

ABSTRACT

Belal Abd El-Samie Ahmed Kandil, Study on Biofertilizers Application In Egypt. Unpublished Ph.D. Dissertation, University of Ain-Shams, Faculty of Agriculture, Department of Microbiology, 2003.

Fifty samples comprising soil and water were collected from field crops situated at Kafr El-Sheikh, Al-Gharbia and Al-Behaira. Two bacterial free cultures were obtained out of fifteen isolates of Cyanobacteria. Complete identification by specialists in the Laboratory of Aquatic Biology and Toxicology have shown that those isolates are strains *Nostoc muscorum* and *Anabaena cylindrica*.

The effects of inoculation with associative diazotrophs comprising strain of *Azorhizobium caulinodans* and Cyanobacteria (*Nostoc muscorum*, *Anabaena cylindrica* and/or mineral N-fertilization with 50 or 100% of the recommended dose in newly reclaimed and wheat cultivars were evaluated under greenhouse and field conditions. Generally, inoculated plants grew better than uninoculated ones with increases in yield and N-content. Under conditions of newly reclaimed land, the same grain yield was obtained by wheat cultivars fertilized by 50% of N and inoculated with N₂-fixing organisms compared with uninoculated plants amended the full dose of nitrogen fertilizer.

Better performances were obtained from the 2 wheat cultivars Sids 1 and Sakha 8 when inoculated with *Azorhizobium caulinodans* IRBG314 & ORS571, *Anabaina cylindrica* GH5, *Nostoc muscorum* KS12 and *Azospirillum* sp. 245.

Key words : *Azo. caulinodans*, *Anabaena cylindrica*, *Nostoc muscorum*, *Azospirillum* sp., Cyhnobacteria, N₂-fixation, Wheat cultivars, N₂-fixers, Associative diazotrophs, Growth and yield responses.

CONTENTS

	Page
List of Tables	IV
List of Figures	VIII
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	4
2.1. Diazotrophs associated with non-legumes in terrestrial environments	4
2.2. Diazotrophs for cereals in Egyptian agri- culture	5
2.3. Azorhizobia as an endophytic diazotrophs ...	12
2.4. Nitrogen fixing cyanobacteria	19
3. MATERIALS AND METHODS	27
3.1. Materials	27
3.1.1. Soil used	27
3.1.2. Diazotrophs	27
3.1.3. Plant cultivars	27
3.1.4. Carrier materials	29
3.1.5. Inorganic fertilizers	29
3.1.6. Media used	29
(A) Go medium	29
(B) BG 11 medium	32
(C) Modified watanabe medium	33
(D) TGYE medium	34
(E) YEP medium	34
3.2. Methods	34
3.2.1. Isolation, purification, characterization and identification of dominant cyano- bacteria from samples representing different cites	34
3.2.2. Effect of inoculation with azorhizobia and cyanobacteria on wheat growth and yield	36

	Page
3.2.2.1. Greenhouse studies	36
3.2.2.1.1. Preparation of grain bed	36
3.2.2.1.2. Preparation of grains to planting	36
3.2.2.1.3. Wheat planting	36
3.2.2.1.4. Inoculation with diazotrophs .	38
3.2.2.2. Field studies	38
3.2.2.2.1. Preparation of <i>Azorhizobium</i> and <i>Azospirillum</i> inocula for field experiment	38
3.2.2.2.2. Preparation of wheat grains to planting	38
3.2.2.2.3. NPK fertilization regimes ..	40
3.2.2.2.4. Parameters followed	40
A: Densities of cyanobacteria population	40
B : Plant growth parameters	40
I. At mid age of plant earning	40
II. Just before harvesting	41
C: Yield parameters	41
3.2.3. Statistical analysis	41
4. RESULTS	42
4.1. Isolation and identification of the cyanobacterial isolates	42
4.2. Comparative responses of 4 wheat cultivars to mineral N-fertilization and inoculation with <i>Azorhizobium caulinodans</i> or cyanobacteria in sandy soil	42
4.2.1. The statistical main effects at vegetative stage	43

III

	Page
4.2.2. Interaction among wheat cultivars, Azorhizobia/cyanobacterial inoculation and mineral N-fertilization at vegetative stage	49
4.2.3. The statistical main effects at harvest	52
4.2.4. Growth and yield components of 4 wheat cultivars as influenced by Azorhizobia/cyanobacteria inoculation and N-fertilization rate at harvest	62
4.3. Response of 2 wheat cultivars to mineral N and biofertilization under field conditions	72
4.3.1. The statistical main effects at panicle initiation stage	74
4.3.2. Interaction among wheat cultivars, azorhizobia/azospirilla/cyanobacteria inoculation and N-fertilization at panical initiation stage	79
4.3.3. The statistical main effects at harvest stage	83
4.3.4. Interaction among wheat cultivars, azorhizobia/azospirilla/cyanobacteria inoculation and N-fertilization at harvest stage	91
4.4. The cyanobacterial count	98
4.5. Nitrogenase activity	98
5. DISCUSSION	104
6. SUMMARY	113
7. REFERENCES	121
ARABIC SUMMARY	