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EFFECT OF OIL-CAKES USED ALONE AND IN COMBINATION WITH ALDICARB ON *MELOIDOGYNE* INFECTING TOMATO

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Among the various soil amendments evaluated against nematode, oil cakes have been found to be very promising (Singh, 1965; Singh and Sitaramaiah, 1966 and 1973; Goswami and Swarup, 1971; Khan *et al.*, 1973; Mishra and Prasad, 1974; Goswami and Vijayalakshmi, 1981), but they have not been effectively exploited. A major limitation of their use is the large quantities required per unit area for soil treatment and this combined with their limited availability generally makes their use uneconomical in most circumstances. However, in addition to any nematicidal properties, oil cakes contain N, P and K and their use in combination with a chemical nematicide might be an economical and effective way for nematode population management with the additional contribution to plant nutrition.

Combinations of different quantities of neem and groundnut cakes with aldicarb were evaluated in a pot trial for the control of *Meloidogyne incognita* on tomato.

Materials and Methods

Finely powdered neem and groundnut cakes were added to autoclaved soil (1:3 sand: loam) in 10 cm diameter clay pots at the rates listed in Table I. The pots were watered regularly for 3 weeks to facilitate the decomposition of the oil cakes. Aldicarb was then applied to the pots by incorporating the granules into the soil to give the combination of treatments in Table I. A tomato cv. Pusa Ruby seedling was planted in each pot and the plants were allowed to become established for 3 or 4 days before inoculating each pot with 2 *M. incognita* juveniles/g soil. There were three replicates of each treatment including the untreated controls.

Fifteen days after inoculation with nematodes, measurements were made of plant and root growth in half of the pots, the number of galls on each root system were counted and nematodes were extracted from the roots. The remainder of the pots were used for similar measurements of plant growth and nematode numbers in roots and soil at 35 days from inoculation.

Penetration of the roots by juveniles was studied in 50 ml plastic pots with the same combination of treatments as for the larger pots. The roots in 3 pots of each treatment were examined for the presence of juveniles at 24, 48, 96 and 144 hours from inoculation. The roots were carefully washed, bleached in sodium hypochlorite for 2-3 minutes, washed in running tap water and boiled for 3-4 minutes in stain solution (Byrd *et al.*, 1983).

Results and Discussion

In general, the best growth of the plants was observed in the neem plus aldicarb (2:2) treatment (Table I). In the groundnut plus aldicarb combinations, the G+A, 1:3 treatment gave maximum plant growth and ranked second in shoot length and root weight, when all the treatments were compared (Table I). The control without nematodes grew less well than the treated pots with nematodes presumably because of the adverse effect of the decomposition of oil cakes.

All the treatments caused a reduction in nematode penetration and this effect was apparent up to 144 hours after inoculation with juveniles. The least penetration occurred in pots treated with aldicarb alone, A, 4, (Table II). However, neem cake and groundnut cake alone or in combination with aldicarb significantly reduced nematode penetration compared with the control.

Among groundnut aldicarb combinations, G-25 treatment showed minimum population which also ranked second with N-50 occupying the first position (Table III).

Thus, from the present investigation, it can be inferred that the combinations of neem-aldicarb (2:2 ratio) and groundnut-aldicarb (1:3 ratio) are significantly superior in terms of plant response and the control of nematode population than other treatments. Aldicarb (A,4) was the most effective treatment in preventing juvenile penetration and thus the combined treatments were more effective than aldicarb alone in promoting plant growth presumably because of the nutrient effect of neem or groundnut cakes.

TABLE I - *Effect of neem and groundnut cakes individually and in combination with aldicarb on the growth of tomato plants 15 and 35 days after inoculation with* Meloidogyne incognita *juveniles.*

Treatment	Shoot length (cm)		Shoot weight (g)		Root length (cm)		Root weight (g)	
	Days		Days		Days		Days	
	15	35	15	35	15	35	15	35
N, 4	10.5	18.9	1.9	8.4	7.0	14.0	1.0	2.3
N+A, 3:1	10.7	19.4	2.0	8.8	6.0	17.7	1.2	2.6
N+A, 2:2	12.0	22.9	2.3	10.2	8.5	18.5	1.6	3.6
N+A. 1:3	10.5	19.0	2.0	9.3	6.9	16.4	1.1	2.9
A, 4	11.0	18.2	2.8	8.5	10.4	15.5	1.9	2.2
G, 4	8.9	16.6	1.2	4.9	6.1	9.7	0.7	2.0
G+A, 3:1	9.3	16.9	1.4	5.1	7.1	10.2	0.8	2.0
G+A, 2:2	9.7	18.3	1.9	6.9	7.2	12.0	1.1	2.7
G+A, 1:3	11.1	19.8	2.2	8.5	8.2	13.6	1.4	3.1
C+O	10.2	15.4	1.8	3.5	6.5	8.0	0.8	2.3
C+N	9.2	13.4	1.4	2.1	7.4	7.2	0.8	1.9
S.E. (between treatments)	0.19		0.11		0.17		0.07	
C.D. at 5%	0.53		0.31		0.44		0.20	

N, 4 = Neem cake alone at 4 g/100 g soil; A, 4 = Aldicarb alone at 16 mg a.i./100 g soil; G, 4 = Groundnut cake alone at 1 g/100 g soil; 3:1, 2:2, 1:3 combinations in proportion to these amounts; C+O = Untreated control without nematodes; C+N = Untreated control inoculated with nematodes.

TABLE II - *Effect of neem and groundnut cakes individually and in combination with aldicarb on the penetration of tomato by* M. incognita *juveniles.*

Treatment	Number of juveniles per root system			
	Hours after inoculation			
	24	48	96	144
N. 4	2.0	4.7	7.7	8.7
N+A, 3:1	2.7	6.3	7.7	10.3
N+A, 2:2	1.7	3.3	5.7	6.0
N+A, 1:3	2.3	4.3	7.7	9.0
A, 4	0.7	1.0	1.7	3.3
G, 4	3.7	7.3	18.3	21.7
G+A, 3:1	2.0	7.7	13.0	17.3
G+A, 2:2	1.7	3.7	10.0	12.3
G+A, 1:3	1.7	3.0	6.0	6.7
C+N	8.3	20.7	30.0	35.7

For explanation of treatments see Table I.

TABLE III - *Effect of neem and groundnut cakes individually and in combination with aldicarb on* M. incognita *infesting tomato, 15 and 35 days after inoculation.*

Treatment	No. of galls per plant		No. of nematodes in		
			root/plant		soil/pot
	Days		Days		Days
	15	35	15	35	35
N, 4	156	204	419	594	3702
N+A, 3:1	167	190	358	574	2838
N+A, 2:2	113	166	233	905	1599
N+A, 1:3	122	204	401	431	1842
A, 4	126	214	405	495	2981
G, 4	187	274	556	701	4525
G+A, 3:1	198	305	542	749	3489
G+A, 2:2	185	294	552	695	3289
G+A, 1:3	158	285	463	487	3044
C+N	234	403	688	1052	6126
S.E. (between treatments)	0.79		0.33		2.00
C.D. at 5%	0.55		0.96		5.89

For explanation of treatments see Table I.

Literature cited

BYRD D.W., KIRKPATRICK JR. T. and BARKER K.R., 1983 - An improved technique for clearing and staining plant tissues for detection of nematodes. *J. Nematol., 15*: 142-143.

GOSWAMI B.K. and SWARUP G., 1971 - Effect of oil-cake amended soil on the growth of tomato and root-knot nematode population. *Indian Phytopath., 24*: 491-494.

GOSWAMI B.K. and VIJAYALAKSHMI K., 1981 - Effect of some indigenous plant materials and oil-cake amended soil on the growth of tomato and root-knot nematode (Abstr.). *Indian J. Nematol., 11*: 121.

KHAN M.W., KHAN A.M. and SAXENA S.K., 1973 - Influence of certain oil-cake amendments and fungi in tomato field. *Acta Botanica Indica, 1*: 49-52.

MISHRA S.D. and PRASAD S.K., 1974 - Effect of soil amendments on nematodes and crop yield. 1. Oil-seed cakes, organic matters, inorganic fertilizers and growth regulators on nematodes associated with wheat and their residual effect in mung. *Indian J. Nematol., 4*: 1-19.

SINGH R.S., 1965 - Control of root-knot of tomato with organic soil amendments. *FAO Pl. Prot. Bull., 13*: 35-57.

SINGH R.S. and SITARAMAIAH K., 1966 - Incidence of root-knot of okra and tomatoes on oil-cake amended soil. *Pl. Dis. Reptr., 50*: 668-672.

SINGH R.S. and SITARAMAIAH K., 1973 - Control of plant parasitic nematodes with organic amendments of soil. Final Tech. report. Effect of organic amendments, green manuring and inorganic fertilizers in root-knot of vegetable crops. Res. Bull. Exp. Sta. & College of Agr., G.B.P.U. A. & T., Pantnagar, No. 6, 289 pp.

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