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Department of Crop Production, University of Ilorin, Ilorin — Nigeria

RESPONSES OF SOME SORGHUM CULTIVARS TO THE ROOT-KNOT NEMATODE *MELOIDOGYNE INCOGNITA* IN NIGERIA

by
O. Babatola and K.A. Idowu

Summary. Reactions of some short duration, dwarf sorghum cultivars and an Ilorin local cultivar to infestation by the root-knot nematode, *Meloidogyne incognita* were studied. The Ilorin local cultivar showed some resistance but all other cultivars exhibited varying degrees of susceptibility to the nematode. Root galling was multiple and severe in cvs. SSV9 and KSV12 and moderate in SSV10, KSV11 and KSV15. Growth, vigour and grain yield were depressed, while days to tillering and 50% flowering were increased with increasing nematode inoculum levels in three dwarf cultivars. Root gall indices increased with increasing inoculum level.

Sorghum is an important cereal crop grown in Nigeria for food. It is susceptible to attacks by root-knot nematodes such as *Meloidogyne javanica* (Caveness, 1967b) and *M. incognita acrita* (Orr and Morey, 1978). Histopathological studies revealed some giant cells without nematodes present and some of the giant cells became vacuolated with fragments of nematodes in the root tissues indicating that the nematodes did not complete their life cycle. The present studies were undertaken to observe the nature of the galls and the effects of *Meloidogyne incognita* (Kofoid *et* White) Chitw. on the growth of this crop.

Materials and methods

Five sorghum cultivars, SSV9, SSV10, KSV11, KSV12, KSV15 obtained from the Institute of Agricultural Research, Zaria and Ilorin local cultivar were sown at the rate of one seed per each 1l pot of steam-sterilized sandy loam soil and inoculated with 5,000 eggs of *M. incognita* five days after germination. Eggs were obtained from infected cowpea roots by the NaOCl method (Hussey and Barker, 1973). Each inoculated cultivar was replicated five times and five replicates of each cultivar were uninoculated. The seedlings were watered each morning, and thirty six days after inoculation, all seedlings were removed from the pots and thoroughly washed clean of soil particles. Root length, dry shoot and root weight, number of galls per root system, length and width of root galls were then measured. Roots were rated for galls using the 0-5 scheme of Taylor and Sasser (1978) and all data were subjected to analysis of variance.

In the second experiment, the cultivars SSV9, KSV11 and KSV12 were planted individually in 10l steam-sterilized loam. Five plants per cultivar were each inoculated with 6,000, 12,000, 24,000 and 48,000 eggs of *M. incognita* and five were left uninoculated as controls. The plants were watered regularly each morning and NPK 15:15:15 fertilizer was applied to plants when four weeks old at the rate of 5g/pot. Days to 50% flowering, and tiller initiation and grain yield were recorded. All plants were uprooted and assessed for root galls 120 days after planting and all data were subjected to analysis of variance.

Results and discussion

All six cultivars were infected by *M. incognita* and manifested varying degrees of root galling. The Ilorin local cultivar showed some level of resistance with the least root gall index (Table I). All other cultivars showed susceptible reactions. The number of galls per root system was least (Table I) in Ilorin local; the galls were distributed randomly throughout the root system but with prominent gall at the root tip. This reaction is similar to the reactions of sorghum to *M. javanica* (Caveness 1967) and *M. incognita acrita* (Orr and Morey, 1978). Mean root gall length was highest in Ilorin local and least in SSV9. The reverse was however true of the root gall diameter (Table I). Both dry shoot and root weights were highest in the inoculated Ilorin local cultivar (Table II) while cv. KSV12 also appeared to be most severely affected in terms of root length, dry shoot and root weights. The root length in cv. KSV12 was reduced by up to 56% in inoculated seedlings.

Days to 50% flowering and tillering as well as yield losses increased with increasing inoculum in all cultivars (Table III). Grain yield was severely depressed in SSV9

but there were no significant differences between the cultivars. There was a positive correlation between inoculum levels and root gall index but yields were negatively correlated with initial inoculum levels and root gall index (Table III). Correlation coefficient between inoculum levels and grain yield were negative and significant (SSV9 = -0.92, KSV11 = -0.90, KSV12 = -0.91).

TABLE I - *Reactions of six sorghum cultivars to the root-knot nematode,* Meloidogyne incognita.

Cultivars	Root gall index	Number of galls per root system	Mean length of galls (mm)	Diameter of galls (mm)
SSV9	4.6	14	23	2
SSV10	3.3	10	36	1
KSV11	3.0	12	24	1
KSV12	3.6	11	35	1
KSV15	3.3	7	32	0
Ilorin Local	2.0	6	47	0
LSD 5%	NS	2.2	4.62	0.31

TABLE II - *Effects of* M. incognita *on growth and biomass of inoculated and uninoculated sorghum cultivars.*

Cultivars	Root length (cm)		Dry root wt. (gm)		Dry shoot wt. (gm)	
		uninoc.	inoc.	uninoc.		uninoc.
SSV9	16.7	30.2	3.8	7.8	11.8	16.6
SSV10	18.2	28.9	4.1	7.9	10.4	15.9
KSV11	20.5	32.4	4.3	8.2	13.4	19.8
KSV12	16.8	38.5	3.5	9.6	13.9	21.5
KSV15	23.5	31.7	4.0	8.3	13.6	17.9
Ilorin Local	34.1	40.8	4.7	8.1	16.8	18.2

TABLE III - *Effects of* M. incognita *inoculum levels on growth and yield of three sorghum cultivars.*

Cultivars	Inoculum levels	50% flowering days	Days to tillering	Grain yield/pot (gm)	Root gall index
SSV9	0	56	66	18.4	0
	3,000	58	66	17.8	2.5
	6,000	60	68	11.0	2.7
	12,000	84	70	10.8	3.5
	24,000	84	81	6.4	3.8
	48,000	90	89	2.5	4.2
KSV11	0	59	64	14.7	0
	3,000	63	65	14.8	2.0
	6,000	79	67	14.6	2.7
	12,000	86	71	13.8	3.0
	24,000	85	76	8.6	4.0
	48,000	93	88	4.0	4.0
KSV12	0	58	64	17.2	0
	3,000	58	64	16.0	1.2
	6,000	79	75	12.6	1.5
	12,000	86	78	11.7	2.0
	24,000	86	85	8.5	3.2
	48,000	91	92	6.1	4.5
LSD 5%		5.79	8.87	6.17	

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