

**SELECTION OF EFFICIENT STRAINS OF  
*Rhizobium leguminosarum*  
WITH SPECIAL TRAITS AND STUDYING  
THEIR SEROLOGICAL RELATIONSHIP.**

By

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# APPROVAL SHEET

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**ABSTRACT**

Three hundred samples of soil or nodulated bean roots were collected from 110 sites represented 13 governorates in Egypt. Samples were examined for the presence of indigenous rhizobia nodulating bean. A collection of 180 isolates of bean rhizobia were evaluated for nodulating ability, effectiveness, tolerance to increased concentrations of NaCl or decreased levels of pH, intrinsic antibiotic resistance, serological



relationship and protein pattern. Sixteen selected strains of bean rhizobia were subjected to comparable studies with another 14 identified foreign strains having special traits to explore their potential survival and activity under adverse conditions, their interaction with 5 bean cultivars and their competitive abilities under increased levels of soil nitrogen.

Data showed that the highest number of isolates were collected from El-Giza and El-Gharbia governorates. The collected isolates showed variable nodulating capacities, effectiveness and also differed in their responses to stressed conditions. Among the 180 isolates of bean rhizobia, the DM 104, which was originated from Demyat governorate was the most effective in  $N_2$ -fixation and tolerability to high NaCl concentration (3.5%) or low pH (3.5) as well as the whole range of tested antibiotics. The native collected isolates were serologically closer to *R. etli* UMR 1632 than to *R. leguminosarum* bv. *phaseoli* 3612 or *R. tropici* UMR 1899. Two protein patterns were identified among bean rhizobia isolates and serologically related strains have shown similar protein pattern. Results of the effects of stressed conditions on the selected strains have confirmed the superiority of the local strain DM 104 and the foreign ones belonging to *R. tropici* compared with other tested strains. However, foreign strains of bean rhizobia were more sensitive to rhizobiophages compared with local ones. Bean varieties also showed different responses to inoculation with local and foreign strains of bean rhizobia under increased levels of soil nitrogen. The competitive ability of bean rhizobia was also affected by the level of mineral nitrogen added to the soil.

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Key words:

*Rhizobium leguminosarum* bv. *phaseoli* - *Rhizobium tropici* - *Rhizobium etli* - Bean rhizobia - Nodulating ability - Effectiveness - NaCl tolerance - Intrinsic antibiotic resistance - serological relationship - protein pattern - Elevated temperature - phage susceptibility - competitiveness.

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