BIOCHEMICAL ACTIVITY OF HALOPHILIC MICROORGANISMS IN MANGROVE ECOSYSTEM

By

SHAIMAA MOHAMED ABDELSADEK AHMED
B.Sc. Agric. Sci. (Agric. Biochemistry), Fac. Agric., Cairo Univ., 2008

THESIS
Submitted in Partial Fulfillment of the Requirements for the Degree of

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In

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Department of Agricultural Biochemistry
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APPROVAL SHEET

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SUPERVISION SHEET

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Name of Candidate: Shaimaa Mohamed Abdelsadek Ahmed **Degree:** M.Sc.
Title of Thesis: Biochemical Activity of Halophilic Microorganisms in Mangrove Ecosystem.
Supervisors: Dr. Samir Abd ElMoneim Ahmed
Dr. Mona Hussein Badawy
Dr. Ahmed Mohy Eldin Abd ElSamie
Department: Agricultural Biochemistry **Approval:** / / 2016

ABSTRACT

This work aimed to study the correlation between biochemical activity in the rhizosphere of mangrove ecosystem and the microbial activity of bacteria isolated from the same ecosystem and the possibility of using these bacterial strains as biofertilizers with one of the economic and important crops: barley cultivated under salt stress through studying some growth criteria, some metabolic activities and the grain yield. Mangrove samples were collected from the mangrove community located at the Egyptian Red Sea coast and subjected for enzymatic activity determination and bacteria isolation. The enzymes activities and growth promoters production of isolated bacteria were conducted; and the best three bacterial isolates were used in a pot experiment. Individually and integrated together, the three bacterial isolates were evaluated to improve barley plantation growth and yield under salinity conditions (350 mM NaCl). In general, the salinity stress affected the growth characters, pigments contents, total free proline, antioxidant enzymes, K^+/Na^+ ratio and yield characters in comparison with controls. The results showed that the inoculation of barley plants with the growth promoting halophilic bacteria isolated from mangrove ecosystem enhanced plant growth and increased yield production under salinity stress conditions; besides those bacteria could be able to improve the salinity tolerance of barley plants.

Key words: Mangrove, Salinity stress, Barley, Enzymes activity, Growth promoters, Halophilic bacteria

DEDICATION

I dedicate this work to my beloved mother whose prayers successfully made me the person I am becoming, thank you my sweet mom.

Every inspiring work needs self efforts in addition to support of reliable friends specially those who are very close to my heart, my humble work I dedicate to my sweet and beloving friends ***Samar Salama*** *and* ***Eman Abo El-rakha*** *whose love, encouragement and support made me able to gain such success and honor.*

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LIST OF ABBREVIATIONS

BLAST	Basic Local Alignment Search Tool
BNF	Biological nitrogen fixation
C^{+ve}	Positive control (stressed uninoculated control)
CAT	Catalase
CMC	Carboxymethyl cellulose
C^{-ve}	Negative control (unstressed uninoculated control)
DNA	Deoxyribonucleic acid
DNS	Dinitrosalicylic acid
E.C	Enzyme Commission number
EC	Electric conductivity
EPS	Exopolysaccharides
GA	Gibberellic acid
GYP	Glucose yeast extract peptone agar
IAA	Indole-3-acetic acid
ICP	Inductively coupled plasma
ISR	Induced systematic resistance
MUB	Modified universal buffer
NCBI	National Center of Biotechnology Information
OC	Organic carbon
OM	Organic matter
PCR	Polymerase chain reaction
PGPR	Plant growth promoting rhizobacteria
PGPT	Plant growth promoting traits
pNP	p-nitrophenol
POX	Peroxidase
ROS	Reactive oxygen species
RWC	Relative water content
SFC	Soil field capacity
TCA	Trichloroacetic acid
TPF	Triphenyl formazan
TTC	2,3,5- triphenyl tetrazolium chloride
TW	Turgid weight
WHC	Water holding capacity

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