

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

By

IBRAHIM HUSSEIN OSMAN AMER

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

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This thesis for Ph.D. degree has been approved by:

Dr. Shaban Desuki Abou-Hussien

Researcher Prof. of Vegetable Crops, Agriculture and Biological
Research Division, National Research Centre.

Dr. Ahmed Abou El-Yazied Abd El-Hafiz

Prof. of Vegetable Crops, Faculty of Agriculture, Ain Shams
University.

Dr. Mohamed Emam Ragab

Prof. of Vegetable Crops, Faculty of Agriculture, Ain Shams
University.

Date of Examination: 3 / 9 / 2016

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Under the supervision of:

Dr. Ahmed Mahmoud El-Gizawy (Late)

Prof. Emeritus of Vegetable Crops, Department of Horticulture,
Faculty of Agriculture, Ain Shams University (Principal Supervisor).

Dr. Mohamed Emam Ragab

Prof. of Vegetable Crops, Department of Horticulture, Faculty of
Agriculture, Ain Shams University.

Dr. Nesreen Ahmed Sabry Helal

Lecturer of Vegetable Crops, Department of Horticulture, Faculty of
Agriculture, Ain Shams University.

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 Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2016.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, internodes number of potato/propagule and plantlet length of potato/propagule. The second experiment 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.

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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Full name</u>
%	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

IX

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