PLANT PARASITIC NEMATODES ASSOCIATED WITH VEGETABLE CROPS IN THE AREA OF BISSAU REPUBLIC OF GUINE-BISSAU

by

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Introduction.

At the request of the Crop Protection Department of the Republic of Guiné-Bissau a survey was conducted from March 11-16s 1985 to identify the plant parasitic nematodes associated with vegetable crops in the area of Bissau. This survey has resulted in a compilation of the most important and frequent plant-parasitic nematode genera associated with these crops in this area.

Materials and Methods.

Eighteen vegetable growing areas were surveyed (Table 1) and 83 soil and root samples were collected on 19 different crops. Samples were analyzed at ORSTOM's nematology laboratory in Dakar, Sénégal.

Nematodes present in the soil were extracted by Seinhorst's (1962) elutriation method. Nematodes present inside the roots were extracted by incubating root-systems for two weeks in a mist chamber (Seinhorst, 1950). Nematodes extracted from soil and roots were counted.

Results and Discussion.

Twenty-two genera of phytoparasitic nematodes were found associated with vegetable crops in the Bissau area.

Table 2 indicates the genera of plant-parasitic nematodes associated with the different vegetable crops and the location where they were detected in soil samples.

Table 3 shows the genera found inside the roots of the different plants and the location where they were collected.

Table 4 indicates the frequency (percentage of samples in which a genus was observed) of the different genera.

Figure 1 provides the size of the population observed for the main genera detected in the eighteen locations surveyed.

The genera observed :

Meloidogyne : was present in 83% of the samples analyzed. With the exception of the field surveyed at Pere, Meloidogyne was observed in all areas prospected. The levels of infestation vary with the locations and the soil type. Sandy soil areas are heavily infected. Mangrove fields with heavy soil and where flooded rice is grown during the rainy season generally present a low infestation.

Meloidogyne is recognized worldwide as a major pest of vegetables and is one of the principal factors limiting the profitability of vegetable crops, particularly in the tropics (Sasser, 1979). In tropical Africa it is the most widely distributed and the most damaging nematode genus (Luc, 1968).

In tropical African countries Meloidogyne populations belong to parthenogenic species : Meloidogyne incognita, Meloidogyne javanica and Meloidogyne arenaria. It is easy to identify a Meloidogyne infestation because they cause characteristic galls on roots and tubers.

In the areas surveyed, Meloidogyne spp. were found associated with all vegetable crops sampled.

Rotylenchulus : is represented by Rotylenchulus reniformis ; this nematode was detected in 64% of the samples and was observed, generally in high population, in 15 fields of the 18 surveyed. R. reniformis is known to cause damages to many crops.

Paratrichodorus : is represented by at least Paratrichodorus minor which was detected in 10 sampling sites. It is a strict ectoparasite. It can be a virus vector, but it mainly causes damage by destroying the root apices.

Pratylenchus : Pratylenchus spp were found in 30% of the samples. The root-lesion nematodes are known to cause extensive damage to a wide range of crops (Taylor, 1976).

Helicotylenchus : this genus is represented by at least Helicotylenchus dihystera. Besides root-knot nematodes Helicotylenchus is the genus the most

frequently encountered in the Bissau area (72% of the samples). Some species e.g., Helicotylenchus multicinctus and H. dihystera, are known to cause damage to banana but little is known of the damage they cause to vegetable crops in tropical Africa (Taylor, 1976).

Hirschmanniella : the genus Hirschmanniella was detected in 11% of the samples. It is represented by Hirschmanniella oryzae and Hirschmanniella spinicaudata. These species are parasites of rice and have been reported to be widely distributed in rice fields in West Africa. During this survey it is probable that they were encountered in fields where rice is grown during the rainy season.

Tylenchulus : represented by Tylenchulus semipenetrans was observed in 3 fields. This species is known to cause sever damage to citrus. It is probable that it has been detected in fields where vegetable crops are associated with citrus.

The other plant-parasitic genera reported in this report are Cephalenchus, Tylenchorhynchus, Filenchus, Malenchus, Xiphinema, Heterodera, Criconemalla, Ecphyadophora, Hemicycliophora, Coslenchus, Trichotylenchus, Dolichorhynchus, Paratylenchus and Scutellonema. Although species of these genera have been known to damage various crops in many other parts of the world, their economic importance on vegetable crops in West Africa is completely unknown.

Species of Ditylenchus detected could be species feeding on fungal colonies.

Conclusion and recommendations.

Three of the 22 genera detected during this survey are recognized as serious crops pests ; these three genera are Meloidogyne, Rotylenchulus and Paratrichodorus. They are present simultaneously and in large populations in a great number of the fields surveyed. They form a parasitic complex difficult to control except by nematicide treatments. Any other specific method applied to control one of them could, at the same time, produce an increase of the populations of the other two because of the suppression of the competition due to the nematode which has been controlled. Thus, it is difficult to recommend the utilization of a cultivar resistant to Meloidogyne or Rotylenchulus because the factors controlling suitability of plants as hosts for Rotylenchulus could differ from those controlling resistance to root-knot.

Meloidogyne is generally considered a major pest of vegetable. It is the genus among nematodes that causes the most damage to these crops. If we take only the genus Meloidogyne into consideration, nematicide treatments remain indispensable for reclaiming heavily infested soil, but they could be part of an integrated control system including preventive measures, crop rotations and physical control (Prot, 1985).

Preventive measures include :

- Treatment of nurseries. Soil in seedling nurseries must be treated in order to prevent the spread of the parasites.

- Elimination of reservoir plants. Papaya, banana, baobab and Prosopis are hosts which permit survival of Meloidogyne in their roots despite control actions. Papaya and banana trees are very susceptible and should be planted away from vegetable crops.

- Elimination of infected roots. In infected fields, parasitized roots should be collected and burnt ; they contain millions of eggs of Meloidogyne.

- Resistant windbreaks. Windbreaks should be chosen among resistant plants such as neem (Azadirachta indica), Anacardia, Citrus, Eucalyptus or filao.

Crop rotations :

Two types of plants can be used in rotations to prohibit or greatly reduce nematode reproduction : resistant plants (or cultivars) and trap crops.

Physical control measures include :

Soil flooding. Meloidogyne cannot survive several months submersion. It would be a sound practice, where possible, to grow vegetables during the dry season on low lands where paddy has been grown during the rainy season, provided that seedlings come from chemically denematized nurseries.

Soil desiccation during the dry season is also effective as Meloidogyne can not survive to the desiccation.

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Table 1 : Vegetable growing areas surveyed.

1 : Ponta Carlos
2 : Antigos Combatentes
3 : Granja Paiol
4 : Santa Louisia
5 : Granja Veterinaria
6 : Granja Pessube
7 : Manuel Agua
8 : Brigada Mecanizada 14 Novembro
9 : Aeroporto
10 : U S residence
11 : Kumura
12 : Palestinian Farm
13 : Granja Prabis
14 : Punta Paoulo Barros
15 : Belein
16 : Pere
17 : Socomin
18 : C I C E R

	M. Meloidogyne	Helicotylenchus	Rotylenchulus	Paratrichodorus	Pratylenchus	Cephalenchus	Tylenchorhynchus	Filenchus	Xiphinema	Heterodera	Criconemella	Ditylenchus	Ecphyadophora	Hirschmanniella	Malenchus	Hemicycliophora	Coslenchus	Trichotylenchus	Dolichorhynchus	Tylenchulus	Paratylenchus
Onion	2-3-5-6-7 8-9-13	2-3-5-6-7 8-9-18	2-3-5-6 7-9-13	2-3-5-6 7	2-3-5 6-18	2-3-5-9	6-8	9-13	7	2-3 6-13	2-3-5 6-13	8	7		2-3 8				3	2	9
Pepper	1-7-13-17	1-7-17	6-7	6-7	1-17	7	1-6	1	1-7	6	6-13	1-7						1			
Sweet pepper	5-12	5-12	5-12	5		5						12									
Cabbage	1-2-4-5-6 7-8-9-11 12-14-15	1-2-3-4-5 6-7-8-11-12 14-18	3-4-5-6-7 8-11-12 15	3-5-7-8 18	1-2-6 9-14	1-3-4-5 6-7-18	8-15	1-4-9 12-18	7-8-14	2-3-4 6-9-12	1-3	1-5-9	2-3 7	4	2-8 9	11-8-9	2-4	1-14		3	
Brocoli	3	3	3	3	3				3	3											
Lettuce	4-5-6 11-18	4-5-6-15 18	4-5-6-11 15	6-18		15-18	4-15-18	15	6-18			5-6	18	4	15		4				
Egg plant	11-13	11-13	11-13	13			13-16		13	13			11			16					
Okra	4-7	4-16	4-15-16	4	7-16	4	4-15-16	15-16	4		4		4	15-16							
Tomato	1-2-4-6-7 9-11-14-17	1-2-4-6-9 11-16-17-18	2-4-6-7 11-17	2-4-6-7 18	1-2-4-6 9-14	1-4-18	6-9-15 16	1-4-14	6-9-14	15	1-2-4	9-15	4	16	2-9	9			4	2	
Bitter tomato	6-9-13	6	6-9-13	6	6			13	13			13	6			6					
French bean	14	4					4				4			4			4				
Amaranthus sp	6-10	6-10	6	6-10			10		6	10		10									
Parsley	1-8	1	6	6		1-6-8	6	1			1	1									
Radish	6-12	6-12		6	6																6
Carrot	1-5	5	1-5					1				1	1			5					
Fennel	11	11	11										11								
Sweet Potato	7	7	7				7	7	7		7			7		7					
Water-melon	12							12				12									

Table 2 : Nematodes found in the soil, host association and situation of detection.

Table 3 : Nematode genera recovered from root systems, host association and situation of detection.

	Meloidogyne	Helicotylenchus	Rotylenchulus	Pratylenchus	Heterodera	Tylenchorhynchus	Scutellonema
Onion	2-3-5-6 8-9-13	3-18	3-13	2-3-6	3	8	
Pepper	1-6-7-13	7		1			
Sweet pepper	5-12						
Cabbage	1-2-4-5-6 7-8-9-11-12 14-15	1-18	12	1-2	3		
Brocoli	3		3				3
Lettuce	4-5-6-11 18	4-5-15	4-5-6-11 15				
Egg plant	11-13		13				
Okra	4-7		4-15	7			
Tomato	1-2-4-6-7 9-11-14	1-4-11-18	2-6-7	2-4-6-9			
Bitter tomato	6-9-13			6			
French bean	14	4					
Amaranthus sp	6-10		6				
Parsley	1-6-8						
Radish	6-12						
Carrot	1-5						
Fennel	11						
Sweet potato	7	7					
Water-melon	12						
Bumpkin	12						

Table 4 : Percentage of soil and root samples in wich the different genera were observed.

Genus	% of samples
Meloidogyne	83
Helicotylenchus	72
Rotylenchulus	64
Paratrichodorus	39
Pratylenchus	30
Cephalenchus	28
Tylenchorhynchus	27
Filenchus	24
Xiphinema	23
Heterodera	22
Criconemella	20
Ditylenchus	20
Ecphyadophora	13
Hirschmanniella	11
Malenchus	11
Hemicycliophora	8
Coslenchus	5
Trichotylenchus	4
Dolichorhynchus	4
Tylenchulus	4
Paratylenchus	2
Scutellonema	1

Figure 1 : Size of population observed in the different fields.