

BIOCHEMICAL AND MOLECULAR STUDIES ON SOME NITROGEN FIXING BACTERIA

BY

SHAIMAA MOUSTAFA HAMED AHMED

B.Sc. Agric. Sc. (Biochemistry), Ain Shams University, 2002

A thesis submitted in partial fulfillment

of

the requirements for the degree of

MASTER OF SCIENCE

in

**Agricultural Science
(Biochemistry)**

**Department of Biochemistry
Faculty of Agriculture
Ain Shams University
2009**

Approval Sheet

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ABSTRACT

Shaimaa Moustafa Hamed Ahmed: Biochemical and Molecular Studies on some Nitrogen Fixing Bacteria. Unpublished M.Sc.Thesis, Department of Biochemistry, Faculty of Agriculture, Ain Shams University, 2009.

Nitrogen is most often the limiting nutrient for crop production, since only a fraction of atmospheric nitrogen is made available to the plants through biological nitrogen fixation (BNF). Extending the BNF ability to non-legumes would be a useful technology for increasing crop yields. In this thesis six free living N₂-fixation bacteria (*Azospirillum brasilense* SP⁷, *Azospirillum brasilense* NO40, *Azospirillum amazonense*, S1, S2 and S3) were compared for their physiological, molecular characteristics and the effects on growth yield parameters of wheat plant. Nitrogenase activity for the selected strains revealed that *Azospirillum amazonense* showed the highest value (26.2 $\mu\text{mol h}^{-1} \text{ml}^{-1}$). The study of the protein profiles for these bacteria were analyzed by SDS-PAGE and the results showed different profile for each strain. Molecular detection of *glnB*, *nifH*, *nifD*, *UAS*, *IGR* and 16S rDNA genes was confirmed using PCR, DNA sequences for *glnB*, *nifH*, *IGR*, 16S rDNA and southern hybridization for *glnB* gene. The inoculation effects of the selected strains on two wheat varieties (Giza 164 and Giza 186) revealed that *Azospirillum amazonense* produced the highest effect followed by *Azospirillum brasilense* NO40. Based on SDS-PAGE for the inoculated wheat the results indicated a variation in storage protein banding pattern of the grains, however, its magnitude was low.

Key words: Nitrogen fixation, free living, *Azospirillum*, Wheat inoculation, Nitrogenase activity and *nif* genes.

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(كيمياء حيوية)

قسم الكيمياء الحيوية

كلية الزراعة

جامعة عين شمس

2009

صفحة الموافقة على الرسالة

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(كيمياء حيوية)

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تاريخ المناقشة : ١٣ / 5 / 2009

جامعة عين شمس
كلية الزراعة

رسالة ماجستير

اسم الطالب : شيماء مصطفى حامد أحمد
عنوان الرسالة : دراسات كيميائية حيوية وجزيئية على بعض البكتريا
المتنبته للنيتروجين
اسم الدرجة : ماجستير في العلوم الزراعية (كيمياء حيوية)

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البحوث الزراعية

تاريخ البحث: ١٤ / ٢ / 2005

الدراسات العليا

أجيزت الرسالة بتاريخ
2009 / ٥ / ١٣

ختم الإجازة

موافقة مجلس الجامعة
2009 / /

موافقة مجلس الكلية
2009 / /

ACKNOWLEDGEMENTS

I do thank **ALLAH** for all gifts, which have given to me.

I would like to express my sincere gratitude and deep appreciation to **prof. Dr. Badr abd-elwahhab**, professor of Biochemistry, Department of Biochemistry, Faculty of Agriculture, Ain Shams University, for his supervision, valuable guidance, kindness, and continuous support.

I would like to extend my deepest gratitude and thanks to **Dr. Nahed Abd-elghaphar**, Senior Researcher, Microbial Molecular Biology Department, Agricultural Genetic Engineering Research Institute (AGERI), Agricultural Research Center (ARC) who has guided me, helped me in countless ways throughout all the stages of this work.

I would like to express my sincere gratitude and deep appreciation to **Dr. Aamal Hassan**, Lecturer of Biochemistry, Department of Biochemistry, Faculty of Agriculture, Ain Shams University, for her generous help and valuable guidance.

I would like to thank **Prof. Dr. Ahmed Bahieldin** Director of the Agricultural Genetic Engineering Research Institute (AGERI), for his support and effort in helping me to finish this dissertation.

I am very grateful to my colleagues at the AGERI: **Reem mohsen, Safa, Lamiaa Salah, Shaimaa Elgamal, Marwa Sameer, Manal Farouk and Rabab.**

Also, I would like to thank all the staff at the Department of Biochemistry, Faculty of Agriculture, Ain Shams University for their continuous encouragement.

Finally, I would like to thank my family, my **Mother** and my **Father** for their prayer, support, encouragement and love. My thanks to my brothers: **Mohamed, Ahmed, Moustafa, Ali and Osama.**

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