

PLANT PARASITIC NEMATODES ASSOCIATED WITH SUGARCANE IN THE IVORY COAST

Patrick QUÉNÉHERVÉ \* and Mireille FARGETTE \*\*

\*Centre ORSTOM, B.P. 8006, 97259 Fort de France Cedex, Martinique and

\*\*Nematologist ORSTOM, Department of Zoology, S.C.R.I. Invergowrie, DD2 5DA, Dundee, U.K.

Accepted for publication 3 September 1991.

**Key-words** : Sugarcane, Ivory Coast, nematodes.

In the Ivory Coast, sugarcane (*Saccharum officinarum* L.) is grown as a continuous monoculture on four plantations, corresponding to a total surface of 24 000 ha, mainly for local consumption of sugar and regional export trade. The sugarcane plantations were established between 1974 and 1980 with various hybrid cultivars in the north and north-east areas of the country on formerly savannah on ferrallitic soil. Many studies were recently published, dealing with the nematofauna associated with sugarcane and its relationship with cultural and environmental factors in West Africa but mainly in Burkina Faso (Cadet & Merny, 1978; Cadet & Spaull, 1985; Cadet, 1986a, b). Data herein reported are the results of nematode surveys conducted between 1985 and 1986 at the four sugarcane plantations Ferkessedougou 1, Ferkessedougou 2, Borotou-Kooro and Zuenoula.

The objective of this paper is simply to update the list of the phytophagous nematodes that have been encountered on sugarcane in the Ivory Coast.

#### Material and methods

The sugarcane fields were chosen to be representative of the whole sugarcane plantation from a geographical point of view. In the selected fields, the sugarcane ratoon plants were two-three months old. A total of 138 soil and root samples were collected from the four sugarcane plantations.

Composite samples were taken in one corner of each field plot. Each sample comprised three cores (about 250 cm<sup>3</sup> each) of soil and roots collected between 15 and 30 cm depth (zone of greatest density of sugarcane roots) on three different rows of sugarcane. Standardized extraction techniques were used for soils and roots (Seinhorst, 1950, 1962). Specific identifications were performed either on fresh material or on fixed nematodes (Seinhorst, 1966; Netscher & Seinhorst, 1969).

#### Results and discussion

During this survey twenty-nine species belonging to 20 genera were identified. They are listed in Table 1 with their respective occurrence at each of the four plantation

sites. Among them, fifteen species had already been reported on sugarcane in the "Ivory Coast-Burkina Faso sugarcane growing area" (Cadet & Merny, 1978; Cadet, 1986a, b; Cadet & Debouzie, 1990) while the remaining ones are reported with sugarcane in the Ivory Coast for the first time. In 1981, seventeen of these species had also been recorded on upland rice in surrounding areas of the north savannah area by R. Fortuner (1981). These nematode species seem to be indigenous to this geographic area consisting of savannah in the north of the Ivory Coast and the south of the Burkina Faso.

The frequencies of occurrence of the commonest phytophagous nematode genera associated with sugarcane ratoon crops at the four plantation sites in the Ivory Coast are reported in Table 2. Among the endoparasites, the genus *Pratylenchus* was recorded with the highest frequency of occurrence, e.g. *Pratylenchus zaei* was encountered in every plantation with similar frequencies. *Meloidogyne* was more frequently found at Ferkessedougou 1 while *Heterodera sacchari* was only found at the Ferkessedougou 1 and 2 plantations. There were no important differences in the frequency of occurrence of the hoplolaimids and of *Paratylenchus aquaticus* among the different sites.

Among the ectoparasites, *Helicotylenchus dihystera* which is the most worldwide distributed species of *Helicotylenchus*, was found in almost all samples. This genus was followed in frequency by the belonolaimids which were also found in more than 70 % of the samples whatever the plantations. *Triversus annulatus* was only detected at Ferkessedougou 1 and 2. The frequency of occurrence of *Paratrichodorus minor* was fairly important at Zuenoula while the longidorids were somewhat more frequent at Ferkessedougou 1. It is obvious that these records are highly subordinate to the sampling method (depth, number and size of samples, number of cores, etc.) and that positive records are only significant due to the natural aggregated distribution of nematodes in the soil.

In conclusion, during this survey the most common and potentially damaging phytophagous nematodes usually associated with sugarcane worldwide (Spaull & Cadet, 1990), *Pratylenchus*, *Meloidogyne*, *Helicotylen-*

**Table 1 :** List of the phytophagous nematodes associated with sugarcane on the four plantation sites of the Ivory Coast (F 1 = Ferkéssédougou 1; F 2 = Ferkéssédougou 2; B = Borotou-koro; Z = Zuenoula).

	F 1	F 2	B	Z
<b>BELONOLAIMIDAE</b>				
* <i>Paratrophurus baoulensis</i> (Netscher & Germani, 1969) Fortuner & Luc, 1987	•	•		•
* <i>Trichotylenchus falciformis</i> Whitehead, 1960	•	•	•	
* <i>Triversus annulatus</i> (Merny, 1964) Sher, 1974	•	•	•	
* <i>Trophurus lomus</i> Saha, Chawla & Khan, 1974				•
<i>Tylenchorhynchus crassicaudatus</i> Williams, 1960	•	•	•	•
<i>Tylenchorhynchus mashhoodi</i> Siddiqi & Basir, 1959	•	•	•	•
<b>PRATYLENCHIDAE</b>				
<i>Pratylenchus brachyurus</i> (Godfrey, 1929) Filip'jev & Schuurmans Stekhoven, 1941		•		•
* <i>Pratylenchus sefaensis</i> Fortuner, 1974				•
<i>Pratylenchus zaeae</i> Graham, 1951	•	•	•	•
<b>HOPLOLAIMIDAE</b>				
<i>Helicotylenchus dihystra</i> (Cobb, 1893) Sher, 1961	•	•	•	•
<i>Helicotylenchus</i> sp	•	•		
<i>Hoplolaimus pararobustus</i> (Sch. stek. & Teun., 1938) Sher, 1963	•	•		
<i>Scutellonema clathricaudatum</i> Whitehead, 1959	•	•	•	•
<i>Rotylenchulus parvus</i> (Williams, 1960) Sher, 1961		•		
<i>Rotylenchulus</i> sp.	•	•	•	•
<b>HETERODERIDAE</b>				
<i>Heterodera sacchari</i> Luc & Merny, 1963	•	•	•	
<i>Meloidogyne javanica</i> (Treub, 1885) Chitwood, 1949	•	•		
<i>Meloidogyne</i> spp.	•	•	•	•
<b>CRICONEMATIDAE</b>				
* <i>Caloosia paradoxa</i> (Luc, 1958) Brzeski, 1974	•	•	•	
* <i>Criconema crassiannulatum</i> (de Guiran, 1963) Raski & Luc, 1984	•			
<i>Criconemella curvata</i> (Raski, 1952) Luc & Raski, 1981	•	•	•	•
* <i>Hemicriconemoides affinis</i> Germani & Luc, 1970		•		
<i>Hemicriconemoides cocophilus</i> (Loof, 1949) Chitwood & Birchfield, 1957		•		•
<b>TYLENCHULIDAE</b>				
<i>Paratylenchus aquaticus</i> Merny, 1966	•	•	•	•
<b>LONGIDORIDAE</b>				
<i>Longidorus siddiqii</i> Aboul-Eid, 1970	•			•
<i>Xiphinema attorodorum</i> Luc, 1961			•	
* <i>Xiphinema ebriense</i> Luc, 1958	•	•		
<i>Xiphinema elongatum</i> Schuurmans Stekhoven & Teunissen, 1938	•	•		•
* <i>Xiphinema fatikae</i> Bos & Loof, 1984	•	•		
* <i>Xiphinema ifacolum</i> Luc, 1961		•	•	•
* <i>Xiphinema savanicola</i> Luc & Southey, 1980		•		•
<b>TRICHODORIDAE</b>				
<i>Paratrichodorus minor</i> (Colbran, 1956) Siddiqi, 1974	•	•		•

\* First records on sugarcane in the Ivory Coast.

**Table 2 :** Frequency of occurrence of the more common phytophagous nematodes associated with sugarcane on the four plantation sites of the Ivory Coast.

	Ferké 1	Ferké 2	Borotou	Zuenoula
<i>Caloosia</i>	21.9	11.3	3.1	0
other criconematids <sup>a</sup>	40.6	38.6	15.6	23.3
<i>Helicotylenchus</i>	100	100	96.9	93.3
<i>Heterodera</i>	18.7	4.5	0	0
hoplolaimids <sup>b</sup>	34.4	38.6	31.3	6.7
longidorids <sup>c</sup>	40.6	15.9	3.1	16.7
<i>Meloidogyne</i>	84.4	50.0	46.9	43.3
<i>Paratrichodorus</i>	3.1	2.3	0	40.0
<i>Paratylenchus</i>	53.1	47.7	9.4	30.3
<i>Pratylenchus</i>	96.9	93.2	93.8	93.3
<i>Rotylenchulus</i>	28.1	13.6	6.3	0
<i>Triversus</i>	18.75	45.5	0	0
belonolaimids	71.9	72.7	100	100

a : other criconematids = *Criconema*, *Criconemella* and *Hemicriconemoides*.

b : hoplolaimids = *Hoplolaimus* and *Scutellonema*.

c : longidorids = *Xiphinema* and *Longidorus*.

d : belonolaimids = *Paratrophurus*, *Trichotylenchus*, *Trophurus* and *Tylenchorhynchus*.

*chus* and some tylenchorhynchids were found frequently in the sugarcane plantations in the Ivory Coast.

#### Acknowledgments

The authors thank M. Patrick Topart for his help to the first author in collecting the samples and the entire staff of the Laboratory of Nematology ORSTOM, Ivory Coast, for their technical assistance.

#### References

- CADET, P. (1986a). Évolution des nématodes ectoparasites dans la rhizosphère de la canne à sucre au Burkina Faso. *Revue Écol. & Biol. Sol*, 23 : 205-213.
- CADET, P. (1986 b). Étude du développement des nématodes dans les racines de la canne à sucre au Burkina Faso et en Côte d'Ivoire. *Revue Écol. & Biol. Sol*, 23 : 287-297.
- CADET, P. & MERNY, G. (1978). Premiers essais de traitements chimiques contre les nématodes parasites de la canne à sucre en Haute-Volta. *Revue Nématol.*, 1 : 53-62.
- CADET, P. & SPAULL, V. W. (1985). Studies on the relationship between nematodes and sugarcane in South and West Africa : Plant Cane. *Revue Nématol.*, 8 : 131-142.
- FORTUNER, R. (1981). Les nématodes associés au riz pluvial en Côte d'Ivoire. *Agron. trop., Nogent*, 36 : 70-77.
- NETSCHER, C. & SEINHORST, J. W. (1969). Propionic acid better than acetic acid for killing nematodes. *Nematologica*, 15 : 286.
- SEINHORST, J. W. (1950). De betekenis van de toestand van de grond voor het optreden van aantasting door het stengelaatje (*Ditylenchus dipsaci* [Kühn] Filipjev). *Tijdschr. Plziekt*, 56 : 291-349.
- SEINHORST J. W. (1962). Modifications of the elutriation method for extracting nematodes from soil. *Nematologica*, 8 : 117-128.
- SEINHORST J. W. (1966). Killing nematodes for taxonomic study with hot F.A.4.1. *Nematologica*, 12 : 178.
- SPAULL, V. W. & CADET, P. (1990). Nematode Parasites of Sugarcane. In : Luc, M., Sikora, R. A. & Bridge, J. (Eds). *Plant Parasitic Nematodes in Subtropical and Tropical Agriculture*, Wallingford, CAB International : 461-491.

## ON THE OCCURRENCE OF THE " MEDITERRANEAN BIOTYPE " OF *TYLENCHULUS SEMIPENETRANS* IN SPAIN

Soledad VERDEJO-LUCAS

Departamento Patología Vegetal, IRTA, Crta. de Cabrils s/n, 08348 Cabrils, Barcelona, Spain.

Accepted for publication 9 September 1991.

**Key-words :** *Tylenchulus*, Spain, nematodes.

*Tylenchulus semipenetrans* Cobb, present in all regions of the world where citrus is grown, also occurs in all citrus growing regions of Spain (Ortuño Martínez *et al.*, 1969; Bello *et al.*, 1986; Martínez Beringola *et al.*, 1987).

Populations of *T. semipenetrans* have been defined as biotypes according to the host status of several indicator plants species (Inserra *et al.*, 1980). Three *T. semipenetrans* biotypes have been identified to date, the " Citrus biotype " infects *Citrus* spp., Carrizo and Troyer citrange, olive, grape and persimmon. The " Mediterra-

nean biotype " is very close to the " Citrus biotype " but does not reproduce on olive. The " Poncirus biotype " reproduces on *Citrus* spp., *Poncirus trifoliata*, their hybrids, and grape but not on olive. The occurrence of biotypes of the nematode is of relevance to rootstock breeding programs, the choice of rootstock to be planted, and other management practices.

In this paper, the results of a differential host test carried out to identify the biotype of four Spanish populations of *T. semipenetrans* are reported.