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OCCURRENCE OF ROOT-KNOT NEMATODES
IN CARDAMOM PLANTATIONS OF KERALA (1)

by
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Among the spices of India, Cardamom [*Elettaria cardamomum* (L.) Maton] occupies over 91,000 hectares with an annual production ranging from 2,600 to 3,800 M.T. It has an export value of Rs. 48 crores (Anon; 1978). The first report of *Meloidogyne* spp. on cardamom was from coffee tracts of South Western India (D' Souza *et al*, 1970). This was followed by reports of *M. javanica* and *M. incognita* (Kumar *et al*, 1971) and *M. incognita* (Koshy *et al*, 1976 and Sundararaju *et al*, 1979).

As a part of an investigation of plant parasitic nematodes associated with cardamom, a survey was carried out in Kerala where 60 per cent of the Indian crop is grown. This paper is concerned with the distribution of root-knot nematodes which were associated with severe damage in nursery and field crops of cardamom.

Two hundred and eighteen root samples and 159 soil samples were collected from field and nurseries in four districts of Kerala (Table I). Each sample consisted of 250 g of soil and 10-15 g of roots. Due to practical difficulties soil samples were not collected in all cases. Nematodes were extracted from soil samples by Cobb's sieving technique and from root samples (5 g) by cutting them into small pieces and leaving in water in petri plates for 48 h at room temperature. Nematodes were collected on a 400 mesh sieve after passing through a 25 mesh sieve. Another lot of roots was stained

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Table I. - Occurrence of root-knot nematodes on cardamom in Kerala (Root and Soil).

AREA	Sites sampled and average population/g of root and 250 g of soil *													POSITIVE FOR	
	NURSERIES								PLANTATIONS				Total		
	PRIMARY				SECONDARY										
	No. of root samples	Average root population	No. of soil samples	Average soil population	No. of root samples	Average root population	No. of soil samples	Average soil population	No. of root samples	Average root population	No. of soil samples	Average soil population			
<i>Idukki district</i>															
Peermadu Taluk	6	478	8	260	18	327	16	236	19	803	16	669	83	83	—
Udumbanchola Taluk	4	2577	3	109	40	580	33	337	48	336	37	721	165	165	—
Devikulam Taluk	7	1030	4	271	17	318	10	77	12	113	5	351	55	55	—
Thodupuzha Taluk	7	34	4	72	1	10	1	11	5	52	1	153	19	19	—
<i>Quilon District</i>															
Pathanamthitta Taluk	1	180	1	4	6	975	3	134	2	255	2	2	15	15	—
<i>Calicut district</i>															
South Wynad Taluk	—	—	—	—	3	170	1	2	12	271	8	126	24	20	4
North Wynad Taluk	—	—	—	—	1	519	—	—	1	619	—	—	2	2	—
<i>Palghat district</i>															
Chitoor Taluk	—	—	—	—	—	—	—	—	8	555	6	428	14	10	4
TOTAL	25	4299	20	716	86	2899	64	797	107	3004	75	2450	377	369	8

* All soil and root samples from nurseries and plantations yielded root-knot nematode population.

with acid fuchsin lactophenol and 15-20 females were teased out. Staining of roots was necessary as galling of the root was not observed in all cases. Anterior and posterior ends of adult females were cut and mounted in lactophenol for species identification.

Root-knot nematodes were present in all fields of cardamom as well as in primary and secondary nurseries sampled (Table I) indicating that infestation is widespread in Kerala. Distribution in the four districts further suggests that infested plants from nurseries must have been frequently planted in the main fields for many several years. The reported yield decline of cardamom in recent years may be the result of widespread distribution of *Meloidogyne* spp. in nursery stocks.

Infested plants in the field exhibited the following symptoms. Poor stand and tillering, yellowing and necrosis of leaf tips and margins, narrowing of leaf blade, heavy to mild fruit drop, excessive branching (witches broom) and galling of roots. These symptoms had previously been attributed to nutritional deficiencies, defective agrotechniques and inadequate shading.

The infested nursery plants also exhibited all the above symptoms. The heavily infested plants from primary nurseries on transplanting to the secondary nursery showed curling of the unopened leaf which failed to emerge. Some emerged after breaking open the pseudostem.

M. incognita (Kofoid *et* White) Chitw. was recorded from Idukki, Quilon, Calicut and Palghat districts while *M. javanica* (Treub) Chitw. was reported from Calicut and Palghat districts only.

More sampling is required in the cardamom growing tracts extending from Kerala to Karnataka and Tamil Nadu States of South India to improve our understanding of the distribution of root-knot nematodes. The yield losses due to root-knot nematodes need to be assessed in order to evaluate the economics of control for this valuable crop.

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