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EFFECT OF NITROGEN FERTILIZER ON RESISTANCE OR SUSCEPTIBILITY OF RICE CULTIVARS TO *MELOIDOGYNE GRAMINICOLA*¹

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Summary. Influence of three levels of nitrogen application on the root-knot nematode was studied in four resistant and two susceptible rice varieties. Resistance to the nematode was maintained in the resistant cultivars. In the susceptible cultivars root-knot infestation increased with nitrogen levels upto 80 kg/ha but decreased markedly at 120 kg/ha.

Some rice cultivars have been reported to be resistant or tolerant to the root-knot nematode, *Meloidogyne graminicola* Golden et Birchfield 1968 (Roy, 1975; Jena and Rao, 1976; Swain *et al.*, 1986). However, such resistance broke down when nitrogen fertilizer was applied to crops (Rao and Israel, 1971; Rao *et al.*, 1984). We have investigated the build up of populations of *M. graminicola* on six rice (*Oryza sativa* L.) cultivars exposed to three levels of a nitrogen fertilizer.

Materials and methods

Four root-knot nematode resistant rice cultivars (Annada, IR 36, Udaya and Daya) and two susceptible (cvs. Annapurna and Parijat) were sown, one seed per pot, in polypots containing 200 g sterilised soil maintained in a green house (26-30°C). Five days after germination urea nitrogen fertilizer in the form of prilled granules was added at 0.71, 1.42 or 2.14 mg per pot (estimated to be equivalent to 40, 80, or 120 kg N/ha). There were 10 replicates of each treatment per cultivar. Each of the pots was inoculated with 200 *M. graminicola* juveniles 15 days after germination. Thirty five days after inoculation, the plants were uprooted, the roots washed and stained in lactophenol blue and the egg masses and adults counted. Juveniles

were extracted from the soil by sieving and modified Baerman funnel technique and counted.

Results and discussion

The number of root-knot galls/plant ranged from 0.4 in Daya at 120 kg N/ha to 12.1 in Annapurna at 80 kg N/ha (Table I). Higher root-knot numbers were recorded at 80 kg N/ha with the susceptible cvs. Annapurna and Parijat and the resistant cv. Daya.

Eggmasses per root system varied from nil in Annada to 2.5 in Parijat at 120 kg N/ha (Table I). Significantly higher number of eggmasses were recorded on the susceptible cultivars; increased nitrogen was associated with a significant increase in eggmasses in cv. Parijat but the reverse in cv. Annapurna. In the resistant cv. Daya there was an increase from 0.18 eggmasses at 80 kg N/ha to 0.60 eggmasses at 120 kg N/ha.

The number of adults per plant root system ranged from 0.7 in Annada at 120 kg N/ha to 37.8 in Parijat at 80 kg N/ha (Table I). In both susceptible and resistant cultivars an increase of nitrogen to 120 kg/ha led to a decrease in the number of adults. As might be expected the number of adults were generally higher on the susceptible cultivars than on the resistant. Similar results were obtained by Glazer and Orion (1984) working with *M. javanica* affecting tomato and other plants.

The population of juvenile stages varied from 2 in Annada at 80 kg N/ha and Daya at 120 kg N/ha to 20.6 in Parijat at 80 kg N/ha (Table I). Significantly higher numbers of juveniles were observed in cvs. Annada and IR 36

¹ Part of the thesis submitted to Utkal University, Bhubaneswar, India, by the Senior author for the award of Ph. D. degree.

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at 40 and 120 kg N/ha in comparison to 80 kg N/ha, whereas the number of juveniles increased with increments of nitrogen in Udaya.

The results indicate that root-knot resistance in cvs.

Annada, IR 36, Udaya and Daya were not affected by increasing levels of nitrogen fertilizer. In the susceptible cvs. Annapurna and Parijat, root-knot infestation was suppressed at the highest level of nitrogen.

TABLE I - Influence of nitrogen application to soil on the build up of root-knot nematode in rice.

Nitrogen level	Rice cultivars						C. D. at	
	Resistant				Susceptible		0.05	0.01
	Annada	IR36	Udaya	Daya	Annapurna	Parijat		
No. of root-knots								
40	3.8	1.8	1.7	1.5	3.0	3.0		
80	0.9	0.6	1.8	4.6	12.1	10.5	0.4	0.5
120	0.5	0.6	1.1	0.4	1.5	5.1		
No. of eggmasses								
40	0.9	0.3	0.3	0.3	1.7	0.6		
80	0.1	0.2	0.4	0.1	1.3	1.4	0.1	0.1
120	0	0.2	0.4	0.6	1.0	2.5		
Adults								
40	9.4	6.0	7.0	8.2	13.2	7.9		
80	6.2	4.1	5.3	8.2	22.4	37.8	5.0	6.6
120	0.7	1.8	2.7	3.0	5.0	12.7		
Juveniles								
	10.4	3.5	2.9	3.5	10.2	18.1		
80	2.0	2.5	5.1	16.7	14.8	20.7	0.7	1.0
120	8.3	6.3	6.7	2.0	1.7	8.5		

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