

# Effect of Salinity on Survival and Symbiotic Performance Between *Rhizobium meliloti* and *Medicago sativa* L. in Saudi Arabian Soils

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*The effect of salinity on the growth and survival of different local and imported strains of Rhizobium meliloti in liquid media for 72 h was studied in the laboratory. The rhizobial strains were tested for their symbiotic efficiencies with lucerne grown in salinized sand culture and in natural Saudi Arabian soils of different salinities in the greenhouse. Results have shown that growth of all rhizobial strains investigated in liquid media was adversely affected by high salinity with relatively slight salt tolerance in the local rhizobial strains. Salinization of sand culture to high concentration (100–250 mM NaCl) greatly affected nodulation and symbiotic N<sub>2</sub>-fixation of lucerne plants grown in it. Growing lucerne in sand of high salt concentration (250 mM NaCl) completely prevented the formation of nodules. Inoculation of lucerne plants grown in sand culture with local isolates of R. meliloti has shown slight salt tolerance up to 100 mM NaCl. These local isolates gave relatively higher symbiotic N<sub>2</sub>-fixation than the rest of the inoculated rhizobial strains. High salinity of natural soils (9.1 and 14.1 dS m<sup>-1</sup>) deleteriously affected the nodule formation and the symbiotic N<sub>2</sub> fixation in lucerne plants inoculated with all rhizobial strains. Inoculation of lucerne plants with rhizobial strains showing tolerance to salinity in sand culture did not show the same tolerance in natural saline soils, and this could be attributed to the competitive potentiality of the strain used in the soil.*

**Keywords** lucerne, N<sub>2</sub>-fixation, nodulation, saline soils, salinity tolerance

Nodulation and nitrogen fixation in legume/*Rhizobium* associations are adversely affected by salinity (Singleton & Bohlool, 1984; Mohammad et al., 1991). However, some *Rhizobium* strains were found to be sensitive, while others were tolerant to high salt concentration either in media or soil. Subba Rao et al. (1972) found that most *Rhizobium meliloti* strains did not tolerate high concentration of NaCl in soil. Also, Steinborn and Roughley (1974) reported that salt in peat used as a carrier reduced the viability of *R. trifolii* in legume inoculant produced in Australia. However, other reports have shown that *R. trifolii*

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