Nematol. medit. (1986), *14*: 287-290.

Department of Nematology, Orissa University of Agriculture and Technology, Bhubaneswar - 751003 - India

PATHOGENICITY AND CONTROL OF *ROTYLENCHULUS RENIFORMIS* ON *CICER ARIETINUM*

by
B. C. MAHAPATRA and N. N. PADHI

The legume *Cicer arietinum* L. known as chickpea or gram is an important pulse crop in India. It is a rich source of protein and also increases the soil fertility by its nitrogen fixing capacity. It accounts for more than a third of the area and about 40 per cent of the total pulse production of the country as it can be grown under rainfed and drought conditions.

At least 46 species of nematodes are known to attack chickpea (Greco *et al.*, 1984; Sharma, 1985; Vovlas *et al.*, 1985). Its susceptibility to the reniform nematode *Rotylenchulus reniformis* Linford *et* Oliveira (Rashid *et al.*, 1973; Sharma *et al.*, 1984) prompted the investigation on pathogenicity at different nematode inoculum levels and aspects of control which are reported here.

Surface sterilized chickpea cv. GBS - 1 seeds were sown in 15 cm diam clay pots filled (1 kg/pot) with autoclaved sandy loam soil compost mixture (4:1 soil: compost) and inoculated with *Rhizobium* culture. Seven days after germination, seedlings were thinned to one plant per pot. Suspensions of pre-adult *R. reniformis* were added to pots when the plants were 10 days old to provide nine inoculum levels (Table I). Each treatment, including the uninoculated control was replicated three times. Sixty days after inoculation, plants were removed from pots and measurements were made of length and dry weight of shoots and roots. Nematodes were extracted from potted soil by Cobb's sieving and decanting method and total numbers were recorded.

Table I - *Effect of different inoculum levels of* Rotylenchulus reniformis *on growth characteristics and number of nematodes/plant on chickpea (mean of 3 replications)*

Inoculum levels (Nemas/pot)	Length (cm)		Dry weight (g)		Nematode	
	Shoot	Root	Shoot	Root	Number	Rate of multiplication
0	30.8	20.9	2.1	0.7	—	—
10	30.5	20.8	2.0	0.7	75	7.5
100	30.4	20.6	2.0	0.7	567	5.7
250	30.3	20.5	1.9	0.7	1287	5.1
500	28.1	20.1	1.5	0.6	2247	4.5
1000	27.4	19.8	1.2	0.6	4020	4.0
2000	26.9	18.9	1.0	0.5	8000	4.0
4000	26.7	18.4	0.8	0.4	14000	3.5
8000	26.0	17.7	0.8	0.4	26400	3.3
10,000	25.2	16.2	0.3	0.3	31003	3.1
C.D.(0.05)	0.6	0.7	0.2	0.1	1.17 (Basing on log value)	—

To investigate the control of *R. reniformis*, 15 cm diam clay pots were each filled with 1 kg naturally infested soil containing 1000 *R. reniformis*/kg and 10 g aldicarb granules were thoroughly mixed with the soil in each pot (5 mg/kg soil), except for the control treatment. One week later, surface sterilized chickpea cv. GBS-1 seeds were sown in pots and simultaneously *Rhizobium* was added. Treatments were established as indicated in Table II. Seed treatment with sodium molybdate was at 3g/kg of seeds sown. Superphosphate (with 16% P_2O_5) was added to the soil in one treatment (6.25 mg/kg soil) with aldicarb granules. Growth regulators IAA, IBA and CCC were sprayed on the plants at 30 days after sowing. Each treatment was replicated three times. Sixty days after the application of aldicarb, plants were removed from pots and measurements were made of plant growth and the populations of nematodes in the soil were recorded.

The lowest inoculum level of *R. reniformis* that significantly reduced plant growth was 500 nematodes/kg soil (Table I). With increasing inoculum levels, the pathogenic symptoms of yellowing of leaves, stunted growth and brownish discolouration of roots became more apparent. The minimum pathogenic level reported for *R. reniformis* on other crops varied from 10 nematodes/kg soil on greengram (Gupta and Yadav, 1982), 100/kg

soil on okra (Sahoo and Padhi, 1985), 1000/kg soil on pointed gourd (Nath *et al.*, 1976) but the difference recorded could be due to a wide range of experimental conditions as well as hosts. As might be expected from the increasing pathogenic effect, with increased inoculum level, nematode multiplication was inversely proportional to the initial inoculum level (Table I).

All treatments significantly reduced nematode populations and improved growth of plants in comparison with the untreated control (Table II). Among the treatments, aldicarb plus IAA was most effective in reducing nematode numbers and this was reflected in the growth of plants. Other growth regulator treatments were not as effective as aldicarb plus superphosphate. Sharma *et al.*, (1983) showed that growth regulators reduced populations of *Meloidogyne incognita* on pea and Badra and Ismail (1981) found that the addition of phosphorus to the soil improved plant growth and suppressed *R. reniformis*.

Table II - *Effect of different chemicals on population of* Rotylenchulus reniformis *and growth of chickpea (mean of 3 replications)*

Treatments	Nematode recovery/kg soil Initial population = 1000		Dry weight of shoot	Dry weight of root
	Mean	% reduction over initial population	Mean (g)	Mean (g)
Aldicarb 5 mg/pot	625	37.5	0.5	0.2
Aldicarb 5 mg/pot + CCC 500 ppm	485	51.5	0.5	0.2
Aldicarb 5 mg/pot + IBA 50 ppm	466	53.3	0.6	0.3
Aldicarb 5 mg/pot + IAA 50 ppm	320	68.0	0.9	0.5
Aldicarb 5 mg/pot + superphosphate 62.5 mg/pot	410	59.0	0.6	0.4
Aldicarb 5 mg/pot + Sod. molybdate 3 g/Kg seed	533	46.6	0.5	0.3
Control	3053	—	0.4	0.1
C.D. (0.05)	1.12	—	0.1	0.1
	(Basing on log value)			

LITERATURE CITED

BADRA T. and ISMAIL S. A., 1981 - Accelerating the role of phenyl alanine in sex differentiation of *Rotylenchulus reniformis* by means of some nutrient formulae. *Revue Nématol., 4*: 209-212.

GRECO N., DI VITO M., REDDY M. V. and SAXENA M.C., 1984 - A preliminary report of survey of plant parasitica nematodes of leguminous crops in Syria. *Nematol. medit., 12*: 87-93.

GUPTA D. C. and YADAV B. S., 1982 - Note on the pathogenicity and on relative susceptibility of green gram varieties to *Rotylenchulus reniformis. Indian J. Agril. Sc., 52*: 41-42.

NATH R. P., HALDAR M. C., AKHTER S. W. and PRASAD H., 1976 - Studies on the nematodes of vegetables in Bihar - I. Effect of the reniform nematode, *Rotylenchulus reniformis* on *Trichosanthes dioica. Indian J. Nematol., 6*: 175-177.

RASHID A., KHAN F. A., and KHAN A. M., 1973 - Plant parasitic nematodes associated with vegetables, fruits, cereals and other crops in North India. I. Uttar Pradesh. *Indian J. Nematol., 3*: 8-23.

SAHOO H. and PADHI N. N., 1985 - Pathogenicity of reniform nematode, *Rotylenchulus reniformis* on okra. *Indian Phytopath., 38*: 164-165.

SHARMA R. K., SHARMA N. T. and TIAGI B., 1983 - Effect of foliar application of some growth regulators on pea plants infected with *Meloidogyne incognita* (Abs.) 3rd Nematol. Symp., Himachal Pradesh Krishi Viswa Vidyalay, Solan, p. 45.

SHARMA S. B., 1985 - A world list of nematode pathogens associated with chickpea, groundnut, pearl millet, pigeonpea and sorghum. Pulse Pathology Progress Report 42, ICRISAT, India: 36 pp.

SHARMA S. B., SAKA V. W., and NENE Y. L., 1984 - Plant parasitic nematode in ICRISAT chickpea fields. *Internl. Chickpea News Letter, 10*: 18-19.

VOVLAS N., GRECO N. and DI VITO M., 1985 - *Heterodera ciceri* sp. n. (Nematoda: Heteroderidae) on *Cicer arietinum* L. from northern Syria. *Nematol. medit., 13*: 239-252.

Accepted for publication on 25 July 1986.