SOME PHYSIOLOGICAL STUDIES ON GREEN AND BLUE-GREEN ALGAE

By

REHAM MOHAMED NAGUIB AHMED ALI EL-BAHBOHY
B.Sc. Agric. Sci. (Environmental Agric.), Fac. Agric., Cairo Univ., 2007

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

MASTER OF SCIENCE

In

Agricultural Sciences
(Plant Physiology)

Department of Agricultural Botany
(Plant Physiology)
Faculty of Agriculture
Cairo University
EGYPT

2015

APPROVAL SHEET

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ABSTRACT

The present study aims at monitoring the effects of three light intensities degree (50, 100 and 150 µE m^{-2} s^{-1}) and three types of growth regulators (BA, TDZ and KIN) at three concentrations (1, 3 and 5 ppm) for 28 days of incubation period on growth, development and some physiological characters of *Chlorella* sp. and *Anabaena* sp. isolates in addition to the N_2-fixation ability of the *Anabaena* sp. isolate in an attempt to increase their economic importance to be used in many life fields. Upon weekly measurement of biomass yield, concentration of photosynthetic pigments and lipids accumulation of both *Chlorella* sp. and *Anabaena* sp. isolates in respect to the different degrees of light intensity, a significantly positive correlation was recorded between biomass yield and increased light intensity. However, the highest levels of light intensity were inductive for lipids accumulation but suppressive for concentrations of all photosynthetic pigments where their maximum values were obtained at 50 µE m^{-2} s^{-1}. In respect to the photosynthetic rate, the highest gross photosynthesis was recorded at 100 µE m^{-2} s^{-1}. Additionally, the highest activity of nitrogenase of *Anabaena* sp. was recorded at 100 µE m^{-2} s^{-1}. The gross photosynthesis, net photosynthesis and respiration rate were superior at 100 µE m^{-2} s^{-1}. Cultivation of both *Chlorella* sp. and *Anabaena* sp. isolates with growth regulators positively increased growth rate, biomass yield, lipids accumulation and concentration of pigments. Regarding *Chlorella* sp., TDZ at 1 ppm was best recommended for biomass yield, total chlorophyll and chlorophyll-a while TDZ at 3 ppm was the best for chlorophyll-b and carotenoids. In addition, TDZ at 5 ppm was superior for lipids content. Regarding *Anabaena* sp., TDZ at 5 ppm was best recommended for biomass yield, total chlorophyll and chlorophyll-a while TDZ at 1 ppm was the best for both of carotenoids and lipids content. Additionally, nitrogenase activity was superior at 1 ppm BA. Photosynthetic rate for both isolates was maximum at the lowest concentration of BA. Cultivation of *Chlorella* sp. and *Anabaena* sp. according to the optimum treatments of light intensity and growth regulators as indicated above, did successfully meet the needs for achieving high economic importance of *Chlorella* sp. and *Anabaena* sp. to be used in production of biofuel, natural colorants and biofertilizers in addition to organic matter that enhance soil fertility and crop productivity.

Key words: *Chlorella*, *Anabaena*, growth regulators, nitrogenase, light intensity.

DEDICATION

I dedicate this work to my father, mother, Waleed, Arwa, Rowan and Ahmed and his wife Yasmine. To the cutest baby Hamza Ahmed, to Uncle Ibrahim El-Bahbohy, to my godfathers Dr. Mohamed Khalil and Dr. Fekry Ghazal, to my friends Yasmine Emad and Maha Holiel and to everyone who lovely and kindly offered me with all the support and encouragement during my post-graduate studies. To every one caused happiness for me in my life.

ACKNOWLEDGEMENT

*BISMILLAHIRRAHMANIRAHIM, all thankful belong to **ALLAH** who makes everything possible.*

*I wish to express my deep appreciation and profound gratitude to my supervisor **Dr. Mohamed Khalil**, Prof. of Plant Physiology Dept., Faculty of Agriculture, Cairo University, for suggesting the research point and supervising, moral support during this work, close guidance, creative supervision and valuable experience and discussion.*

*All respect and thanks for **Dr. Abeer Mahmoud**, Associate Prof. of Plant Physiology Dept., Faculty of Agriculture, Cairo University for her supervision and guidance.*

*Sincere gratitude and appreciation are also due to **Dr. Fekry Mohamed Ghazal**, Prof. of Soil Microbiology, (SWERI), (ARC), for supervising the work as well as his continual valuable guidance during the work and his constructive criticism during the development of this thesis. I would like to thank him for his patience while training me to think as a phycologist, and for encouraging me when I was facing difficulties. Really, I don't know how to thank him.*

*Special thanks and all respect and appreciation are for **Dr. Adel Khattab**, Prof. of Agric. Botany Dept., and **Dr. Abdul Allah Tantawy,** Prof. of Ornamentals Dept., Faculty of Agriculture, Cairo University for their non-forgettable help after my graduation and their support for me till achieving the biggest goal in my life and accomplishing this work.*

*Special thanks are due to **Dr. Alaa Abul Soud**, Prof. of Agric. Microbiol., and **Dr. Hatem Hussein,** Prof. of Microbiology, (ARC), for their valuable and great help that I can't forget it about kindly providing facilities in my work.*

*Deep thanks and respect to **Dr. Mohamed Darwish,** Researcher of Soils, National Research Centre, for his great and valuable help that I can't forget it during the first steps of my working with algae.*

*Deep thanks to **Dr. Hashem Abdel Latif,** Lecturer of plant Crops Dept., Faculty of Agriculture, Cairo University, for his great help and providing facilities about data analysis.*

All my thanks are also extended to all the staff members of Plant Physiology Dept., Faculty of Agriculture, Cairo University, particularly ***Prof. Dr. Mohamed Ramadan****,* ***Dr. Essam Abdel Moaaty*** *and* ***Dr. Shady Ossama*** *for their valuable help that can't be forgotten in all my life.*

Special great gratitude and appreciation are given for my lovely family; ***Dad****,* ***Mum****, my brothers;* ***Ahmed and Waleed*** *and my sisters;* ***Arwa*** *and* ***Rowan*** *for their patience, continual help and support for accomplishing my post-graduate studies. Also, deep thanks and respect to* ***Dr. Maha Holiel, Dr. Amal Alaa****,* ***Dr. Alia Amer, Eng. Kawsar****,* ***Mr. Bahaa****,* ***Om-Mohamed*** *and everyone support me all time and provide me with all needed facilities. Also, I feel deeply grateful to my country Egypt.*

LIST OF ABBREVIATIONS AND INITIALS

Abbreviation	Meaning of abbreviation
µE m^{-2} s^{-1}	Micro Enschteine /m^2/s
2,4-D	2,4-dichloro phenoxy acetic acid
2iP	2-isopentenyl aminopurine
ARA	Acetylene Reduction Assay
BA	Benzyladenine or 6-benzylaminopurine
BBM	Bold's Basal Medium
BG-11	Blue-Green 11 Medium
bp	Base pair
BRs	brassinosteroids
CKs	cytokinins
DPU	1,3-diphenylurea
EtOH	ethanol
GA_3	Gibberellic acid
IAA	indole-3-acetic acid
IBA	indole-3 butyric acid
IM	indomethacin
Kin	Kinetin (6-furfurylaminopurine)
mM	Milli molar
NAA	Naphthalene acetic acid
Nase	Nitrogenase
ng	Nano gram
nm	nanometer
No.	Number
O.D	Optical Density
PAA	2-phenylacetic acid
PM	Pico molar
ppm	Part per million
TDZ	Thidiazuron
ZT	zeatin
µM	Micro molar

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