Faculty of Science

Botany Department

Effect of some micro-algal extracts on growth and metabolic activities of some crop plants.

By

Rania Mohammed Mahmud Abd El-Gawad

A thesis submitted in partial fulfillment

Of

The requirements for the degree of

Master of Science

In

Botany

(Microbiology)

Botany Department

Faculty of Science, Fayoum

FAYOUM UNIVERSITY

2010

Effect of some micro-algal extracts on growth and metabolic activities of some crop plants.

By

Rania Mohammed Mahmud Abd El-Gawad

B. Sc of Botany (2003)

Faculty of Science

Cairo University (Fayoum Branch)

Supervisions committee:

1. Prof. Dr. Nabil Abo El-kassim

Assistant prof. of Mycology, Botany Department, Faculty of science, Fayoum University.

Signature:

2. Dr. Ashraf M. Eyssa

Lecturer of Bacteriology, Botany Department, Faculty of science, Fayoum University

Signature:

3. Dr. Wael M. El Sayed Ibrahim

Lecturer of Phycology, Botany Department, Faculty of science,

Fayoum University

Signature:

Approval sheet

Effect of some micro-algal extracts on growth and metabolic activities of some crop plants.

By

Rania Mohammed Mahmud Abd El-Gawad

This thesis for M.Sc degree in Botany has been

Approved by:

Prof. Dr. John Beeching

Department of Biology and Biochemistry, University of Bath.

Prof. Dr . Mostafa Mohammed El- Sheekh

Prof. of Phycology, Vice Dean Faculty of Science Botany Department, Faculty of Science, Tanta University

Prof. Dr. Nabil Abo El-kassim

Assistant prof. of Mycology, Botany Department, Faculty of science, Fayoum University.

Acknowledgment

All gratefulness and deepest appreciation to "Allah", for all gifts that given to me.

I would like to thank all people that directly or indirectly contributed to the successful conclusion of this work.

I am deeply indebted to late prof. Dr. Mahmud Hafez Mahmud, for his suggestion of this point and his keen supervision till his death in 2006.

I m deeply grateful to Prof. Dr. Nabil Abo El-kassim, Assistant

Professor of Mycology, Botany Department, Faculty of Science, Fayoum University, for his keen supervision, fruitful discussion, continuous encouragement and expert advise.

I would like to express my deepest gratitude to Dr. Ashraf M. Essa, Lecturer of Bacteriology, Faculty of science, Fayoum University, for his keen supervision, fruitful discussion and continuous encouragement.

I would like to express my deepest gratitude to Dr Wael M. El-Sayed Ibrahim, Lecturer of Phycology, Botany Department, Faculty of Science, Fayoum University, for his valuable support, guidance, his interest to make this thesis in its best form with the stimulating discussion and valuable comments and I am really very fortunate having had these scientists as adviser.

Thanks are also to all members of the Botany Department, Faculty of Science, Fayoum University, for their support throughout this work.

Especially thanks are also to my father, mother, and my friend faten who helped me build the bridge and to my husband and my pretty sons who helped me to finish and cross the bridge

Dedication

Curriculum vita

Personal Information	Name	Rania Mohammed Mahmud Abd El-Gwad
	Mobile:	+20105594595- +20109010120
	E-mail:	Rmm00@fayoum.edu.eg
	Religion:	Muslim
	Date of birth:	1/6/1982
	Marital status:	Married
	Nationality:	Egyptian
	Job:	Demonstrator, Botany department, Faculty of Science, Fayoum University, Egypt.
Languages	English:	Fluent
Education	B.Sc. form Faculty of Science, Cairo University,	

and Qualification	Fayoum Branch (2003) [Very good with the distinction of honor].
Fields of research	Botany (microbiology)

Summary and conclusion

Microalgae are employed in agriculture as biofertilizers and soil conditioners. The main target of the present study is to improve and enhance germination, growth and some related physiological activities of sunflower and sorghum as indicator plants by soaking their seeds in different concentrations of algal extract and culture filtrate.

The results obtained in this study can be summarized in the following points.

1-Nine algal species were isolated from soil samples collected from different crop fields in Fayoum Governorate, Egypt. According to preliminary

experiments, five species of the isolated algae were selected:

Cyanophyta (*Anabaena oryzae, Nostoc ellipsosporum* and *Synechococcus* sp.) and Chlorophyta (*Chlorella vulgaris* and *Scenedesms quadricauda)*.

2- Analysis of the selected algal extract and filtrate showed that, the studied algae are candidate to produce different amounts of phytohormones either endogenously or exogenously, also they contain varied quantities of photosynthetic pigment, carbohydrates, protein, nitrogen and phosphorus.

3- Seeds of the two economic crop plants which are sorghum and sunflower were soaked in different concentrations of algal extract (25%, 50%, 75% and 100%) and culture filtrate.

The results of this summarized as the following main points.

a) - The germination percent of the investigated crop plants increased progressively throughout the germination period. Moreover, the percent of seed germination appeared either to increase or decrease depending on the algal extract and culture filtrate used in treatment.

b) - It should be mentioned that, the growth criteria (Shoot length, root length, fresh weight and dry weight of seedlings) were increased significantly with different concentrations of algal extract and culture filtrate.

c)-The enzymatic activities of growing seedlings concerning to catalase, peroxidase and polyphenole oxidase were found to be increased very high significantly upon treatments with different algal extracts and culture filtrates.

4- Greenhouse pot experiment was planned to investigate the effect of presoaking of seeds with selected algal extract and culture filtrate on growth criteria, metabolic activities, and the yield of the tested crop plants. This work revealed that.

a) - The growth criteria (Shoot length, root length, fresh weight and dry weight of plant) of the two crop plants increased significantly with algal treatment compare to control.

b) - The photosynthetic pigment of the tested crop plants were generally increased significantly except for few concentrations which seems to be non significant.

c) - Presoaking of *Sorghum* durra and *Helianthus annus* seeds with different concentrations of algal extract and their culture filtrate caused a considerable changes in the accumulation of estimated metabolites (carbohydrates, protein and total nitrogen) as well as phenolic compounds during the vegetative stage of growth.

d) - For *Helianthus annus,* the study which continued to the yield stage showed that, the yield of *Helianthus* significantly increased with algal