

Soil application of *Bacillus pumilus* and *Bacillus subtilis* for suppression of *Macrophomina phaseolina* and *Rhizoctonia solani* and yield enhancement in peanut

Hassan Abd-El-Khair^{1*}, Karima H. E. Haggag² and Ibrahim E. Elshahawy¹

¹Plant Pathology Department, Agricultural and Biological Research Division, National Research Centre, Giza, Egypt.

²Pest Rearing Department, Central Agricultural Pesticides Laboratory, Agricultural Research Centre, Dokki, Giza, Egypt.

Abstract : *Macrophomina phaseolina* and *Rhizoctonia solani* were isolated from the root of peanut plants collected from field with typical symptoms of root rot in Beheira governorate, Egypt. The two isolated fungi were able to attack peanut plants (cv. Giza 4) causing damping-off and root rot diseases in the pathogenicity test. Thirty rhizobacteria isolates (Rb) were isolated from the rhizosphere of healthy peanut plants. The inhibition effect of these isolates to the growth of *M. phaseolina* and *R. solani* was in the range of 11.1- 88.9%. The effective isolates of Rb₁₄, Rb₁₈ and Rb₂₈, which showed a strong antagonistic effect (reached to 88.9) in dual culture against the growth of *M. phaseolina* and *R. solani*, were selected and have been identified according the morphological, cultural and biochemical characters as *Bacillus pumilus* (Rb₁₄), *Bacillus subtilis* (Rb₁₈) and *Bacillus subtilis* (Rb₂₈). Control of peanut damping-off and root rot by soil application with these rhizobacteria isolates in addition to two isolates of *B. pumilus* (Bp) and *B. subtilis* (Bs) obtained from Plant Pathology Dept., National Research Centre, was attempted in pots and in field trials. In pots experiment, soil application with Rb₁₄, Rb₁₈, Rb₂₈, Bp and Bs, decreased the incidence of damping-off and root rot, increased the number of survived peanut plants in *M. phaseolina* and/or *R. solani* -infested soil in comparison with the control. These treatments also increased the average length of roots and shoots; average number of branches/plant; average number of leaves/plant; average plant fresh and dry weight of the survived peanut plants compared with control. In field experiments, results reveal that soil application with Rb₁₄, Rb₁₈, Rb₂₈, Bp and Bs, significantly reduced the incidence of damping-off and root rot of peanut. At harvest, these treatments improved peanut growth (average dry weight of peanut plant) and yield components, viz. average number of pods per plant, average weight of pod per plant and average weight of 100 seeds. The levels of protection provided by the tested rhizobacteria isolates (Rb) represent practical potential for field control of damping-off and root rot and yield enhancement in peanut.

Key word: Peanut, damping-off and root rot, rhizobacteria isolates, growth promotion, yield enhancement.