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EFFECT OF THREE SYSTEMIC NEMATICIDES AGAINST ROOT-KNOT NEMATODES IN A CARDAMOM NURSERY[1]

by
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Heavy incidence of *Meloidogyne incognita* (Kofoid *et* White) Chitw. in nurseries of cardamom [*Elettaria cardamomum* (L.) Maton] was reported in Kerala (Koshy *et al.*, 1976; Ali and Koshy, 1982) and Tamil Nadu (Ali, 1982) states of South India. Seedlings infested with root-knot nematodes had poor tillering and stunted growth, rosetting of the leaves with yellowing of leaf margins and drying of leaf tips. The severe symptoms were curling of the unopened leaf which failed to emerge from a whip like structure. Young seedlings had typical nematode galling on the roots which later branched profusely, especially at the tip.

In the regions of South India where cardamom is cultivated, it is a common practice to establish cardamom nurseries within plantations where a constant water source is available. In order to establish such nurseries, the undergrowth and overhead shade is cleared away to get adequate light for emerging seedlings. Since land and a water source are limiting factors, the sites of nursieres generally remain unchanged for many years. Such repeated cropping favours the build up of nematode populations. When infected seedlings are transplanted into production fields, their establishment and growth are poor. Several infected seedlings are the cause of the widespread distribution of nematodes over a large area of a plantation creating additional production hazards.

The nematicidal control of root-knot nematodes was investigated in

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heavily infested primary nursery beds at the Central Plantation Crops Research Institute, Research Centre Appangala, Kodagu district, Karnataka. The site of this nursery had been used for more than three years for raising seedlings. In the experiment, seedlings were raised in 6×1 m beds 30 cm above the ground. Humus rich heavy forest soil was used for the preparation of beds. After the seedlings had emerged, the beds were shaded with overhead coir mat pandals, mulched, and irrigated on alternative days.

The months after emergence, the seedlings were treated with the three nematicides at the dosages indicated in Table I. The mean population density of root-knot nematodes in the soil prior to treatment was 435 second stage juveniles per 250 g. Treatments were replicated and randomized three times. Controls were untreated. After three months, ten seedlings with intact root systems were randomly removed from each plot. The roots were thoroughly washed free from soil. Data on root length, shoot length and number of tillers were recorded. A composite of 250 g soil samples was drawn from each plot and nematodes were extracted by Cobb's sieving technique.

Roots were cut into small pieces, mixed thoroughly and a 5 g sample taken at random was stained in boiling acid fuchsin lactophenol for three minutes and comminuted in a Waring Blender for 30 seconds. Three aliquots of 5 ml were examined for eggs, juveniles and adults. Rating for galling was not always possible as excessive branching of roots was found in almost all of the seedlings instead of typical galling.

None of the nematicide treatments totally prevented nematode infestation but there were significant reductions in root-knot densities between the treatments (Table I). The largest decrease in nematode numbers occurred in beds treated with the highest doses of nematicides. Phorate 5 Kg ai/ha was less effective than aldicarb and carbofuran at the same rate. Seedling growth in plots treated with carbofuran at 15 Kg ai/ha was better than the corresponding rate of aldicarb. However, carbofuran provided 84% reduction in nematode numbers in contrast to 90% by aldicarb.

There were significant differences in the growth of seedlings between the treatments and the control. Similar results were obtained by Koshy *et al.*, 1979 in secondary cardamom seedlings treated with fensulfothion, aldicarb and carbofuran.

The treated seedlings put out new shoots and were more vigorous than the untreated plants. Some of the untreated seedlings exhibited leaf curling and the leaf failed to emerge.

Table I - *Effect of three systemic nematicides on* Meloidogyne incognita *and growth of plants in a primary cardamom nursery*

Treatments	No. of tillers	Rhizome weight (g)	Root length (cm)	Shoot length (cm)	Nematode numbers Root (per g)	Nematode numbers Soil (per 250 g)
Aldicarb 5 Kg/ha	1.8	7.8	30.5	31.5	770	291
Aldicarb 10 Kg/ha	2.4	8.6	36.8	39.1	379	140
Aldicarb 15 Kg/ha	3.8	12.1	40.5	43.8	136	62
Carbofuran 5 Kg/ha	2.2	7.4	28.4	29.7	839	381
Carbofuran 10 Kg/ha	3.7	9.2	35.0	39.8	406	189
Carbofuran 15 Kg/ha	4.1	12.3	44.3	46.3	149	79
Phorate 5 Kg/ha	1.3	4.8	29.2	28.0	926	460
Phorate 10 Kg/ha	1.9	7.1	32.5	31.5	513	263
Phorate 15 Kg/ha	2.1	10.4	39.2	41.2	246	90
Control	1.1	3.1	23.9	22.5	1351	571
LSD at 5%	0.23	0.42	6.58	1.68	29.35	13.34

The ratio of benefit in seedling cost and treatment cost of aldicarb and carbofuran at 15 Kg/ha is 10:1 and 16:1 respectively, considering the advantage of getting more vigorous, better quality seedlings and 100% establishment of transplants in secondary nurseries and in main fields.

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