

OTHER CONTRIBUTIONS - OTRAS CONTRIBUCIONES

OCCURRENCE OF PLANT PARASITIC NEMATODES IN AVOCADO IN BAHIA, BRAZIL [NEMATODOS FITOPARASITOS DEL AGUACATE EN BAHIA, BRASIL]. R. D. Sharma and S. A. Sher. Divisao de Entomologia, Centro de Pesquisas de Cacau, Itabuna, Bahia, Brazil; Department of Nematology, University of California, Riverside, California, U. S. A.

ABSTRACT

A taxonomic survey of the nematode fauna associated with declining avocado trees (*Persea americana* Mill.) from Bahia, Brazil, was conducted in 1971-1972. Nine genera of known or suspected plant parasitic nematodes were isolated from 18 samples collected from Buerarema, Itabuna, Itajuípe, Itapé and Urucuca. The nematodes encountered in the present survey were: *Helicotylenchus dihystera*, *Xiphinema* sp., *X. setariae*, *X. basiri*, *Rotylenchulus reniformis*, *Dolichodorus* sp., *Hemicyclophora* sp., *Meloidogyne* sp., *Tylenchus* sp., *Trichodorus* spp. and *Aphelenchus avenae*. All these nematodes are recorded for the first time from avocado in Bahia, Brazil.

INTRODUCTION

Avocado (*Persea americana* Mill.) is grown in nearly all family orchards, often close to farm buildings, in the State of Bahia, Brazil. Its fruit is rich in proteins and fat, both of which are essential constituents for the human diet.

Records of nematodes associated with avocado roots have come from the U. S. A. (Allen & Jensen, 1951; Ducharme & Suit, 1953; Sher, 1955; Sher *et al.*, 1959; Young & Ruehle, 1955), from the Gold Coast (Peacock, 1956), Israel (Minz, 1957; Minz *et al.*, 1963), and the French West Indies (Scotto La Massese, 1969). Information on the role of nematodes in avocado culture in the State of Bahia is completely lacking; therefore during a general survey of different crops, avocado was also sampled for nematodes.

MATERIALS AND METHODS

In May, 1971, the first general survey of nematodes was undertaken to determine the genera of known and possible plant parasitic nematodes present in different crops, including avocado grown in the cacao region of the State of Bahia. Data on the distribution of plant parasitic nematodes according to host, soil type, and geographic area were recorded in order to study the nematode problem.

For economic reasons the survey was limited to sites where trees showed poor growth or symptoms of decline. Sampling sites, soil type, number of samples collected from around the roots of avocado trees and nursery seedlings are listed in Table 1.

In all trees or nursery seedlings sampled for nematodes dieback symptoms were the most common. The diseased trees showed progressive dieback of the main branches and also the secondary branches which can be recognized from a distance. The trees had yellowing to bronzing of foliage, suppression of new growth, sparse foliage due to defoliation. The feeder roots of the attacked trees showed swelling of the tips and curly tip symptoms. The roots were of a yellowish-grey color. In the case of nursery seedlings the moderate infection due to nematodes caused blackening of the root system, and in severe cases the secondary and tertiary roots were absent, a condition which may be caused by the attack of secondary microorganisms.

About 1.5 Kg of soil and 100 g of feeder roots were collected in plastic bags from around the roots of trees with decline symptoms, and when available, healthy trees were also included. The soil was collected using a spade. From 5 to 6 spots, up to 40 cm depth, were dug within a radius of 150 cm from the tree trunk. In case of nursery seedlings, the whole plastic bag of 2.5 Kg was brought to the laboratory for nematode extraction.

The individual samples were thoroughly mixed and 100 g of soil were processed for nematode recovery. A modified decantation-cottonwool filter technique (Oostenbrink, 1960) was used, including the use of sieves with pore sizes of 1000 μ , 105 μ , and 44 μ (triple) prior to using the cottonwool filters. The residues of the 1000 μ sieve contained the finer

TABLE 1

Locality, soil type and number of samples collected from around the roots of avocado (*Persea americana* Mill.) in Bahia, Brazil.

Locality	Trees / Seedling	Soil Type	Number of Samples
Buerarema	Trees	Heavy clay	2
Itabuna	Trees	Loamy	10
	Seedling	Clay loamy	1
Itajuípe	Seedling	Loamy	1
Itapé	Trees	Heavy clay	2
Urucuca	Trees	Heavy clay	2

roots which were freed from organic matter and were then placed in tap water in Petri dishes and teased out with stout steel needles under the dissecting microscope in order to locate the position of endoparasitic nematodes. The residue of the 105 μ sieve was passed through nylon screens of 125 μ which were then placed in Petri dishes containing 20 ml of tap water in order to collect larger nematodes. The filtrate of the 105 μ sieve and the residues of the 44 μ sieve were mixed before passing through double cottonwool filters. The nematode suspensions were collected from the extraction trays and Petri dishes after 24 hours. They were then mixed together and the volume was completed to 100 ml. Afterwards nematode populations were determined to generic level using a stereoscopic microscope. Identification to species level was done by killing and fixing the concentrated nematode population in 5 % formalin and preparing permanent mounts in pure glycerin (Seinhorst, 1966).

RESULTS AND DISCUSSION

Assessment of economic levels of crop injury lie outside the scope of the present survey and will be undertaken as a separate study in the future. Nine genera of known or suspected plant parasitic nematodes were found in 18 samples collected from different sites which are listed in Table 1. The plant parasitic nematodes and the percentage of occurrence are listed in Table 2.

Of the known plant parasites, the spiral nematode, *Helicotylenchus dihystra*; dagger nematodes, *Xiphinema* sp., *X. setariae*, and *X. basiri*; and the reniform nematode, *Rotylenchulus reniformis* were encountered most frequently and in large numbers. The awl nematode *Dolichodorus* sp. and the sheath nematode *Hemicycliophora* sp. formed the second important group of plant parasitic nematodes. Stubby root nematodes, *Trichodorus* spp., were encountered in only one sample each. The suspected plant parasites *Tylenchus* sp. and *Aphelenchus avenae* were also present. The root knot nematode, *Meloidogyne* sp., was found in soil around established trees from Itapé. Besides the plant parasites and suspected plant parasites, predatory and saprophytic nematodes were also found in almost all the samples, both from the seedlings and established trees.

The spiral nematode, *Helicotylenchus* sp., has been reported from Israel (Minz, 1957) and Nigeria (Caveness, 1967). *Rotylenchulus reniformis* has been reported from the Gold Coast (Peacock, 1956), Nigeria (Caveness, 1967), and the French West Indies (Scotto La Massese, 1969). *Xiphinema* sp. were the most dominant in this survey, particularly in light soils, and have also been recorded from Israel (Minz *et al.*, 1963). *Trichodorus* spp. were isolated from the soil of both nursery seedlings and established trees from Itabuna, and were

TABLE 2

Plant parasitic nematodes associated with the roots of avocado (*Persea americana* Mill.) in Bahia, Brazil.

Nematodes	Occurrence (%)
<i>Helicotylenchus dihystera</i> (Cobb, 1913) Sher, 1961	89
<i>Xiphinema</i> sp.	60
<i>X. setariae</i> Luc, 1958	60
<i>X. basiri</i> Siddiqi, 1959	60
<i>Rotylenchulus reniformis</i> Linford & Oliviera, 1940	30
<i>Trichodorus</i> spp.	12
<i>Dolicodorus</i> sp.	11
<i>Hemicycliophora</i> sp	11
<i>Meloidogyne</i> sp.	11
<i>Tylenchus</i> sp.	11
<i>Aphelenchus avenae</i> Bastian, 1865	6

also reported by Sher (1965) from U. S. A. The root lesion nematode, *Pratylenchus vulnus* (Sher *et al.*, 1959), and the burrowing nematode, *Radopholus similis* (Young & Ruehle, 1955), both proven pathogens of avocado in U. S. A. were not encountered in this survey. *Helicotylenchus*, *Rotylenchulus* and *Dolichodorus* were isolated from both heavy and light soils.

The samples collected around avocado trees showing severe dieback were associated with high population of 3 species of *Xiphinema*, and the feeder roots showed curly tip and swollen tip symptoms. The other nematode species present were *Helicotylenchus dihystera* and *Rotylenchulus reniformis*. In the nursery seedlings the root system was blackened and disintegrated which may be due to nematode attack besides invasion by other microorganisms and may also be due to excess of moisture. The nematodes collected from nursery plants were *Helicotylenchus dihystera*, *Hemicycliophora* sp., *Dolichodorus* sp., *Xiphinema* sp., and *Trichodorus* spp. Many plants died either in the nursery or failed to establish in the field after transplanting.

These data indicate that many nematodes that can parasitize avocado roots are widely distributed in the State of Bahia. All the nematodes listed in Table 2 are recorded for the first time from avocado in Bahia, Brazil. This survey shows that a large number of nematode species were isolated from a very small number of soil samples. Plant parasitic nematodes may be an important limiting factor in avocado culture in Bahia and need further research.

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RESUMO

Um levantamento taxonômico da fauna nematológica associada com o deprecimento de abacateiro (*Persea americana* Mill.) na Bahia, foi realizado em 1971-72. Nove gêneros de nematodes conhecidos ou suspeitos de serem parasitos de plantas foram isolados de 18 amostras de solo coletadas em Buerarema, Itabuna, Itajuípe, Itapé e Urucuca. Os nematoides encontrados no presente levantamento são: *Helicotylenchus dihystera*, *Xiphinema* sp., *X. setariae*, *X. basiri*, *Rotylenchulus reniformis*, *Dolichodorus* sp., *Hemicycliophora* sp., *Meloidogyne* sp., *Tylenchus* sp., *Trichodorus* spp., *Aphelenchus avenae*. É o primeiro registro de todos estes nematoides associados com abacateiros na Bahia, Brazil.

PLANT NEMATODES ASSOCIATED WITH JACKFRUIT (*ARTOCARPUS HETEROPHYLLUS* LAM.) IN BAHIA, BRAZIL [NEMATODOS FITOPARASITOS ASOCIADOS CON EL ÑAME ISLEÑO (*ARTOCARPUS HETEROPHYLLUS* LAM.) EN BAHIA, BRAZIL].
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SUMMARY

The following known or suspected plant parasitic nematodes were found in association with the jackfruit tree (*Artocarpus heterophyllus* Lam.) in Bahia, Brazil: *Xiphinema setariae*, *Rotylenchulus reniformis*, *Helicotylenchus dihystera*, *Trichodorus* sp., *Peltamigratus* sp., *Meloidogyne* sp., and *Aphelenchus avenae*.