



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكرو فيلم

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم



نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون أية تغيرات



يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %



شبكة المعلومات الجامعية



بعض الوثائق الأصلية تالفة



شبكة المعلومات الجامعية



بالرسالة صفحات

لم ترد بالأصل

B1.457

Studies on chemical addition to water used in different Irrigation systems

A THESIS

Submitted by

Ehab Abdalla El-Sayed Farag

Alexandria University 1988

To

Department of Ag. Engineering, Fac. of Agric.

Minufiya University

In Partial Fulfillment of the Requirements

for the Degree of

Master of Science

In

Agricultural Engineering

1999

APPROVAL SHEET

STUDIES ON CHEMICAL ADDITION TO WATER
USED IN DIFFERENT IRRIGATION SYSTEMS.

By

Shab Abdall El-Sayed farag

B.SC. Agric. Engineering 1988
Alexandria University

THESIS

*Submitted in partial Fulfilment of the
Requirements for the Degree of
MASTER OF SCIENCE*

In

AGRICULTURAL ENGINEERING
*Department of Agricultural Engineering
Faculty of Agriculture
Minufiya University*

1999

Aproved

Metwalli
Sharafa S.M.

M. A. M. Ali
Ali

(Committee in charge)

Shibin El- Kom: 25 / 7 / 1999



Credit sheet

This M.Sc., Thesis entitled “Studies on chemical addition to water used in different Irrigation systems” and submitted by Ehab Abdalla El-sayed Farag has been supervised by the following staff members of the Departments of Agric. Engineering. Faculty of Agriculture’ Minufiya University.

1- Prof. Eng. Kaleem Farrah Hanna.

Prof. of Agriculture Engineering Minufiya

2- Dr. Mahmoud Ali Mohamed (Ph.D.).

Assistance Professor of Agricultural Engineering

3- Dr. Ahmed Hassan El-Sayed Gomma (Ph.D.).

Assistance Professor of Agricultural Engineering, Minoufiya Univ.

Signatures of supervision committee

Prof. M. A. M. A. K.

Dr. _____

Dr.

ACKNOWLEDGMENT

The author wishes to express his deep thanks and appreciation for the soul of *prof. Kaleem Farah Hanna* prof. of Agric Engin. Dept. of Agricultural Engineering Faculty of Agriculture Minufiya University and *Dr. Prof. Sayed Mohamed Sharaf* Prof. and Head of Agricultural Engineering, Fac. of Agric. Minofiya Univ. for his sincere help and juidance during this work.

Thanks and appreciation are extended to *Associate. Prof Mahmoud Ali Mohamd* Prof Asist. of Agricultural Engineering , Fac. of Agric. Menoufia Univ. for his sincere help and guidance during this work.

Thanks and appreciation are extended to *Dr. Ahmed Hassan El-Sayed Gomaa* Associate professor of Agricultural Engineering, Fac. of Agric. Minofiya Univ. for his sincere help and guidance during this work.

Thanks are also extended to the *staff members of Agric. Eng. Dep.* for supporting the facilities and co-operation.

Contents

Title	Page
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	3
2.1. Effect of irrigation and fertilizing on potato yield	3
2.2. Irrigation regime	7
2.3. Surface irrigation for potato	8
2.4. Sprinkler irrigation system for potato	9
2.5. Drip irrigation	11
2.5.1 Definition of drip irrigation	11
2.5.2. Advantage of a drip irrigation system	14
2.5.3. Drip irrigation for potato crop.	16
2.6. Applying fertilizer through irrigation	18
2.7. Field water use efficiency.	19
3. MATERIAL AND METHODS	22
3.1. Soil analysis.	22
3.2. Drip irrigation system	22
3.2.1. system layout	22
3.2.2. Drip irrigation treatments	25
3.3 Sprinkler irrigation system	26
3.3.1 Sprinkler irrigation system layout	26
3.3.2. Sprinkler irrigation treatments	26
3.4. Surface irrigation	31
3.5. Fertilization.	32
3.6. Economic costs of water.	33
3.7. Statistical analysis.	34
4. RESULTS AND DISCUSSION	35
4.1. Applied irrigation water.	35

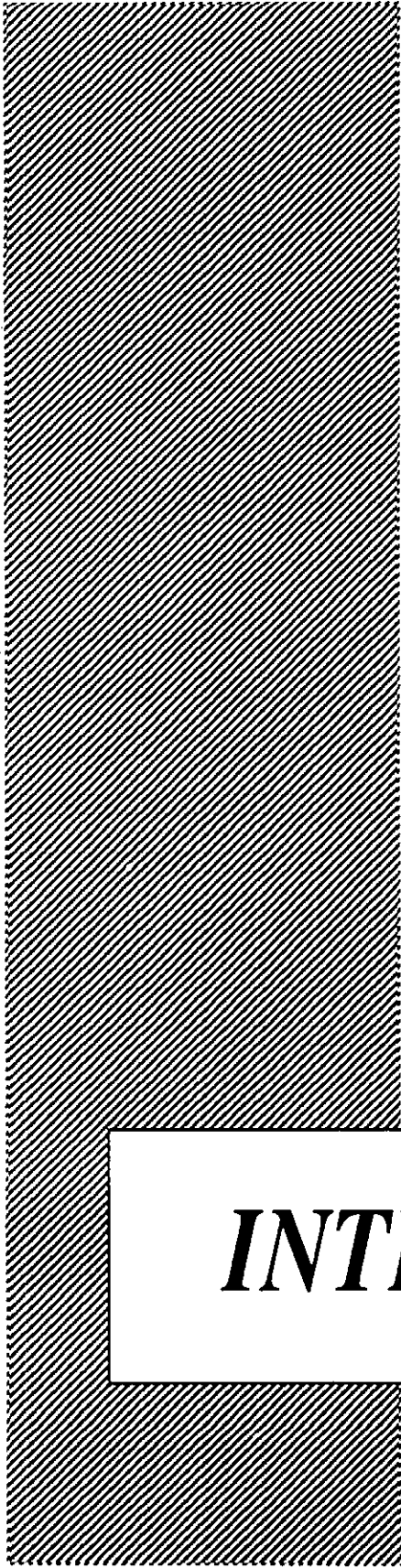
4.1.1. Under drip irrigation system	35
4.1.2. Under sprinkler irrigation system.	43
4.1.3. Under surface irrigation	43
4.2. The tuber yield	47
4.2.1 Potato yield under drip irrigation system	47
4.2.2. potato yield under sprinkler irrigation system	50
4.3. Water use efficiency	56
4.4. Cost analysis	59
4.4.1. Cost of water	59
4.4.1.1. fixed costs.	59
4.4.1.2 Variable costs	60
4.4.2. Costs of drip irrigations system	61
4.4.2.1 Fixed costs	61
4.4.2.2. Variable costs	61
4.4.3. : Costs of sprinkler irrigation system	62
4.4.3.1. Fixed costs	62
SUMMARY	66
REFERENCES	69

Table Contents

Title	Page
Table (3.1) Physical properties of the studied	23
Table (3.2) The values of the potential evapotranspirations ETO, through potatoes growing season	27
Table (3.3) Crop factor, Kc, during growth season of potatoes	28
Table (3.4) The symbols are used in fig (3.2)	30
Table (4.1) Water irrigation added for the defferent treatment under drip irrigation system	36
Table (4.2) Drip-irrigation regime for potato crop	41
Table (4.3) Drip irrigation regime for potato crop	42
Table (4.4) : Irrigation regime for potato under sprinkler irrigation system	44
Table (4.5) Potatos tubers yield in ton/fed. under drip irrigation system	48
Table (4.6) Potato tubers yield in ton/fed. under sprinkler irrigation system	51
Table (4.7) The statistical analysis of the water are efficiency for potato for all treatments	57
Table (4.8) Cost analysis for drip and sprinkler irrigations systems for potato	64

Figures Contents

Title	Page
Fig. (3.1) Drip irrigation system layout	24
Fig. (3.2) Sprinkles irrigation system layout	29
Fig. (4.1) Potatoes growth season	37
Fig. (4.2 a) Drip irrigation treatments for potatoes crop everyweak.....	38
Fig. (4.2 b) Drip irrigation treatments for potatoes crop every week ...	39
Fig. (4.2 c) Drip irrigation treatments for potatoes crop every week. ...	40
Fig. (4.4) Total applied water for different treatments	46
Fig. (4.5) Relation between the production ton/fed and the amount of water m ² /fed when using drip irrigation	49
Fig. (4.6) Relation between the production ton/fed and the amount of water m ² /fed when using sprinkler irrigation	52
Fig. (4.7) Relation between the production ton/fed and the means of fertelization at different systems of irrigation.	47
Fig. (4.8) The effect of irrigation rates by drip, sprinkler and furrow irrigation systems on the water use efficiency (WUE).	58



INTRODUCTION

INTRODUCTION

Agriculture sector plays a vital role in the economic of Egypt because of its effect in the income of the country.

The government does its effort to increase the agricultural production by means of the vertical and the horizontal increase. Meanwhile, agricultural expansion in the new reclaimed lands in Egypt is faced with the shortage in water resources.

There is a growing trend toward the use of the modern irrigation systems in the new reclaimed lands in Egypt because of the limited water resources such as trickle irrigation and sprinkler irrigation systems. The benfites of the modern irrigation systems can be summarized as follows:

- a) Saving about 30% of irrigation water.
- b) Improving water drainage.
- c) Saving money and effort increasing.
- d) Possibility of adding the chemicals with irrigation water.

Therefor, the modern irrigation systems (Trickle irrigation and sprinkler irrigation) are economical in the use of irrigation water and control the application of chemical fertelizer rates.

The present study discuss the possibility of adding the chemical fertelizers with water under three different systems