

**Final Report**

**On**

**Biodiversity of alfalfa rhizobia in different  
regions of Saudi Arabia**

**Submitted to: Agricultural Research Center**

**Submitted by: Soil Science Department,**

**College of Food and Agricultural Science,**

**King Saud University**

**Principal Investigator: Dr. Fahad N. I. Al-Barakah**

**Co- Principal Investigator: Dr. Reda A.Z. Youssef**

**1426 H – 2005 G**

## SUMMARY

Soil bacteria *Sinorhizobium meliloti* are of enormous agricultural value, because of their ability to fix atmospheric nitrogen in symbiosis with an important forage crop legume- alfalfa. The main aim of this project was (i) to isolate indigenous *S. meliloti* strains from different field sites in Saudi Arabia, (ii) to assess genetic diversity and genetic relationships amongst strains of natural populations and (iii) to provide information about nodulation and symbiotic efficiency of indigenous *S. meliloti* strains. Two hundred and forty two strains isolated from alfalfa nodules collected from different field sites were analyzed. Genetic characterization by rep-PCR was applied to study the status of *Sinorhizobium meliloti* populations inhabiting nodules of alfalfa. Cluster analysis of rep-PCR profiles showed significant differences among *S. meliloti* isolates. Among indigenous strains two divergent groups could be determined. Greenhouse studies were performed for evaluation of symbiotic efficiency and compatibility of *S. meliloti* strains with Caf.101 cultivar. Quantitative expression of symbiotic efficiency was evaluated by measurement of nodule dry weight, protein content and dry matter yield of plants. Significant differences in dry matter yield of alfalfa were determined depending on the strain used. The results indicate that four indigenous *S. meliloti* strains can be characterized as the most efficient of all strains used in this project.

### **Major Accomplishments of the Research Project:**

1. Extensively characterized alfalfa rhizobia using modern molecular and serological techniques.
2. Determined that the isolated alfalfa rhizobia were extremely genetically diverse, indicating that strains underwent evolutionary changes throughout their extensive interaction with the host plant.