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INTERACTION BETWEEN *MELOIDOGYNE JAVANICA* AND *MACROPHOMINA PHASEOLINA ON LENTIL*

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Lentil is an important and widely grown pulse crop in Northern India. During a survey of lentil crops in the Dadri area along Aligarh-Delhi sector of G.T. Road, certain fields were found to be badly damaged; the roots of affected plants were galled and had dark patches on them. Examination of the infected roots in the laboratory revealed the presence of the root-rot fungus, *Macrophomina phaseolina* (Maubl.) Ashby. while egg-laying females of the root-knot nematode, *Meloidogyne javanica* (Treub) Chitwood were found in the galls. Although the association of these two pathogens has been reported on *Ligustrum japonicum* (Alfieri and Stokes, 1971) and on kenaf (Tu and Cheng, 1971), there is no information about their association on lentil. The present study was carried out to evaluate the possible interaction between these organisms and the resulting effect on the growth of lentil.

Materials and methods

Seeds of lentil (*Lens culinariis* Medic.) cv L-912 were surface sterilized with 0.1% mercuric chloride, then thoroughly washed with sterile distilled water and dried in the shade. Four seeds were sown in 15 cm diameter clay pots containing 1 kg of steam sterilized soil (clay, sand compost mixture 7:2:1). One week after seed germination seedlings were thinned to one per pot. Two weeks later the plants were inoculated with 2000 freshly hatched second stage juveniles of *M. javanica*, obtained from a single eggmass culture, and/or with 1 g of mycelium of *M. phaseolina* grown 15 days in Richard's medium (Riker and Riker, 1936) according to the inoculation scheme given in Table I. Each treatment was replicated five times. Uninoculated plants served as control. These pots were arranged on a glass house bench in a randomized manner.

The experiment was terminated two months after inoculation. The roots were thoroughly and gently washed and the length and fresh weight of shoot and root were taken. Cobb's sieving and decanting method followed by a modified Baermann funnel technique (Southey, 1986) was used for the isolation of nematodes from soil. Root-knot index was determined on a scale of 0-5 (Taylor and Sasser, 1978). Also, multiplication rate of the nematode was determined by calculating the reproduction factor (R) by dividing the final population (Pf) by the initial population (Pi) of the nematode as suggested by Oostenbrink (1966). Data were statistically analysed for critical difference (C.D.) at $P = 0.05$ and $P = 0.01$ (Sukhatme and Amble, 1978).

Results and Discussion

Both pathogens, *M. javanica* and *M. phaseolina* caused significant reductions in plant growth including pod formation of lentil (Table I). This damaging effect was more pronounced when the pathogens were inoculated together. In combined inoculations, however, the reduction in plant growth and pod formation was more in the simultaneous than in the sequential inoculation. When the nematode was inoculated 10 days prior to the fungus and the fungus 10 days prior to the nematode, there was little reduction in plant growth compared with the plants inoculated with the nematode and the fungus simultaneously.

The trend in the soil population of the nematode and the root galling suggest a negative interacting correlation between the test organisms. The fungus proved to be inhibitory to the nematode (Table I), the effect on the nematode being greatest when the fungus was inoculated 10 days prior to the nematode inoculation.

TABLE I - *Effect of individual and combined inoculations of* Meloidogyne javanica *and* Macrophomina phaseolina *on lentil cv. L-912.*

Inoculation Scheme	Shoot length (cm)	Weight (g)			No. of pods per plant	Nematode population (soil + roots)	R = $\frac{P_f}{P_i}$	Root-knot index
		Shoot	Root	Total				
C	36.3	8.7	5.7	14.4	19.3	—	—	—
N	24.6	4.3	2.5	6.8	8.0	13160	6.6	3.3
F	25.5	4.7	2.6	7.3	8.7	—	—	—
N + F	24.4	4.0	2.1	6.1	7.3	8950	4.5	2.5
N — F	28.4	5.4	3.2	8.6	11.0	10245	5.1	2.9
F — N	30.6	6.2	4.0	10.2	13.7	6542	3.3	1.5
C.D. (P = 0.05)	1.7	1.0	0.4	3.4	1.9	210.7		0.2
(P = 0.01)	2.3	1.4	0.6	4.8	2.6	287.4		0.3

C = Uninoculated control, N = Nematode alone, F = Fungus alone, N + F = Nematode and fungus simultaneously, N — F = Nematode 10 days prior to fungus, F — N = Fungus 10 days prior to nematode.

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