

**SOME FACTORS AFFECTING SOIL EROSION  
BY WATER IN NORTH WESTERN COAST OF  
EGYPT**

**BY**

**EMAN ABD EL-FATAH ALI AMER**

B.Sc. Agric. Sc. (Soil Science), Ain Shams University, 1996

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**This thesis for Master degree has been approved by:**

**Prof. Dr. Mohamed Essam El-Din Shawky** .....

Professor Emeritus of Soil Science, Faculty of Agriculture,  
Cairo University

**Prof. Dr. Mounir Abdou Aziz** .....

Professor Emeritus of Soil Science, Faculty of Agriculture,  
Ain Shams University

**Prof. Dr. Mohamed El-Sayed Galal** .....

Professor of Soil Science, Faculty of Agriculture, Ain Shams  
University

**Prof. Dr. El-Tony Mohamed Ali** .....

Professor of Soil Science, Faculty of Agriculture, Ain Shams  
University

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## **Under the supervision of:**

Prof. Dr. El-Tony Mohamed Ali

Professor of Soil Science, Department of Soil Science, Faculty of  
Agriculture, Ain Shams University (Principal supervisor)

Prof. Dr. Mohamed El-Sayed Galal

Professor of Soil Science, Department of Soil Science, Faculty of  
Agriculture, Ain Shams University

Prof. Dr. Salah El-Din Mohamed Mostafa Arroug

Professor of Soil Science- Soil, Water and Environmental  
Research Institute, Agricultural Research Center

## **ABSTRACT**

**Eman Abd El-Fatah Ali. Some factors affecting soil erosion by water in north-western coast of Egypt. Unpublished M.Sc. Thesis. Ain Shams University, Faculty of Agriculture, Department of Soil Science. 2005.**

Bahig area at the North Western Mediterranean Coast of Egypt undergoes sever soil erosion. Some processes, which change the soil nature under two watersheds in Bahig area, i.e., virgin and recently cultivated soils were taken into consideration during this study. This study aimed at evaluating soil erosion phenomenon in this area through estimating the annual soil loss by water erosion. Also, the effects of water erosion on soil physical and chemical properties were studied under different conditions of cultivation cover and slope.

The following criteria were assessed: Particle size distribution, calcium carbonate distribution, total aggregation and stability index, pH, organic matter, total calcium carbonate percentage, EC and soluble cations and anions.

The obtained results revealed that soil loss by water was estimated as 6.55 and 0.26 t/ha/yr for virgin and recently cultivated soils, respectively. Soil loss by water erosion substantially exceeded the tolerable limits and conservation practices are necessary to control soil loss in the north-western coast of Egypt.

Soil erosion markedly affected particle size distribution, calcium carbonate content and distribution, total aggregation and stability index, organic matter content, salinity, soluble cations and anions.

**Keywords:** Bahig area, water erosion, sheet erosion, rill, gully and splash erosion, erosivity, erodibility, soil conservation practices.

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## CONTENTS

	Page
1. INTRODUCTION .....	1
2. REVIEW OF LITERATURE .....	2
2.1. Physiography of the study area.....	2
2.1.1. Location .....	2
2.1.2. Climate .....	2
2.1.3. Geology, Geomorphology and topography .....	3
2.1.4. Soils, water, agriculture and management .....	4
2.2. Water erosion .....	7
2.2.1. Water erosion mechanism .....	7
2.2.2. Types of water erosion.....	8
2.2.3. The universal soil loss equation.....	9
2.3. Impact of erosion on some soil properties.....	19
2.3.1. Particle size distribution.....	19
2.3.2. Organic matter.....	21
2.3.3. Soil aggregation and stability index.....	22
3. MATERIALS AND METHODS .....	25
3.1. Location and description of the studied area.....	25
3.2. Location of soil profiles.....	25
3.3. Soil loss equation by water erosion .....	25
3.4. Soil samples .....	28
3.5. Determination of soil properties .....	28
3.5.1. Physical properties .....	28
3.5.2. Chemical properties .....	29
4. RESULTS AND DISCUSSION .....	31
4.1. Evaluation of USLE parameters under Bahig area conditions.....	31
4.1.1. Rainfall erosivity factor “R” .....	31
4.1.2. Soil erodibility factor “K” .....	37
4.1.3. Effect of slope factor “LS” on soil loss by water erosion under virgin and vegetation conditions ...	41

4.1.4. Effect of cropping management factor “C” under virgin and vegetation conditions .....	47
4.1.5. Conservation practice factor “P” .....	48
4.2. Impact of water erosion on soil properties .....	50
4.2.1. Physical properties .....	50
I– Particle size distribution .....	50
II. Calcium carbonate distribution .....	62
III. Particle size distribution as affected by slope position .....	68
IV. Particle size distribution as affected by plant cover .....	68
V. Aggregate size distribution and aggregate stability .....	74
4.2.2. Soil chemical properties.....	89
I. Soil pH.....	89
II. Organic matter.....	89
III. Total calcium carbonate percentage .....	93
IV. Soil water extract components.....	94
5. SUMMARY AND CONCLUSION .....	100
6. REFERENCES.....	106
ARABIC SUMMARY .....	

## LIST OF TABLES

Table (1): Rainfall and temperature data obtained from Burg El-Arab meteorological station during 10 years from (1994–2003).....	32
Table (2): Monthly distribution of erosivity factor “R” during 2000–2003 years (according to USLE) .....	35
Table (3): Rainfall erosivity factor “R” according to Roose equation (1977).....	36
Table (4): Erodibility factor “K” based on Wishmeier’s Nomograph for “virgin” soils.....	38
Table (5): Erodibility factor “K” based on Wishmeier’s Nomograph for “recently cultivated” soils.....	39
Table (6): Erodibility factor “K” based on Arroug equation for “virgin” soils .....	42
Table (7): Erodibility factor “K” based on Arroug equation for “recently cultivated” soils.....	43
Table (8): Estimation of slope factor “LS” .....	46
Table (9): Cover index factor “C” construction sites.....	48
Table (10):Particle size distribution of the studied soil samples without removal of $\text{CaCO}_3$ in “virgin” soils, according to USDA classification .....	55
Table (11):Particle size distribution of the studied soil samples without removal of $\text{CaCO}_3$ in “recently cultivated” soils, according to USDA classification.....	56
Table (12):Particle size distribution of the studied soil samples with removal of $\text{CaCO}_3$ in “virgin” soils, according to USDA classification .....	57
Table (13):Particle size distribution of the studied soil samples with removal of $\text{CaCO}_3$ in “recently cultivated” soils, according to USDA classification.....	58



Table (14):Calcium carbonate distribution in different fractions, in “virgin” soils.....	63
Table (15):Calcium carbonate distribution in different fractions, in “recently cultivated” soils .....	64
Table (16):Aggregate size distribution in “virgin” soils.....	78
Table (17):Aggregate size distribution in “recently cultivated” soils.....	79
Table (18):Primary particles analysis and stability index in “virgin” soils.....	82
Table (19):Primary particles analysis and stability index in “recently cultivated” soils.....	83
Table (20):pH, organic matter and total calcium carbonate in the studied soil profiles of “virgin” soils.....	90
Table (21):pH, organic matter and total calcium carbonate in the studied soil profiles of “recently cultivated” soils.....	91
Table (22):Some chemical properties in the studied soil profiles of “virgin” soils .....	95
Table (23):Some chemical properties in the studied soil profiles of “recently cultivated” soils.....	96

## LIST OF FIGURES

Fig. (1): Annual rainfall and mean monthly temperature distribution over the studied area from 1994 to 2003.	34
Fig. (2): Distribution of "R" values according to USLE over Bahig area from 2000 to 2003 .....	36
Fig. (3): The soil erodibility nomograph .....	40
Fig. (4a): Location of the soil profiles in the two watersheds ....	45
Fig. (4b): Effect of slope length under “virgin and recently cultivated” soils, 4 % slope, on soil loss.....	46
Fig. (5): Particle size distribution without removal of $\text{CaCO}_3$ in "virgin" soils .....	51
Fig. (6): Particle size distribution without removal of $\text{CaCO}_3$ in "recently cultivated" soils .....	52
Fig. (7): Particle size distribution with removal of $\text{CaCO}_3$ in "virgin" soils .....	53
Fig. (8): Particle size distribution with removal of $\text{CaCO}_3$ in "recently cultivated" soils .....	54
Fig. (9): Sand percentage in “virgin and recently cultivated” soils (0-15 cm) .....	59
Fig. (10): Silt percentage in “virgin and recently cultivated” soils (0-15 cm) .....	60
Fig. (11): Clay percentage in “virgin and recently cultivated” soils (0-15 cm) .....	61
Fig. (12): Particle size distribution of $\text{CaCO}_3$ in "virgin" soils ..	65
Fig. (13): Particle size distribution of $\text{CaCO}_3$ in "recently cultivated" soils.....	66
Fig. (14): Total $\text{CaCO}_3$ percentage (0-15 cm) in “virgin and recently cultivated” soils.....	67
Fig. (15): Particle size distribution without removal of $\text{CaCO}_3$ of surface soil samples (0-15) as affected by slope position in “virgin” soils.....	69

Fig. (16): Particle size distribution without removal of $\text{CaCO}_3$ of surface soil samples (0-15) as affected by slope position in “recently cultivated” soils.....	70
Fig. (17): Calcium carbonate distribution of surface soil samples (0-15) as affected by slope position in “virgin” soils.....	71
Fig. (18): Calcium carbonate distribution of surface soil samples (0-15) as affected by slope position in “recently cultivated” soils.....	72
Fig. (19):Aggregate size distribution in “virgin” soils .....	76
Fig. (20):Aggregate size distribution in “recently cultivated” soils .....	77
Fig. (21):Total aggregation % in “virgin and recently cultivated” soils (0-15 cm).....	80
Fig. (22): Stability index in “virgin and recently cultivated” soils (0-15 cm) .....	81
Fig. (23):Aggregates of 2.0 mm diameter % in the surface layers (0-15 cm) of “virgin and recently cultivated” soils .....	86
Fig. (24):Aggregates of 0.25 mm diameter % in the surface layers (0-15 cm) of “virgin and recently cultivated” soils .....	87
Fig. (25):Aggregates of 0.1 mm diameter % in the surface layers (0-15 cm) of “virgin and recently cultivated” soils .....	88
Fig. (26):pH in “virgin and recently cultivated” soils (0-15 cm) .....	92
Fig. (27):Organic matter % in “virgin and recently cultivated” soils (0-15 cm) .....	92
Fig. (28):Calcium carbonate % in “virgin and recently cultivated” soils (0-15 cm).....	92

Fig. (29):Soluble cations in "virgin and recently cultivated" soils (0-15 cm) .....	97
Fig. (30):Electrical conductivity (mmhos/cm) in "virgin and recently" cltivated soils (0-15 cm).....	98

## **1. INTRODUCTION**

Protecting and conservating agricultural lands from soil erosion are of supreme importance to humankind. Water erosion of agricultural lands contributes to muddying streets of the urban areas, siltation of farm ponds and streams and pollution and eutrophication of lakes and rivers.

Water is an active force of soil erosion. Water erosion flourishes when rains are abundant and cover of vegetation is deadly.

The universal soil loss equation (USLE) is used to predict the amount of soil loss by erosivity and erodibility. Falling raindrops and running water derive their erosivity from the kinetic energy they possess which result in detachment and transport of soil particles.

Soil properties such as topography, depth, permeability, texture, structure and fertility influence the erodibility of soil, and type of conservation influence that can be used successfully.

Bahig area, located in the north-western coast of Egypt suffers from severe soil erosion. Therefore, the current work is concerned with one part of the broad spectrum of land-use schemes of the north-west coast. Some of the processes that are changing the nature of the soils in the course of putting virgin and recently cultivated will examine. Studies will made on virgin arable soils and soil under recently cultivated, to evaluate some factors affecting soil erosion by water.

## **2. REVIEW OF LETERATURE**

### **2.1. Physiography of the study area:**

#### **2.1.1. Location:**

The study area is located in the north western coastal zone at Bahig area (about 60 km west of Alexandria). Bahig area is bounded by longitudes 29° 29' to 29° 31' east, and latitudes 30° 49' to 30° 51' north.

#### **2.1.2. Climate:**

The climatic conditions of the study area are typically arid Mediterranean climate, which characterized by aridity with long hot rainless summer, mild winter with low amount of rainfall. The other seasons are characterized by unstable climate, Khamasien storms and sometimes heavy rainfall.

The essential features of the climate of the north-western coastal region can be listed briefly as follows: rainfall amount is about 150 mm/year and evenly distributed along most of the coast, except for Sallum and Fuka, which receive less and Burg El-Arab, which receives more. Rainy days are only 15-25 in autumn and winter and no rain in summer. Mean annual maximum temperature is 25 °C and mean annual minimum is 15 °C. Mean annual relative humidity at noon is 55 percent and the mean annual saturation deficit at noon is 10 mm Hg. High relative duration of sunshine is about 80 percent for the year. High potential evaporation is about 1500 mm per annum.

Wind in the studied area is generally light, but blow strongly from the north-west direction during winter and early spring. Climatological normal reported by **FAO (1970) and (1991)** indicate that the average wind velocity along the coast is about 20 to 25 km/hr. The end of summer records many calm days and the average of wind speed drops to 15 km/hr.

The Mediterranean coastal region of Egypt lies in Meigs's "warm coastal deserts" (Meigs, 1973).

### **2.1.3. Geology, geomorphology and topography:**

The geology of the Mediterranean coastal zone has been intensively studied by Shata (1971), El-Shazly and Attia (1994) and others.

Shukri and Philip (1956) studied the geomorphology of the Mediterranean coast area and stated that the beach sediments are formed of oolitic calcareous grains derived from the old bars, which border the coast.

Said (1962) stated that the ridges are marine coastal beaches formed throughout the Pleistocene age in successive periods of high sea levels as a result of the off-shore currents. He stated also that these ridges were formed under water as off-shore sand banks, then emerged during subsequent periods of lower sea levels and they may begun to blow after loosing and drying. This may account for the typical wind blow structure, which observed sometimes in the area.

According to FAO (1970), rocks are exposed at the surface of the area and range in age from recent sediments along the coast to Miocene limestone in the escarpment and on the plateau. The height of the successive ridges may well represent the maximum sea level during successive interfluvial periods. These ridges although originally consist of loose materials, however, they now form more or less hard limestone. The topography becomes higher in an irregular from the coast inland. The relief is characterized by a successive undulation running more or less parallel to the coast. Calcareous rocky ridge and alternating with depressions. Several ridges start near lake Mariut and become gradually less obvious towards the west. The main features of the various physiographic units lead to the distinction of three major physiographic systems: