Pak.J.Bot., 27(1): 217-220, 1995.

EFFECT OF NEEM OIL ON *IN VITRO* GROWTH OF ROOT INFECTING FUNGI

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Abstract

Effect of neem oil and benomyl on the growth of root infecting fungi viz., *Macrophomina phaseolina*, *Rhizoctonia solani* and *Fusarium moniliforme* was examined. Benomyl showed greater suppression in growth of *R. solani* and *F. moniliforme* than neem oil whereas neem oil @ 0.1% was more effective against *M. phaseolina* than benomyl. Efficacy of benomyl and neem oil increased with increase in concentration. Neem oil extracted from seed samples collected from different localities showed variable suppression of growth of the test fungi.

Introduction

Among the soilborne root infecting fungi, *Macrophomina phaseolina, Rhizoctonia solani* and *Fusarium moniliforme* produce serious losses on crop plants. Of these, *M. phaseolina* is reported to produce charcoal rot of over 500 species of plants (Sinclair, 1982) with at least 72 hosts recorded from Pakistan (Mirza & Qureshi, 1978; Shahzad *et al.*, 1988). Similarly, *R. solani* which exists as active mycelium in soil and attacks a range of plants (Parmeter, 1970) has been recorded on 64 hosts in Pakistan (Mirza & Qureshi, 1978; Shahzad & Ghaffar, 1991). *F. moniliforme* is also known to attack important crop plants (Booth, 1971) with 20 hosts recorded in Pakistan (Mirza & Qureshi, 1978; Ghaffar, 1992).

Several reports have been made on the fungicidal properties of neem (Khan *et al.*, 1974; Singh *et al.*, 1980; Vir & Sharma, 1985; Dwivedi & Dubey, 1986; Parveen & Alam, 1993) where neem oil has been found to inhibit the growth of *R. solani* (Singh *et al.*, 1980), *M. phaseolina* and *F. moniliforme* (Vir & Sharma, 1985). The present report describes the effect of neem oil on *in vitro* growth of *M. phaseolina*, *R. solani* and *F. moniliforme* in comparison with benomyl fungicide. The efficacy of neem oil collected from different localities has also been evaluated.

Materials and Methods

Neem oil extracted from seeds of plant growing in Karachi by n-hexane method (Kazmi *et al.*, 1991) was incorporated into Potato Dextrose Agar medium @ 0.025, 0.05 and 0.1%. In another set, benomyl fungicide was used at the same concentra-

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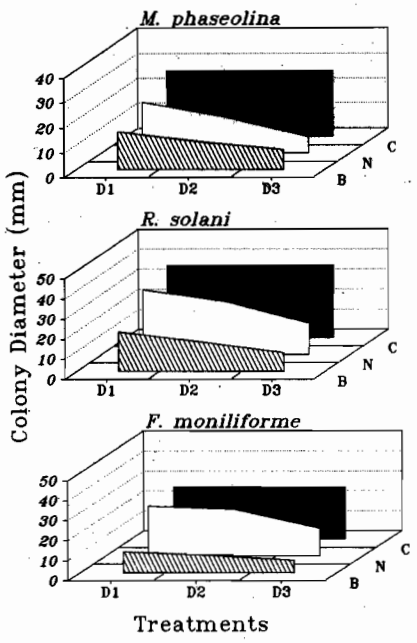

Fig.1. Effect of neem oil and benomyl on radial growth of *Macrophomina phaseolina, Rhizoctonia solani* and *Fusarium moniliforme*.

C= Control, N= Neem oil, B= Benomyl, D1= 0.025%, D2= 0.05%, D3= 0.1%.

tions. PDA without neem oil or benomyl served as control. The media were poured into 70 mm diam., Petri plates @ 10 ml per plate and 5 mm diam., discs of inoculum of *M. phaseolina*, *R. solani* and *F. moniliforme* from the edge of actively growing cultures were placed separately in the centre of the plates. There were four replicates of each treatment. The plates were incubated at 28°C and radial growth of test fungi was recorded. In another experiment, efficacy of neem oil extracted from seed samples collected from different localities viz., Karachi, Hyderabad, Dokri, Shikarpur and Faisalabad was evaluated using the method described above.

Results and Discussion

a. *Comparison of the efficacy of neem oil with benomyl:* Benomyl significantly suppressed the growth of *M. phaseolina*, *R. solani* and *F. moniliforme*. The extent of suppression was related to the concentration of benomyl used (Fig. 1). Neem oil was found to suppress the growth of *M. phaseolina* and *R. solani* at all concentrations used whereas growth of *F. moniliforme* was suppressed only where neem oil was used @ 0.1% (Fig. 1). Like benomyl, the efficacy of neem oil increased with increase in concentration. Benomyl showed greater suppression in growth of *R. solani* and *F. moniliforme* than neem oil whereas use of neem oil @ 0.1% was found superior than benomyl in suppressing the growth of *M. phaseolina*.

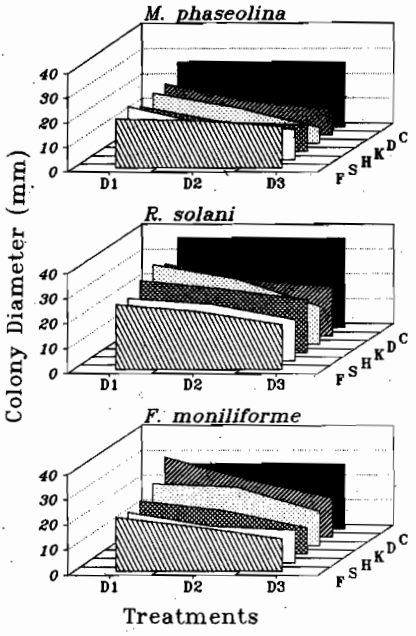

Fig.2. Effect of neem oil extracted from seed samples collected from different localities on radial growth of *Macrophomina phaseolina, Rhizoctonia solani* and *Fusarium moniliforme*.
C= Control, D= Dokri, K= Karachi, H= Hyderabad, S= Shikarpur, F= Faisalabad, D1= 0.025%, D2= 0.05%, D3= 0.1%.

Vir & Sharma (1985) reported that the use of neem oil @ 2.5, 5 and 10% inhibited growth of *F. moniliforme* by upto 58, 67 and 100% and that of *M. phaseolina* by upto 61, 76 and 100% respectively. Germination of sclerotia of *M. phaseolina* is reduced substantially by volatile and non-volatile fractions of neem oil (Dwivedi & Dubey, 1986). Neem oil has been found to inhibit the growth of *R. solani* in liquid medium. Seeds of gram after treatment with neem oil when sown in soil artificially infested with *R. solani*, produced disease free seedlings (Singh *et al.*, 1980). Results of the present studies would suggest that use of neem oil holds promise in plant disease control as compared to chemical fungicides which are costly and hazardous .

b. ***Efficacy of neem oil from different localities***: Neem oil extracted from seed samples collected from different localities showed variable effects against all the three test fungi. The efficacy of neem oil increased with increase in its concentration in the medium. Neem oil from all the localities when used @ 0.1% showed significant suppression in growth of *M. phaseolina*, *R. solani* and *F. moniliforme*. Greatest suppression in growth of *M. phaseolina* was observed where neem oil extracted from seeds of plant growing in Karachi was used @ 0.1%, whereas, oil from plants of Hyderabad was most effective against *F. moniliforme* (Fig. 2).

There are reports that Azadirachtin (a tetranortiterpenoid) and other biologically active compounds of neem vary in seed samples collected from different sites (Ermel *et al.*, 1986) which could be the reason for variable efficacy of neem oil from different localities. There is need for the evaluation of neem oil collected from different localities before use.

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(Received for Publication 1 September 1994)