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EVALUATION OF FIVE NEMATICIDES AS SEED TREATMENT FOR THE CONTROL OF *MELOIDOGYNE INCOGNITA* INFECTING GREEN GRAM, *VIGNA RADIATA*

by
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Summary. Carbofuran, diazinon, phorate, prophos and sebuphos, each at the rate of 0.5, 1 and 2 per cent a.i. (W/W) were tested as seed treatments for the control of *Meloidogyne incognita* infecting green gram under field condition. Each of the chemicals was effective in decreasing nematode numbers and root-knot development, with consequent increase in plant growth. The best result was obtained with carbofuran at 2 per cent a.i.

Green gram, *Vigna radiata* (L.) Verd Court is cultivated throughout India and is an important pulse crop, contributing nearly 9.3% to the total pulse production. The root-knot nematode problem could be minimized by chemical seed treatment to provide initial protection against juveniles penetration of the seedlings and thus improve plant growth and yield (Kaushik and Bajaj, 1981). An experiment was conducted to test the efficacy of five nematicides as a seed treatment against *Meloidogyne incognita* (Kofoid *et* White) Chitw. infecting green gram.

Materials and methods

The required quantities of carbofuran, diazinon, phorate, prophos and sebuphos (Table I) were ground to a powder and using gum as a sticker, were applied as a uniform smooth coating to the seeds of green gram cv. PLM-97. The treated seeds were dried and then sown in a field of sandy loam soil (coarse sand 1.22%, fine sand 44.13%, silt 16.23% and clay 23.05%) naturally infested with *M. incognita* (658 J_2 per 250 g soil). Treated and untreated (control) seeds were sown in plots measuring 2x2.5 m in rows 25 cm apart and spacing within the row of 10 cm. There were three replicates in each treatment. At harvest, ten plants were selected randomly from each plot and plant height, fresh and dry weight of root and shoot were measured. The number of egg masses and females in the roots were counted (Hartman, 1983) and root-knot development was assessed as galls/-plant. The soil samples (250 g each) were randomly collected from each plot and processed for final population counts of nematodes (Southey, 1986) to evaluate the rate of nematode multiplication (Pf/Pi) (Oostenbrink, 1966). Data were statistically analysed and critical difference was calculated at P = 0.05 level (Panse and Sukhamte, 1989).

Results and discussion

The results (Table I and II) revealed that plant growth parameters were enhanced and nematode numbers and root-knot development

were suppressed with each of the chemicals used as seed treatment. In general, treatments were most effective at higher concentrations (2%) and least at lower concentrations (0.5%). However, although prophos (1%) improved plant height this did not differ significantly from the untreated control. Carbofuran was the most effective among the different chemicals in reducing nematode populations and root-knot development followed by sebuphos, phorate, diazinon and prophos at the highest concentration (2%). Similarly, all of the chemicals at 1 per cent concentration, and carbofuran and sebuphos even at 0.5 per cent concentration, significantly inhibited population increases and root-knot development but to a lesser extent (Table II).

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TABLE I - *Effect of seed treatment with nematicides on plant growth of green gram cv. PLM-97 infected with* Meloidogyne incognita *under field conditions.*

Treatment	Concentration % (a.i. W/W)	Plant height (cm)	Shoot weight		Root weight	
			Fresh (g)	Dry (g)	Fresh (g)	Dry (g)
Carbofuran	0.5	67.6	43.5	12.3	5.1	1.0
	1.0	75.5	44.2	13.5	5.8	1.1
	2.0	81.0	49.4	15.6	11.3	1.9
Diazinon	0.5	63.1	31.1	10.3	3.7	0.8
	1.0	69.8	39.8	12.4	5.1	0.9
	2.0	74.5	44.3	13.8	6.3	1.3
Phorate	0.5	64.7	31.5	10.3	4.1	0.8
	1.0	72.6	41.2	12.6	4.1	0.8
	2.0	76.9	45.9	13.9	7.0	1.4
Prophos	0.5	62.9	30.3	9.9	3.5	0.9
	1.0	66.4	37.5	11.7	4.8	1.0
	2.0	72.1	42.7	13.1	5.9	1.2
Sebuphos	0.5	66.4	32.6	11.6	4.4	0.9
	1.0	73.3	41.9	13.1	5.7	1.1
	2.0	79.5	47.1	15.2	8.1	1.4
Control		60.8	28.9	8.8	3.1	0.7
C.D. (P = 0.05)		6.46	3.60	2.57	1.67	0.16

TABLE II - *Effect of seed treatment with nematicides on* M. incognita *population and root-knot development on green gram cv. PLM-97 under field conditions.*

Treatment	Concentration % (a.i. W/W)	No. females per plant	No. egg masses per plant	No. galls per root system	Reproduction factor (RF)[1]
Carbofuran	0.5	75.4	40.6	56.3	3.51
	1.0	54.9	29.7	39.2	2.29
	2.0	39.1	18.2	26.8	1.34
Diazinon	0.5	89.6	51.3	68.2	3.97
	1.0	71.3	40.7	53.3	2.86
	2.0	56.6	31.9	38.1	1.99
Phorate	0.5	85.1	48.6	64.5	3.88
	1.0	64.2	36.6	47.2	2.60
	2.0	47.7	27.1	33.4	1.71
Prophos	0.5	92.8	57.3	70.8	4.05
	1.0	78.2	45.1	59.5	3.23
	2.0	64.6	36.3	47.1	2.28
Sebuphos	0.5	79.4	45.1	59.8	3.66
	1.0	57.6	32.7	41.3	2.44
	2.0	43.3	24.4	29.8	1.43
Control		96.3	55.4	74.6	4.09
Initial population					658.00
C.D. (P = 0.05)		11.75	7.65	10.53	0.38

[1] = RF = Pf/Pi (Final Population/Initial Population).

Literature cited

HARTMAN K., 1983. Enhancement technique for egg masses of root-knot nematode with phloxine B. *In*: Proc. Third Res. & Plann. Conf. on root-knot nematodes, *Meloidogyne* spp. (C.C. Carter ed.), IMP, Lima, Peru, 233 pp.

KAUSHIK H. D. and BAJAJ H. K., 1981. Control of root-knot nematode *M. javanica* infesting mungbean and gram by seed treatment. *Haryana Agric. Univ. J. Res., 11*: 106-108.

OOSTENBRINK M., 1966. Major characteristic of the relation between nematodes and plants. *Meded Hogesh., Wageningen, 66*: 3-46.

PANSE V. G. and SUKHATME P. V., 1889. *Statistical methods for agricultural workers*. Indian Council of Agricultural Research Publication, New Delhi, India 359 pp.

SOUTHEY J. F., 1986. *Laboratory methods for work with plant and soil nematodes*. Min. Agri. Fish. and Food, HMSO, London, 202 pp.

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