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EFFECT OF DIFFERENT NEMATICIDES AND NEEM OIL CAKE IN THE CONTROL OF *RADOPHOLUS SIMILIS* IN YELLOW LEAF DISEASE AFFECTED ARECANUT PALMS

P. SUNDARARAJU* and P. K. KOSHY

Division of Nematology, Central Plantation Crops Research Institute, Regional Station, Kayangulam, Krishnapuram-690 533 Kerala, India

Abstract : Investigations were carried out to study the effect of three nematicides viz., fensulfothion @ 50 g ai/palm, aldicarb @ 10 g a.i./palm, DBCP @ 10 ml a.i./palm and neem oil cake @ 1.5 kg/palm for the control of *Radopholus similis* in yellow leaf disease affected arecanut palms. All chemicals were effective in reducing the population of *R. similis* significantly compared to the control plants. Fensulfothion yielded maximum number of nuts (347.9) and total nut weight (7958 g) per palm, closely followed by aldicarb against untreated plants which yielded maximum number of 36.5 nuts with a total nut weight of 1066 g per palm.

Key words : *Radopholus similis*, **arecanut, systemic nematicides, neem oil cake**

The arecanut palm, *Areca catechu* L., commonly known as betelnut palm, is extensively cultivated in South India. The production as well as area under arecanut cultivation in Kerala has shown a decreasing trend, in the recent years, mainly because of yellow leaf disease (YLD), a serious threat to this crop in certain districts of Kerala and Karnataka. The burrowing nematode, *Radopholus similis* has been found to be associated with lesions, rotting and black tip of arecanut roots, a primary symptom of yellow leaf disease (Sundararaju & Koshy, 1982). Investigations were therefore, initiated to evaluate nematicides as well as *neem* oil cake for control of *R. similis* on arecanut palms.

MATERIALS AND METHODS

Fifty, bearing palms, of uniform age, exhibiting yellow leaf disease symptoms, were selected during 1976 at Central Plantation Crops Research Institute (CPCRI), Research Centre, Palode, Trivandrum District, Kerala and grouped into 5 lots on the basis of their disease intensity. Pre-treatment soil and root samples were drawn for initial evaluation of *R. similis* and other parasitic nematode population. There were 5 treatments comprising of fensulfothion (Dasanit 5 G) @ 50 g a.i./palm, aldicarb (Temik 10 G) @ 10 g a.i./palm, DBCP (Nemagon 60 EC) @ 10 ml a.i./palm and *neem* oil cake @ 1.5 kg/palm and control. The treatments were randomized and replicated 5 times.

The required quantity of nematicides and *neem* oil cake were applied very near to the root system after opening a basin during May/June, September/October and December/January, depending upon the availability of soil moisture. In the case of DBCP, the calculated quantity of nematicides was mixed with water and

*Section of Nematology, Central Plantation Crops Research Institute, Kasaragod-670 124, Kerala, India.

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then added to the arecanut basin as soil drench. The basins were covered with soil, after applications of nematicides and oil cake, and irrigated immediately. Fertilizer application and other cultural practices were adopted as per standard schedules of the crop.

Per-treatment soil and root population of nematodes were assessed every year during September/October bacause of the availabilty of maximum population during that period. Nematode population from roots was extracted by the method reported by Koshy *et al.* (1975), and the disease severity was estimated as per the indexing method suggested by Rawther (1976) and modified by George *et al.* (1980). Yield data of individual palms were also recorded every year.

RESULTS

Analysis of the data (Table 1) showed that all chemicals were effective in reducing the population of *R. similis* significantly. Initial nematode population varied from 9 to 61 per gram of root. Nematode population in October, 1976, did not show any significant difference, nor were there differences in yield after treatment (Tables 1 and 2). However, the population was reduced considerably after application of nematicides compared to control palms. In the second year (1977) the nematode population in palms treated with fensulfothion, aldicarb, DBCP and *neem* oil cake was significantly less than in control. However, better yield response was noticed only in fensulfothion and *neem* oil cake treatments. During 1978 also significant reduction in the nematode population was observed and interestingly in the succeeding two years, 1979 and 1980, no *R. simlis* could be recovered from the treated palms whereas untreated palms (control) recorded 172 to 425 nematodes per 25 g of roots. Increase in yield was noticed in 1978 in fensulfothion, aldicarb and *neem* oil cake treatments compared to control and DBCP treatments. Though absolute control of *R. similis* was observed in all treatments during 1979, yield response was more only in the case of fensulfothion and aldicarb treatments. Highly significant yield increase was noticed in 1980. Fensulfothion treatment had yielded more number of nuts (347.9) and total nut weight per palm (7958g), closely followed by aldicarb. Treatments with DBCP and *neem* oil cake were at par with each other.

The results with respect to disease indices of arecanut palms in different treatments are given in Table 3. The analysis of the data showed that disease incidence did not differ significantly between the treatments. Considerable reduction of disease indices was noticed in

TABE 1. *Effect of different nematicides and* neem *oil cake in the control of* Radopholus similis *in YLD affected arecanut palms*:

(a) *Nematode population in the roots during different years (Mean of five replications)*

Sl. No.	Treatments	Dosage	Initial population	Nematode population in 25 g of roots				
				1976	1977	1978	1979	1980
1.	Aldicarb	@ 10 g a.i./palm	1525	180	48	15	0	0
2.	DBCP	@ 10 ml a.i./palm	1350	152	4	0	0	0
3.	Fensulfothion	@ 50 g a.i./palm	865	125	7	5	0	0
4.	Neem oil cake	@ 1.5 kg/palm	242	120	135	50	0	0
5.	Control		625	648	380	425	472	205

TABLE 2. *Effect of different nematicides and* neem *oil cake in the control of* Radopholus similis *in YLD affected arecanut palms*;

(b) *Yield of nuts during different years (Mean of five replications)*

Sl. No.	Treatment and dosage	Fruit yield (Number of nuts and nut weight)									
		1976–'77		1977–'78		1978–'79		1979–'80		1980–'81	
		No. of nuts	Nut weight (g)	No. of nuts	Nut weight (g)	No. of nuts	Nut weight (g)	No. of nuts	Nut weight (g)	No. of nuts	Nut weight (g)
1.	Aldicarb @ 10 g a.i./palm	163.1 (12.8)	3 66	426.5 (11.3)	2520	147.0 (12.1)	4624	172.4 (13.1)	4488	250.9 (15.8)	6205
2.	DBCP @ 10 ml a.i./palm	20).2 (14.5)	4542	81.4 (9.0)	1680	149.3 (12.2)	3078	185.3 (13.6)	3990	111.6 (10.6)	3034
3.	Fensulfothion @ 50 g a.i./palm	331.3 (18.2)	7210	121.2 (11.0)	3360	241.9 (15 6)	6360	234.6 (15.3)	5838	347.9 (18.7)	7958
4.	Neem oil cake @ 1.5 kg/palm	224.4 (15.0)	4640	125.9 (11.2)	4490	200.3 (14.2)	4926	167.7 (13.0)	4230	140.1 (11.8)	3066
5.	Control	137.8 (11.7)	3376	68.7 (8.3)	1868	125.4 (11.2)	2964	88.9 (9.4)	2292	36.5 (6.0)	1066
	C.D. at 5%	NS		NS		NS		NS		5.8	3647

Figures in parentheses are square root transformed values.

TABLE 3. *Effect of different nematicides and* neem *oil cake in the control of* Radopholus similis *in YLD affected arecanut palms* :

(c) *Disease indices assessed during different years (Mean of five replications)*

Sl. No.	Treatments	Dosage	Pre-treatment disease index	Disease indices during different years					Mean
				1976	1977	1978	1979	1980	
1.	Aldicarb	@ 10g a.i./palm	37.8	28.8	29.8	24.8	24.2	21.0	25.7
2.	DBCP	@ 10 ml a.i./palm	33.6	30.4	26.2	27.2	30.8	34.2	23.7
3.	Fensulfothion	@ 50 g a.i./palm	28.0	22.6	20.8	21.6	24.8	21.2	22.2
4.	Neem oil cake	@ 1.5 kg/palm	35.4	31.8	30.4	23.8	23.4	27.0	27.3
5.	Control		25.2	33.6	35.2	36.2	37.2	43.0	37.0

the palms treated with fensulfothion and aldicarb compared to untreated (control) palms during 1980. Decrease in disease incidence and increase in yield were observed in all treatments compared to control in the fifth year (1980) while comparing the severity of disease symptoms before and after application of nematicides, it is interesting to note that a gradual decrease in disease incidence was seen in treated palms as compared to that in untreated (control) palms.

DISCUSSION

The results of the experiment on yellow leaf disease affected arecanut palms showed that during the fourth and fifth years, no population of *R. similis* could be recovered from the nematicides and *neem* oil cake treated palms.

Fensulfothion and aldicarb were effective both in controlling the nematode and in increasing the yield of arecanut. The effectiveness of fensulfothion and aldicarb for control of *R. similis* and increasing the yield has been reported on on banana by Nair (1979). Similar observations were also reported by Sundaraju and Koshy (1983) on arecanut seedlings in pot conditions. The present result is also in agreement with that of Broadley (1979), who reported that fensulfothion @ 2 g a.i./stool applied to banana 3 times in a year continuously for 4 years gave maximum control of *R. similis*.

From the studies it was seen that fensulfothion @ 50 g a.i./palm and aldicarb @ 10 g a.i./palm applied at the same dosage to arecanut palm thrice a year, continuously for 4 years gave absolute control of *R. similis*, increased yields significantly and also resulted in decreased disease indices of the yellow leaf disease.

The yield increase might have been due to the increased root growth, resulting in better uptake of plant nutrients. The disease indices of treated palms were also low which is encouraging even though the role of this nematode in the etiology of yellow leaf disease could not be fully established. Root rot is one of the major symptoms of YLD and the present result therefore, suggests the role of this nematode as a predisposing factor in the incidence of yellow leaf disease of arecanut.

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