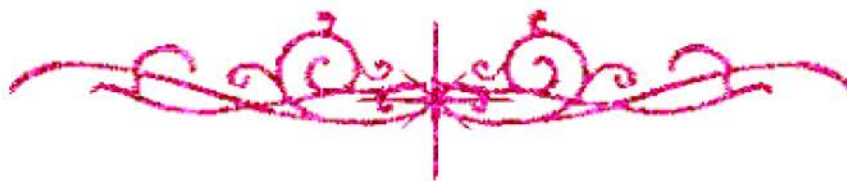


# بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ





# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

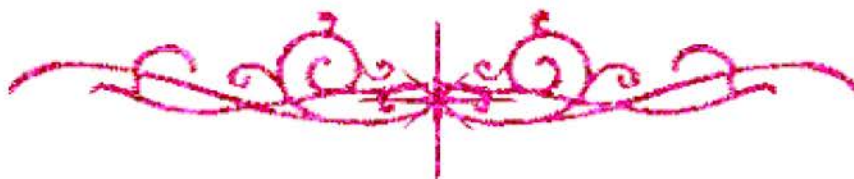
## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغييرات



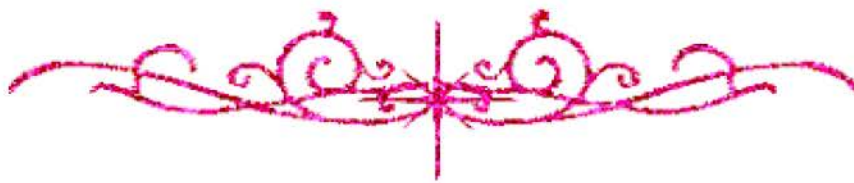
## يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



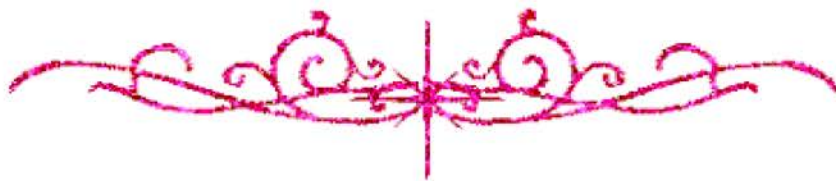


# بعض الوثائق الأصلية تالفة





# بالرسالة صفحات لم ترد بالأصل



B I V I C W

MORPHOLOGICAL AND PHYSIO-CHEMICAL  
EVALUATION OF SOME SOILS IN THE  
WESTERN BACK OF SUEZ CANAL

BY

**Abdel Halim Abdel Whab Mohamed Khalil**

*B.Sc. Agric. (Soil Science), Alexandria University, 1969*

*Thesis*

Submitted in Partial Fulfillment of the  
Requirements for the Degree

of

**Master**

In

Soil Science

Department of Soil Science  
Faculty of Agriculture

Menoufiya University

**1999**

## APPROVAL SHEET

**Title of thesis:** MORPHOLOGICAL AND PHYSIO-CHEMICAL EVALUATION OF  
SOME SOILS IN THE WESTERN BANK OF SUEZ CANAL.

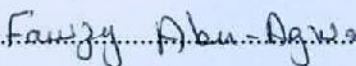
**Submitted to:** Department of Soil Science Faculty of Agriculture  
Menoufiya University.


**Submitted by:** Abdel Halim Abd El-Whab Mohamed Khalil

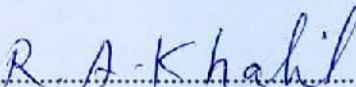
**For :** The Degree of M.Sc. Agric., Sci. (Soils).

**This thesis has been approved by:**

Prof. Dr.  .....

Prof. Dr.  .....

Prof. Dr.  .....

Prof. Dr.  .....

(Committee in charge)

Shibin El-Kom

Date of examination:     /     / 1999.

## CREDIT SHEET

This M. Sc. Thesis entitled "MORPHOLOGICAL AND PHYSIO-CHEMICAL EVALUATION OF SOME SOILS IN THE WESTERN BANK OF SUEZ CANAL" and submitted by ABD EL-HALIM ABD EL-WHAB MOHAMED KHALIL has been supervised by the following Staff Members of the Department of Soil Science, Faculty of Agriculture, Menoufiya University and Soil, Water & Environment Research Institute, Agriculture Research Center.

**1- Prof. Dr. Refat A. Khalil (Ph.D.)**

Professor of Soil Chemistry.

**2- Prof. Dr. Omar A. Gobran (Ph. D.)**

Professor of Pedology.

**3- Prof. Dr. Abd El-Monem M. Amer (Ph.D. )**

Professor of Soil Physics.

**4- Dr. Ragab B. Shehata (Ph.D.).**

Associate Professor of Pedology.

Signatures of supervision committee:

Prof. Dr. Refat A. Khalil ..... *R.A. Khalil*

Prof. Dr. Omar A. Gobran ... *O. Gobran*

Prof. Dr. Abd El-Monem M. Amer ..... *A.M. Amer*

Dr. Ragab B. Shehata *R. Shehata*



## ACKNOWLEDGEMENT

The author wishes to take this opportunity to express about his deepest thanks for many persons who have helped in the design and in the work involved in carrying out the field and lab. Work and analysing the results.

Sincere appreciation and deep gratitude to **Prof. Dr. Refat A. Khalil** professor of Soil Chemistry, the head of Soils Department., Faculty of Agriculture, Menoufiya University. For suggesting the subject, continuous supervision, guidance, comments, valuable help encouragement making very possible effort for this manuscript to be prepared

Thanks are due to **Prof. Dr. O.A. Gobran** professor of Pedology, Soils Department, Faculty of Agriculture, Menoufiya University, for his supervision, help, advice, guidance and continuous encouragement at all stages of this work.

Thanks, also to **Prof. Dr. A.M. Amer** Professor of Soil Physics, Soils Department, Faculty of Agriculture, Menoufiya University for his supervision, advice, valuable assistance and encourage out during course of this work.

Grateful acknowledgement is due to **Assoc. Prof. Dr. R.B. Shehata**, Soil, Water and Environment Res. Inst., Agric. Res. Center, who had helped and supported the author in the field as well as laboratory work and measurements of the investigation.

Thanks are also due to all the staff members of Soils Department, Faculty of Agriculture, Menoufiya University.

Thanks are also due to all the staff members of Soil, Water and Environment Res. Inst., Agric. Res. Center.

# CONTENTS

	Page
1. INTRODUCTION .....	1
2. REVIEW OF LITERATURE .....	2
2.1. Geogenesis of the soils .....	2
2.2. Geomorphology .....	3
2.3. Topography .....	6
2.4. Natural vegetation .....	7
2.5. Climatic conditions .....	7
2.6. Water resources .....	9
2.7. Soils .....	10
2.8. Land evaluation .....	15
2.8.1. Definition .....	15
2.8.2. Development of land evaluation .....	16
2.8.3. Land evaluation studies in Egypt .....	19
3. MATERIALS AND METHODS .....	21
3.1. Location .....	21
3.2. Field work .....	21
3.3. Methods of analyses .....	21
3.3.1. Physical and chemical analyses .....	21
3.3.2. Mineralogical analyses .....	24
3.4. Soil classification .....	25
3.5. Land evaluation .....	25
4. RESULTS AND DISCUSSION .....	26
4.1. Morphological description of soil profiles .....	26
4.2. Physical and chemical properties of the studied soils .....	27
4.3. Nature of soil depositional environments and mechanism of transportation .....	35
4.4. Soil origin .....	39
4.4.1. Light minerals .....	39
4.4.2. Heavy minerals .....	42
4.4.3. Soil profile uniformity .....	46
4.4.4. Weathering ratios .....	46
4.5. Identification of clay minerals .....	49
4.6. Soil Taxonomy .....	53
4.7. Land evaluation .....	56

	Page
4.8. Land suitability for certain crops .....	56
4.8.1. Out wash plain .....	58
4.8.2. Wadi plain .....	58
4.8.3. Alluvial fans .....	58
4.8.4. Lake beaches .....	60
4.8.5. Wind blown sandy deposits .....	60
4.8.6. River terraces .....	60
4.8.7. Wadi EI-Tumialate formation .....	60
<b>5. SUMMARY .....</b>	<b>61</b>
<b>6. REFERENCES .....</b>	<b>67</b>
<b>7. APPENDIX .....</b>	<b>74</b>
<b>8. ARABIC SUMMARY</b>	

## 1. INTRODUCTION

Food production continues to be one of the most pressing problems of Egypt as well as the rest of third world, due to the rate of population increasing. Desertic part represents about 94 % of the total area in Egypt.

Thus, land evaluation of the desert soils for agricultural purposes should not be limited to the kind of crops grown, but also to express the value of a piece of land for a certain use considering the sustainability aspect.

The pedogenetic studies is a trail to contribute and provide such knowledge to help in planning for proper agricultural land use program of the desertic soils. Accordingly it is rather essential to conduct the pedological studies as a step to evaluate their potentiality.

Consequently, the government is planning to install many facilities to expand the agricultural area, beside supporting research and development of the cultivated area to maintain their production at a feasible limit.

To fulfill the horizontal expansion aim, the desert soils are more concerned. Among these areas, the area that bounded by Suez Canal from the east, El-Sharkiya Governorate from the west, Ismaeliya Canal from the north and Adabia and Gabel Ataka from the south, is considered

The aim of the current study is to evaluate morphological, physical, chemical and mineralogical characteristics of the desert soils adjacent to both Suez and Ismaelyia Governorates. Classification and quantitative evaluation of these soils were also carried out. Accordingly, suitable suggestion could be attained to help in planning the reclamation technique and to understand how to deal with these soils for agricultural use.

## **2- REVIEW OF LITERATURE**

## 2. REVIEW OF LITERATURE

### 2.1. Geogenesis of the soils:

The High Dam soil survey done by **FAO group (1964)** stated that all the soils located between Ismaeliya and Suez are very young, and differences in soil profile characteristics formed under climatic influences (pedogenesis) are very minor.

They added that the pronounced differences in soil properties are caused by differences in geological development (geogenesis), i.e. the influences of sedimentation and erosion. Such factors as the origin of the sedimentary materials; the means and length of transport, the conditions and environment of sedimentation, or the exposure and erosion of older formations, are more important in explaining the physical and chemical properties of these soils and their differences.

They showed that the only pedogenetic features seen, are some lime spots in the soil profiles and the presence of cemented soil horizons formed by gypsum. Gypsum pans have been observed and many Miocene and other geological formation are rocky in the surface just because of this kind of concentration. These formations principally consist of soft limestone, marl and shaly clays, but all very rich in gypsum.

They noted that in the northern part, sandy and fine or only slightly gravelly Pleistocene Nile deposits prevail, for the greater part which are probably deposited in a shallow sea water. Wind-blown sands derived from these deposits occur, most of them still shifting under the influence of the wind.

Further to the south the soils of the out wash plains and wadi plains are also young from a point of view of soil formation.

The soil material is of local origin and very rich in gypsum. The soils are shallow, overlying older gypsiferrous formations, often marly or consisting of shaly clay.

The same authors showed that wadi plain soils of Wadi Ei- Bahara, close to Suez show the influence of the sea in the presence of sea shells in the profile and on the soil surface; some what closer to the Gulf the coarse textured gypsiferrous wadi plain soils become poorly drained saline coastal clay soils.

The geologic map of the area and its hinterland show three main geological formations: Fig. (1).

$Tp_1$ . the recent and Pleistocene deposits which occupy the northern part between Wadi Ashara, and which extend as far east as the Suez canal and south ward to the Gulf of Suez only locally small area of Miocene formation is occurred.

$Tm$ . the Miocene formation which occupies most of the area to the west, with many Oligocene and possibly some lower and upper middle Eocene out crops.

$Te$ . The middle Eocene formation which is exposed in Gabel Ataka:

The area of eastern site of Nile Delta is totally occupied by sedimentary rocks belonging to the Tertiary and the Quaternary epochs, (Ball, 1939; Said, 1962; El-Fayoumy, 1968 and Abu Al-izz, 1971).

## 2.2. Geomorphology:

According to Ball (1939) and Abu Al-izz (1971), the Eastern Desert of Egypt is characterized by a group of geomorphic features that make it basically different from the western desert.

Also, Said (1962) and Shata (1978), indicated that the landforms recognized in the area of East Nile Delta, are the alluvial fans, the out wash