LONG-TERM EFFECT OF IRRIGATION BY LOW-WATER QUALITIES ON SOIL PROPERTIES AND PRODUCTIVITY

BY

ADEL ABDEL RASHEED SOLIMAN MOHAMED
B.Sc. Agr. (Soil Science), Ain Shams University, 1976

A thesis submitted in partial fulfillment
of
the requirements for the degree of

MASTER OF SCINCE

in

Agriculture
(Soil Science)

Department of Soils
Faculty of Agriculture
Ain Shams University

1996

APPROVEL SHEET

LONG-TERM EFFECT OF IRRIGATION BY LOW-WATER QUALITIES ON SOIL PROPERTIES AND PRODUCTIVITY

BY

ADEL ABDEL RASHEED SOLIMAN MOHAMED
B.Sc. Agr. (Soil Science), Ain Shams University, 1976

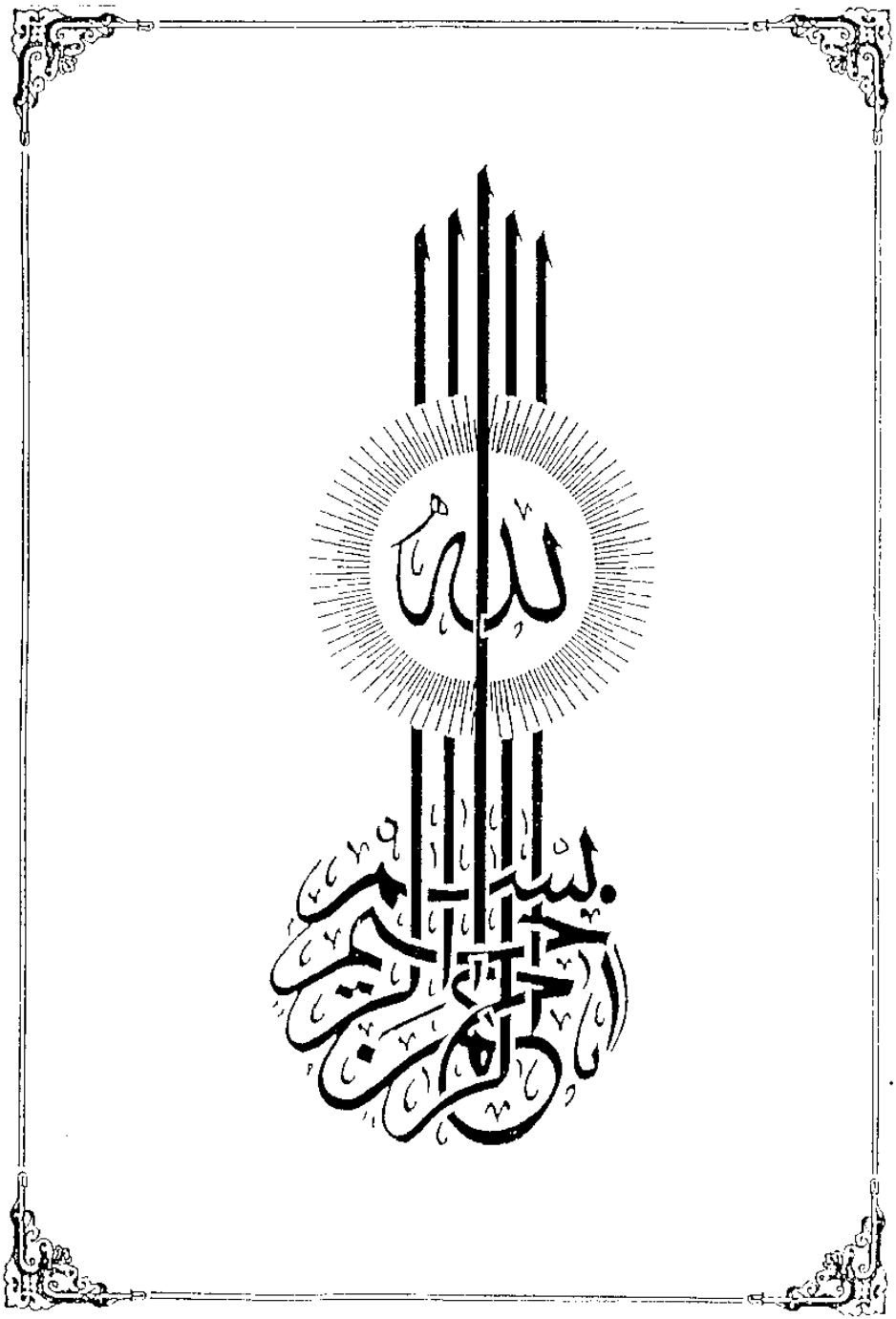
This thesis for master degree has been approved by:

Prof. Dr. Fahmey Mohamed Habib ..... F. Habib
Prof. of Soil Sci. Fac. of Agr. Moshtohor, Zagazig Univ.

Prof. Dr. Hasnaa Abu-Gabal Mohamed ..... E. Abu Gabal
Prof. of Soil Sci. Fac. of Agr., Ain Shams Univ.

Prof. Dr. Moneer Abdo Aziz .....
Prof. of Soil Sci. Fac. of Agr., Ain Shams Univ.

Date of examination : 1 / 7 / 1996



LONG-TERM EFFECT OF IRRIGATION BY LOW -WATER QUALITIES ON SOIL PROPERTIES AND PRODUCTIVITY

BY

ADEL ABDEL RASHEED SOLIMAN MOHAMED

B.Sc. Agr. (Soil Science).Ain Shams University, 1976

Under the supervision of

Prof.Dr. **Moneer Abdo Aziz**
Prof of Soil Sci. Fac. of Agr. Ain Shams Univ.

Prof.Dr. **El-Tony Mohamed Ali**
Prof of Soil Sci. Fac. of Agr. Ain Shams Univ.

Prof.Dr. **Dia El-Din El-Quosy**
Director of water management Ins.

Abstract

Adel Abdel Racheed Soliman, long-term effect of irrigation by low-water qualities on soil properties and productivity. Unpublished Master of science, University of Ain Shams, Faculty of Agriculture, Department of Soil Science, 1996.

The present work was conducted to evaluate the long term effect of using low water qualities (Drainage water) on soil properties and productivity of different cultivated crops. The study was carried out in two areas, El-Hamul and San El-Hagar areas in Kafr El-Sheikh and Sharkia Governorates, respectively , Egypt

The obtained results reveal that, the long-term use of drainage water for irrigation purposes increased soil salinity, and TDS especially in San El-Hagar area. Exchangeable calcium was the dominant cation as compared with the other cations and there was a marked increase in ESP in the areas irrigated with drainage water and this increase reached about double values in El Hamul area. Consequently, the values of DSA and WSA and structure parameters were influenced negatively by increasing ESP values and low aggregation stability was obtained. The correlation coefficients between both ESP and soluble sodium with aggregate sizes and structure parameters showed that ESP affected markedly on structure parameters more than soluble sodium in both areas.

On the other hand, soil bulk density was slightly decreased when drainage water was used for irrigation in both areas, while total soil porosity was increased and also the values of retained soil moisture. The values of field capacity, wilting percentage and available water capacity were increased when drainage water was used for irrigation compared with conventional one. The mean values of total effective pores was decreased when drainage water was used in San El-Hagar area as compared with El-Hamul one, while

the mean value of quickly drainable pores were decreased when drainage water was used for irrigation in San El-Hagar and El Hamul areas. The values of infiltration rate were increased in El-Hamul area as compared with San El-Hagar one under the conditions of irrigation with drainage water. The data of crop yields in both studied areas indicated to a decrease in the productivity when carried out by drainage water.

The amount of decrease in yields per one unit increase in EC_{ex} are 2.29, 0.776, 0.642 and 0.695 units crop for Clover, Wheat, Rice and Maize, respectively in El Haul area while, the decrease was 1.887,0.469,1.50 and 0.419 for the same crops, respectively in San El-Hagar area.

Keywords :

El-Hamul area, San El-Hagar area, Irrigation water quality, Drainage water, Conventional water, Soil chemical properties, Soil physical properties, Soil productivity

ACKNOWLEDGEMENT

The author wishes to express his deepest appreciation and gratitude to Prof. Dr. Moneer Abdo Aziz and Dr. El Toni Mohamed Aly, Professors of Soil Science, Faculty of Agriculture, Ain Shams Univ. and Dr. Dia El Din El Quosy, Director of Water Management Research Institute, National Water Research Center, Ministry of Public Works and Water Resources, for their supervision, valuable advice, patient, scientific and technical remarks, kind encouragement and valuable assistance through this work.

Grateful thanks are also due to Dr. Safwat Abdel Dayem,Director of Drainage Research Institute (DRI) , Dr.Shaden Abdel Gawad, Deputy director DRI, Dr. Ahmed Mohamed Morsy, Dr. Mohamed Akmal Omara and Dr. Mohamed Bakr Abdel Ghani, Drainage Research Institute, National Water Research Center, Ministry of Public Works and Water Resources for valuable helps and gratitude assistance.

Sincers thanks are also forwarded to all staff members of the Drainage Research Institute for providing facilities to continue this work.

CONTENTS

LIST OF TABLES