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EFFICACY OF FOUR SYSTEMIC NEMATICIDES AGAINST *RADOPHOLUS SIMILIS* IN COCONUT NURSERY

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Abstract : Four systemic nematicides, aldicarb, carbofuran, phorate and phenamiphos at 10, 15 and 25 kg a.i./ha, applied three times at the same rate for a period of one year against the burrowing nematode, *Radopholus similis* in coconut nursery, were evaluated. In general, all the treated plants recorded significantincrease in plant growth but this increase was not consistent with increase in dosage of chemicals. Carbofuran @ 15 kg a.i./ha recorded maximum plant growth compared to 10 or 25 kg a.i./ha. Except 10 kg a.i./ha of aldicarb and 10 and 25 kg a.i./ha of carbofuran all the other dosages and chemicals reduced nematode population significantly. At all dosages, aldicarb treated plants recorded maximum plant growth compared to respective doses of the other three chemicals. Phorate and phenamiphos, at all three levels, were found to decrease the nematode population significantly but plants treated with phenamiphos always recorded better plant growth than phorate. There was no significant difference between three dosages of phorate and phenamiphos in the control of nematodes as well as their effect on plant growth. Complete control of *R. similis* was obtained with phenamiphos and phorate @ 25 kg a.i./ha. Thus application of phenamiphos or phorate @ 25 kg a.i./ha is recommended for release of nematode free seedlings from infested coconut nurseries.

Key words : *Radopholus similis*, Systemic nematicides, Coconut nursery, Control.

In India, coconut is grown in about 1.1 million hectares and 67 per cent of the total area under cultivation is in Kerala State. The department of Agriculture, Kerala State distributes 18 *lakh* cocount seedlings every year from 20 coconut nurseries, located at different places in the State. Extensive surveys have shown wide spread occurrence of *Radopholus similis* in the southern parts of the country and even in nurseries (Koshy *et al.* 1978; Koshy and Sosamma, 1979). To prevent, if possible, its spread to uninfested areas, through infested coconut seedlings, a control experiment was set up with four systemic nematicides to evaluate their efficacy against *R. similis* infested coconut seedlings.

MATERIALS AND METHODS

The experiment was laid out in sandy loam soil on cocount cultivar West Coast Tall at District Agricultural Farm (3.667 ha), Karunagapplly, Quilon district, Kerala during 1980 where banana was grown continuously as a shade crop for ten years till 1978. Sprouts with a plumule height of 8 to 10 cm were selected and planted in previously prepared 65 beds, comprising 6500 sprouts in the month of August, 1980. Care was taken to avoid sprouts that had put out roots outside the husk. Four systemic nematicides, aldicarb 10 G, carbofuran 3G, phorate 10G and phenamiphos 40 EC @ 10, 15 and 25 kg a.i./ha (0.1, 0.5 and 0.25 g a.i./m^2) were tested in a com-

pletely randomized block design. Each treatment was replicated five times in a bed size of 7.5 × 1.5 m containing 100 seedlings in four lines per bed and the chemicals were applied thrice a year (September, December and May). *R. similis* population is known to be minimum in summer, hence applications were resumed only in May after the onset of few monsoon showers. Furrows were opened on both sides of the sprouts, in each bed, to a depth of 15-20 cm and the required quantity of the nematicide was mixed with 5 kg dry soil and applied uniformly in furrows manually. The furrows were covered with the displaced soil. Control beds received all the operations other than the nematicides. The plots were irrigated heavily after application of nematicides and regularly twice a week. The plots were kept free of weeds. Soil and root samples were taken for nematode assays prior to each treatment and care was also taken to avoid border plants from sampling. Fifteen uniform plants of the two centre rows were marked for recording height, number of leaves and girth at collar region.

In August 1981, five plants each were carefully removed with intact root system, at random, from every bed and washed free of soil for recording final growth characters. A composite sample of 250 g. soil was taken from each bed for assessing nematode population. Root samples (10 g) were collected from each plant, and stained for count of nematode population in roots. Samples were also drawn from haustorium, plumule and roots inside the husk for nematode estimation.

RESULTS

Among the four chemicals, at 10 kg a.i./ha, aldicarb gave the best plant growth followed by phenamiphos, carbofuran and phorate but significant reduction in nematode population and lesion index was obtained with phorate followed by phenamiphos and not with aldicarb or carbofuran (Table I)

The higher dose of 15 kg a.i./ha also showed a similar trend with regard to reduction in nematode population and lesion index with added efficacy of aldicarb. Plant growth (shoot length and weight) was again maximum with aldicarb followed by carbofuran and phenamiphos.

At 25 kg a.i./ha, phorate and phenamiphos resulted in absolute control of *R. similis* in roots. At this dose, carbofuran also reduced the population significantly.

The samples from haustorium (apple-10 g), base of the stem (35 g) and roots inside the husk (50 g) yielded more numbers of *R. similis* from untreated plants than the treated ones.

DISCUSSION

For control of nematodes, among the four chemicals tried at three levels viz. 10, 15 and 25 kg a.i./ha, it was observed that except 10 kg a.i./ha of aldicarb and 10 and 15 kg a.i./ha of carbofuran all others were found to have significant effect at one per cent level. All the treated plants recorded highly significant increase in number of leaves and collar girth over controls but this was not consistent with an increase in chemical dosage or with all the plant growth characters. At all the dosages, aldicarb treated plants recorded maximum growth while phorate recorded maximum reduction in nematode population. Phenamiphos, @ 10 kg. a.i./ha, appeared, however, to be the best when both, reduction in nematode population as well as plant growth were considered together. This agrees with Burnett *et al.*, (1974) who reported that phenamiphos is highly effective against *R. similis* on banana. Melin and Vilardebo (1976) and Vilardebo and Guerout (1976) have also reported that three application of 3 g a.i. phenamiphos per plant results in best yield of

TABLE I. *Effect of nematicides on growth characters of coconut seedlings and nematode populations*

Treatments (kg a.i./ha)	Shoot length (cm)	Shoot weight (g)	No. of leaves	Collar girth (cm)	Root lesion index	Nematode population/ g root
Aldicarb						
10	196.2	566.0	7.0	13.2	3.1	185
15	191·2	570.2	7.0	13.6	2.6	77
25	201.2	611.0	6.8	14.0	1.6	11
Carbofuran						
10	176.6	450.4	7.2	12.2	3.7	205
15	190.4	539.4	7.2	13.4	4.1	167
25	170.0	478.8	7.0	12.6	2.6	26
Phorate						
10	164.8	454.8	7.0	12.8	1.2	14
15	167.4	459.6	7.2	12.8	1.2	2
25	172.0	220.8	7.4	13.4	1.0	0
Phenamiphos						
10	183.0	526.2	7.0	13.1	2.0	29
15	183.0	527.6	6.8	12.9	2.0	6
25	188.0	535.2	7.0	13.1	1.7	0
Control	158.2	429.4	6.0	12.7	4.7	269
C.D. at 1%	13.2**	67.1**	0.47**	0.65**	1.02**	89.5**

banana. In the present trial, 1 g a.i/m², applied three times in a year, gave the best plant growth and reduction in nematode population compared to other three chemicals. Also with 2.5 g a.i./m², applied three times in a year, absolute control of *R. similis* was obtained with phorate as well as phenamiphos.

A perusal of the literature on control of *R. similis* on banana using systemic nematicides reveals that all these experiments were to get increase in banana yield by bringing down the nematode population, but the present study was to find out a dosage for the release of nematode free seedlings to the farmers. Koshy and Sosamma (1979) reported control of *R. similis* on infested coconut seedlings by a dip in DBCP 1000 ppm concentration for 15 minutes. Koshy and Nair (1979) reported ineffectiveness in reduction in root population of *R. similis* with fensulfothion, DBCP and carbofuran in a nursery trial at Kasaragod but none of the chemicals was reported to be effective in a complete eradication of the nematode. In the present studies absolute control of *R. similis* could be obtained with phorate and phenamiphos @ 25 kg a.i./ha (2.5 g a.i./m² or 0.25 g a.i./seedling) applied three times in a year compared to 3 g a.i./banana plants for an economic yield.

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