

**MULTIFUNCTIONAL LEGUME-TREE RHIZOBIA
AS NECESSARY MICROBIOTA TO SUPPORT
DESERT AGRICULTURE**

By

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**B.Sc. Agric. Sci. (Agric. Microbiology), Fac. Agric., Ain Shams Univ., 1996
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ABSTRACT

Legume trees play important roles in soil conservation and enhancement of soil fertility in agroforestry systems. The present study throw some lights on legume tree rhizobia interaction in the Egyptian environments, this necessitates to isolate rhizobia from root nodules. Partial identification of isolated rhizobia from legume nodules was done. Authentication tests, effect of some stresses beside cross inoculation trial were considered as well. A total of 125 root nodule bacterial isolates was recovered and microscopically examined. All isolates were Gram negative, non-sporing - rods and motile. The authentication tests confirmed that 92 isolates and 10 strains were able to nodulate the host plants (*Albizzia lebbek*, *Prosopis juliflora*, *Leucaena leucocephala*, *Acacia nilotica*, *Acacia albida*, *Acacia saligna* and *Sesbania sesban*). The isolates differed in their colony morphology according to their specific host genotype.

Growth and nodulation of trees as affected by rhizobial inoculation and N-fertilization were examined in greenhouse experiments. The isolates AL13 isolated from *Albizzia lebbek*, P10 isolated from *Prosopis juliflora*, AS8 from *Acacia saligna* and S18 from *Sesbania sesban* were the most infective forming 86, 123, 198 and 134 nodules pot⁻¹, respectively. Cross-inoculation of *L. leucocephala* with rhizobia isolated from *Acacia*, appeared to be less infective microsymbiont for *Leucaena* than those specific for *Albizzia*, *Sesbania* and *Prosopis*.

A scant growth was observed with the rhizobial isolate S18 tolerated 7% NaCl in their growth medium. All isolates showed no growth when inoculated on YMA with 8% NaCl. All the examined rhizobia could normally grown at incubation temperatures between 28 and 39°C. No growth was recorded with all the tested isolates incubated at 48°C. The antibiotic tetracycline had a wider range of antibacterial activity, against high number of the rhizobial isolates and strains. Some of the isolates, e. g. S15 and P3 were ampicillin and bacitracin-resistant. The rhizobia strain DS43 from *L. leucocephala* showed the highest tolerance to acidic and alkaline pH. Growth of all the examined isolates was completely inhibited on PH 10.

All the examined isolates and strains had ability to produce exopolysaccharides in amounts ranging from 0.66 to 2.4 g/L, polybetahydroxy buterate (0.21-0.97 g/L), and siderophores from 5-59%.

Protein profile of the tested rhizobium isolates and reference strains showed similarities of 57-92%.

Key words: Legume trees, nitrogen fixation, rhizobia, cross inoculation, environmental stresses.

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