EFFECT OF MAGNETIC FIELD TREATMENTS ON GROWTH AND YIELD OF POTATO UNDER MICROPROPAGATION AND FIELD CONDITIONS

By

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B. Sc. Agric. Sc. (Horticulture), Ain Shams University, 2005
M. Sc. Agric. Sc. (Agricultural and Food Production in Arid Lands - Biotechnology in Arid Lands), Ain Shams University, 2010

A thesis submitted in partial fulfillment

Of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in
Agricultural Sciences
(Vegetable Crops)

Department of Horticulture
Faculty of Agriculture
Ain Shams University

2016

Approval Sheet

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ABSTRACT

Ibrahim Hussein Osman Amer: Effect of Magnetic Field Treatments on Growth and Yield of Potato under Micropropagation and Field Conditions. Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2016.

This study was carried out at Strawberry and Non Traditional Horticulture Crops Center, The Faculty of Agriculture, Ain Shams University, during 2012/2013 and 2013/2014 seasons. Three separated experiments were carried out to study the effect of magnetic field treatments on: (a) establishment stage of potato micro-propagation at tissue culture laboratory, (b) germination of true potato seeds, seedlings growth and potato production under low plastic tunnel and (c) Potato (cv. Spunta) production under open field conditions in relation to magnetized water. The first experiment was carried out in the tissue culture laboratory, the shoot tips of potato tubers were exposed to three magnetic field strengths (20- 30- 40 mT) for three periods (5, 10, 15 min). Results showed that the highest significant values were obtained with treatment of 20 mT for 15 min for survival percentage (%)/propagule, internods number of potato/propagule and plantlet length of potato/propagule. The second exeriment was carried out under low plastic tunnel, the true seeds of potato (*Solanum tuberosum*) cv. "Spunta" were exposed to different magnetic field strengths (20- 30- 40 mT) for different treatment periods (5, 10, 15 min). Data showed that the best results were achieved by the treatment which gave 30 mT with 10 min for values of germination percentage, plant length, number of leaves per plant, yield components (number of tubers, fresh weight of tubers per plant and potato tuber diameter) as well as, chemical contents of potato tuber (N, P, K and starch content). The third experiment was carried out at open field by planting certified virus free potato seeds (*Solanum tuberosum*) cv. "Spunta" at the area being divided in two parts. One of them was irrigated by magnetized water and another part with untreated water. Nile water was

treated by passing the water through the device (Magnetic Water Processor, Nefertari Biomagnetic Company) at magnetic field strength (150 mT) with 50 cm length. The volume rate of water flow was 50 L/min by Calpeda motor (1 hp). The plants irrigated with magnetized water produced the highest significant values of plant length, number of leaves, and stem diameter of potato plant. The applying of magnetized water caused increasing number of tuber, fresh weight, diameter of potato tuber. As well as, the average tuber size, specific gravity, nitrate, potassium and phosphorus content of potato tuber were increased by using magnetized water.

Key words: Potato, *in vitro*, magnetic field, low plastic tunnel, magnetized water, open field.

ACKNOWLEDGEMENT

Praise and thanks to **Allah**, who guided and helped us to achieve this work.

I would like to express my deepest thanks and gratitude to Late **Prof. Dr. Ahmad Mahmoud El-Gizawy**, Professor of vegetable crops, Horticulture Department, The Faculty of Agriculture, Ain Shams University, for his supervision, valuable help and continuous support during preparing this work.

My deepest and sincere gratitude to **Prof. Dr. Mohamad Emam Ragab**, Professor of vegetable crops, Horticulture Department, The Faculty of Agriculture, Ain Shams University for suggesting the current study, his supervision and greet help during carrying out and preparing of this work.

My deepest and sincere gratitude to **Prof. Dr. Adel Abd El-Sattar**, Professor of physics, Department of Physics, Faculty of Science, Ain Shams University, for his much appreciated supervision and invaluable help & support throughout this work. He showed me how to be a respectable researcher and provided for the opportunity and encouragement to start this work.

My deepest thanks to **Dr. Nesreen Ahmed Sabry Helal**, Lecturer of Vegetable Crops, Horticulture Department, Faculty of Agriculture, Ain Shams University, for her kind care and continuous encouragement.

My sincere thanks to all staff members of Horticulture Department.

Finally, I would like to express my deep gratitude to my beloved parents, my wife and my sons **Hussein**, **Nasr El-Din** and **Ayaa** for their encouragement, patience and sincere inspiration.

CONTENTS

LIST OF TABLES

LIST OF FIGUERS

LIST OF PHOTOES

LIST OF ABBREVIATIONS

Abbreviation	Full name
%	percent sign
µT	micro tesla
ATM	atmosphere
BAP	6-Benzylaminopurine
C°	celsius degree
cm	Centimeter
Cont.	Control
Cv.	cultivar
EC	electrical conductivity
EMF	Electromagnetic field
Fed	Feddan
g	gram
GA^3	gibberellic acid
GMF	geomagnetic field
GST	Glutathione S-transferase
h	hour
ha	hectare
IBA	Indole-3-butyric acid
Kg	kilogram
MF	magnetic field
mg	milligram
min	minutes
mm	millimeter
mmol	millimole
MS	Murashige and skoog medium (1962)
m/s	meter per second
mT	milli tesla
No.	number
nT	nano tesla
ppm	parts per million
s	second
SMF	static magnetic field

w/v	weight to volume
v/v	Volume to volume
Var.	variety