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EFFECT OF A PLANT BASED PRODUCT-'NIMIN' AND SOME PLANT OILS ON NEMATODES

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Summary. Nimin, an industrial product containing neem triterpenes, and oil from castor (*Ricinus communis*), mustard (*Brassica juncea*), neem (*Azadirachta indica*) and rocket-salad (*Eruca sativa*) significantly suppressed populations of some ecto-parasitic nematodes and reduced the incidence of *Meloidogyne incognita* on chilli (*Capsicum annuum*) when applied as bare-root dips. Nimin gave the best results in terms of reduced root-knot incidence and improved plant growth, followed by oils of neem, castor, rocket-salad and mustard. The effect of treatments was related to their concentrations.

Water extracts of oilcakes and leaves of castor have been shown to have some systemic action against the root-knot nematode, *Meloidogyne incognita*, when bare-root dips were given to infected plants (Akhtar and Alam, 1990). Nimin (Godrej Soaps Ltd. India) is marketed as a urea-coating agent to prevent loss of nitrogen by leaching but as it contains neem-triterpenes it may have nematicidal properties (Akhtar and Alam, 1993). It was therefore included with oils of castor (*Ricinus communis* L.), mustard [*Brassica juncea* (L.) Czern. *et* Coss], neem (*Azadirachta indica* A. Juss.) and rocket-salad (*Eruca sativa* L.) which are readily available in India, in trial to test their nematicidal activity as bare-root dips.

Materials and methods

Ten ml of Nimin or oils of castor, mustard, neem or rocket-salad were dissolved in 90 ml of distilled water. After one hour the emulsions were centrifuged filtered and extracts were arbitrarily termed standard 'S'. Dilutions at S/2 and S/10 were prepared from the 'S' concentration with distilled water.

Three-week-old seedlings of chilli (*Capsicum annuum* L.) cv. Jawala, grown in sterilized soil, were dipped in the different concentrations for 30 minutes. Each treatment was replicated five times, including undipped control. Roots were washed with water and the seedlings were then transplanted singly in earthen pots (15 cm diam. x 30 cm deep) containing 1 kg autoclaved soil-manure mixture. Each pot was inoculated with 1000 freshly hatched second stage juveniles (J2) of root-knot nematode *Meloidogyne incognita* (Kofoid *et.* White) Chitw. Two months after inoculation, plants were carefully removed and growth parameters and root-knot indices, on a 0 to 5 scale (Sasser *et al.*, 1984) were assessed.

In another experiment, soil was collected from a vegetable growing field having a mixed population of plant-parasitic nematodes, viz., *Hoplolaimus indicus* Sher, *Helicotylenchus indi-*

cus Siddiqi, *Rotylenchulus reniformis* Linford *et* Oliveira, *Tylenchorhynchus brassicae* Siddiqi, and juveniles of *M. incognita*. The soil was sandy loam with pH 6.0 and organic matter cotnent of less than 1% (w/w). The moist (60% field capacity) soil was screened (2 mm mesh) and transferred to 15 cm diam. earthen pots. The pots were placed in a glasshouse at random and watered to maintain the moisture level. Three week-old chilli seedlings that had been grown in sterilized soil were given bare root dip treatments as before and then transplanted singly in each pot. Each treatment was replicated five times including the control. Two months after transplanting the plants were removed and the roots were washed in big container (10 l). Nematode populations after termination of experiments was isolated by Cobb's sieving and decanting method along with Baermann's funnel technique (Southey, 1986) and assessed.

Results and discussion

Bare-root dips in different concentrations of the test materials significantly reduced the root-knot development caused by *M. incognita* (Table I) and population build-up of plant parasitic nematodes (Table II). The severity of infection decreased with the increase in concentrations of the extracts. Nimin was more effective in decreasing root-knot infection than neem oil, followed by castor, rocket-salad and mustard oils. Growth of the plants improved with increased concentration of the extracts and was correlated with the degree of nematode control (Tables I and II).

TABLE I - *Effect of bare-root dip-treatment with 'Nimin' and some plant oils on root-knot caused* by Meloidogyne incognita *and plant growth of chilli cv. Jawala.*

Treatment	Concentration	Root-knot index (0-5 scale)	Plant weight (g)			Plant length (cm)		
			Shoot	Root	Total	Shoot	Root	Total
Nimin	S	1.0	30.5	10.7	41.2	40.4	10.4	50.8
	S/2	1.7	28.4	9.6	28.0	38.6	9.8	48.4
	S/10	2.0	26.7	8.7	35.4	36.5	8.9	45.4
Neem oil	S	1.2	27.4	9.9	37.3	38.5	9.9	48.4
	S/2	2.1	26.0	8.1	34.1	36.1	8.7	44.8
	S/10	2.7	24.7	7.9	32.6	35.1	7.1	42.2
Castor oil	S	1.3	26.7	8.7	35.4	37.8	9.0	46.8
	S/2	2.4	24.9	7.8	32.7	26.0	7.9	43.9
	S/10	2.9	23.4	6.9	30.3	34.2	7.0	41.2
Rocket-salad oil	S	1.5	24.4	8.3	32.7	36.4	8.8	45.2
	S/2	2.5	23.7	7.1	30.8	35.0	7.6	42.6
	S/10	3.0	20.5	6.3	28.1	33.7	6.6	40.3
Mustard oil	S	1.7	23.7	8.0	31.7	35.7	8.0	43.7
	S/2	2.7	21.9	7.0	28.9	34.6	7.0	41.6
	S/10	3.0	20.5	6.0	26.5	32.9	6.2	39.1
Undipped inoculated		4.0	12.2	4.2	16.4	20.4	3.5	23.9
Undipped uninoculated		–	35.7	15.7	51.4	50.9	16.4	67.3
Dipped uninoculated		–	37.2	16.3	53.5	52.3	18.2	70.5
L.S.D. (P = 0.05)		0.93			2.05			2.32

TABLE II - *Effect of bare-root dip-treatment with 'Nimin' and plant oils on population densities of some plant parasitic nematodes and growth of chilli cv. Jawala plants.*

Treatment	Concen-tration	Numbers of Nematodes/250 g soil							Plant weight (g)			Plant length (cm)		
		Hop	Hel	Tyl	Trh	Rot	Mel	Total	Shoot	Root	Total	Shoot	Root	Total
'Nimin'	S	78	40	30	75	78	80	381	32.5	10.2	42.7	44.2	10.2	54.4
	S/2	90	63	52	40	82	110	437	30.9	8.9	39.8	41.1	9.7	50.8
	S/10	102	93	65	62	138	209	669	27.9	7.8	35.7	39.4	7.8	47.2
Neem oil	S	88	42	45	68	92	95	430	30.2	8.9	39.1	43.4	9.5	52.9
	S/2	98	68	54	65	105	119	509	27.4	7.6	35.0	40.4	8.5	48.9
	S/10	110	95	79	78	140	290	792	25.6	6.5	31.1	39.2	7.1	46.3
Castor oil	S	95	65	62	76	110	118	526	28.1	7.6	35.7	42.0	9.2	51.2
	S/2	101	78	76	87	140	128	610	25.4	6.5	31.9	39.4	7.8	47.2
	S/10	141	112	92	96	180	295	816	23.0	5.6	28.6	37.9	7.2	45.1
Rocket-salad oil	S	99	68	68	87	112	126	560	25.6	6.6	32.2	41.6	8.9	50.5
	S/2	110	88	87	95	141	132	653	24.0	5.1	29.1	38.1	7.8	45.9
	S/10	151	144	101	110	198	298	1003	21.7	4.9	26.6	26.2	6.9	43.1
Mustard oil	S	102	64	79	89	114	186	635	23.1	6.0	29.1	40.6	8.4	49.0
	S/2	142	78	91	101	192	216	820	21.9	5.1	27.0	37.2	7.3	44.5
	S/10	178	148	112	140	202	312	1092	20.0	4.6	23.0	36.1	6.4	42.5
Undipped infested soil		210	195	165	275	290	575	1700	18.4	3.5	21.9	28.4	5.5	33.9
Undipped sterilized soil									35.7	15.7	51.4	50.9	16.4	67.3
Dipped sterilized soil									37.2	16.3	53.5	52.3	18.2	70.5
L.S.D. (P = 0.05)								36.01			2.01			2.09

Hop = *Hoplolaimus indicus*, Hel = *Helicotylenchus indicus*, Tyl = *Tylenchus filiformis*, Trh = *Tylenchorhynchus brassicae*, Rot = *Rotylenchulus reniformis*, Mel = *Meloidogyne incognita* juveniles.

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