Name of Candidate: Mostafa Mohammed Afify **Degree**: M.Sc.
Title of Thesis : Studies on the Fertigation of Grape
Supervisors: Dr. Sayed Taha Abou-Zied
Dr. Youssief Ali Abdel-Aal
Department : Soil Science **Approved : 22 / 11 / 2011**

Abstract

Field experiment was conducted with grapevine grown in sandy soil under drip irrigation at El Sadat city, Menoufiya Governorate, Egypt for two consecutive seasons (2006 and 2007) to investigate the effect of different phosphorous fertilizers on Thompson seedless grapevine bud behavior, leaf area, yield, average cluster weight, berry measurements, berry juice measurements, (TSS, acidity, TSS/Acidity), chemical composition of blades and phosphorus concentration in soil samples. Four sources of phosphorus were used, phosphoric acid (H_3PO_4), monoammonium phosphate (MAP), ammonium polyphosphate (APP) and urea phosphate (UP) with two rates 20 and 40 kg P_2O_5/fed., applied as once, twice and three times/week through irrigation water. Phosphorus at 40 kg P_2O_5/fed. increased significantly vine yield and improved fruit quality more than 20 kg P_2O_5/fed. under all treatments. As regards to sources of phosphorus, all the measured parameters were better with UP and APP than H_3PO_4 and MAP under the two rates and the different patterns of applications. Also, the results showed that application of phosphorus fertilizers at three times /week was the best.

Key words: Grapevine,Thompson seedless,phosphorus fertilizers, fertigation.

Name of Candidate: Mohamed Salah Kotb **Degree:** Ph.D.
Title of Thesis: Factors Affecting Charge Characteristics and Buffering Capacity of Some Soils of Egypt
Supervisors: Dr. Reda Ragab Mohamed Shahin
Dr.Yehia Arafa Ahmed Nasr
Department: Soil Science
Approval: 14 /12/ 2011

ABSTRACT

Factors affecting the charge characteristics and buffering capacity were studied on synthetic components similar to those found in natural soils and also on soil samples represente alluvial (Torriorthents) and calcareous (calciorthids) and some of their clay separates.

The statistical analysis showed significant correlation between both (σ_T) and (σ_P) and variable charge (σ_V) and clay, amorphous material, as well as free Fe_2O_3, Al_2O_3 and SiO_2 oxides in the alluvial soils while it was correlated to clay, total and active carbonate in calcareous soils. The removal of amorphous materials increased all charges σ_T, σ_P and σ_V and the magnitude of increase was significantly correlated with clay and AM is alluvial, and with clay, total and active $CaCO_3$ in calcareous once. On the other hand, the removal of AM decreased both PZNPC and PZSE with extents significantly correlated to total and active $CaCO_3$ in calcareous soils, while the decrease of PZSE was significantly correlated to clay and AM contents in alluvial ones. All parameters of ion exchange were increased significantly by increasing clay contents in both the investigated soils and by increasing total and active $CaCO_3$ in calcareous one. The removal of amorphous material increased CEC_P and CEC_m while AEC_m and PZNC were decreased.

Three buffering capacity indices were calculated in two pH ranges (3-6 and 6-9) and discussed in the present study. The three buffering capacity indices were significantly correlated to each other but BC_{H+} was less sensitive to the changes of soil properties as compared to the other indices. Generally, the obtained buffering capacity indices in 3-6 pH range (BC_{3-6}) were much lower than those for BC_{6-9} in alluvial soils, while in calcareous ones the reverse relation ($BC_{3-6} > BC_{6-9}$) was recorded.

Key words: PZC, charge characteristics, buffering capacity, ΔCEC, alluvial, calcareous soils, pH-dependent CEC.

Name of Candidate: Yousif Kotb El Ghonamey **Degree:** Ph.D.
Title of Thesis: The Use of Remote Sensing and GIS Techniques for Assessment of Soils of Wadi El-Natrun, Egypt
Supervisors: Dr. Maher Abdel-Mohsen Abdel-Hamid
Dr. Yehia Arafa Ahmed Nasr
Dr. Mahmoud Mohamed Fahim
Department: Soil Sciences
Branch: **Approval:11/1/2011**

ABSTRACT

The studied area is located between longitudes 30° 06′ 21".37 to 30° 28′ 50".02 East and latitudes 30° 18′ 02".88 to 30° 31′ 06".66 North and covers about 142,687 fed.

A physiographic analysis using visual interpretation on Spot 4 of false colour composite of bands 3,2,1 scale 1:50000 was carried out to delineate the different physiographic units of the studied area. Physiographic units were accurate defined by the Digital Elevation Model of Wadi El-Natrun area. Thirty four soil profiles and seventy minipits were examined to represent the soils of the studied area. The physiographic units were incorporated with soil taxonomic units of sub great group level and field data to represent physiographic soil map of the studied area.

The studied area was grouped into two main landscapes, Hills and Plain. They forms 71.7 % and 28.3 % of the studied area, respectively.

The studied soils are slightly to extremely saline (EC values range from 1.0 to 71.9 dS/m). Soil texture is mostly sandy to sandy clay loam. Soil pH values range from 7.2 to 8.0. Organic matter content is very low (0.3%). The soils are classified as Typic Haplocalcids, Typic Aquisalids, Lithic Torriorthents, Typic Torripsamments and Typic Torriorthents.

The current capability of soils are moderately suitable (S_2), marginally suitable (S_3), temporary not suitable (N_1) and permanently not suitable (N_2). The soils of class S_2 form 59.4% of the studied area (~ 84743 fed.). It includes one subclass S_2 x, as the texture is the limiting factor. The soils of class S_3 cover an area of about 48038 fed. (33.7 %) and it contains two subclasses namely S_3tx (topography and texture are the limiting factors) and S_3 txn (topography, texture and salinity are the limiting factors). The soils of class N_1 form 1.9 % of the studied area (~ 2756 fed.). The soils of class N_2 cover about 5331 fed. (~ 3.7 %). Potential capability reveals that the soils of subclasses S_3tx and S_3txn could be improved to subclass S_2 x.

Ten crops were selected to asses their suitability for cultivation in the studied area: wheat, barley, grain sorghum, olive, grapes, tomato, onion, carrots alfalfa and fodder beet. Olive is the most suitable crop in the studied area followed by grapes, tomato, onion, carrots, alfalfa and fodder beet.

Key words: Assessment, soils, Wadi El-Natrun area, Egypt, GIS techniques**,** remote sensing

Name of Candidate: **Gehan Helmy Abd El-Azziz** **Degree:** Ph.D.
Title of Thesis: Phyto and chemical remediation of soil contaminated with lead and cadmium
Supervisors: Dr. Maher Abdel-Mohsen Abdel-Hamid
Dr. Mostafa Moawed Abd El-Tawab
Dr. Mohamed Amin Abu-Sinna
Department: Soil Sciences
Approval: / /2011

ABSTRACT

This work aims at evaluating the ability of both white mustard (Sinapis alba l.) and Indian mustard (Brassica juncea l.) as phytoremediators plants for remediation soil polluted with Pb and Cd elements. The study also aims at studying the effective role of adding EDTA for availability and mobility of both metals and their accumulation in plant tissues. The role of humic acid as a chemical agent to remediate soil polluted with Cd and Pb has also been studied.

Cd and Pb-contents in white mustard (*Sinapis alba*) and Indian mustard (*Brassica juncea*) showed progressive accumulations of both metals in plant shoots and roots with increasing their contents in soil as compared to the control treatment. Shoot dry matter weight gradually increased with increasing the applied Cd and Pb rates, the reverse was true for both root and seed organs. Cd and Pb contents in soils, either total or available forms tended to increase as the applied Cd and Pb rates increased. Application of 0.05%EDTA to soil significantly increased the concentration of Cd and Pb in both tested plants.

The obtained data showed pronounced decreases in both total and available forms of Cd and Pb in soils amended with EDTA as compared to untreated ones. There was a pronounced reduction in dry matter weights of plant organs. Cd and Pb contents in the soil after application of humic acid showed a pronounced gradual decrease as humic acid levels increased. Cd and Pb contents in lettuce plants grow in soils after application of humic acid decreased as applied humic acid level increased from 0.0 to 4 g kg^{-1} soil. The results revealed that dry matter weight of lettuce plant grown in soil treated with different humic acid levels (i.e., 2, 3, and 4 g kg^{-1} soil) tended to increase as humic acid level increase, as compared to untreated soil. The results showed that there were no changes in Cd and Pb uptake by lettuce plant with increasing applied humic acid. The obtained data showed a pronounced increase in Cd and Pb content in lettuce plants grown in pots without EDTA as compared to those treated with EDTA. Cd and Pb content in lettuce tissues recorded a more less amounts in cases of phytoremediation by using *Brassica juncea* species than *Sinapis alba*. The obtained data also showed a pronounced increase in dry matter weight of lettuce plants grown under soils treated with EDTA.

Key words: Phytoremediation, Cd, Pb, EDTA, Humic Acid, White mustard, Indian mustard.

Name of Candidate: Essam Fawky Ramadan **Degree:** Ph.D.
Title of Thesis: Environmental Study of Surface and Groundwater Related to Soil Degradation
Supervisors:. Dr. Salah El-Dean Bakr El-Amir (late)
Dr. Mohamed Fahmy Mohamed Hussein
Dr. Rushdi Mohamed Mohamed El-Kilani
Department: Soil Sciences
Branch: Soil & Water **Approval:** / /

ABSTRACT

Several thousands of years of basin-irrigation of the alluvial soils of the Nile Delta in Egypt have not resulted in any significant degradation of these precious soil resources in the country. However, few decades of perennial-irrigation practice have introduced notable soil degradation features that cannot be isolated from the prevailing environmental conditions and the newly applied manmade hydrological practices in that irrigated basin. This work has concentrated on the aspects that directly show the link, and intimate relationship, to the lately applied water regime / quality and the increasingly observable soil degradation in a pilot area of the concerned basin. The study area is a part of a southern Damietta river branch meander, in the Nile Delta apex, some 40 km northwest of Cairo, Egypt. Water and soil paste-extract chemical data has shown an intricate association between ion concentrations and compositions of water and soil. In addition, it illustrates how this link may develop on the pathway of soil salinity / sodicity increase.

It has been shown that the recently introduced tile-drainage system may remove significant ionic hazard from the irrigated basin. However, soil salinity and sodicity is continuously building up in the study area that was previously considered as part of the most productive lands in the country. It seems that poor water quality and poor soil-surface management stand mostly for the observed soil structural and soil hydrogeochemical degradation. Groundwater in the study area has shown a high water quality, though it is not used to satisfy any significant part of the present-day local / regional irrigation water needs since total water requirements are satisfied by the use of Nile water transport and distribution through irrigation canals. Re-use of agricultural drainage water has occasionally been proposed by other authors as a water resource to fill the gap of local and regional irrigation water shortages in the alluvial soils of Egypt. However, the data of the present study demonstrates the poor quality of most sampled tile-drainage water checkpoints. Consequently, agricultural drainage water cannot be recommended for any reuse in irrigation without being initially pre-treated on the local / regional scale. On the contrary, groundwater quality is mostly high, and such groundwater is immediately usable to fill out a part of the irrigation duties, in particular at the ends of the irrigation canals, and for the drawdown for the high water table below soil surface. In order to evaluate and follow soil structure deterioration in the pilot area, a modern simple, but sensitive, structure-index parameter has been applied, using three polar and non-polar liquids, and showed the major trend of soil structure decline down to 100cm in 14 clay-textured profiles that can be related to changes in soil hydrogeochemistry.

A detailed lab assessment of the breakthrough curve (BTC) experimental technique has been applied to soil columns, treated with five different input water qualities. The BTC parameters and its interpretation have revealed interesting details about the miscible-displacement and the rapid rise of sodicity in soil material under poor water quality. It has been shown that 1-4 years of application of poor water quality are sufficient for the ESP to exceed significantly the alarming 15 limit. On the contrary, high water quality never gives rise to ESP of 15 in flooded soil material.

Key words: Degradation, Surface and Groundwater, Hydro geochemical, Structure