

## SURVEY OF PLANT PARASITIC NEMATODES OF COCONUT IN INDIA

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### ABSTRACT

In India coconut is grown in about 1.1 million hectares and 67 per cent of the total area under cultivation is in Kerala. A total of 210 soil samples collected from locations from the root zone of coconut, yielded 29 genera of plant parasitic nematodes viz : *Aphelenchus* (7%), *Aphelenchoides* (3%), *Atylenchus* (1%), *Caloosia* (6%), *Criconeoides* (11%), *Dolichodorus* (6%), *Ditylenchus* (9%), *Dipterophora* (2%), *Helicotylenchus* (50%), *Hemicriconeoides* (2%), *Hemicyclophora* (3%), *Hirshmanniella* (2%), *Hoplolaimus* (25%), *Longidorus* (11%), *Macroposthonia* (3%), *Meloidogyne* (15%), *Neotylenchus* (1%), *Paratylenchus* (2%), *Pratylenchus* (11%), *Paralongidorus* (2%), *Psilenchus* (1%), *Radopholus* (25%), *Rotylenchus* (5%), *Rotylenchulus* (21%), *Scutellonema* (5%), *Tylenchus* (3%), *Tylenchorhynchus* (50%), *Trichodorus* (4%), and *Xiphinema* (11%). Though plenty of second stage larvae of *Meloidogyne* sp. and pre-adult forms of *Rotylenchulus* sp. were encountered no females of any of these were found within the root tissues. *Radopholus similis* population was frequently met within the roots showing lesions. *R. similis* infested roots exhibited elongate reddish brown lesions and various intensities of rooting. The maximum *R. similis* population recorded was 745 g of root during the survey. Maximum *R. similis* population occurred during September to November and the least during April to June. Therefore surveys for *R. similis* may preferably be carried out during these peak periods.

It was seen that coconut root bits of 2-3 cm length split into 4 to 8 pieces left submerged in water for 48 hours under laboratory conditions (26-32°C) became dark brown in colour with a slimy scum formation on the water surface. Openings of the finer test sieves used to get blocked within one or two months of their use. The same difficulty was encountered with root samples of arecanut, pepper and banana but not with root samples of turmeric and ginger, which could be overcome by subjecting the root samples for extraction to lower temperature conditions (10-20°C) in a frigidaire or BOD incubator. Not only the recovery of nematodes was poor but also the nematodes were inactive under laboratory conditions. The rich tannin content of the roots may be the possible reason for this.

In India coconut is grown in about 1.1 million hectares and 67 per cent of the total area under cultivation is in Kerala. A total of 48 genera of nematodes have been reported from coconut, of which 38 are plant parasites (Govindankutty and Koshy, 1978). The most important among them is *Rhadinaphelenchus cocophilus* followed by *Radopholus similis*. The former, causing red ring disease of coconut (Fenwick, 1969; Blair, 1969), has not been recorded so far from India. Weischer (1967) recorded *R. similis* from India along with 14 other genera of plant parasitic nematodes. Koshy *et al.* (1978) recorded widespread occurrence of *R. similis* in South India. Results of a survey conducted on coconut in Kerala are reported hereafter.

A total of 210 samples covered 39 localities in 10 districts of coconut gardens in Kerala. The samples were taken after every 10 kilometres along the important roads in Kerala. Root and soil samples were collected one metre away from the bole of the palm from a depth of 10-50 cm with a 75 mm diameter soil auger. Three such samples were taken within the basin at 120° from each other, mixed well and 250 c. c. samples were drawn. In addition to the root bits collected through the auger, 50 to 60 g of tender white to orange coloured semihard portions of the main roots also were collected wherever possible from the base of the palm. Soil samples were processed by sieving and sifting method and root populations were extracted by the method reported by Koshy *et al.* (1975) and counts made under a stereoscopic microscope. The survey was conducted during September to January, the period of maximum nematode occurrence (Koshy and Sosamma, 1978).

Twenty-nine genera of plant parasitic nematodes were recorded from soil (Table I). *R. similis* and *Pratylenchus* sp. were recorded from the root samples. Between the two endoparasitic nematodes encountered, percentage occurrence of *R. similis* was 35% whereas *Pratylenchus* sp. was recorded only in 2% of the samples.

Table 1. Occurrence and population density of nematodes  
in Association with coconut

Genera	Number of occurrences in 210 samples	Population range in 250,g soil
<i>Aphelenchus</i> sp.	14	1-16
<i>Aphelenchoides</i> sp.	7	1-9
<i>Atylenchus</i> sp.	3	3-16
<i>Caloosia</i> sp.	13	7-19
<i>Criconemoides</i> sp.	22	1-16
<i>Dolichodorus pulvinus</i>	12	1-19
<i>Ditylenchus</i> sp.	18	1-6
<i>Diphtherophora</i> sp.	4	1-8
<i>Helicotylenchus</i> sp.	105	1-245
<i>Hemicriconemoides</i> sp.	4	1-6
<i>Hemicycliophora</i> sp.	6	1-15
<i>Hirshmanniella</i> sp.	4	3-21
<i>Hoplolaimus</i> sp.	52	1-18
<i>Longidorus saginus</i>	23	1-11
<i>Macroposthonia oachirai</i>	7	2-16
<i>Meloidogyne</i> sp.	32	1-126
<i>Neotylenchus</i> sp.	2	1-4
<i>Paratylenchus</i> sp.	5	1-122
<i>Pratylenchus</i> sp.	22	1-546
<i>Paralongidorus flexus</i>	4	1-7
<i>Psilenchus</i> sp.	2	10-15
<i>Radopholus similis</i>	52	1-94
<i>Rotylenchulus</i> sp.	10	1-22
<i>Rotylenchulus reniformis</i>	43	3-1413
<i>Scutellonema</i> sp.	10	6-14
<i>Tylenchus</i> sp.	7	1-7
<i>Tylencherhynchus elegans</i>	104	1-370
<i>Trichodorus</i> sp.	9	1-7
<i>Xiphinema americanum</i>	24	1-94

*R. similis* infested roots exhibited typical lesions and various intensities of rotting whereas no symptom could be noticed on *Pratylenchus* infested roots. The maximum *R. similis* population recorded during the survey was 745/g of root. Although numerous second stage larvae of *Meloidogyne* sp. and pre-adult forms of *Rotylenchulus reniformis* were encountered from the soil samples, no females of either of these were recorded within the root tissues.

It was observed that coconut root segments 2-3 cm long and split into 4-8 pieces when left submerged in water under laboratory conditions for extraction, the water become dark brown in colour along with a slimy scum formation on the surface. On sieving, it was found the opening of the finer sieves were occluded by the scum. Besides the low percentage of recovery of *R. similis*, the nematodes extracted were found to be less active. Among the various methods tried, extraction at lower temperature (15-20°C) was found to be the easiest.

On examination, seedlings distributed from coconut nurseries in Karunagappally, Nileswar and Kasaragod recorded heavy incidence of *R. similis*. The average *R. similis* population ranged from 38/g of root at Kasaragod to 745g of root at Karunagappally. The burrowing nematode has so far been reported only from Kerala, Tamil Nadu and Karnataka States (Koshy *et al.* 1978). Therefore in view of the wide host-range and potential as a pathogen, carrying seedlings to the uninfested areas is not advisable. Seedlings therefore should be propagated only in clean soil or in soil treated with nematicides adequately to ensure nematode-free seedlings.

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