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PATHOGENICITY OF *MELOIDOGYNE INCOGNITA* ON *CORCHORUS OLITORIUS*by
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Summary. Two experiments were carried out to study the pathogenic effects of *Meloidogyne incognita* on two cultivars of *Corchorus olitorius*. Plant height, mean number of leaves per plant, mean leaf area, fresh and dry shoot weight and chlorophyll content decreased with increases in initial inoculum levels for both cultivars in the two experiments. N.P.K. 15:15:15 was found to improve the tolerance of the plants infected by *M. incognita* by markedly reducing the yield losses compared with plants which received no fertilizer treatment, even at lower inoculum levels.

Corchorus olitorius L., an annual broadleaf herbaceous and fibrous plant is an important crop in Nigeria where it is grown for the bast fibre and as a leaf vegetable. It is susceptible to attack by various nematodes including *Helicotylenchus* spp., *Scutellonema clathricaudatum* and *Hemicyclophora* spp. (Caveness, 1967). *Meloidogyne* spp. may be particularly damaging (Quin, 1975). Babatola (1983) described the symptoms of attack as chlorosis, wilting, significant reductions in leaf size and total fresh weight, in addition to the characteristic gall of the roots.

This paper reports results of pathogenicity studies on *C. olitorius* infected by *Meloidogyne incognita* (Kofoid et White) Chitw. and the effect of N.P.K. 15:15:15 fertilizer on such plants.

Materials and methods

Two cultivars 'NHC0 13' (Oniyaya) and 'NHC0 77' (Eleti Ehor0) obtained from the National Horticultural Research Institute Ibadan, Nigeria, were used in each of two experiments carried out in 1987, planting 4 day old seedlings on steam-sterilised sandy loam. The inoculation of the nematode was performed by pouring, two days after transplanting, in the root region 15,000; 30,000 and 45,000 eggs/pot for each cultivar for the first experiment and 4,000; 8,000 and 12,000 eggs/pot for the second one. Each treatment was replicated five times in the first experiment and four times in the second. An equal number of uninoculated plants served as control. Fertilizer was applied only in the first experiment three weeks after inoculation at the rate of 2g/pot. Pots were laid out in a split plot design in a shade house and were watered daily. The height of the plants and number of leaves per plant were recorded at weekly intervals. Forty nine days after inocu-

lation each plant was cut through at the stem base and both fresh and dry shoot weight were then recorded. Roots were uprooted and rated for galls using the 0-5 scheme of Taylor and Sasser (1978).

Average leaf area was determined by the Gunkel and Mulligan (1953) method using the relationship reported by Watson (1937) and Gunkel and Mulligan (1953) to calculate area thus:

$$\text{Leaf area} = \frac{\text{Leaf dry weight (g)} \times \text{disc area (cm}^2\text{)}}{\text{disc dry weight (g)}}$$

The Olofinboba and Fawole (1976) method was used to determine chlorophyll content. The absorbance of chlorophyll was measured on the unicam 'sp' ultraviolet spectrophotometer, at 665nm and 649nm for chlorophyll 'a' and 'b' respectively.

Total amount of chlorophyll was calculated thus:
Chlorophyll content =

$$\frac{6.45 (A \text{ 665nm}) + 17.72 (A \text{ 649nm})}{\text{weight of 10 dry disc (g)}} \text{ mg/cm}^3.$$

All data were subjected to analysis of variance.

Results and discussion

Heavily infected *Corchorus olitorius* plants were severely stunted with fewer and smaller leaves which also appeared chlorotic.

Tables I and II indicate a progressive reduction in final value of plant height, number of leaves per plant, mean leaf size and chlorophyll content with increasing inoculum level. In most cases uninfected plants (control) were significantly better ($P = 0.05$) than inoculated plants in both

cultivars, whether fertilized or not. Inoculated plants were usually not significantly different from each other.

Fresh and dry shoot weight followed the same trend of decrease with increasing inoculum level (Tables I and II). With the exception of cv 'NHCo 13' at 15,000 eggs/pot with fertilizer (Table I), most of the other inoculated plants whether or not fertilized had significantly lower shoot yield than the control plants. Galling occurred in all inoculated plants and its intensity increased with increasing inoculum levels.

In both experiments, both cultivars manifested similar reaction for most parameters but cv 'NHCo 77' however had tendency to produce more leaves than cv 'NHCo 13'.

Infected plants that received N.P.K. fertilizer exhibited greater tolerance to infection than the unfertilized ones. Even though their roots were heavily galled, most growth and yield parameters showed much improvement over plants that received no N.P.K. fertilizer application even at lower inoculum levels. Whereas plants with inoculum levels of 15,000 eggs/plant had yield reductions of 44.5% and 57.7% respectively for cvs 'NHCo 13' and 'NHCo 77' under fertilizer (Table I), yield losses of 78.2% and 81.3% (based on fresh shoot weight) were obtained respectively for the above cultivars in the second experiment at a relatively lower level of 12,000 eggs/plant but without fertilizer (Table II).

TABLE I - Effect of *Meloidogyne incognita* on growth and yield of *Corchorus olitorius* in presence of N.P.K. 15:15:15 fertilizer.

Cultivar	Inoculum levels (eggs/pot)	Plant height (cm)	Number of leaves	Mean leaf area (cm ²)	Fresh shoot weight (g)	Dry shoot weight (g)	Chlorophyll content (mg/g leaf)	Gall rating	Yield loss based on fresh shoot weight (%)
'NHCo 13'	0	74	75	74.3	28.8	5.3	224	0	0
	15,000	37	34	48.5	16.0	2.6	153	4.7	45
	30,000	30	27	40.9	11.9	1.8	132	5.0	59
	45,000	20	19	25.8	7.6	0.9	119	5.0	74
'NHCo 77'	0	72	99	73.9	32.4	5.5	233	0	0
	15,000	32	47	37.5	13.7	1.8	164	4.5	58
	30,000	24	37	32.6	9.6	1.3	140	5.0	71
	45,000	10	21	14.8	4.5	0.5	119	5.0	86
LSD at 5%		22	29	27.5	12.8	1.6	31	0.4	

TABLE II - Effect of *Meloidogyne incognita* on growth and yield of *Corchorus olitorius*, without fertilizer application.

Cultivar	Inoculum levels (eggs/pot)	Plant height (cm)	Number of leaves	Mean leaf area (cm ²)	Fresh shoot weight (g)	Dry shoot weight (g)	Chlorophyll content (mg/g leaf)	Gall rating	Yield loss based on fresh shoot weight (%)
'NHCo 13'	0	43	35	48.0	17.6	3.4	215	0	0
	4,000	28	20	20.8	8.1	1.3	190	3.5	54
	8,000	21	17	11.9	5.0	0.8	97	4.2	71
	12,000	15	14	8.3	3.8	0.5	87	4.6	78
'NHCo 77'	0	42	55	56.9	21.4	3.7	220	0	
	4,000	32	42	29.4	10.5	2.1	173	3.2	51
	8,000	24	26	11.8	5.1	0.8	112	4.2	76
	12,000	18	20	9.8	4.0	0.7	91	4.3	81
LSD at 5%		14	17	12.8	9.2	1.7	67.6	1.0	

This suggests that the use of N.P.K. 15:15:15 fertilizer at the proper time and rates during plant growth will be more effective in the reduction of damage due to *M. incognita* and probably other parasitic nematodes of *C. oleratorius*.

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