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SUSCEPTIBILITY AND GROWTH RESPONSE OF SELECTED SUGARCANE CULTIVARS TO INFECTION BY *MELOIDOGYNE INCOGNITA*

by
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Summary. Susceptibility and growth responses of 12 selected sugarcane cultivars to infection by *Meloidogyne incognita* were carried out in a screenhouse. All were highly susceptible to the nematode infection. The top growth of cv. CO 440 was significantly greater than the other cultivars.

Root-knot nematodes (*Meloidogyne incognita* and *M. javanica*) are a major economic problem limiting sugarcane production in Nigeria. Since the establishment of the sugar industry in Nigeria in 1961, sugarcane cultivars for propagation in the sugar estates have been imported from Barbados, India, United States of America, Australia and Guyana. Many of these were found to be susceptible to *M. incognita* (Salawu, 1985, 1986). Some cultivars from Cuba are tolerant to *M. incognita* infection (Legon and Razjivin, 1980).

This reports the results of an investigation on the susceptibility of twelve selected sugarcane cultivars to the nematode infection and the growth response of the crop. The cultivars are from Barbados, India, Guyana, and the United States of America and are not known to have resistance to *Meloidogyne* species.

Materials and methods

Sugarcane sets from single bud cuttings, from each of the twelve cultivars (Table I) were surface-sterilized in 1.5% sodium hypochlorite (NaOCl) solution for 10 minutes and later established in steam-sterilized sandy loam top soil mixed with pure sand in ratio 2:1 in perforated 5-litre plastic pots and irrigated with tap water daily.

Three weeks after emergence of sugarcane above ground, each pot was inoculated in the root zone with approximately 2000 second stage juveniles of *M. incognita* extracted from eggmasses on *Celosia argentia L.* using modified extraction tray method of Whitehead and Hemming (1965). Each cultivar was replicated three times and the experiment was in a randomized complete block design on benches in a screenhouse. Fertilizer (N.P.K., 2:1:1) was applied monthly at 5g per pot. Soil temperature at 10cm was 24-28°C.

Plants were harvested from the pots 195 days after inoculation. Fresh shoot and root weight, the stalk length (from ground level to the topmost visible dewlap), the internode number, as well as the number of tillers per plant were recorded. The degree of infestation and plant resistance were determined by using the rating scheme of Taylor and Sasser (1978): 0 = 0 gall, resistant; 1 = 1 gall, moderately resistant; 2 = 2-10 galls, moderately susceptible; 3 = 11-30 galls, susceptible; 4 = 31 galls and above, highly susceptible.

Five gram root samples were randomly taken from each cultivar per plant immediately after harvest and comminited for 30 seconds in a Waring Blender. Second stage juveniles of the nematode were extracted using the method described before, and recorded.

Results and discussion

All the twelve cultivars were susceptible to *M. incognita* attack although the number of galls on the roots varied (Table I). Galls on cvs BJ6547 and B6604 were significantly fewer than on other cultivars, and the number of the second stage juveniles from the roots of BJ6547 was significantly fewer than those of CO997, CO976, D20/58, Cp29/116, BJ6552, CO6806, B6604, and DB5155 (Table I). Microscopic examination of the galled roots of all the cultivars revealed large number of developmental stages of the nematode inside the tissues, accompanied by browning and severe decay of affected roots.

All of the cultivars displayed yellow discoloration of the leaves about 90 days after inoculation particularly in cvs Cp29/116, BJ6552, CO440, CO6604, and DB5155. Tillering was greatly inhibited in five out of twelve sugarcane cultivars tested including CO976, B4681, BJ6552,

CO6806, and B6604. The number of internodes developed per cultivar varied. This was higher in CO997 and Cp29/116 (Table I). Fresh shoot and root weight in all the cultivars varied. Root proliferation was greatest in D20/58, but not significantly different from CO997, CO976, and BJ6547. Similarly the shoot weight of B69620 was greater than BJ6547, CO976, CO6806 and D20/58.

Inhibition of tillering observed in some of the cultivars tested accord with the earlier observation by Salawu (1986) who demonstrated that cvs CO957 and D47/15 known to tiller profusely in the field were inhibited by the nematode under the screenhouse conditions.

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TABLE I - *Fresh shoot and root weight, stalk length, internode and tiller number, reaction and the degree of infestation of sugarcane cultivars infected with* Meloidogyne incognita.

Sugarcane cultivar	Fresh weight		Stalk length (cm)	Internode number	Tiller number	Root galls[1] per plant	Second stage juvenile per 5g root[1/]	Degree of infestation	Reaction of host
	Shoot (g)	Root (g)							
DB5115	188.0	93.2	89.5	10	6	(277) 2.4	(4420) 3.6	4	Highly susceptible
BJ6547	170.9	111.8	95.3	8	10	(51) 1.7	(1047) 3.0	4	Highly susceptible
CO976	177.0	104.8	91.7	7	2	(196) 2.3	(3863) 3.6	4	Highly susceptible
B4681	183.9	63.8	75.8	7	2	(271) 2.4	(2730) 3.4	4	Highly susceptible
CO997	239.9	103.0	125.8	14	4	(251) 2.5	(4013) 3.5	4	Highly susceptible
D20/58	175.7	126.2	113.0	9	10	(387) 2.6	(3106) 3.5	4	Highly susceptible
B69620	249.6	66.5	135.7	10	4	(213) 2.3	(2079) 3.3	4	Highly susceptible
Cp29/116	195.0	76.2	113.0	11	5	(217) 2.3	(4215) 3.6	4	Highly susceptible
BJ6552	204.0	54.3	111.8	10	3	(246) 2.4	(4122) 3.6	4	Highly susceptible
C0440	262.7	55.5	132.7	10	4	(154) 2.2	(2367) 3.4	4	Highly susceptible
CO6806	110.9	49.8	57.3	8	2	(162) 2.3	(3358) 3.5	4	Highly susceptible
B6604	208.6	79.5	112.7	10	3	(68) 1.8	(4483) 3.6	4	Highly susceptible
S. E.	20.20	9.63	8.62			0.07	0.13		

[1/] Log. transformation, untransformed data in parentheses.

Literature cited

LEGON J.P.O. and RAZJIVIN A.A., 1980 - Sugarcane varieties resistant to *Meloidogyne incognita* Chitwood 1949. *In*: International Society of Sugarcane Technologists Proceedings XVII Congress, Manila, Philippines, 1-11 February, 1980, 1426-1432.

SALAWU E.O., 1985 - Root-knot resistance in sugarcane varieties and histological changes in infested roots. *Bangladesh J. Sugarcane*, 7: 5-12.

SALAWU E.O., 1986 - Reaction of sugarcane varieties to a root-knot nematode, *Meloidogyne incognita*. *Pak. J. Nematol.*, 4: 19-26.

TAYLOR A.L. and SASSER J.N., 1978 - Biology, Identification and Control of Root-knot Nematode (*Meloidogyne* species). Raleigh, North Carolina, North Carolina State University Graphics, 111 pp.

WHITEHEAD A.G. and HEMMING J.R., 1965 - A comparison of some quantitative methods of extracting small vermiform nematodes from soil. *Ann. appl. Biol.*, 55: 25-28.

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