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

BY

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

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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 Unpublished M.Sc.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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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 29º 29˙ to 29º 31˙ east, and latitudes 30º 49˙ to 30º 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, expect 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 Meig'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: