

## NEMATODES ASSOCIATED WITH COCONUT NURSERIES IN KARACHI AND ADJOINING AREAS. Part-I

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A comprehensive survey of coconut growing areas in and around Karachi revealed the presence of large populations of these nematodes. *Helicotylenchus multicinctus*, *H. martini*, *Hoplolaimus indicus*, *Pratylenchus penetrans*, *P. zae*, *Tylenchorhynchus maximus*, *Hemicriconemoides strictathecatus*, and *Xiphinema americanum*. Coconut seedlings were treated with 1% Tenekil for the establishment of nematode free nursery.

**Key words:** Nematodes, Coconut, Control.

### Introduction

The coconut palm (*Cocos nucifera* L.) is found throughout the tropics usually along the sea shore. The climate of Karachi is very suitable for its growth, but it is susceptible to the attack of several pests of major and minor importance including nematodes. The most important nematode pest is *Rhadinaphelenchus cocophilus* which causes red ring disease of coconut and oil palm. Fortunately this nematode is not found in Pakistan. Another important nematode disease found in coconut palm is root-rot disease caused by burrowing nematode *Radopholus similis* (Cobb, 1893) and Thorne, 1949. This nematode on infestation produces small reddish brown cortical lesions on roots of coconut which later coalesce and cause extensive root-rotting [1]. Koshy *et al.* [2] reported major attack of *Radopholus similis* in South India on coconut. Koshy and Sosamma [3] recovered maximum population of these nematodes during Sept.-Nov.

Weischer [4] examined sixty soil samples from root (wilt) disease affected palms and reported 15 genera of plant parasitic nematodes from the rhizospheres of coconut i.e. *Xiphinema*, *Longidorus*, *Hoplolaimus*, *Meloidogyne*, *Tylenchorhynchus*, *Helicotylenchus*, *Dolichodorus*, *Pratylenchus*, *Radopholus*, *Rotylenchulus*, *Hemicyclophora*, *Criconema*, *Hemicriconemoides* and *Paratylenchus*. Bilqees and Khan [5] reported *Aphelenchoides* spp., *Helicotylenchus* spp., *Hemicriconemoides* spp., *Hoplolaimus* spp., *Longidorus* spp., *Paratylenchus* spp., *Psilenchus* spp., *Tylenchorhynchus* spp., *Tylenchus* spp., *Rotylenchulus* spp. and *Xiphinema* spp. from four localities of Baluchistan.

Koshy *et al.* [6] and Raski *et al.* [7] recorded *Boleodorus* spp., *Parodontus* spp., *Caloosia* spp., *Tylenchorhynchus coffeae*, *Psilenchus* spp., *Ditylenchus* spp., *Atylenchus* spp., *Neotylenchus* spp., *Rotylenchus* spp., *Scutellonema* spp., *Helicotylenchus abunammal*, *Hoplolaimus seinhorsti*, *Hirschmaniella oryzae*, *Xiphinema elongatum*, *Trichodorus* spp.,

*Paratrichodorus acaudatus*, *Tylencholaimellus* spp., *Diphtherophora* spp., *Epicharinemakeralense*, *Ecphyadophora* spp., *Aphelenchus isomerus* and *Aphelenchoides* spp. Koshy [8] found that *Radopholus similis*, *Pratylenchus zae*, *Dolichodorus pulvinus* and *Longidorus saginus* were found to be feeding on coconut and other nematodes may be feeding on other intercrops. Khan *et al.* [9] isolated *Paralongidorus citri* Siddiqi, 1963. *P. citri* was found in high frequency (106/100 ml of soil) associated with coconut palm in Karachi.

So far no comprehensive survey has been conducted to assess the population of parasitic nematodes associated with coconut in Karachi. This is the first step in this direction.

### Materials and Methods

A random survey of coconut growing areas in and around Karachi was conducted and samples of coconut soil, lesioned roots and unhealthy seedling were collected and brought to the Nematology laboratory. Soil samples were washed by Cobb's sieving and decanting method and by improved Baermann method. Roots were washed under tap water, chopped into 5-10 cm pieces and immersed in water in covered petri plates. These petri plates were kept in incubator at 20-25°. After 24 hr. the water from petri plates was sucked by means of pipette. Lesion nematodes i.e. *Pratylenchus* spp. were isolated from the water taken off. The diseased coconut seedling of dwarf green variety were transferred to Applied Biology Experimental Farm, treated with 1% Tenekil (polychlorinated hydrocarbon) by dipping method for 15 min. and later planted into 2 ft. deep pits having farmyard manure, FPC, silt and sand at the ratio of 2: 1: 1: 1 which was already treated with a mixture of Tenekil and Nimrod at ratio of 10: 5 ml in water. Soil samples were taken from these pits before treatment and population of pathogenic nematodes was checked. A control set of the plants of the same age i.e. about 16 weeks was kept side by side for comparison.

Nematodes extracted after 24 hr. from the soil samples were counted in a counting dish. Nematodes were killed by gentle heating and fixed in TAF for 24 hr. After that nematodes were transferred to 1.5% glycerine with some traces of copper sulphate to prevent fungal contamination and kept in desiccater for slow evaporation. Permanent mounts were prepared in anhydrous glycerine. Nematodes were identified upto the species level are mentioned in table and graphic representation of nematode population is shown in Fig 1.

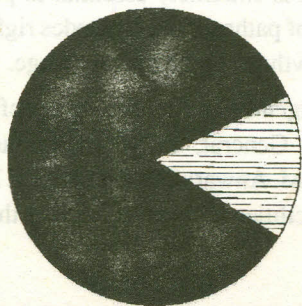


Fig. 1. Graphical representation of nematode population showing percentage values of plant parasitic and saprophytic nematodes found around the roots of coconut plants.

- Percentage of plant parasitic nematodes i.e. 83.20%.  
 ▨ Percentage of saprophytic nematodes i.e. 16.80%.

### Results and Discussions

In this survey several pathogenic nematodes have been found around the roots of coconut nurseries viz. *Rotylenchulus reniformis* Linford and Oliveira, 1940, *Hemicriconemoides cocophillus* Loos, 1949 (Chitwood and Birchfield, 1951) *H. mangiferae*, Siddiqi, 1961, *H. strictathecatus* Esser, 1960, *Helicotylenchus martini* Sher, 1966, *H. multicinctus* (Cobb, 1893) Golden, 1956, *Hoplolaimus indicus* Sher, 1963, *Pratylenchus similis* Khan and Singh, 1975, *P. penetrans*, Flipjev, 1936, *Tylenchorhynchus maximus* Allen, 1955. *T. robustus*, Thorne and Malek, 1968, *Xiphinema americanum* Cobb, 1913, *X. brasiliense* Lordello, 1951, and *X. insigne*, Loos 1949.

Apart from these some less pathogenic and some free living nematodes have also been found (Table 1). The population levels of *Helicotylenchus multicinctus*, *H. martini*, *Hoplolaimus indicus*, *Pratylenchus penetrans*, *P. zaei*, *Tylenchorhynchus maximus*, *Hemicriconemoides strictathecatus* and *Xiphinema americanum* were at the alarming level i.e. 116, 72, 63, 56, 49, 69, 49, and 42 per 100 ml of soil respectively. Pre-treatment population of plant parasitic nematodes viz. *Helicotylenchus multicinctus*, *Pratylenchus zaei*, *P. penetrans*, *P. similis* and *Tylenchorhynchus robustus* recovered from the soil of the pits were not at the alarming level. The plants treated with 1% Tenekil remained healthy during the observations while untreated cultivars were weak

TABLE 1. PLANT PARASITIC NEMATODES, THEIR POPULATION THRESHOLD AND LOCALITY.

Sr. No.	Locality	Nematodes	Population range nematodes/100ml
1.	Mustaq Coconut Farm Hub Choki	<i>Rotylenchulus reniformis</i>	
		Linford & Oliveira 1940	39-51
		<i>Hemicriconemoides cocophillus</i> (Loos, 1949), Chitwood Birchfield, 1957	27-42
		<i>Helicotylenchus martini</i> Sher, 1966	68-72
2.	PARC Farm, Landhi	<i>Helicotylenchus multicinctus</i> (Cobb, 1893), Golden 1956	107-116
		<i>Hoplolaimus indicus</i> Sher, 1963	49-63
		<i>Paralongidorus citri</i> Siddiqi, 1959) Siddiqi, Hooper & Khan, 1963	23-29
3.	Coconut Farm Lucknow Colony, Korangi, Karachi	<i>Helicotylenchus multicinctus</i>	88-102
		<i>Pratylenchus similis</i> Khan & Singh, 1975	26-32
		<i>Tylenchorhynchus maximus</i> Allen, 1955	62-69
		<i>Aphelenchus avenae</i> Bastian, 1865	21-32
4.	Yousaf Baloch Coconut Farm, Memon Goth, Karachi	<i>Rotylenchulus reniformis</i>	19-26
		<i>Pratylenchus penetrans</i> Flipjev, 1936	39-52
		<i>Eudorylaimus subjunctus</i> Andrassy, 1959	35-46
5.	Adil Coconut Farm Malir, Karachi	<i>Helicotylenchus multicinctus</i>	63-73
		<i>Tylenchorhynchus maximus</i>	49-51
		<i>Aphelenchoides blastophthorus</i> Franklin, 1952	27-32
		<i>Xiphinema americanum</i> Cobb, 1913	46-49
6.	Sind Horticultural Farm Korangi Karachi	<i>Hemicriconemoides mangiferae</i> Siddiqi, 1961	25-31
		<i>Helicotylenchus martini</i>	62-68
		<i>Xiphinema americanum</i>	39-44
		<i>Eudorylaimus subjunctus</i>	27-34
7.	Ghanchi Coconut Farm Gudap, Karachi	<i>Hoplolaimus indicus</i>	59-62
		<i>Pratylenchus penetrans</i>	45-50
		<i>Tylenchorhynchus maximus</i>	42-46
		<i>Cephalobus persignis</i> Bastian, 1865	42-49
		<i>Longidorus elongatus</i> (DeMan, 1876), Thorne & Swanger, 1936	32-37
8.	Coconut Farm Deh Karkaro, Super Highway, Karachi	<i>Helicotylenchus multicinctus</i>	52-61
		<i>Hoplolaimus indicus</i>	27-31
		<i>Hemicriconemoides cocophillus</i>	25-29
		<i>Xiphinema brasiliense</i> Lordello, 1951	17-21
		<i>Hemicriconemoides strictathecatus</i> Esser, 1960	31-42

(Contd....)

(Table 1, Contd.)

	<i>Pratylenchus penetrans</i> P. zae	29-38
	Graham, 1951	37-49
	<i>Eudorylaimus subjunctus</i>	27-32
9. Coconut Farm, Near Nasir Colony, Korangi Road, Karachi	<i>Xiphinema americanum</i>	27-33
	<i>Pratylenchus zae</i>	31-39
	<i>Tylenchorhynchus maximus</i>	20-24
	<i>Paratylenchus similis</i>	29-34
	<i>Aphelenchus avenae</i>	33-36
	<i>Trichodorus cylindricus</i> (Cobb, 1920)	9-16
10. Coconut Farm, Kala Board, Malir, Karachi	<i>Pratylenchus neglectus</i> (Rensch, 1924), Filipjev & Schuurmanns Stekhovan	23-27
	<i>Tylencholaimellus</i> spp. Cobb in Cobb, 1915	9-11
	<i>Paralongidorus maximus</i> Siddiqi, Hooper & Khan 1963	17-19
	<i>Aphelenchoides blastophthorus</i>	21-24
	<i>Xiphinema brasiliense</i>	16-19
11. Coconut Farm Behind Drigh Colony, Karachi	<i>Helicotylenchus martini</i>	27-35
	<i>H. multicinctus</i>	36-42
	<i>Pratylenchus penetrans</i>	49-56
	<i>Tylenchorhynchus maximus</i>	16-21
	<i>Eudorylaimus subjunctus</i>	30-33
	<i>Ditylenchus goldeni</i> (Maqbool, 1982), Fortuner & Maggenti, 1987	7-9
12. Coconut Farm, Near Safoora Goth, University Road, Karachi	<i>Hemicriconemoides mangiferae</i>	19-31
	<i>Pratylenchus zae</i>	23-31
	<i>Hoplolaimus indicus</i>	24-28
	<i>Mosodorylaimus sindhensis</i> Saeed & Khan, 1987	9-13
	<i>Cruzema lambdiensis</i> (Artigas, 1927), Dougherty, 1953	3-7
	<i>Cephalobus persignis</i> Bastian, 1865	31-41
	<i>Crionemella</i> spp.	4-6
13. Coconut Nurseries, Akbar Bugti Farm, Deh Kharkaro, Super Highway, Karachi	<i>Tylenchorhynchus robustus</i> Thorne & Malck, 1968	56-59
(i). Karachi Northen	<i>Pratylenchus zae</i>	51-54
	<i>Xiphinema insigni</i>	32-36
	<i>Helicotylenchus martini</i>	29-34
	<i>H. indicus</i>	31-37
(ii). Karachi Southern	<i>Pratylenchus penetrans</i>	47-58
	<i>Tylenchorhynchus robustus</i>	41-47
	<i>Pratylenchus zae</i>	33-39
	<i>Tylenchorhynchus maximus</i>	41-49
(iii). Karachi Western	<i>Helicotylenchus multicinctus</i>	45-52
	<i>Tylenchorhynchus robustus</i>	43-46
	<i>Pratylenchus zae</i>	40-45
	<i>Xiphinema americanum</i>	32-38
	<i>X. insigni</i> , Lees, 1949	29-34

and meagre. The post treatment nematode population after 12 weeks was 75% less than the associated with the untreated plants.

Such a high frequency of nematode populations in the initial state of growth period of the plants is significant as it could be responsible for severe damage to the tender root stock cultivars. Since the critical growth period is period in plant life cycle when it does not have any extra roots which it could afford to lose, it is extremely essential to protect the plants from the attack of pathogenic nematodes right from the early stage of the growth i.e. at the nursery stage.

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