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MANAGEMENT OF *MELOIDOGYNE INCOGNITA* AND *HELICOTYLENCHUS MULTICINCTUS* IN BANANA WITH ORGANIC AMENDMENTS

by

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Summary. A field experiment was conducted for three years to assess the effect of organic amendments on the management of the root-knot nematode *Meloidogyne incognita* and the spiral nematode *Helicotylenchus multicinctus* on banana. There was a significant reduction in the nematode population in plants treated with press-mud (15 t/ha) or neem cake (1.5 t/ha). The organic amendments enhanced plant height, pseudostem girth, number of leaves per plant and leaf area and also increased the fruit yield. The organic amendments were comparable with carbofuran treatment.

Studies carried out in major banana growing areas of Tamil Nadu State, India have shown frequent association of the root-knot and spiral nematode with the crop (Jonathan, 1994). The yield loss of banana due to *Meloidogyne incognita* is ca. 30 per cent (Jonathan, 1994) with a similar loss estimated for *Helicotylenchus multicinctus* (Rajendran 1984). Organic amendments are considered to be generally sucessful in the control of plant parasitic nematodes (Mehta *et al.*, 1994). So an investigation was undertaken to establish whether organic amendments could be effective against the root-knot and spiral nematodes infesting banana.

Materials and methods

The experiment was conducted for three years in a field infested with *M. incognita* (Kofoid *et* White) Chitw. and *H. multicinctus* (Cobb) Golden in a completely randomised block design with eight treatments each replicated three times. Banana (*Musa* sp.) suckers cv. Poovan of uniform size, each weighing approximately 1250 g were selected, peeled to a depth of 1 cm, treated with hot water (50-55 °C) for 10 minutes and planted at a spacing of 2.1 x 2.1 m. Pre-treatment soil samples were collected for estimation of nematode populations. The organic amendments were applied at the rates shown in Table I around the suckers and covered with soil.

The plant growth parameters viz., plant height, pseudostem girth, number of leaves and leaf area were recorded 180 days after planting. Post treatment soil and root samples were collected on 180, 270, and 360 days after planting. Nematode populations were estimated in 250 cc soil and 5 g of root sub-samples from each plot. Nematodes were extracted from soil using Cobb's sieving gravity method and Baermann funnel technique. The plants were carefully uprooted at harvest and the gall index graded on a 1 to 5 scale (Heald *et al.*, 1989).

Results and discussion

There was a significant increase in the height of plants in plots treated with carbofuran (3 kg a.i./ha), pressmud (15 t/ha) and neem cake (1.5 t/ha) (Table I). The highest pseudostem girth was achieved in pressmud, neem cake and carbofuran treatments. These treatments also produced the greatest number of leaves and largest leaf area (Table I).

Reduction in *M. incognita* and *H. multicinctus* infestation was observed in both pressmud and neem cake treatments and the effect was comparable with carbofuran treatment. Significant reduction in nematode population was recorded in the treatments up to harvest. The lowest root gall index occurred in carbofuran, pressmud and neem cake treatments compared with the control plants which had the maximum value of 5 (Table II).

The results of the experiment repeated during the year 1996-97 and 1997-98 were precisely similar to those obtained in 1995-96. The present study has indicated the effect of pressmud and neem cake in minimising the infestation of root-knot and spiral nematodes in banana. The organic amendments suppressed nematode infestation and consequently increased plant growth and yield. Pressmud, a sugar factory waste, can be provided at a very low cost, but it must be allowed to cure for three months before application to the field. It is a cost effective and environmentally friendly management of banana nematodes.

TABLE I - *Effect of organic amendments on plant growth and yield of banana in soil infested by* Meloidogyne incognita *and* Helicotylenchus multicinctus.

Treatment	Plant height (cm)	Pseudostem girth (cm)	Leaves/plant (Number)	Total leaf area (m^2)	Bunch weight (kg)
Pressmud 15 t/ha	192	45.0	8.3	1.00	14.5
Bio-compost 2 t/ha*	169	36.8	6.6	0.81	12.6
Farm yard manure 25 t/ha	172	38.2	6.7	0.84	12.5
Poultry manure 25 t/ha	172	39.2	7.3	0.80	12.6
Neem cake 1.5 t/ha	191	43.9	8.0	0.96	14.4
Castor cake 1.5 t/ha	185	40.8	7.6	0.78	12.9
Carbofuran 3 kg ai/ha	195	43.8	8.6	1.02	14.8
Control	150	29.2	5.7	0.57	9.0
SE	1.9	0.9	0.2	0.02	0.3
CD at 5%	5.7	2.6	0.6	0.05	0.7

* Compost made out of sugar factory wastes.

TABLE II - *Effect of organic amendments on* M. incognita *and* H. multicinctus *infestation in soil and banana roots.*

Treatment	Initial nematode population		Post treatment nematode population												Gall index (1-5 scale[a])
			180 days after planting				270 days after planting				360 days after planting				
	M. incognita	*H. multicinctus*	*M. incognita*		*H. multicinctus*		*M. incognita*		*H. multicinctus*		*M. incognita*		*H. multicinctus*		
	Soil		Soil	Root	Soil	Root	Soil	Root	Soil	Root	Soil	Root	Soil	Root	
Pressmud 15 t/ha	542	262	174	17	69	8	207	20	77	10	225	26	102	15	2.6
Bio-compost 2 t/ha	548	289	234	45	156	15	268	48	179	25	306	55	200	31	4.0
Farm yard manure 25 t/ha	534	271	230	42	161	14	272	45	186	24	300	55	211	31	3.6
Poultry manure 25 t/ha	539	311	242	41	155	16	278	43	190	25	284	57	217	33	3.3
Neem cake 1.5 t/ha	537	256	184	17	76	8	212	22	82	11	230	26	109	17	2.8
Castor cake 1.5 t/ha	540	293	250	39	89	19	247	42	97	30	253	56	117	30	3.5
Carbofuran 3 kg ai/ha	543	259	176	16	72	7	209	20	80	10	229	25	105	15	2.5
Control	551	306	592	52	359	33	662	60	376	50	747	96	397	60	5.0
SE	–	–	3.2	0.2	2.3	0.2	4.1	0.3	2.4	0.6	3.0	0.2	3.3	0.5	0.2
CD	–	–	11.9	0.5	6.8	0.6	12.3	0.8	7.1	1.8	9.1	0.6	10.2	1.6	0.6

[a] gall index: 1 = No galls, 2 = 1-25% galling, 3 = 26-50% galling, 4 = 51-75% galling, 5 = 76-100% galling per root system.

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Accepted for publication on 21 February 2000.