica</i>	66.7	46.7	10.0	41.1
<i>Glycosmis pentaphylla</i>	36.7	23.3	3.3	21.1
<i>Hemidesmus indicus</i>	53.3	20.0	0	24.4
<i>Jatropha curcas</i>	36.7	20.0	0	18.9
<i>Leucas aspera</i>	93.3	86.7	10.0	63.3
<i>Manihot utilissima</i>	86.7	70.0	20.0	58.9
<i>Momordica charantia</i>	100.0	73.3	13.3	62.2
<i>Momordica pterigosperma</i>	100.0	96.7	60.0	85.6
<i>Murraya koenigii</i>	73.3	60.0	26.7	53.3
<i>Piper longum</i>	43.3	20.0	0	21.1
<i>Phyllanthus niruri</i>	73.3	70.0	10.0	51.1
<i>Thespesia populnea</i>	10.0	3.3	0	4.4
<i>Thevetia nerifolia</i>	70.0	56.7	26.7	51.1
Mean	59.0	42.7	11.3	37.6
CD for treatments				5.66
CD for dilutions				2.45
CD for interactions				9.81

Table 2. In-vitro effect of leaf extracts on the mortality of second stage juveniles of *M. incognita* (Av. of three replicates)

Treatments	Percentage mortality after 48 h			Mean
	1:5	1:10	1:100	
<i>Bauhinia tomentosa</i>	60.0	40.0	3.3	34.4
<i>Calophyllum inophyllum</i>	60.0	43.3	3.3	35.6
<i>Calotropis gigantea</i>	26.7	20.0	0	15.6
<i>Erythrina indica</i>	66.7	43.3	13.3	41.1
<i>Glycosmis pentaphylla</i>	63.3	30.3	3.3	32.2
<i>Hemidesmus indicus</i>	60.3	26.7	10.0	32.2
<i>Jatropha curcas</i>	56.7	26.7	6.7	30.0
<i>Leucas aspera</i>	100.0	86.7	23.3	70.0
<i>Manihot utilissima</i>	96.7	76.7	20.0	64.4
<i>Momordica charantia</i>	100.0	76.7	16.7	64.4
<i>Momordica pterigosperma</i>	100.0	96.7	70.0	88.9
<i>Murraya koenigii</i>	76.7	63.3	26.7	55.6
<i>Piper longum</i>	43.3	23.3	0	22.2
<i>Phyllanthus niruri</i>	86.7	66.7	23.3	58.9
<i>Thespesia populnea</i>	13.3	0	0	4.4
<i>Thevetia nerifolia</i>	73.3	63.3	26.7	54.4
Mean	67.7	49.0	15.4	44.0
CD for plants				6.18
CD for dilutions				2.68
CD for interactions				10.72

Table 3. In-vitro effect of leaf extracts on the mortality of 2nd stage juveniles of *M. incognita* (Av. of 3 replicates)

Treatments	Percentage mortality after 72 h			Mean
	1:5	1:10	1:100	
<i>Bauhinia tomentosa</i>	70.0	56.7	6.7	44.4
<i>Calophyllum inophyllum</i>	73.3	70.0	10.0	51.1
<i>Calotropis gigantea</i>	50.0	30.0	3.3	27.8
<i>Erythrina indica</i>	70.0	56.7	16.7	47.8
<i>Glycosmis pentaphylla</i>	73.3	70.0	3.3	48.9
<i>Hemidesmus indicus</i>	66.7	40.0	16.7	41.1
<i>Jatropha curcas</i>	56.7	33.3	6.7	32.2
<i>Leucas aspera</i>	100.0	86.7	26.7	71.7
<i>Manihot utilissima</i>	96.7	80.0	23.3	66.7
<i>Momordica charantia</i>	100.0	76.7	26.7	67.8
<i>Momordica pterigosperma</i>	100.0	100.0	70.0	90.0
<i>Murraya koenigii</i>	80.0	63.3	30.0	57.8
<i>Piper longum</i>	46.7	26.7	3.3	25.6
<i>Phyllanthus niruri</i>	86.7	80.0	23.3	63.3
<i>Thespesia populnea</i>	16.7	3.3	0	6.7
<i>Thevetia nerifolia</i>	80.0	63.3	26.7	56.7
Mean	72.9	58.5	18.3	49.9
CD for treatments				5.20
CD for dilutions				2.25
CD for interactions				9.00

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