POSTER SUMMARY

OCCURRENCE, ABUNDANCE AND DISTRIBUTION OF PLANT PARASITIC NEMATODES ASSOCIATED WITH SUGARCANE IN WESTERN KENYA

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Abstract

There has been a decline in sugarcane yields in Kenya from an average of 90.86 t/ha in 1996 to 71.46 t/ha by 2005. Several factors have contributed to this decline among which are plant parasitic nematodes. This poster summary describes an attempt to identify plant parasitic nematodes associated with the sugarcane crop in western Kenya and factors influencing nematode distribution.

Keywords: soil texture, organic products, crop cycle, *Pratylenchus* spp., *Scutellonema* spp., *Meloidogyne* spp.

Introduction

Sugarcane is an important cash crop in Kenya, earning growers approximately KES 8 billion annually. However, cane yields have declined from an average of 90.86 t/ha in 1996 to 71.46 t/ha in 2005 (Anon, 2005).The threat posed by plant parasitic nematodes may have become serious because of monocropping and poor knowledge of this soil pest. According to Sasser and Freckman (1987), the average annual yield loss on a worldwide scale due to damage caused by plant parasitic nematodes is 12.3%. In some areas Stirling and Blair (2000) have reported nematode infestation causing yield losses of up to 50% in sugarcane. To develop effective control measures, knowledge of the population and distribution of major plant parasitic nematodes associated with sugarcane is necessary. A survey carried out in the Nyanza sugar belt showed that *Pratylenchus* is the predominant nematode genera in this area. This poster summary reports on a study undertaken to identify the nematode populations and distribution in the western sugarcane zones of Kenya.

Materials and Methods

The study was conducted in the western sugarcane zones of Nzoia, Mumias, West Kenya and Busia. A total of 81 plots were selected by stratified random sampling. Soil was collected from the sugarcane rhizospheres, and nematodes were extracted from 200 cm^3 of soil from each sample, using the modified Baermann funnel technique (Hooper, 1990). Nematodes from 5 g root samples were extracted using the maceration/filtration technique described by Hooper (1990). The nematodes were killed using gentle heat in a water bath at 50-70ºC and fixed using the method described by Hooper (1990). Nematodes were identified up to the genus level following the key introduced by Mai and Lyon (1975) and the counts recorded. From each preserved nematode suspension, 2 ml was drawn using a pipette and placed in a counting dish under a light microscope. Three nematode counts were done and the average

was recorded. Data were subjected to the general linear model and means were separated by using the least significant difference test at P≤0.05 using SAS Release 8.1 for Windows (2000).

Results

Plant parasitic nematodes belonging to 15 different genera were identified (Table 1). Overall, soils in the Nzoia and Mumias zones were found to be more heavily infested than those in the Busia and West Kenya zones. There were significant differences (P≤0.05) in the occurrence and distribution of plant parasitic nematodes among the four sugarcane zones of western Kenya. The most prevalent genera were *Pratylenchus, Scutellonema* and *Meloidogyne,* in decreasing order, and the least prevalent were *Xiphinema*, *Ditylenchus* and *Hoplolaimus.*

Table 1. Numbers (N) of plant parasitic nematodes present in 200 cm^3 soil samples from the Nzoia, Mumias, West Kenya and Busia sugarcane zones of western Kenya, expressed as a percentage of the total number recovered from each zone.

Nematode genera	Nzoia		Mumias		West Kenya		Busia		Total	
	N	%	N	%	N	%	N	%	N	%
Pratylenchus	2060	15.7	1805	26.1	80	7.9	980	34.4	4925	20.6
Scutellonema	2260	17.2	1400	20.3	0	0	700	24.6	4360	18.2
Meloidogyne	1955	14.9	980	14.2	0	0	205	7.2	3140	13.1
Rotylenchus	1065	8.1	670	9.7	590	58.4	50	1.8	2375	9.9
Aphelenchoides	1660	12.6	230	3.3	0	0	0	0	1890	7.9
Paratylenchus	845	6.4	250	3.6	310	30.7	395	13.9	1800	7.5
Tylenchus	1380	10.5	160	2.3	0	0	220	7.7	1760	7.4
Helicotylenchus	675	5.1	585	8.5	10	1	20	0.7	1290	5.4
Tylenchorhynchus	570	4.3	305	4.4	20	2	80	2.8	975	4.1
Xiphinema	135	1.0	90	1.3	0	0	110	3.9	335	1.4
Ditylenchus	100	0.8	225	3.6	0	0	0	0	325	1.4
Hoplolaimus	240	1.8	40	0.6	0	0	40	1.4	320	1.3
Belonolaimus	85	0.6	60	0.9	0	0	20	0.7	165	0.7
Trichodorus	95	0.7	100	1.4	0	0	30	1.1	225	0.9
Longidorus	0	0	10	0.1	0	0	0	0	10	0.04
Total %*		54.9		28.9		4.2		12.0		100

*Percentage of all plant parasitic nematodes extracted from collected samples

Discussion

- This study has clearly shown that plant parasitic nematodes associated with sugarcane are present in significant numbers in western Kenya. *Pratylenchus, Scutellonema* and *Meloidogyne* were found to be the predominant genera.
- Nematodes from four genera namely *Helicotylenchus, Xiphinema, Meloidogyne* and *Aphelenchoides*, were not affected by soil type.
- Altitude influences plant parasitic nematodes as was observed in this study. The four genera found to be significantly influenced were *Ditylenchus, Paratychenchus, Aphelenchoides* and *Tylenchus*.
- Three genera of plant parasitic nematodes, namely *Ditylenchus, Tylenchus* and *Pratylenchus*, were influenced by duration of cultivation as reflected by the number of crop cycles. In this study increase in crop cycles led to an increase in the number of nematodes up to the second ratoon crop, after which the population declined.
- A higher concentration of plant parasitic nematodes was found in the out-grower farms as compared to the nucleus estates. Only two genera, namely *Hoplolaimus* and *Aphelenchoides*, were found in higher numbers in the nucleus estates than in the out-grower farms.

Conclusions and Recommendations

Fifteen genera of plant parasitic nematodes associated with sugarcane were identified in the western sugarcane zones of Nzoia, Mumias, West Kenya and Busia in Kenya. Of these, *Pratylenchus, Scutellonema* and *Meloidogyne* were predominant.

Soils with higher contents of sand harbour more parasitic nematodes. Three genera, namely *Ditylenchus, Tylenchus* and *Pratylenchus*, were found to be influenced by duration of sugarcane cultivation. The genera influenced by altitude are *Ditylenchus, Paratychenchus, Aphelenchoides, Tylenchus* and *Xiphinema.*

Use of organic fertilizers such as manure reduces parasitic nematodes associated with sugarcane. Therefore, measures to manage plant parasitic nematodes in western sugarcane zones in Kenya should be geared towards the major nematodes, namely *Pratylenchus, Scutellonema* and *Meloidogyne.* The centre of focus in management should be the heavily infested Nzoia Sugarcane Scheme and Mumias. In the West Kenya zone, which is least infested, a concerted effort should be made to prevent an increase in nematode populations.

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