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

By

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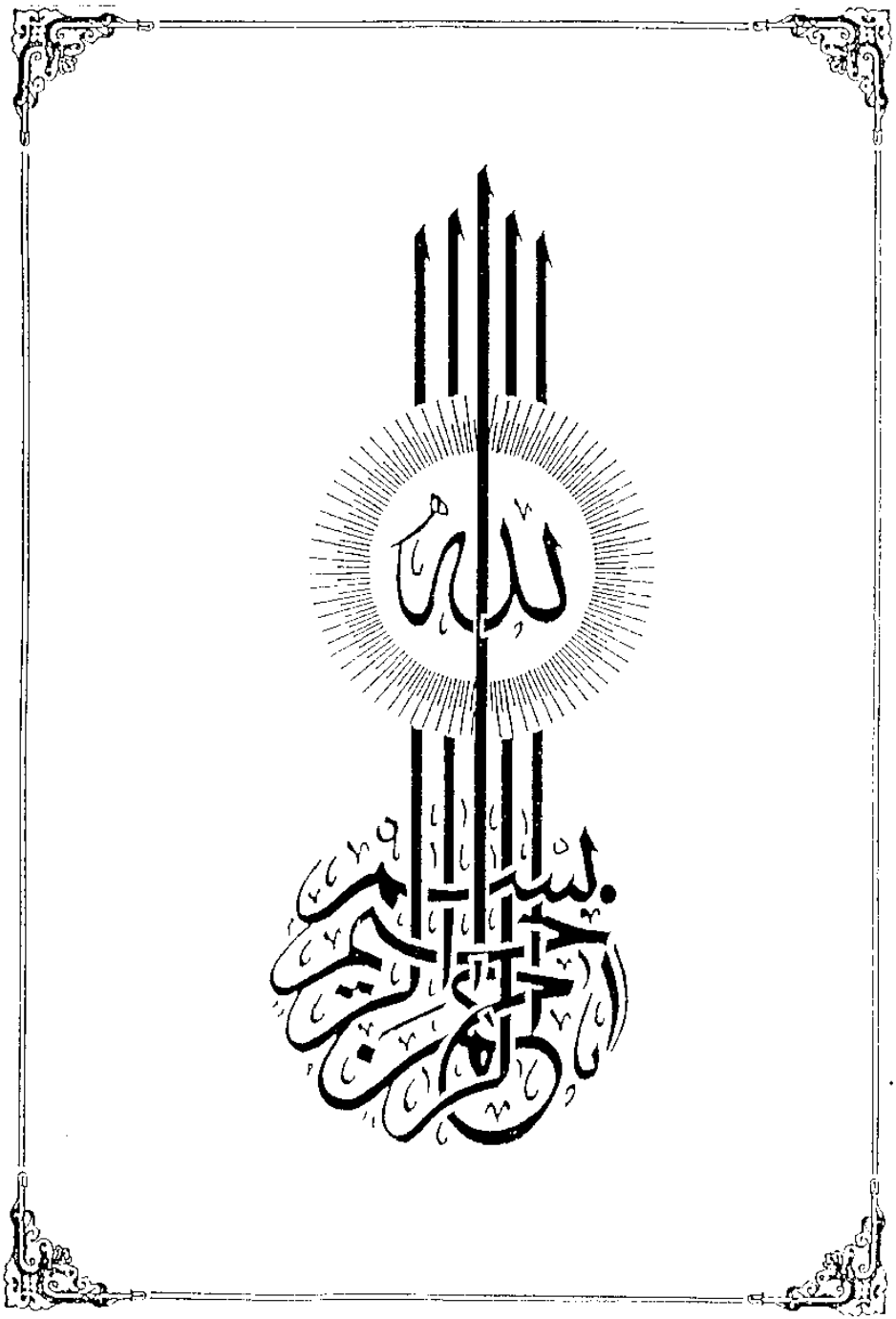
A thesis submitted in partial fulfilment of the requirements for the degree of DOCTOR PHILOSOPHY in Agricultural Science (Agricultural Microbiology)

Department of Agric. Microbiology
Faculty of Agriculture
Ain Shams University

1995



APPROVAL SHEET

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Date of Examination: / / 1995

ACKNOWLEDGEMENT

I would like to express my sincere gratitude and deep appreciation to Prof. Dr. M.E. El-Haddad, Professor of Agric. Microbiology, Faculty of Agriculture, Ain Shams University, for suggesting the problem, close supervision, constructive criticism, and the unfailing help during the whole of this study.

I wish to express my special thanks to Prof. Dr. S.M. Abdel-Wahab, Chief Researcher of Agric. Microbiology, Soil and Water Research Institute, Agricultural Research Center for suggesting the problem, close supervision, his helpful guidance during the study and the cooperation through the whole work.

Grateful acknowledgement is also extended to Dr. M.I. Mostafa, Lecturer of Agric. Microbiology, Faculty of Agric., Ain Shams Univ. for his supervision, encouragement, assistance, fruitful discussion and sincere help during this study.

Thanks are also extended to Dr. B.A. Othman, Assoc. Prof. of Virology, Dr. S.A. Ibrahim, Prof. of Microbial Genetics, Fac. of Agric., Ain Shams univ. and Dr. M.N. Omar, Senior Researcher, A.R.C. for assistance and providing some facilities needed in this study.

Thanks due to all the staff member and colleagues in the Biofertilizer Production Unit, Soil and Water Research Institute, A.R.C. as well as the staff members and colleagues in the Department of Agricultural Microbiology, Faculty of Agric. Ain Shams University, for encouragement and giving all the facilities and materials that made this work possible.

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ABSTRACT

Three hundred samples of soil or nodulated bean roots were collected form 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.

Key words:
Rhizobium legumiosarum 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.

TABLE OF CONTENTS

Page

LIST OF TABLES