SOME ASPECTS IN THE RECLAMATION OF SANDY CALCAREOUS SOILS

BY

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Approval Sheet

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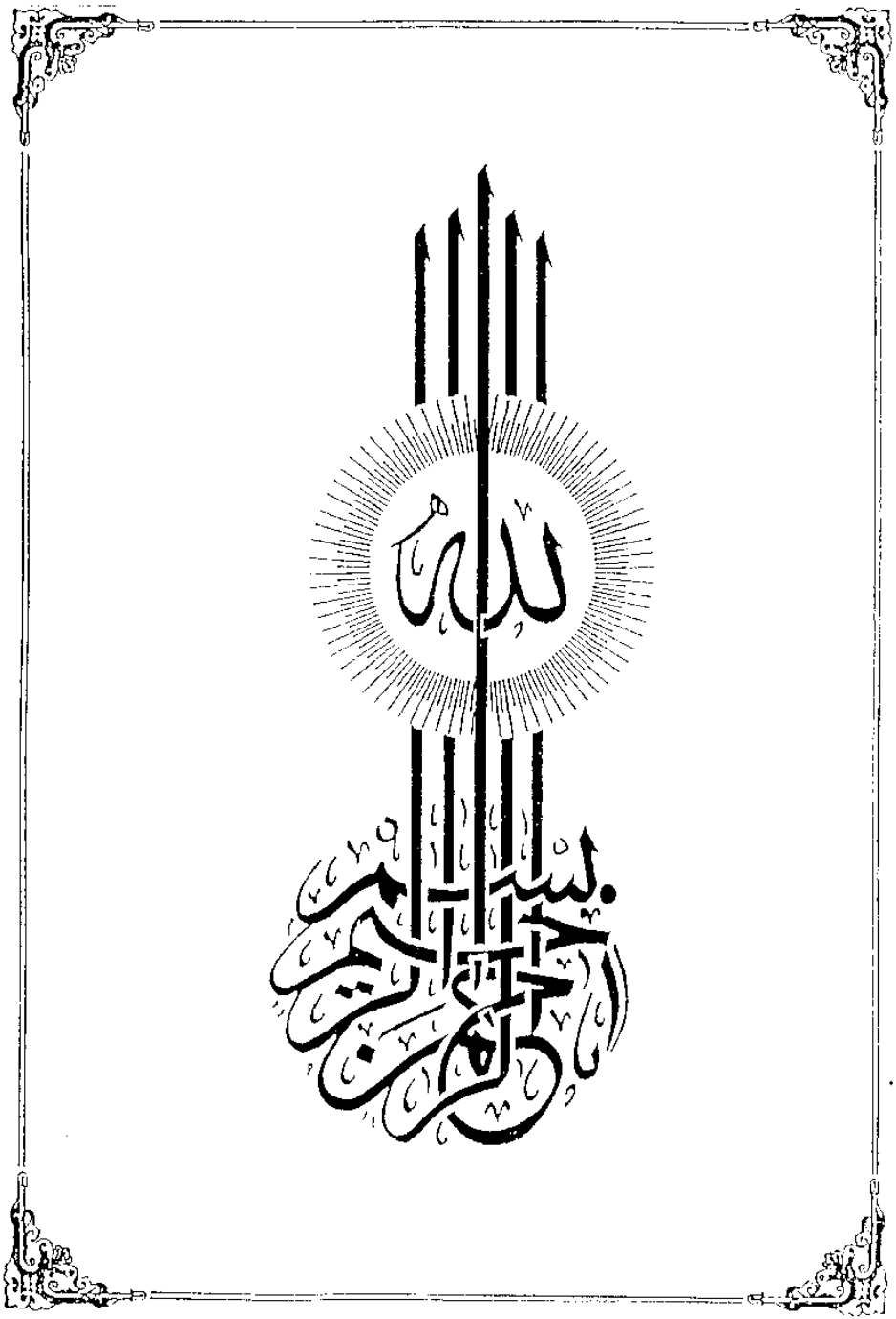

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Abstract

This work aimed to study some aspects in the reclamation of sandy calcareous soils. El-Gabal El-Asfar Farm was selected for this study. Six soil profiles were selected to represent soil irrigated with sewage water for about 0, 10, 20, 30, 40 and 50 years. They were morphologically described in the field. Soil samples were analyzed for some physical and chemical properties, total and available contents of Mn, Cu, Zn, Cd, Pb,

Ni and Co. Also, available B was determined in these samples. Twelve water samples were taken in four different seasons. These samples were analyzed for chemical analysis and soluble contents of Mn, Cu, Zn, Cd, Pb, Ni, Co and B. Samples of mandarin, orange and lemon were collected from plants grown on different locations where soil samples were collected. These samples included leaves and fruits. These were analyzed for total contents of Mn, Cu, Zn, Cd, Pb, Ni, Co and B.

The obtained results can be summarized in the following points :

1- The concentrations of Mn, Cu, Zn, Cd, Pb, Ni, Co and B. in irrigation water samples were lower than the maximum permissible limits.

2- $CaCO_3$ content was only traces in the surface layers of studied profiles at any time of receiving sewage water for irrigation.

3- The organic matter content in the top soil layers increased with the time of sewage water application.

4- The highest values of total Mn content was in the 5 - 10 cm layer under different times of sewage water applications.

5- Copper and Zn contents accumulated in the surface soil layers in an available form.

6- The depth of pulluted layer with lead increased by time of sewage water application.

7- Nickel and Co contents accumulated mostly in unavailable form.

8- Increasing years of application did not produce any accumulation of heavy metals in all parts of citrus trees.

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INTRODUCTION

1- Introduction

Egypt has an agressive plan to overcome the food gap through increasing the agricultural production. There are two possibilities; intensifying farming inputs in the old lands and expanding the cultivated areas outside the Nile Delta and Valley in the desert. By year 2000, it is hoped to bring about 2.8 million feddans of desert land under cultivation and to increase the existing cropping intensity from 200% to 300%.

The main limiting factor in horizontal expansion is irrigation water. In the same time vast areas which have been put under reclamation plan in Egypt are the sandy or sandy calcareous soils. These soils are suffering from insufficient irrigation water, organic matter content as well as macro and micronutrients. Application of significant amounts of organic matter to the sandy calcareous soil has been a successful practice for improving its physical and chemical conditions as well as its productivity. Therefore, irrigation with sewage water can be used for this purpose. Sewage water usually has high content of organic matter and several heavy metals. The soils can receive and decompose large amounts of organic material and the released nutrients could be utilized by the crops and where applications are used year after year, this will lead to accumulation of some heavy metals in the upper layer of the soil.

Since a long time, the city of Cairo drains and applies liquid sewage sludge to the loamy sand soils of El-Gabal El-Asfar area, 30 Km north east of Cairo. This study is aimed to investigate the prolonged application of sewage water for irrigation as a reclamation process for sandy calcareous soil and the heavy metal accumulation in soil layers as well as in the different parts of citrus trees grown in the studied areas. Heavy metals accumulation is considered one of the main limiting factors for using sewage water to irrigate edible crops wheather for man or animal. These heavy metals are considered also as soil pollutants and should be carefully undertaken through reclamation processes when using sewage water. Therefore this study was conducted in the soils of El-Gabal El-Asfar Farm. The farm is of sandy soil and irrigated with sewage effluent of Cairo for more than 70 years. Most of El-Gabal El-Asfar area is under citrus trees. In this work selected soils of these fields were studied for heavy metal accumulation. Besides Orange, Mandarin and Lemon trees were also studied for heavy metals accumulation in the leaves, fruit juice and peel. Time of applying sewage water for irrigation was also considered through selecting farms with different ages.

REVIEW OF LITERATURE