Salwa Akl

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

Salwa Akl

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

Salwa Akl

بعض الوثائق الأصلية تالفة
وبالرسالة صفحات لم ترد بالأصل

Rhizobium meliloti - *Medicago sativa* symbiosis in salt - affected environments

THESIS

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Agricultural Microbiology

By

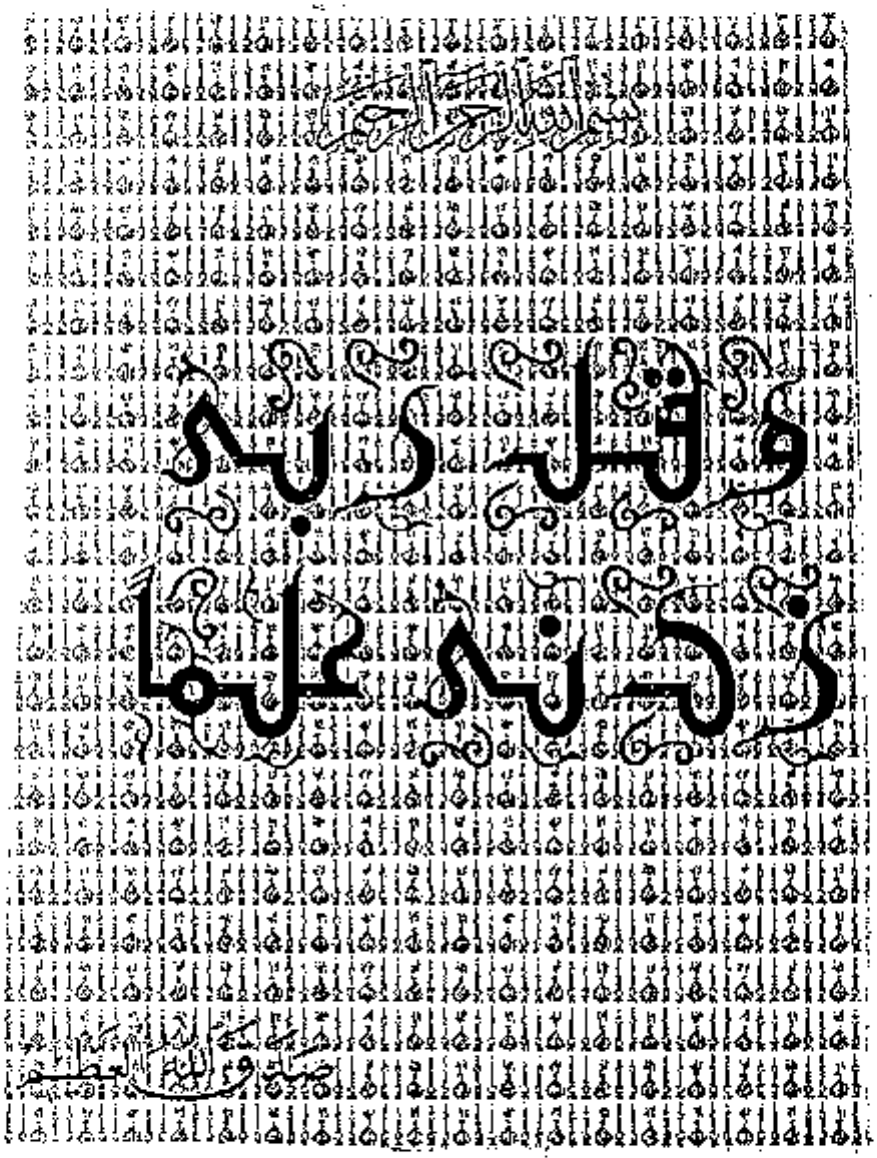
Elham Ismail Ali El-Khatib

B. Sc. (Soil Sciences)
Faculty of Agriculture, Cairo University (1986)

M. Sc. (Agricultural Microbiology)
Faculty of Agriculture, Cairo University (1993)

Department of Agricultural Microbiology
Faculty of Agriculture
Cairo University

2000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APPROVAL SHEET

Rhizobium meliloti - *Medicago sativa* symbiosis in salt - affected environments

By

Elham Ismail Ali El-Khatib

Approved by :

Prof. Dr. Samir Mohamed Abdel Wahab
Prof. Agric. Microbiology, Microbiology Dept.,
Soils, Water and Environ. Res. Institute,
A R C, Giza, Egypt. ..S.M. Abdel-Wahab..

Prof. Dr. Ismail Hosny Ali
Prof. Agric. Microbiology,
Fac. Agric., Cairo University. ..Ismail Hosny.....

Prof. Dr. Mohamed Fayez Fouad
Prof. Agric. Microbiology,
Fac. Agric., Cairo University. ...M. Fayez...

Prof. Dr. Moawad Kamel Zahra
Prof. Agric. Microbiology,
Fac. Agric., Cairo University. ..M. K. Zahra....

Committee in charge

Date : / /2000

Cairo University
Faculty of Agriculture
Department of Agricultural Microbiology

SUPERVISION COMMITTEE

Name : ***Elham Ismail Ali El-Khatib***

Title : ***Rhizobium meliloti - Medicago sativa*** **symbiosis in salt - affected environments**

Degree : Ph. D. Agricultural Microbiology

Under the supervision of :

Prof. Dr. Moawad Kamel Zahra
Prof. Agric. Microbiology,
Fac. Agric., Cairo Univ.

Prof. Dr. Mohamed Fayez Fouad
Prof. Agric. Microbiology,
Fac. Agric., Cairo University.

Prof. Dr. Saleh Ahmed Saleh
Prof. Agric. Microbiology, Microbiology Dept.,
Soils, Water and Environ. Res. Institute,
A R C, Giza, Egypt.

DEDICATION

TO

my parents, brothers, sister, husband and son

who have given me much

LOVE and SUPPORT

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Name of candidate Elham Ismail Ali El-Khatib Degree Ph. D
Title of Thesis "*Rhizobium meliloti* - *Medicago sativa* symbiosis in salt-affected environments"
Supervisor Prof. Dr. Moawad Kamel Zahra; Prof. Dr. Mohamed Fayez Fouad; Dr. Saleh Ahmed Saleh
Department Agricultural Microbiology
Branch Soil Microbiology
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ABSTRACT

The present work concerns with the possible improvement of *Rhizobium meliloti* - *Medicago sativa* symbiosis in salt - affected soils. A number of laboratory, greenhouse and field studies was conducted to clarify some aspects of this association. Eight *R. meliloti* strains were screend for their tolerance to increased NaCl concentrations (0.0 - 8.0%) on yeast extract mannitol (YEM) and minimal nitrate mannitol (MN) agar media Results showed that all strains did withstand a concentration of 2.5% and all were susceptible to 8.0%. The amino acid pools of two *R. meliloti* strains (ARC 2, salt sensitive and B3, salt tolerant) grown in MN broth medium received different concentrations of NaCl (100 - 500 mM) were assayed. Results revealed that, for ARC 2 strain, 11 (ca. 65%) of the 17 assessed intracellular free amino acids were increased in response to osmotic stress by NaCl. Regarding B3 strain, 9 of the examined amino acids were increased as the salt quantity in MN medium increased to 500 mM. The eight *R. meliloti* strains were screened for superior symbiotic performance with 6 *Medicago sative* cultivars in a pot experiment. Sewa cultivar positively responded, to the highest extent, to rhizobia inoculation where nodules produced approached 105 per pot against 42 for cv. Hegazi 4. Mixed culture of *Rhizobium* + associative diazotrophs + *Saccharomyces* together with 15 kg N fed^{-1} induced good nodulation. Soil salinity negatively interacted with nodule biomass production. Response of *Medicago sativa* cultivar (Salt Tolerant) to N fertilization, organic manure and improved *R. meliloti* inocula was evaluated in moderately saline soil (EC. 6.6 dS m^{-1}). Alfalfa plants inoculated with triple inocula produced 27 nodules plant^{-1} representing 230.9% increase over untreated ones. Inoculation, whatever the candidates, resulted in the accumulation of 20.75 - 38.39 g plot^{-1} more N compared to untreated plants.

CONTENTS

Introduction

INTRODUCTION

Great efforts are currently made to improve forage and field crops production in the fertile Delta and adjacent newly reclaimed sandy soils. Introduction of the proper biofertilizers, to satisfy a part of plant needs of essential nutrients, is now among the necessary practices that should be considered under the umbrella of farm management. Unfortunately, environmental constraints somewhat restrict the success and performance of the introduced microbial preparations. Soil salinity represents a unique soil factor that certainly reflects on plant-microbe interactions.

The aim of the present study is to experiment the symbiotic performance of *Rhizobium meliloti* with *Medicago sativa* in salt - affected soils. A number of rhizobial strains and legume cultivars was screened for preliminary selection. The validity of the randomly amplified polymorphic DNA (RAPD) analysis for identification of various *Rhizobium meliloti* strains was investigated. Besides, greenhouse and field trials were executed to monitor the superior alfalfa-inocula interaction in salt - stressed environments for future applications and recommendations.

Review of Literature