PHYSIOLOGICAL STUDIES ON POTATO

By

MERVAT FARRAG FARAG
B. Sc. (Horticulture), Fac. Agric., Cairo Univ., Egypt, ٢٠٠٠.

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

MASTER OF SCIENCE

In

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(Vegetable Crops)

Department of Vegetable Crops
Faculty of Agriculture
Cairo University
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APPROVAL SHEET

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M. Sc. (Thesis)
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Mervat Farrag Farag
B. Sc. (Horticulture), Fac. Agric., Cairo Univ., Egypt, ٢٠٠٠.

Approved by:

Dr. MOHAMED MOHAMED ALY ABDALLA……
Professor of Vegetable Crops, Fac. Agric., Assiut University.

Dr. SAYED FATHY EL-SAYED……
Professor of Vegetable Crops, Fac. Agric., Cairo University.

Dr. SAID ABDALLA SHEHATA ……
Professor and Head of Vegetable Crops Department, Fac. Agric., Cairo University.

Date: ٢ \ ١٢\ ٢٠٠٧

SUPERVISION SHEET

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SUPERVISION COMMITTEE

Dr. SAID ABDALLA SHEHATA
Professor of Vegetable Crops and head of vegetable department, Fac. Agric., Cairo University.

Dr. HASSAN ALI HASSAN
Associate Professor of Vegetable Crops, Fac. Agric., Cairo University.

Dr. AHMED ABDEL-MONEIM TAWFIK
Senior Researcher of Vegetable Crops, Horticulture, Res. Inst., ARC.

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دراسات فسيولوجية على البطاطس

رسالة ماجستير
في العلوم الزراعية
(خضر)

مقدمة من

مرفت فراج فرج
بكالوريوس في العلوم الزراعية (بساتين) – كلية الزراعة – جامعة القاهرة ٢٠٠٠

لجنة الإشراف

أ/ د. سعيد عبد الله شحاتة
أستاذ ورئيس قسم الخضر – كلية الزراعة – جامعة القاهرة

د. حسن علي حسن
أستاذ مساعد بقسم الخضر – كلية الزراعة – جامعة القاهرة

أ/ د. أحمد عبد المنعم توفيق
رئيس بحوث البساتين - بنك الجينات – مركز البحوث الزراعية

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بكالوريوس في العلوم الزراعية (بساتين – كلية الزراعة – جامعة القاهرة ٢٠٠٠)

لجنة إجازة الرسالة:

أ/ د. محمد محمد علي عبد الله

.....

أستاذ الخضر – كلية الزراعة – جامعة أسيوط

أ/ د. سيد فتحي السيد.....

أستاذ الخضر – كلية الزراعة – جامعة القاهرة

أ/ د. سعيد عبد الله شحاتة

.....

أستاذ ورئيس قسم الخضر – كلية الزراعة – جامعة القاهرة

دراسات فسيولوجية على البطاطس

رسالة مقدمة من

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للحصول على

درجة الماجستير

في

العلوم الزراعية
(خضر)

قسم الخضر
كلية الزراعة
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مصر

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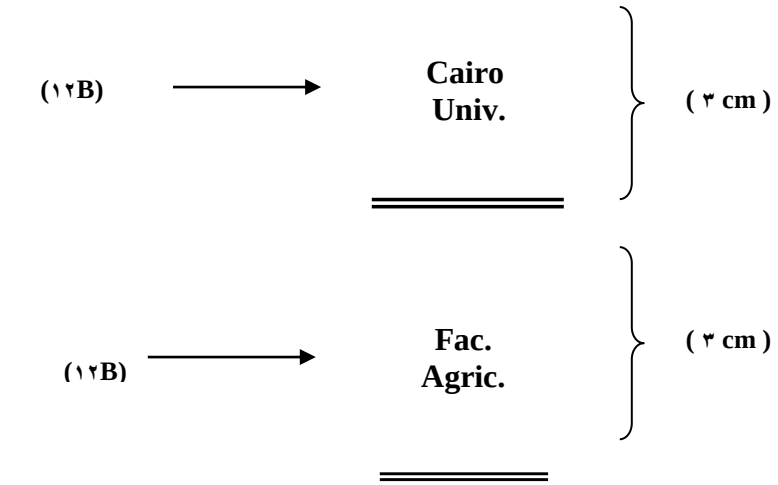
CONTENTS

LISTT OF TABLES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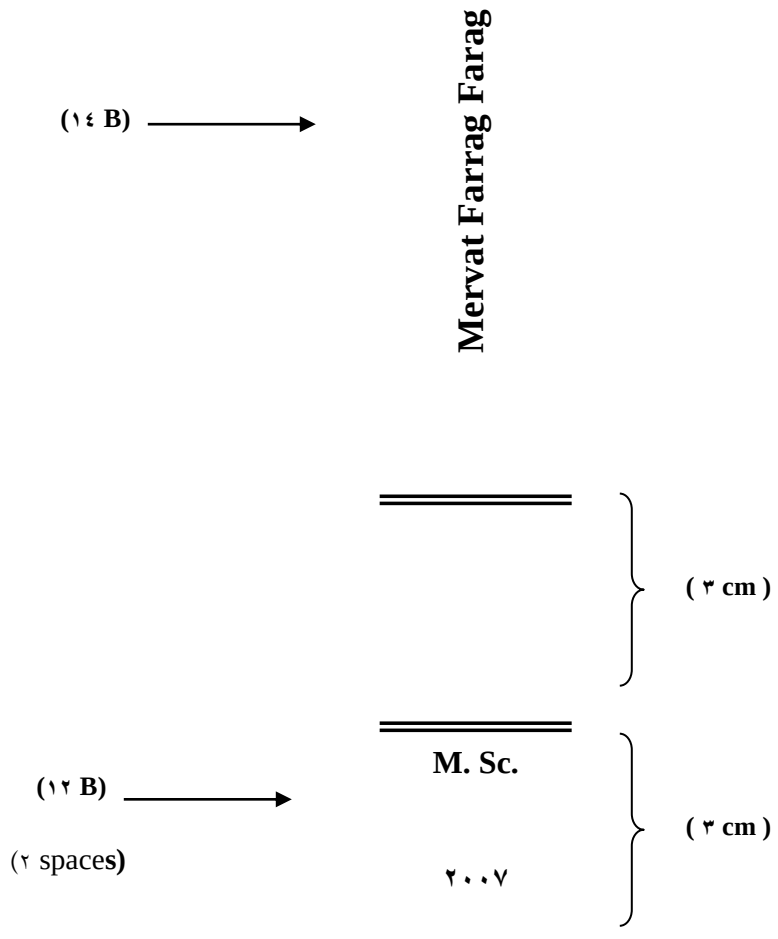
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Mervat Farrag Farag
(٣ cm)
(١٢ B)
(٢ spaces)
M. Sc.
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ABBREVIATIONS, EXPRESSIONS AND SYMBOLS

Biomagic (BM)

Bio-Vit (BV)

The Effective microorganisms (EM)

Nitrogen and Phosphorus minerals fertilizers (NP)

Days after planting (DAP)

Phosphate Dissolving Bacteria (PDB)

Phosphate Solubilizing Microorganisms (PSM)

Phosphate Solubilizing Bacterium (PSB)

Vesicular Arbuscular Mycorrhizas (VAM)

Plant Growth Promoting Bacteria (PGPB)

True Potato seed (TPS)

Farm Yard Manure (FYM)

Recommended Dose of Fertilizers (RDF)

Leaf Area Index (LAI)

Specific Gravity (SG)

Name of Candidate: Mervat Farrag Farag **Degree:** M. Sc.
Title of Thesis: Physiological studies on potato
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ABSTRACT

Two field experiments were conducted at Ali Moubark Farm, South Tahrir Research Station, Horticulture research Institute, ARC. during ٢٠٠٣/٢٠٠٤ and ٢٠٠٤/٢٠٠٥ seasons to investigate the influence of inorganic and bio-forms of nitrogen and phosphorus fertilizers as well as their combination on the vegetative growth, yield, yield components, chemical composition and quality of potato tubers (*Solanum tuberosum*, L.) cv. Mondial grown under local conditions of new reclaimed land. A drip irrigation system with nozzles of ٠,٢٥ m apart

The experiment included ١٧ treatments with ٣ replications arranged in randomized complete block design. Biofertilizers treatments were applied with or without ٥٠٪ of recommended nitrogen and phosphorus application. In addition, the study also included the application of ٠, ٥٠ and ١٠٠٪ of nitrogen and phosphorus only as recommended for potato production in Egypt according to the recommendation of Ministry of Agric. The biofertilizers under the present study were inoculation with nitrogen fixing bacteria and phosphate dissolving bacteria (called Bio-Vit, BV), spraying plants with a mixture of some amino acids, vitamins and macro and micro elements called Biomagic (BM, ٧,٥ g/L) and a mixture of lactic acid bacteria, photosynthetic bacteria, Actinomycetes, yeasts, and fungi (called Effective Microorganismis, EM).

Using ٥٠٪NP + EM + BV gave the highest values of plant height, increased numbers of tubers as well as gave the heaviest fresh weight and dry matter of tubers per plant at ٧٥ and ٩٠ DAP.

Also, ٥٠٪NP + EM + BV treatment gave the heaviest fresh weight and dry matter of foliage as well as average leaf area of the ٥th leaf of potato at ٧٥ and ٩٠ DAP.

The same treatment increased total yield ton/fed, improved grading values and marketable yield ton/fed.

Application of ٥٠٪NP + EM + BV increased chlorophyll content of leaves at ٧٥ and ٩٠ DAP, decreased non-reducing sugars and total sugars content of tubers % at ١٢٠ DAP and thus nitrates and starch content of tubers, also decreased N and P content of plant foliage at ٧٥ DAP and tubers at ٧٥ and ١٢٠ DAP.

INTRODUCTION

Potato (*Solanum tuberosum*, L.) is one of the most important and popular vegetable crops grown in Egypt for local consumption and export. Thus, large expansion and introduction of potato cultivation into recently reclaimed sandy soil is taking place. Sandy soil is one of the appropriate soil types for potato and tuber crops production. However, the major drawbacks of this type of soil include low fertility and poor physical and biological soil properties. Improvement of such soil conditions might accomplish by the addition of mineral sources of nitrogen (N), phosphorus (P). One of the major concerns in today's world is the pollution and contamination of soil due to the use of excess chemical fertilizers and pesticides. Biological sources of nutrients are considered environmentally safe and healthy for humans. Nitrogen and phosphorus are considered major plant nutrients and could be suupplied from biological sources. Biological sources may contain organisms such as bacteria, fungi, and/or cynobacteria to create these nutrients that are able to enrich the nutrient quality of soil. Consequently, they may enhance plant nutrients uptake and promote plant growth (Lampkin, ١٩٩٠).

In Egypt, biological nitrogen and phosphorus application with or without mineral fertilizers, showed to be comparable to mineral sources and to increase vegetative growth, yield, chemical composition and quality attributes of many crops.