



POTENTIAL OF INCORPORATING SUGARCANE HOST RESISTANCE IN INTEGRATED NEMATODE MANAGEMENT STRATEGIES

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Abstract

There has been a persistent decline in sugarcane yields in Kenya. Over the past decade it dropped by 26%. Amongst other pests, nematodes have been thought to contribute to the decline. Currently nematode control focuses on development of IPM strategies due to banning of chemical nematicides out of health and environmental concerns. A field study was conducted to assess the potential of incorporating host resistance in IPM strategies to manage plant parasitic nematodes in sugarcane production. Three cane cultivars namely KEN83-737, N14 and Co 421 respectively rated as resistant, tolerant and susceptible were subjected to three different rates of nematicide (aldicarb) treatment. In the nematicide-treated plots, KEN83-737, N14 and Co 421 reduced nematode population numbers by 70%, 53% and 33% while in the control plots, they supported nematode population growth by 24%, 32% and 92% respectively. The reduction of nematode populations caused an increase in cane yield (34%), stalk girth (18%), plant height (37%), millable stalks number (53%) and pol cane (5%). This reduction was highest for resistant and lowest for susceptible cultivars. It is most probable that the reduction in nematode populations differed for the different cultivars due to their different host resistance status. Host resistance may therefore be incorporated in IPM packages by use of cane cultivars resistant or tolerant to plant parasitic nematodes.

Introduction

Sugarcane (*Saccharum* spp. hybrids) is a major cash crop grown mainly in western Kenya and earns small-scale farmers approximately US \$300 million (KSB, 2013). However, there has been a persistent decline in yields, dropping by 26% from 74 to 55 tons/ha between 2004 and 2013 (KSB, 2013). This decline has been attributed to several factors among them nematodes which have been reported to cause up to 50% yield loss (Cadet et al., 2007). As a result of the banning of chemical nematicides in the control of nematodes due health and environmental concerns, focus has shifted to developing integrated nematode management packages, one of whose important components is host resistance.

Objective

To determine the presence of field host resistance to plant parasitic nematodes among selected sugarcane cultivars and evaluate the potential of incorporating it in integrated nematode management packages.

Materials and methods

- A field study was conducted at KALRO-SRI farm with eutric cambisols.
- Three cultivars namely KEN83-737, N14 and Co 421 rated respectively as resistant, tolerant and susceptible were selected.
- Aldicarb (Temik 10G) was applied at 3, 1.5 and 0 kg ha⁻¹.
- At harvest data collection was done for girth, plant height, millable stalks number and yield, and quality parameters pol cane and juice, brix cane and juice, fibre cane, purity and commercial cane sugar (%).
- Nematodes were sampled at 0, 9 and 18 months after planting and extracted following the modified Baermann funnel technique described by Hooper et al. (2005).
- Nematode data were log transformed and all data subjected to ANOVA using Genstat version 9.2 and means separated by LSD at P≤0.05.

Results

- Application of nematicide reduced nematode numbers for all cultivars (Fig. 1).
- However, the reduction was different for the different cultivars. KEN83-737, N14 and Co 421 reduced the nematode numbers by 70, 53, and 33 % while they supported nematode population growth by 24, 32 and 92 % respectively in the control at 9 months after planting (Table 1).
- The reduction in nematode population caused an increase in stalk girth, plant height, millable stalks number, cane yield and quality by 18, 37, 53, 34 and 5% respectively (Table 2).

Figure 1. Effect of different nematicide rates on nematode population numbers across the different sugarcane cultivars in 200 cm³ soil

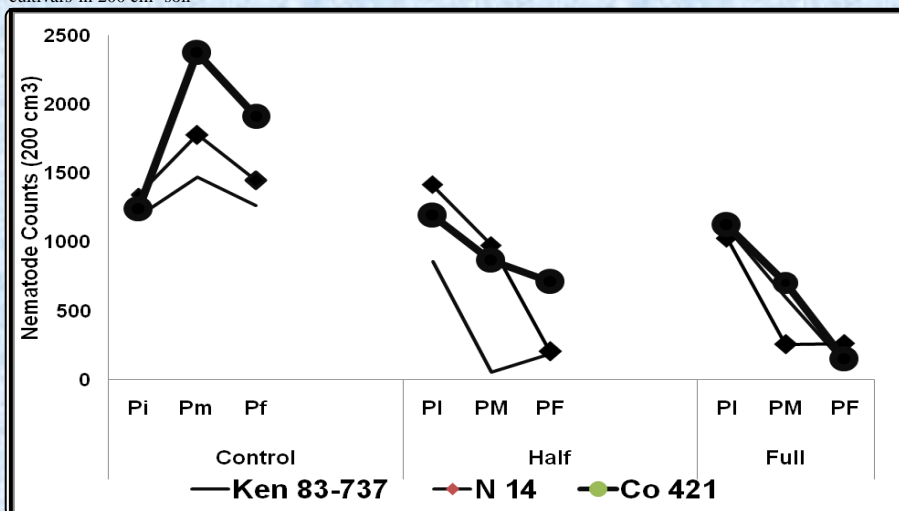


Table 1. Effect of nematicide treatment and controls on nematode population.

Treatment	Effect on nematodes	KEN83-737	N14	CO421
Nematicide- applied	% nematode control	70	53	33
Control	% nematode increase	24	32	92

Table 2. Effect of nematicide treatment and controls on yield and yield components .

Treatment	Girth (mm)	Plant height (cm)	Millable stalks no. (no.)	Yield (tons/ha)	Pol cane (%)
Control	22	228	156	140	14.44
Nematicide- applied	26	313	239	187	15.16
Increase (%)	18	37	53	34	5

Conclusion and recommendations

- The reduction in nematode numbers was highest for the resistant and lowest for the susceptible cultivars.
- It is most probable that this reduction was partly due to host resistance status of the cultivars.
- Host resistance may therefore be incorporated in IPM packages by use of resistant or tolerant cane cultivars for nematode management.

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Reference

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