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INTERACTIVE EFFECT OF ROOT-KNOT, RENIFORM AND STUNT NEMATODES ON TOMATO

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Summary. The effect of individual and concomitant inoculation of *Meloidogyne incognita*, *Rotylenchulus reniformis* and *Tylenchorhynchus brassicae* was studied under pot conditions on tomato. The maximum damage occurred when all three nematodes were inoculated simultaneously. The rate of nematode multiplication was maximum in case of individual inoculation while it decreased when inoculated concomitantly. The maximum root-knot index was observed in a single inoculation and was adversely affected when inoculated in combination with the other nematode species.

In the Aligarh district, tomato is badly damaged by concomitant attack of *Meloidogyne incognita* (Kofoid et White) Chitw., *Rotylenchulus reniformis* Linford et Oliveira and *Tylenchorhynchus brassicae* Siddiqi. The present investigation was undertaken to assess the effect of these three species singly and in various combinations on nematode multiplication, root-knot development and growth of tomato.

Materials and methods

Two-week old seedlings of tomato cv. Pusa Ruby raised in sterilized microplots were transplanted singly into 15 cm clay pots filled with 1 kg steam-sterilized soil (soil + compost mixed in 3:1 ratio). Two days after transplanting each seedling was inoculated with 2000 freshly hatched second stage juveniles of *M. incognita*, 2000 immature females of *R. reniformis* or 2000 *T. brassicae* individually and in various combinations (Table I). Uninoculated plants served as control. Each treatment was replicated three times. The experiment was terminated after 45 days from the date of inoculation when the roots of the tomato plants were gently washed in running water to remove adhering soil particles. Shoots and roots were weighed and their lengths measured. Root-knot index was based on a 0-5 scale, where 0 = no galling; 1 = 1-2 galls; 2 = 3-10 galls; 3 = 11-30 galls; 4 = 31-100 galls and 5 = > 100 galls/root system. Nematodes in the soil as well as in the roots were extracted by using Cobb's sieving and decanting method followed by modified Baermann's funnel technique and counted. Data were analysed statistically.

Results and discussion

Inoculation of all the three nematode species individually caused significant reduction in the growth of the plants compared with the uninoculated control (Table I). *M. incognita* caused comparatively more damage than *R. reniformis* and *T. brassicae*. Growth was further reduced when two nematode species were present but differences between the various combinations were not significant. However, concomitant inoculation with all three species gave a reduction in plant growth that was significantly different from all other treatments (Table I). The results indicate that *M. incognita* is more damaging than the other two pathogens.

The rate of multiplication of each of the nematode species was greatest when inoculated singly. The reproduction of *R. reniformis* and *T. brassicae* was significantly suppressed when inoculated in combination with *M. incognita* (Table I). There was little suppression of *R. reniformis* and *T. brassicae* when inoculated together. A significant reduction in the reproduction of *M. incognita* occurred only with the concomitant inoculation of *M. incognita* and *R. reniformis* and there was no significant reduction with *T. brassicae*. Hence it can be assumed that *R. reniformis* is more antagonistic to *M. incognita* than *T. brassicae*.

The maximum root-knot index occurred when *M. incognita* was inoculated alone and was less in combination with *T. brassicae* and *R. reniformis* although not significantly so. The least root-knot index occurred when all nematode species were inoculated concomitantly (Table I).

TABLE I - Effect of individual and concomitant inoculation of *M. incognita*, *R. reniformis* and *T. brassicae* on root-knot development, nematode multiplication and growth of tomato cv. Pusa Ruby.

Treatment	Length (cm)			Fresh weight (g)			Final population in soil			No. of nematodes (all stages) in root			Total population (Soil + root)			Rf ⁽¹⁾ = Pf/Pi			Root-knot index
	Shoot	Root	Total	Shoot	Root	Total	Mi	Rr	Tb	Mi	Rr	Tb	Mi	Rr	Tb	Mi	Rr	Tb	
Inoculated control	36.6	20.0	56.6	23.5	7.4	30.9	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>M. incognita</i> (Mi)	32.1	12.6	44.7	18.3	5.2	23.5	36317	—	—	109	—	—	36426	—	—	18.2	—	—	4.5
<i>R. reniformis</i> (Rr)	34.3	15.5	49.8	20.8	5.1	25.9	—	32756	—	—	74	—	—	32830	—	—	16.4	—	—
<i>T. brassicae</i> (Tb)	35.0	15.1	50.2	21.0	5.6	26.6	—	—	21274	—	—	9	—	—	21283	—	—	10.6	—
Mi + Rr	30.3	8.1	38.4	13.7	4.6	18.3	31374	22787	—	86	60	—	37460	22847	—	15.7	11.4	—	3.3
Mi + Tb	29.2	11.7	40.9	15.2	4.8	20.0	33308	—	13000	97	—	2	33405	—	13002	16.7	—	6.5	3.5
Rr + Tb	31.8	12.2	44.0	16.5	5.2	21.7	—	26676	15714	—	69	6	—	26745	15720	—	13.2	7.8	—
Mi + Rr + Tb	25.0	8.5	33.5	10.4	4.0	14.4	25928	17085	10341	73	38	—	26001	17123	10341	13.0	8.5	5.1	3.0
L.S.D. at 5%			6.2			4.2										2.3	3.1	2.7	1.8
L.S.D. at 1%			8.6			5.9										3.5	4.7	4.1	2.7

⁽¹⁾ Rf = Reproduction factor, Pf = Final Population, and Pi = Initial population.