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EFFECT OF *MELOIDOGYNE INCOGNITA* AND *HETERODERA SACCHARI* SINGLY AND COMBINED ON THE GROWTH OF SUGARCANE

by
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Summary. The effect of a root-knot nematode, *Meloidogyne incognita*, and the sugarcane cyst nematode, *Heterodera sacchari*, on the growth of sugarcane (*Saccharum officinarum* L.) cv. Co 396 was investigated in a screenhouse. *H. sacchari* alone significantly reduced shoot weight and caused severe root necrosis. The effect of *M. incognita* was similar to that of *H. sacchari*. In concomitant infections with *H. sacchari* and *M. incognita* shoot and root weights of plants were significantly reduced; other symptoms were severe necrosis and galling of the roots.

The sugarcane cyst nematode, *Heterodera sacchari* Luc *et* Merny and the root-knot nematode, *Meloidogyne incognita* (Kofoid *et* White) Chitw. are the most serious nematode pests affecting sugarcane (*Saccharum officinarum L.*) production in Nigeria. Jerath (1968) found that sugarcane plants attacked by *H. sacchari* grew thin and stunted and Odihirin (1976) reported that the nematode caused total crop failure at the Bacita Sugar Estate in 1966 to 1975 cropping seasons. Salawu and Adeniji (1985) showed that *H. sacchari* significantly reduced the growth of sugarcane cv. Co 1001 under screenhouse conditions. Although root-knot nematodes, *Meloidogyne* species are known to be pests of sugarcane, information on the reaction of various sugarcane cultivars grown at the Nigerian Sugar Estates is still limited. Salawu (1985, 1986, 1990), however, reported a number of cultivars to be susceptible to *Meloidogyne incognita*.

The results of an investigation on the effect of *H. sacchari* and *M. incognita* singly and in combination on the growth of sugarcane are reported here.

Materials and methods

A culture of *H. sacchari* used in the investigation was raised on rice cv. OS6. Second stage juveniles of *M. incognita* used as inoculum were extracted from egg masses on the infested roots of tomato cv. Ife 1, using the modified extraction tray method of Whitehead and Hemming (1965). Setts of the sugarcane cv. Co 396 from single bud cuttings were surface-sterilised in 1.5% sodium hypochlorite (NaOCl) solution for 10 minutes and then planted in steam-sterilised sandy loam soil mixed with pure sand in a 2:1 ratio, in perforated 5 litre plastic pots. Two weeks after emergence, the plants were inoculated with a suspension of approximately 5000 second stage juveniles of the nematode species at the root zones. There were four treatments: 1) *H. sacchari* alone, 2) *M. incognita* alone, 3) *H. sacchari* + *M. incognita* (5000 juveniles of each), 4) uninoculated plants as control. Each treatment was replicated five times, randomly arranged on the screenhouse bench and irrigated daily with tap water. Four grams of fertiliser (N.P.K., 2:1:1) was added twice at 30-day intervals. Plants were removed from pots 120 days after inoculation. The stalk length, number of tillers, fresh shoot and root weights were recorded.

Five gram samples of infected roots taken at random were comminuted in a Waring Blender for 30 seconds and nematodes recovered as described before. Root galls were counted per whole plant root system. Cysts of *H. sacchari* were recovered from the soil using the modified Fenwick can (Oostenbrink, 1950).

Results and discussion

The results are presented in Table I. There was a significant reduction in root proliferation in plants inoculated with both *M. incognita* and *H. sacchari* and this was accompanied by significant reduction in plant top growth compared with the untreated plants (Table I). Plants treated with the nematodes singly had reduced top growth. A similar reduction in the growth was reported with sugarcane cv. Co 1001 infected with *H. sacchari* (Salawu and Adeniji, 1985) and *M. incognita* (Salawu, 1986).

Examination of roots 120 days after inoculation with *M. incognita* revealed heavy galls on the roots, typical of root-knot nematode infection. Females of *H. sacchari* emerged from cracks on the roots and clustered in large numbers some distance behind the apical meristem of the root. The roots bore few root hairs and showed severe necrosis. Mi-

TABLE I - *Influence of* Heterodera sacchari *and* Meloidogyne incognita *singly and concomitantly on growth of sugarcane cv. Co 396.*

Inoculum	Fresh Weight		Stalk	Tiller [1]	H. sacchari		M. incognita	
	Shoot (g)	Root (g)	length (cm)	number	Cysts/ 250ml soil	J_2/5g roots	No. galls/ root system	J_2/5g roots
H. sacchari alone	215.6b	150.9a	58.4ab	(5) 2.3a	300	1942	–	–
M. incognita alone	219.6b	133.6a	67.0b	(6) 2.4b	–	–	129	1922
H. saccari (5000) + *H. incognita* (5000)	170.8a	88.9b	51.8a	(4) 2.1a	415	2587	47	1202
Control	269.8c	159.7a	59.6ab	(4) 2.1a	–	–	–	–

[1] Square root transformation, untransformed data in parenthesis. Means followed by same letter, in every column, do not differ significantly (P = 0.05) according to Duncan's Multiple Range Test.

croscopic examination, however, showed that swollen roots contained juveniles and mature females of *M. incognita*. Poor development of root hairs on some roots was caused by *H. sacchari*. Jerath (1968) found that sugarcane roots infected by *H. sacchari* bore few root hairs.

The most significant result from this study was the antagonistic interaction between *H. sacchari* and *M. incognita* on sugarcane. The number of *H. sacchari* increased whereas those of *M. incognita* decreased. This suppression of *M. incognita* by *H. sacchari* may be due to overcrowding, and/or interspecific competition for an infection court as suggested by Salawu (1978) in a similar study on rice.

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