NEMATODES OF THE COCOA REGION OF BAHIA, BRAZIL I - PLANT-PARASITIC AND FREE-LIVING NEMATODES ASSOCIATED WITH RUBBER (*Hevea brasiliensis* MUELL. ARG)*

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Rubber production is increasing in Brazil, and the trend is likely to continue in the forseable future. Hevea brasiliensis Müell.-Arg., known as Para rubber, was first collected from the Amazon Basin and named after the Para District of Brazil. It is grown at lower altitudes and is known as low land type tree. As little information is available at present it is considered useful to review the nematological works and observations carried out in Nigeria (1) and in Brazil (4).

Rubber is susceptible to diseases and insects, where as the role of plant-parasitic nematodes is still unknown. Therefore the main object of this investigation was to determine the occurrence and distribution of plant-parasitic and free-living nematodes associated with rubber in Bahia, Brazil.

MATERIALS AND METHODS

In May, 1971, the first general survey of nematodes was started to determine the genera of known and possible plant-parasitic nematodes besides free-living nematodes present in different crops, including rubber in the Cocoa Region of the State of Bahia. Data on the distribution of plant-parasitic nematodes according to host, soil texture and geographic area was recorded in order to study the nematode problem.

For economic reasons the survey was limited to sites where trees showed poor growth or declining symptoms. Sampling sites, soil type, number of samples collected from the rhizosphere of rubber nursery plants and trees are listed in Table 1. About 1.5 kg of soil and 100 g of feeder roots were collected in

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Table 1 - Sampling sites, soil type and number of samples collected from the rhizosphere of rubber nursery plants and trees in Cocoa Region of Bahia, Brazil.

Sampling sites	Nursery/ trees	Soil texture	Number of samples
Itabuna (CEPEC)	Nursery	Sandy	8
Itabuna (CEPEC - Soil fertility experiment)	Nursery	Loamy	1
Una (Terra Nova Estate)	Trees	Heavy	3
Uruçuca (Mocambo Estate)	Trees	Heavy	6
Uruçuca (Boa Vista Estate)	Trees	Heavy	1
Ituberá (Agrisma Estate)	Trees	Heavy	1

plastic bags using a spade to dig from 5 to 6 spots up to 40 cm depth within a radius of 150 cm and 40 cm from tree trunk and nursery plants respectively.

Individual samples were thoroughly mixed together, and 100 g were removed for the purpose of nematode recovery. A modified decantation cotton wool filter technique (2) was used for recovery involving the use of sieves with pore sizes of 1000 µ, 105 µ and a staple of three sieves of 44 µ each mesh prior to nematode cotton wool filters. The holdback of 1000 µ sieve gave the finer roots free from organic matter which were then placed in Petri dishes and shredded carefully with stout steel needles under the dissecting microscope in order to locate the position of nematodes in the tissues. The holdback of 105 µ sieve was passed through nylon screens of 125 µ placed in Petri dishes containing 20 ml of tap water in order to collect larger nematodes. The filtrate of 105 µ sieve was mixed with the holdback of 44 µ sieves and afterwards passed through double cotton wool filters.

The nematode suspensions were collected from the extraction trays and Petri dishes after 24 hours, mixed together, and made up to 100 ml. Later on nematode populations were determined and analysed up to generic level using stereoscopic microscope. The nematodes were killed and fixed in 5% formalin and permanent mounts were prepared in pure glycerin (3).

RESULTS AND DISCUSSION

Assessment of economic levels of crop injury lay outside the scope of the present survey. The symptoms of the diseased rubber plants and the associated nematodes up to generic level were reported earlier (4). The plant-

parasitic and free-living nematodes found are listed in Tables 2 and 3. Plant-parasitic nematodes of the genera Xiphinema and Paratrichodorus, some species of which are virus vectors, were particularly numerous in the nursery at Itabuna. All the nine samples collected from the nurseries contained plant-parasitic and free-living nematodes (Tables 2 and 3).

In established plantations at Terra Nova Estate, Una, the trees with dieback symptoms were associated with identified nematode of the genus Paratylenchus. The comparatively healthy tree was totally free from nematodes. In Mocambo Estate, Uruçuca, nine nematodes genera of plant-parasitic forms were encountered both from healthy and diseased trees (Table 2). High populations of Macroposthonia onoensis with 51 specimens per 100 ml of soil were recovered from a healthy tree and was absent in the diseased tree. Xiphinema larvae, Longidoridae larvae and Criconematidae male were present in the samples from healthy trees.

In Agrisma Estate, Ituberá, a sample collected from the rhizosphere of a declining tree with yellowing of foliage and progressive dieback symptoms contained four nematode genera of plant-parasitic forms viz: Dolichodorus sp., Trichodorus cf. monohystera, Discocriconemella limitanea, Paratylenchus brachyurus and 15 free-living forms (Table 3). From Boa Vista Estate, Uruçuca, a single sample from a healthy tree growing among diseased trees contained seven plant-parasitic forms, one suspected plant-parasite (Table 2) and 19 free-living forms (Table 3). The

Table 2 - Plant-parasitic nematodes associated with the roots of Para rubber (H. brasiliensis Müell. Arg.) in Bahia, Brazil.

Genus/Species	Occurrence (*)
In nurseries (9 samples)	
Dolichodorus sp.	11.1
Helicotylenchus sp.	55.5
Hemicycliophora sp.	44.4
Huntaphelenchoides sp.	55.5
Meloidogyne sp.	22.2
Paratrichodorus minor	77.7
Pratylenchus brachyurus	55.5
Psilenchus cf. hilarulus	11.1
Rotylenchulus reniformis	33.3
Tylenchus sp.	55.5
Xiphinema ifacolum	77.7
X. vulgare	55.5
X. denoudeni	11.1
In established plantations (11 samples)	
Aphelenchoides sp.	9.1
Basiria sp.	9.1
Criconematidae (male)	9.1
Discocriconemella limitanea	18.2
Dolichodorus sp.	9.1
Helicotylenchus sp.	9.1
H. dihystera	45.5
H. pseudorobustus	18.2
Huntaphelenchoides sp.	9.1
Longidoridae (larva)	9.1
Macroposthonia onoensis	36.4
M. coomansi	9.1
Meloidogyne sp.	36.4
Paratylenchus sp.	18.2
Pratylenchus brachyurus	18.2
Rotylenchulus reniformis	9.1
Trichodorus cf. monohystera	9.1
Tylenchus sp.	9.1
Xiphinema sp. (larva)	18.2

(*) % in the samples.

Table 3 - Free-living nematodes associated with roots of nursery plants and mature Para rubber trees (Hevea brasiliensis Müell. Arg.) in Bahia, Brazil.

Genus/Species	Nurseries	Trees	Genus/Species	Nurseries	Trees
Aphelenchus avenae	+	+	E. granuliferus	-	+
Acrobeles sp.	+	-	Heterocephalobus longicaudatus	+	+
Achromadora sp.	-	+	Iotonchus trichurus	-	+
Alaimus sp.	+	+	Mesodorylaimus sp.	+	-
A. primitivus	-	+	M. parasubitilis	+	-
Amphidelus sp.	+	+	Monhystera filiformis	+	-
A. cf. uniformis	-	+	Mononchoides sp.	-	+
Aporcelaimellus sp.	+	+	Mylodiscus sp.	-	+
A. obtusicaudatus	+	+	Mylonchulus index	-	+
Axonchium sp.	-	+	M. sigmaturus	+	+
A. amplicolle	-	+	Neoactinolaimus sp.	-	+
Belondira sp.	-	+	Nothotylenchus sp.	-	+
B. cf. neortha	-	+	Nygolaimus sp.	+	+
Belondirella teres	-	+	N. sharmai	+	-
Carcharolaimus pizai	-	+	Plectus sp.	-	+
Cephalobus sp.	+	-	P. parietinus	-	+
Chitwoodius sp.	-	+	Prismatolaimus intermedius	+	-
C. transvaalensis	-	+	Prodorylaimus sp.	-	+
Cobbonchus sp.	+	-	Proleptonchus sp.	+	-
Cryptonchus abonormis	+	-	Rhabditis sensu lato	-	+
Dorylaimellus sp.	+	+	Sporonchulus dentatus	-	+
D. graminis	+	+	Thornonema sp.	-	+
D. cf. longicollis	+	+	T. cavalcantii	-	+
D. cf. yangambiensis	-	+	Tylencholaimus sp.	-	+
Dorylaimoides sp.	+	+	Zeldia sp.	+	-
D. bambessae	+	-			
D. clavatus	+	-			
D. parvus	-	+			
Eudorylaimus sp.	+	+			

plant-parasitic forms were Aphelenchoides sp., Basiria sp., Rotylenchulus reniformis, Helicotylenchus sp., H. dihystera, Xiphinema sp. (larva), Discocriconemella cf. limitanea and the suspected plant-parasites was Aphelenchus avenae.

Pratylenchus brachyurus, Rotylenchulus reniformis, Paratrichodorus minor, Xiphinema ifacolum, X. vulgare, X. denoudeni, Helicotylenchus sp., Meloidogyne sp., and Psilenchus cf. hilarulus from nursery plants and the nematodes mentioned in Table 2 under the sub-heading, "In established plantations", are recorded as associated with rubber for the first time in Brazil. Discocriconemella limitanea, Dolichodorus

sp., Helicotylenchus pseudorobustus, Huntaphelenchoides sp., Macroposthonia onoensis, M. coomansi, Paratylenchus sp., Trichodorus cf. monohystera, Tylenchus sp., Aphelenchoides sp., and Basiria sp., associated with mature rubber trees are recorded for the first time. The following nematodes, Scutellonema sp., Tylenchorhynchus sp., Hoplolaimus pararabustus, and several species of Xiphinema recorded from Nigeria by Caveness (1) were not yet encountered in this survey.

The nematodes recorded in Table 3 are reported for the first time from rubber nursery plants and mature trees. The large number of nematodes isolated from very small quantities of soil as well as the different forms of nematodes present, indicate that a study on the economic importance of nematodes on rubber is needed.

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SUMMARY

A taxonomic survey of nematodes associated with Hevea brasiliensis Müell. Arg. in Bahia, Brazil, was conducted from May, 1971 till May, 1972. Dolichodorus sp., Huntaphelenchoides sp., Meloidogyne sp., Pratylenchus brachyurus, Rotylenchulus reniformis, Psilenchus cf. hilarulus, Paratrichodorus minor, Tylenchus sp., Xiphinema ifacolum, X. vulgare, X. denoudeni were isolated from nursery plants and Aphelenchoides sp., Basiria sp., Discocriconemella limitanea, Dolichodorus sp., Helicotylenchus pseudorobustus, Huntaphelenchoides sp., Macroposthonia onoensis, M. coomansi, Paratylenchus sp., Trichodorus cf. monohystera, Tylenchus sp., and Xiphinema sp., from mature trees. Besides the plant-parasitic nematodes

mentioned above, a total of 36 genera and 54 species of free-living nematodes of which 19 genera and 25 species were from the nursery plants and 28 genera and 40 species from mature trees are recorded for the first time.

NEMATÓDIOS DA REGIÃO CACAUEIRA DA BAHIA, BRASIL. I - NEMATÓDIOS PARASITOS E NÃO PARASITOS ASSOCIADOS COM A SERINGUEIRA (*Hevea brasiliensis* MUELL. ARG.)

(RESUMO)

Um levantamento taxonômico de nematódios associados com a seringueira (Hevea brasiliensis Müell. Arg.) na Bahia, Brasil, foi realizado entre maio de 1971 e maio de 1972. Dolichodorus sp., Huntaphelenchoides sp., Meloidogyne sp., Pratylenchus brachyurus, Rotylenchulus reniformis, Psilenchus cf. hilarulus, Paratrichodorus minor, Tylenchus sp., Xiphinema ifacolum, X. vulgare, X. denoudeni foram isolados de plântulas enviveiradas e Aphelenchoides sp., Basiria sp., Discocriconemella limitanea, Dolichodorus sp., Helicotylenchus pseudorobustus, Huntaphelenchoides sp., Macroposthonia onoensis, M. coomansi, Paratylenchus sp., Trichodorus cf. monohystera, Tylenchus sp. e Xiphinema sp., de plantas adultas no campo. Além dos nematódios parasitos mencionados acima, um total de 36 gêneros e 54 espécies de nematódios não parasitos - dos quais 19 gêneros e 25 espécies, foram isolados de plântulas enviveiradas e 28 gêneros e 40 espécies, de árvores adultas - são registrados pela primeira vez.

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