NEMATODES OF COCOA (*Theobroma cacao* L.)

V. K. SOSAMMA, P. K. KOSHY AND P. SUNDARARAJU
Nematology Laboratory
Central Plantation Crops Research Institute,
Krishnapuram-690 533, Kayangulam, Kerala, India.

ABSTRACT

Cocoa *(Theobroma cacao* L.*)* is one of the major cash crops in the tropics. West Africa grows about 60 per cent of the world crop. In India, cocoa though cultivated since 200 years, was till recently, confined to a very small area. Today the area under cocoa is about 10,000 ha, of which Kerala state grows cocoa in 5,500 ha mainly as an intercrop in coconut and arecanut gardens. The paper presents the results of a preliminary survey on plant parasitic nematodes associated with cocoa in Kerala and Karnataka. Though many species of plant parasitic nematodes have been recorded from the rhizosphere of cocoa, precise information on the pathogenicity of any one of them except of *Meloidogyne incognita* is lacking.

Results of the preliminary survey comprising 88 each of soil and root samples collected from Kerala and Karnataka showed that the most common root parasite is *Meloidogyne incognita* and the dominant nematode in the rhizosphere is *Helicotylenchus* sp. Inoculation studies showed cocoa seedlings developed severe root galling with females with egg masses of *M. incognita* exposed to the root surface. Species belonging to *Meloidogyne*, *Tylenchorhynchus*, *Hoplolaimus*, *Xiphinema*, *Helicotylenchus*, *Rotylenchulus*, *Criconemoides*, *Longidorus*, *Radopholus* and *Trichodorus* were extracted from soil around roots of cocoa.

INTRODUCTION

Cocoa has been cultivated in India for at least 200 years, yet till recently it was confined to a very small area. There has been, in recent years, an increasing interest in the cultivation of cocoa to this country, particularly as a mixed crop in

coconut and arecanut gardens. Today, the area under cocoa is about 10,000 ha, of which Kerala state grows it in 5,500 ha.

Ritzema Boz (1900) was the first to record root-knot nematode on cocoa. The only report from India on plant parasitic nematodes associated with cocoa was made by Kumar *et al.* (1971), recording *Pratylenchus coffeae, Meloidogyne incognita* and *Rotylenchulus reniformis.* World-wide association of *Meloidogyne* spp. with cocoa was reported by Entwistle (1972). Sharma and Maia (1976) established the pathogenicity of *M. incognita* on cocoa and suggested its involvement as a primary agent in the etiology of "sudden death" disease under field conditions. Nemacur was reported to be the most effective nematicide in increasing yield and controlling species of *Helicotylenchus, Meloidogyne* and *Dolichodorus* on cocoa var. catongo under glass house conditions (Sharma and Ferraz, 1977). This paper presents the results of a preliminary survey on nematodes associated with cocoa as an intercrop in coconut and arecanut gardens in Kerala and Karnataka.

RESULTS

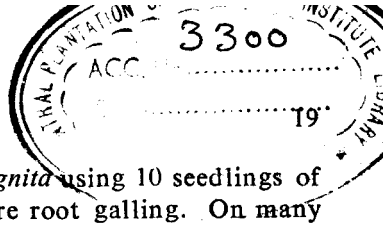
During 1978 a survey was carried out on cocoa grown as an intercrop in coconut and arecanut gardens. A total of 88 each of soil and root samples were collected from the rhizosphere of cocoa from nine locations in Alleppey, Cannanore, and Trivandrum districts of Kerala and two locations in South Kanara district of Karnataka. Sampling was confined to the feeder root zone (dripping area). Five gram each of root samples were washed, cut into small pieces and left in petri plates containing 100 ml. of tap water for 72 h. The nematodes were collected on 400 mesh sieve after passing through 60 mesh. Soil samples (250 g) were analysed by sieving and sifting method. Perineal patterns of 10 females of *Meloidogyne* were examined and identified as *M. incognita.*

Nematode species belonging to 15 genera viz. *Aphelenchus* sp., *Criconemoides* sp., *Diphtherophora* sp., *Helicotylenchus* sp.,

Hemicriconemoides sp., *Hoplolaimus* sp., *Longidorus* sp., *Meloidogyne* sp., *Mononchus* sp., *Paratylenchus* sp., *Radopholus similis*, *Rotylenchulus* sp., *Trichodorus* sp., *Tylenchorhynchus* sp., and *Xiphinema* sp. were isolated from the rhizosphere of cocoa plants (Table 1). Only *M. incognita* was isolated from the root samples (18%).

Table 1. Occurrence And Population Density Of Nematodes In Association With Cocoa

Genera	Number of occurrences in 88 samples	Population range in 250 g soil
Aphelenchus sp.	2	3-5
Criconemoides sp.	4	3-114
Diphtherophora sp.	1	14
Helicotylenchus sp.	22	2-321
Hemicriconemoides sp.	2	5-15
Hoplolaimus sp.	21	2-166
Longidorus sp.	7	1-3
Meloidogyne sp.	27	7-2341
Mononchus sp.	9	1-41
Paratylenchus sp.	1	3
Radopholus similis	9	1-8
Rotylenchulus sp.	11	32-1213
Trichodorus sp.	3	1-3
Tylenchorhynchus sp.	17	7-440
Xiphinema sp.	11	1-76



Inoculation studies with *M. incognita* using 10 seedlings of cocoa var. forestro developed severe root galling. On many occasions egg masses were seen exposed on the root surface. Along with this, inoculations were made with *Radopholus similis* population isolated from coconut roots on to a set of another ten seedlings. *R. similis* was found to penetrate the feeder roots in small numbers, but failed to multiply.

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