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EFFECT OF GREEN MANURING ON *RHIZOCTONIA* AND ROOT-KNOT NEMATODE COMPLEX ON TOMATO

by

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Summary. The growth of tomato (cv. HS-101) plants was significantly increased in soil amended with subabool (*Leucaena leucocephala*) and neem (*Azadirachta indica*) leaves compared to the unamended control. *Meloidogyne javanica* population (number of galls and egg-masses) was also reduced in amended soil. Neem decreased the incidence of both *Rhizoctonia bataticola* and *R. solani* in the treatment where nematodes were inoculated one week earlier than the fungus, whereas subabool reduced fungal disease only in the treatment where *R. solani* was inoculated alone.

Aqueous leaf extracts of neem (*Azadirachta indica* A. Juss) and subabool (*Leucaena leucocephala* L.) have been found to be inhibitory to both *Rhizoctonia* spp. and *Meloidogyne javanica* (Bhatti, 1988). The chopped leaves of subabool, when allowed to degrade for 14 days or more, controlled the root-knot nematode more efficiently than undegraded leaves (Paruthi *et al.*, 1987). Papavizas and Davey (1960) observed that green plant amendments (buckwheat, corn, oats, snap beans and sudan grass) applied to *Rhizoctonia solani*-infested soil effectively protected snap bean plants from the pathogen. It is assumed that certain saprophytic microflora and fauna associated with the decomposition of soil amendments may play some role in the suppression of the fungus as well as the nematode. Hence, the present studies were planned to provide an insight into the effect of these amendments on both the organisms when present together.

Materials and methods

Fresh leaves of neem and subabool were finely chopped and mixed with autoclaved sandy soil at 40 g per pot (15 cm diam) and allowed to degrade for 3 weeks. Four week old tomato (*Lycopersicon esculentum* Mill.) plants, cv. HS-101, were transplanted singly into the pots. Three days later, second-stage juveniles of *Meloidogyne javanica* (Treib) Chitw. (1000 per pot) and/or *Rhizoctonia bataticola* (Taub.) Butler (1 g mycelium per pot) grown for 5 days on potato dextrose broth were inoculated simul-

taneously or seven days prior to or after each other. Amended and unamended controls were also maintained. Another set was inoculated with *Rhizoctonia solani* Kühn while all other conditions of the experiment were the same as above. Each treatment was replicated four times. Observations on plant growth, nematode population and incidence of fungal disease were recorded 40 days after the nematode inoculation.

Results and discussion

The results (Table I) show that shoot weight (dry) and root weight (fresh) were decreased significantly in all the treatments (unamended) compared to the uninoculated unamended control in both the experiments. However, with the addition of subabool and neem leaves, the shoot and root weights were improved significantly. Addition of subabool leaves resulted in better plant growth compared with neem leaves. Increase in root dry weight was non-significant in both experiments. Nematode population densities were adversely affected by amendment of the soil with subabool or neem leaves as demonstrated by fewer galls and eggmasses, compared with the unamended control. The incidence of fungal disease for both *Rhizoctonia* spp. was decreased in soil amended with neem leaves in the treatment where nematodes were inoculated prior to the fungus. Subabool leaves did not affect fungal disease except in the treatment where *R. solani* was inoculated alone (Table I).

Bhatti (1988) observed a decrease in mycelial dry

TABLE I - Effect of *Rhizoctonia bataticola*, *R. solani* and/or *Meloidogyne javanica* on plant growth, nematode multiplication and incidence of fungal disease on tomato in soil amended with subabool and neem leaves.

Treatment	<i>R. solani</i>				<i>R. bataticola</i>			
	Subabool leaves	Neem leaves	Untreated control	Mean	Subabool leaves	Neem leaves	Untreated control	Mean
SHOOT DRY WEIGHT (g)								
Uninoculated control	2.0	1.2	1.0	1.4	1.5	1.0	0.9	1.2
Nematode alone	1.1	1.0	0.8	0.9	1.4	1.5	0.9	1.1
Fungus alone	1.7	0.7	0.8	1.0	1.9	1.2	0.4	1.1
Fungus + Nematode ¹	2.1	0.9	0.6	1.2	1.7	1.4	1.0	1.3
Nematode + Fungus ²	1.1	0.8	0.6	0.8	1.8	1.1	0.7	1.2
Nematode + Fungus ³	1.2	0.5	0.3	0.6	1.5	0.8	0.8	1.0
Mean	1.5	0.9	0.7		1.6	1.2	0.7	
C.D. (5%)	Treatments			0.4	Leaves			Ns
	Leaves			0.3	Leaves			0.2
ROOT FRESH WEIGHT (g)								
Uninoculated control	3.5	3.8	3.0	3.4	4.6	4.8	4.0	4.4
Nematode alone	2.7	2.6	2.9	2.7	4.2	3.7	2.3	3.4
Fungus alone	3.1	2.9	2.5	2.6	3.1	3.4	3.2	3.2
Fungus + Nematode ¹	4.3	3.6	2.2	3.3	4.3	3.5	1.8	3.2
Nematode + Fungus ²	4.1	3.2	1.8	2.8	3.3	3.4	2.4	3.0
Nematode + Fungus ³	3.6	3.1	1.2	2.6	2.5	3.1	2.8	2.8
Mean	3.5	3.1	2.2		3.6	3.6	2.7	
C.D. (5%)	Treatments			NS	Leaves			0.7
	Leaves			0.6	Leaves			0.5
NUMBER OF GALLS⁴								
Nematode alone	6.0	8.6	8.0	7.5	10.4	7.9	7.4	8.6
Fungus + Nematode ¹	5.2	6.8	5.2	5.1	4.9	4.7	6.1	5.2
Nematode + Fungus ²	2.8	6.7	4.6	4.7	8.0	4.3	6.9	6.4
Nematode + Fungus ³	4.4	6.2	5.4	5.3	5.1	3.6	6.2	5.0
Mean	4.6	7.0	5.8		7.1	5.1	6.6	
C.D. (5%)	Treatments			1.3	Leaves			1.6
	Leaves			1.1	Leaves			1.4
NUMBER OF EGGMASSSES⁴								
Nematode alone	2.4	2.8	5.1	3.4	3.4	2.9	4.5	3.6
Fungus + Nematode ¹	1.8	1.7	4.3	2.6	1.6	2.1	3.8	2.5
Nematode + Fungus ²	1.0	1.2	2.5	1.5	2.6	2.4	3.6	2.9
Nematode + Fungus ³	1.7	1.3	2.5	1.8	2.0	1.6	4.2	2.6
Mean	1.7	1.7	3.6		2.4	2.2	3.8	
D. (5%)	Treatments			0.8	Leaves			NS
	Leaves			0.7	Leaves			0.8
FUNGUS DISEASE INDEX								
Fungus alone	+	++	++		++	++	++	
Fungus + Nematode ¹	++	++	++		++	++	++	
Nematode + Fungus ²	++	+	++		++	+	++	
Nematode + Fungus ³	++	++	+++		++	++	++	

1 Fungus 7 days before nematode; 2 Nematode 7 days before fungus; 3 Nematode and fungus simultaneously; 4 $\sqrt{n+1}$ values.
Fungus disease index: + low, ++ moderate, +++ heavy.

weight of the two species of *Rhizoctonia* in the leaf extracts of subabool and neem whereas no effect on fungal disease was observed in the present studies except in the treatment where nematodes were inoculated one week earlier than fungus.

The differences may be due to the method of application since in the present studies leaves were allowed to decompose before fungal inoculation which perhaps changed the biochemical composition of the leaves and hence variation in the results.

Literature cited

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