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Studies on the Efficacy of *Bacillus subtilis* against the Root rot fungus, *Macrophomina phaseolina* on Urd bean

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Root rot disease caused by *Macrophomina phaseolina* often result in considerable loss of the crop especially under rainfed conditions. Success has been achieved in the biological control of plant pathogens using bacteria as antagonists. *Bacillus subtilis* is known to produce extracellular antibiotics that are inhibitory to some plant pathogens (Podile *et al.*, 1988). A commercial preparation of *B. subtilis* A.13 has been developed under the trade name QUANTUM 4000 and is recommended for treatment of peanut seeds for the control of soil borne disease (Weller, 1988).

Bacillus subtilis was isolated from soil samples collected from Coimbatore, South Arcot and Madurai districts and identified in accordance with Bergey's Manual of Determinative Bacteriology (Buchnan and Gibbsons, 1974). The antagonistic effect of *B. subtilis* isolate B.s.9 was tested against *M. phaseolina* by dual culture method (Boosalis, 1956). In pot culture studies, sterilised soil was used. *M. phaseolina* grown in sand maize medium was incorporated in the pots @5g/kg of soil. Urd bean seeds were treated with *B. subtilis* (B.s.) isolates 5, 9 and 11 @ 3g peat based inoculum per 100 g of seeds, dried in shade and sown. The treatments were as follows.

1. Control
2. Pathogen alone
3. Pathogen + B.s 5 inoculation
4. Pathogen + B.s 9 inoculation
5. Pathogen + B.s 11 inoculation
6. Carbendazim seed treatment

In each pot, 25 seeds were sown. The treatments were replicated four times.

Of the 20 isolates of *B. subtilis*, 11 were found to be inhibitory to the growth of *M . phaseolina in vitro*. Among them B.s.5 from Coimbatore and B.s.9 and B.s.11 from South Arcot districts recorded significantly higher inhibition zone of 2.6 , 3.0 and 2.3 mm respectively and these were utilised for seed treatment studies. The results are presented in Table 1. Seed treatment with B.s.9 and B.s.11 isolates of *B. subtilis* significantly reduced root rot disease of urd bean and they were on par with Carbendazim seed treatment.

Inhibition of some plant pathogenic fungi *Viz., Rhizoctonia solani, Sclerotium rolfsii* and *Fusarium solani* by *B. subtilis* was also reported by Podile *et al.* (1988). The isolate B.s.9 applied through seed has given the maximum protection against root rot disease of urd bean under pot culture conditions. Improved seed coating materials and methods may increase the effectiveness of antagonists (Utkhede and Rahe, 1980). Control of urd bean root rot disease by *B. subtilis* seed treatment has already been reported by Jeyarajan *et al.* (1991). Since root rot caused by *M. phaseolina* is a serious problem in rainfed pulses and economic chemical control measure is not

Table 1. Effect of *Bacillus subtilis* isolates in controlling root rot of urd bean

Treatments	Disease %
Control	-
M. phaseolina alone	65
B. subtilis isolate 5	45
B. subtilis isolate 9	15
B. subtilis isolate 11	20
Carbendazim	20

C.D.(P = 0.05) 28

available, the present finding can be effectively utilised for the management of the disease.

Key Words : Urd bean, *Macrophomina phaseolina,* biological control, *Bacillus subtilis*

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