THE INTERACTION EFFECTS OF SALTY WATER AND FERTILIZATION ON SOIL PHYSICAL AND CHEMICAL PROPERTIES, YIELDS AND WATER CONSUMPTIVE USE OF PLANTS GROWN IN DIFFERENT EGYPTIAN SOILS

By

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A thesis submitted in partial fulfillment

of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Agricultural Science
(Soil Science)

Department of Soils
Faculty of Agriculture
Ain Shams University

1989

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Approval Sheet

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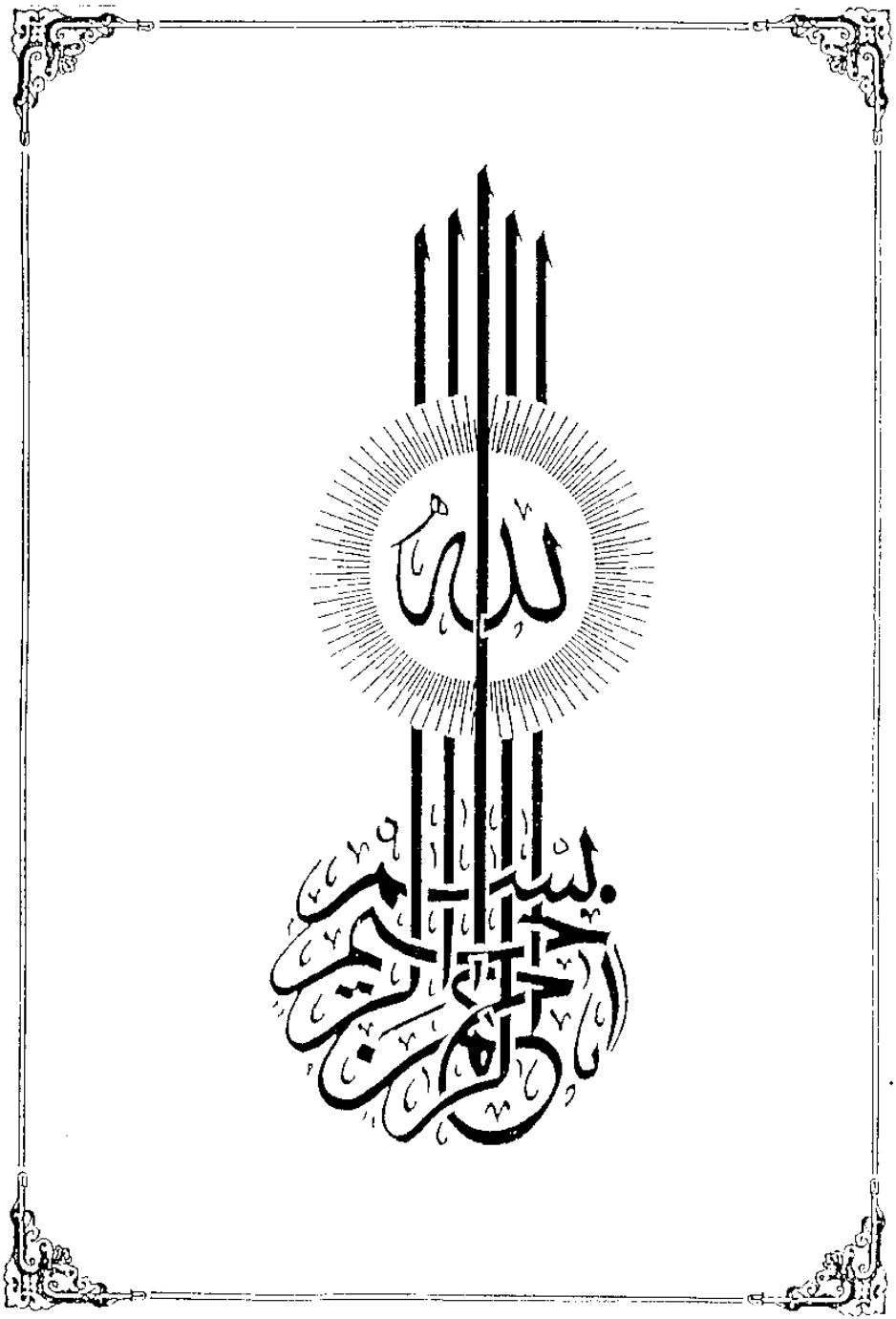

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Abstract

A pot experiment was conducted to study the effect of saline irrigation water as well as N- fertilization of some physical and chemical properties of clay, [illegible] and sandy soils and the growth of barley plants. The [illegible] results can be summarized as follows:

A- Soil physical properties:

1- The content of $CaCO_3$ in calcareous soil was greatly decreased by increasing the values of irrigation water salinity, SAR and Ca: Mg ratio.

2- The use of saline irrigation water [illegible] of both Na and Mg ions relatively increased soil bulk density particularly at low salt concentration (1500 ppm). On the other hand, the high salt concentration associated with high

or the values of both SAR and Ca: Mg ratio. This behaviour was more pronounced in the second season. While, increasing the level of N-fertilization slightly increased water consumptive use in the second season.

The highest value of WUE was obtained for the combination of SAR 7, Ca: Mg (1: 1), salinity level of 1500 ppm, and N_3 level (80 kg N/fed.), except in the case of loamy soil.

2- Salinity level of irrigation water was the main factor affecting water use efficiency for grain production and the effect of either SAR values or Ca: Mg ratios was negligible.

D- Plant growth and grain yield :

A highly negative and significant relationship was existed between each of salinity level, SAR value, Ca : Mg ratio and dry matter yield of barley plant particularly in the second season. In addition, the irrigation with saline water associated with high level of N-fertilization increased the dry matter yield as compared with the low level ones and irrigated with the same saline solutions. Similar results were obtained for both grain yield and seed index of barley plant in the two seasons.

ACKNOWLEDGEMENT

The author wishes to express his deep gratitude and thanks to Prof. Dr. S.Y. METWALLY and Prof. Dr. M.A. AZIZ, Soils Department, Faculty of Agriculture, Ain Shams University and Senior Researcher Dr. A.M. EL-SWEEDY, Soils and Water Research Institute, Agr. Res. Centre, Ministry of Agr. for their supervision, valuable suggestions, deep interest, continuous help and constructive criticism throughout the coarse of research and writing the thesis.

Thanks are also due to Assoc. Professors Dr. M.A. Mostafa and Dr. M.A. El- Toni and Lecturer Dr. E.M. Khaled, Soils Department, Faculty of Agriculture, Ain Shams University and Senior Researcher Dr. S.E. HEGGY, Soils and Water Research Institute Agr. Res. Centre, Ministry of Agr. for their valuable help through the whole stages of the investigation and deep interest in this study.

Sincere thanks are also, forwarded to all staff - members of Soil Physics and Chemistry Department in the Soils and Water Research Institute and Bahtim Agricultural Research Station for providing facilities to continue this work.

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1- INTRODUCTION

Irrigation is extremely important in arid parts of the world; with the increasing demands for crop production and also for nonagricultural uses of water, more efficient means of irrigation are needed.

Increasing production means that more land must be brought into cultivation by proper land development practices or improving farming techniques.

Besides, changes in agricultural water management in response to rising production costs has a potential for changing both quality and quantity of any water remaining after use.

Recently, imposition of more strict water quality standards has created new water quality management patterns. On the other side, the accumulation of soluble salts in the soil is a major problem in irrigated arid regions . Salts are concentrated in the soil as water is removed from it by evapotranspiration. This concentrated salts can negatively affects seed germination and plant growth. The reverse response may be caused by the limited availability of water due to the high osmotic potential of the soil solution and also to the unsuitable physical and chemical conditions of the soil due to high amounts of exchangeable sodium.

Another problem related to salinity in soils is the quality of water that drains out of the soil profile. Water that moves through the soil may be creat a problem of salinity in the irrigation return flow water. This problem is aggravated because it influences the water qualtiy for irrigation and other uses downstream. Therefore, good water management is needed to control soil salinity in order to obtain optimum crop yield and, at the same time, to minimize the effect of salinity and alkalinity hazard on soil and plant growth to the least possible extent.

Under local conditions, shortage in the available water resources for agricultural purposes in new cultivated and reclaimed lands is an important agriculture problem in Egypt. To meet the requirements of agricultural expansion programme, series of projects were under-taken through the utilization of drainage and underground water which wicely varies in their solubility for irrigation.

The present research is a trial to obtained vital answers to the important question; to any extent the interaction between salty irrigation water and fertilization could be sensible upon some physical and chemical properties of soil, crop yield and water consumptive use in three different types of Egyptian soils ?

2. REVIEW OF LITERATURE

Review concerned with this subject points out that the effect of applying saline irrigation water on soil properties depends on the characteristics of either applied water or irrigated soil.

Previous investigations showed that using saline water in irrigation practices is not easy to be tried, it affects both the soil properties and plant growth and be affected by the environmental conditions. When such saline water is used for irrigation it may increase soil salinity and causes plant growth inhibition .

In general, the effect of saline water usage could be illustrated under the following subheadings:

2.1. The effect of irrigation water quality on some soil physical properties :

2.1.1. The effect of salt concentration :

Many investigators directed attention to the important effect of saline irrigation water on soil permeability.

Zein-El-Abedine et al. (1968) found that the increase of salt concentration in irrigation water was associated with an increase in the coefficient of soil permeability. On the other hand, Servant (1971) concluded that a marked decrease in soil permeability was observed by irrigation with sodium solutions.