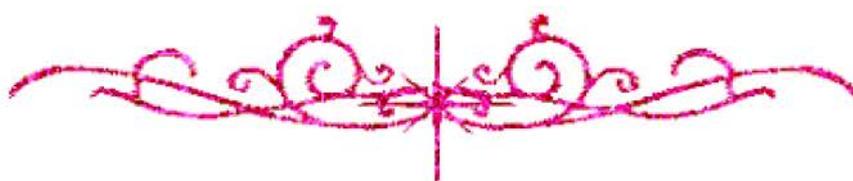


سامية محمد مصطفى



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



سامية محمد مصطفى



شبكة المعلومات الجامعية



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



سامية محمد مصطفى



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغييرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



سامية محمد مصطفى



شبكة المعلومات الجامعية



بعض الوثائق الأصلية تالفة



سامية محمد مصطفى



شبكة المعلومات الجامعية



بالرسالة صفحات

لم ترد بالأصل





B K V E A

**EFFECT OF BACTERIAL INOCULATION
FERTILIZATION AND INTERCROPPING ON
YIELD AND NITROGEN CONTENT OF SOME
FORAGE CROPS**

By

HANY SABRY SADIEK EL GENDY

B.Sc. Agriculture (Soils), Assiut Univ., 1973

M.Sc. Soil Science, Assiut Univ., 1987

A THESIS

**Submitted in Partial Fulfillment of
the Requirement for the Degree**

of

Doctor of Philosophy

from the

Department of Soils and Water

University of Assiut

1994

Supervised by:

Prof. Dr. Farida H. Badawy

Dr. S.M. Mahmoud

Dr. M.A. Gameh

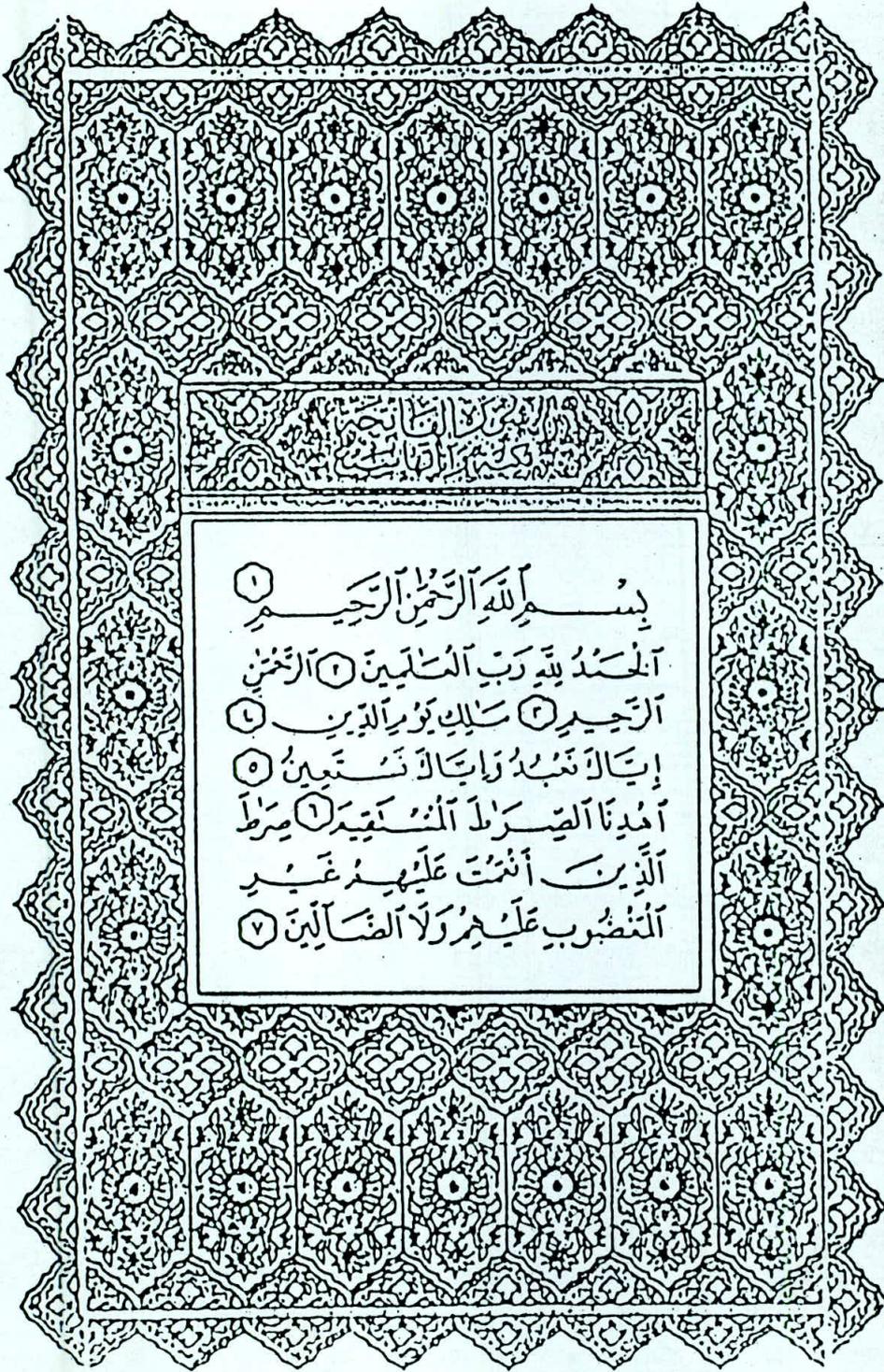
Examined by:

Prof. Dr. Y.A. Hamdi

Prof. Dr. M.F. Ghoneim

Prof. Dr. Farida H. Badawy

Dr. S.M. Mahmoud



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ ①
الرَّحِيمِ ② سَلَامٌ عَلَيْكَ يَا دَرِي ③
إِيَّالَا نُبِيَّ رَأْسِ الْكَوْنَيْنِ ④
أَمْدِنَا الصِّرَاطَ السَّعِيدَ ⑤ صِرَاطَ
الَّذِينَ أَنْعَمْتَ عَلَيْهِمْ غَيْرِ
التَّضَلُّوبِ عَلَيْهِمْ وَلَا الضَّالِّينَ ⑥

APPROVAL SHEET

Name : Hany Sabry Sadiek El-Gendy

Title : Effect of bacterial inoculation fertilization and intercropping on yield and nitrogen content of some forage crops.

This Ph.D. Dissertation has been examined, reviewed and approved as of style and contents by the following committee in charge:

- 1- Prof. Dr. Y.A. Hamdi ----- *Y.A. Hamdi*
- 2- Prof. Dr. M.F. Ghoneim ----- *M.F. Ghoneim*
- 3- Prof. Dr. Farida H. Badawy ----- *Farida H. Badawy*
- 4- Dr. S.M. Mahmoud ----- *Salah M. Mahmoud*

Date: 26 / 6 / 1994

A decorative vertical bar with a hatched pattern runs down the center of the page. A horizontal bar with a black border and rounded ends is positioned across the middle of the vertical bar. The word "ACKNOWLEDGEMENTS" is printed in a bold, italicized, serif font within this horizontal bar.

ACKNOWLEDGEMENTS

ACKNOWLEDGEMENT

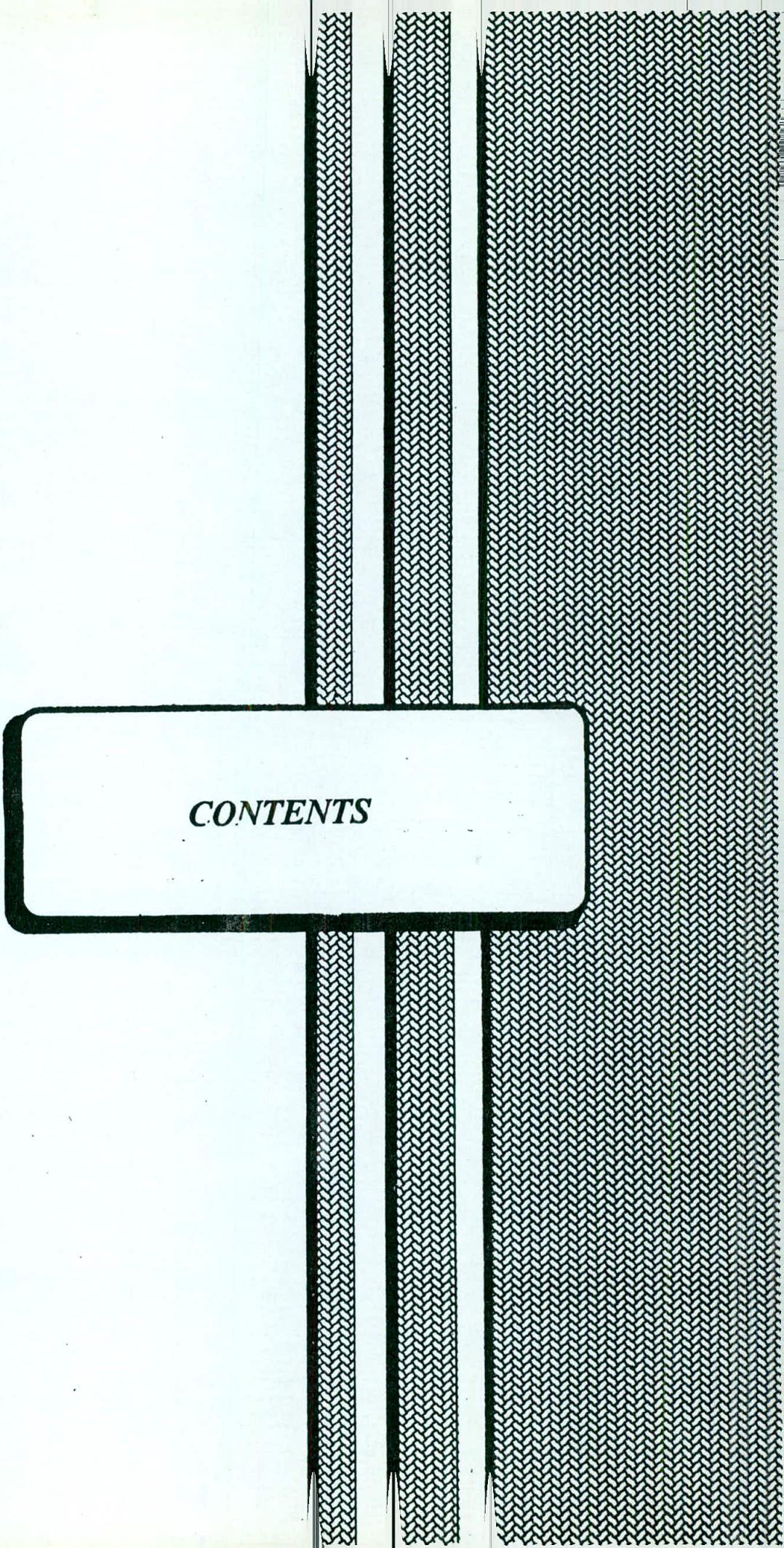
The author wishes to express his sincere gratitude and appreciation to **Dr. Farida H. Badawy**, Professor of Soil Microbiology, Department of Soils and Water, Faculty of Agriculture, Assiut Univ. for her efforts, continuous help, keen supervision, helpful advice and valuable suggestions in all phases of this study.

Deep thanks are also due to **Dr. S.M. Mahmoud** and to **Dr. M.A. Gameh**, Associate Professors of Soils, Dept. of Soils and Water, Assiut Univ. for their guidance and kind help during this work.

The author wishes also to express his gratefulness to **Dr. M.M. El-Dsouky**, Dept. of Soils and Water, Faculty of Agriculture, Assiut Univ. for his help in the statistical and computer analysis.

The author is indebted to engineer **M. Hamdi Tolba**, the Chairman of the High Dam Lake Authority for his great encouragement and facilities he offered.

Thanks are also due to all staff members of the Dept. of Soils and Water, Faculty of Agriculture, Assiut Univ. for offering valuable advices, and to my colleagues at the Agriculture Research Center of the High Dam Lake Authority for their cooperation during this work.



CONTENTS

CONTENTS

	Page
INTRODUCTION -----	1
REVIEW OF LITERATURE -----	4
I- Effect of inoculation -----	4
- Pigeon pea -----	4
- Siratro -----	6
- Guar -----	8
II- Nitrogen fertilization -----	9
a- Pigeon pea -----	10
b- Siratro -----	11
c- Guar -----	11
d- Millet -----	12
III- Phosphorus fertilization -----	12
a- Pigeon pea -----	13
b- Siratro -----	14
c- Guar -----	14
IV- Cereal-legume intercropping -----	15
a- Factors affecting productivity -----	18
1- Crop density -----	18
2- Plant spacing and arrangement -----	20
3- Crop combinations -----	21
4- Nitrogen fertilization -----	23
b- Land Equivalent Ratio (LER) -----	26
MATERIALS AND METHODS -----	28
- Soil sampling and analysis -----	30
- Plant materials -----	31
- Crops description and performance -----	31
Pigeon pea -----	31
Siratro -----	32
Guar -----	33
Millet -----	35
- Strains of Rhizobia -----	35
- Testing and selection of efficient strains -----	36

- Rhizobium inoculants -----	39
- Seed inoculation -----	40
- Plantation -----	40
- Experimental work -----	41
I- Inoculation and fertilization experiments--	41
II- Intercropping and nitrogen fertilization---	42
- Harvesting, plant sampling and analysis -----	43
- Sampling for nodules determination -----	44
- Statistical analysis -----	45
RESULTS AND DISCUSSION -----	46
I- Strain selection -----	46
- Pigeon pea pot experiment -----	47
- Siratro pot experiment -----	47
- Guar pot experiment -----	50
II- Field experiments on forage yield -----	52
A- Pigeon pea experiments -----	52
First season (1991) -----	52
At Garf Hussein -----	52
At Abu El-Reesh -----	58
Second season (1992), At Garf Hussein -----	61
B- Siratro experiments -----	72
First season (1991) -----	72
At Garf Hussein -----	72
At Abu El-Reesh -----	77
Second season (1992), At Garf Hussein -----	79
C- Guar experiments -----	89
First season (1991) -----	89
At Garf Hussein -----	89
At Abu El-Reesh -----	95
Second season (1992), At Garf Hussein -----	101
Conclusions -----	106
III- Intercropping of guar with millet -----	116
Experiment of the first season (1991) -----	116
Forage yield -----	116
Land Equivalent Ratio (LER) -----	120
Nodulation of guar -----	121

Experiment of the second season (1992) -----	123
Forage yield -----	123
Nitrogen content in forage yield -----	130
N % in dry matter -----	131
Land Equivalent Ratio (LER) -----	132
Nodulation of guar -----	134
Conclusions -----	136
SUMMARY -----	138
REFERENCES -----	147
ARABIC SUMMARY -----	-

LIST OF TABLES

Table No.		Page
1	Some physical and chemical properties of representative soil samples from the two experimental sites. -----	29
2	Origin and sources of <i>Bradyrhizobium</i> strain --- used.-----	37
3	Response of Pigeon pea to inoculation with different strains of <i>Bradyrhizobium</i> spp. under screen house conditions (1990). -----	48
4	Response of Siratro to inoculation with different strains of <i>Bradyrhizobium</i> spp. under screen house conditions (1990) -----	49
5	Response of Guar to inoculation with different strains of <i>Bradyrhizobium</i> spp. under screen house conditions (1990) -----	51
6	Effect of rhizobia inoculation, nitrogen and phosphorus fertilization on forage yield of Pigeon pea at Garf-Hussein, 1991 -----	53
7	Interaction effects of rhizobia inoculation, nitrogen and phosphorus fertilization on yield of Pigeon pea at Garf Hussein, 1991 -----	54
8	Mean nodulation of Pigeon pea as affected by rhizobia inoculation, nitrogen and phosphorus fertilization at Garf Hussein, 1991 -----	56
9	Mutual effects of rhizobia inoculation, nitrogen and phosphorus fertilization on nodulation of Pigeon pea at Garf Hussein, 1991 -----	57
10	Main effects of rhizobia inoculation, nitrogen and phosphorus fertilization on Pigeon pea forage yield at Abu-El-Reesh, 1991 -----	59
11	Nodulation of Pigeon pea as affected by rhizobia inoculation, nitrogen and phosphorus fertilization at Abu-El-Reesh, 1991 -----	60
12	Interaction effects of rhizobia inoculation, nitrogen and phosphorus fertilization on yield of Pigeon pea at Abu-El-Reesh, 1991 -----	62