BIOMANAGEMENT OF DIAZOTROPHS FIELD CROPS WEAVE IN SALT AFFECTED ENVIRONMENTS

By

HEBA BELAL ABDEL-SAMEI KANDIL

B. Sc. Agric. Sci., (Soil Science), Fac. Agric., Cairo Univ., 2006
M.Sc. Agric. Sci. (Agric. Microbiology), Fac. Agric., Cairo Univ., 2012

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APPROVAL SHEET

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Date: 15 / 5 / 2018

SUPERVISION SHEET

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Title of Thesis: Biomanagement of Diazotrophs Field Crops Weave in Salt Affected Environments.
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ABSTRACT

The objective of this work was to support growth and yield of faba bean and wheat grown under salt-affected conditions using inocula bacterial endophytes along with a *Rhizobium leguminosarum* strain. The examined endophytic bacterial strains isolated and characterized in a previous work were conclusively identified using 16S rDNA gene sequence analysis as *Pantoea agglomerans, Pseudomonas stutzeri*, *Klebsiella* sp., *Brevundimonas diminuta and Bacillus cereu*s. These strains showed ability *in vitro* to produce plant growth promoting substances as ammonia (NH_3), produce hydrogen cyanide (HCN), as well as the ability to fix nitrogen, dissolve phosphate, Poly-β-hydroxybutyrate (PHB) in addition their intrinsic antibiotic resistance. Plant growth promoting ability of these bacteria was evaluated in a field experiment. Growth and productivity of wheat (*Triticum aestivum*) and faba bean (*Vicia faba*) were improved under high saline soil stress at Sahl El-Hossinia region, El- Sharkia governorate, Egypt due to inoculation with the endophytes. 100 seed and1000 grain weights, protein concentration and yield were increased when inoculated with *P. agglomernas* and *Klebsiella* sp. weighing 96 g.100grains^{-1}, maximum grain protein of 16.9% was recorded with the single strain *Klebsiella* sp. inoculum and the highest total yield of 1580 kg.feddan^{-1} in faba bean while that maximum grain weight reaching up to 45 g.1000 grains^{-1} in wheat inoculated with *Klebsiella* sp. and *Brev. diminuta*. The highest seed protein accumulation was obtained as a result of inoculation with *P. agglomernas* and *Ps. stutzeri* (9.9 %) and total yield increased up to 1549 kg.fed^{-1} when rhizobial strain combined with *Ps. Stutzeri*, respectively in wheat. Results referred to a possible role of the isolated endophytes as inocula strains for improving wheat and faba bean growth and productivity under salinity stress.

Key words: Soil salinity, endophytes, N_2-fixation, plant growth promotion, hydrogen cyanide, wheat, faba bean.

DEDICATION

This work is dedicated to whom my heartfelt thanks; to my parents, my brother (Ahmed), my sister (Aya) for their patience, my nephew (Mutayam) my best friend (Mariam), help and for all the support they lovely offered along the period of my graduation.

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