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5. SUMMARY

The current study was carried out on two salt affected soils of El-Tiena Plain area to study and evaluate the effect of some soil amendments under different salinity levels of leaching water on some physical and chemical properties and also its content of available nutrients.

This study was carried out on two surface soils of Gilbana, El-Tiena Plain, Ismailiya Governorate. Physical and chemical properties and its content of available N, P and K were determined. These investigation included two experiments as follows:

I. The First Experiment:

This experiment was carried out to study the effect of leaching with water salinity levels on physical and chemical properties, and the available N, P and K of the studied soils. Tap water was mixed with sea water at ratios of 1 : 1, 1 : 3, 1 : 7, 1 : 15, 1 : 31 and 1 : 63. The experiments conducted in columns 60 cm height and diameter 8.5 cm which soil height in the column was 40 cm. Each column was leached with the mixture of leaching water until values of EC (dSm^{-1}) become constant. Then, the soils left until complete air dry. Each column was divided into two depths (0 – 20 and 20 – 40 cm). Each depth of the soil was prepared for the determinations the physical, chemical properties and available nutrients.

The obtained results of this experiment could be summarized as follows:

1. The soils bulk density (B.D) were greatly affected by salinity levels of leaching water, where BD decrease with increasing leaching salinity levels.
2. The highest values of total porosity (TP) were found at higher salinity levels of leaching water, while the lowest values were found with leaching by tap water.
3. Increasing the salinity levels of leaching water were associated with the increase of soil hydraulic conductivity (HC) due to the increase of soil porosity.
4. Increasing salinity levels in leaching water increased the water stable aggregates for high diameter and each of aggregation state, aggregation degree and aggregation index.
5. Concerning the effect of leaching water salinity on the chemical properties, results show a little decrease of soil pH, soil E.C (dSm^{-1}) and the content of soluble cation and anions (meq/100 g) with the decrease salinity level of leaching water. This decrease was found in the surface layers which was higher than of subsurface layer for each mixture of leaching water treatment and the highest decrease was found with Na^+ followed by K^+ for soluble cations and for Cl^- followed by HCO_3^- for soluble anions.

6. Cation exchange capacity (C.E.C) and the content of exchangeable cations (meq / 100 g) data show little increase of two soils with the decrease of leaching water salinity levels. These changes were more clear in the surface layer in the two studied soils. Also the values of ESP were decreased with the decrease salinity levels of leaching water.

7. Data also show that the soil content (mg/kg) of available N and K decrease with the increase of salinity level of leaching water, while P increase with the increase of salinity level of leaching water.

II. The Second Experiment:

The aim of this experiment was to study the individual and combined effect of different application rates of gypsum, H_2SO_4 and compost with salinity levels of leaching water. The leaching water mixtures values in this experiment were 1 : 3, 1 : 15 and 1 : 63, tap-sea water ratio. Gypsum was applied at rates of 0, 100 and 200% of gypsum requirement. Sulphoric acid was added at rates of 0, 100 and 200% from sulphoric requirement. On the other hand, compost was used at rates of 0, 3 and 6%. Similar column which used in the first experiment were used in this experiment. The evaluated soil amendments were mixed with the surface 10 cm of column. The columns were leached with the used leaching water until the EC

(dSm^{-1}) values of leaches became constant. Also, each column was divided into two equal depths (0 – 20 and 20 – 40 cm) and each depth were prepared for the determined parameters. The data of this experiment could be summarized as follows:

1. Bulk density decreased with increasing rate of soil amendments and the decrease of bulk density of soil 2 was lower than those of soil 1.
2. Total porosity increased with the increase of application rates of these amendments. Soil amendments can be arranged according to their effect on the increase of soil T.P as follows gypsum > H_2SO_4 > compost.
3. Hydraulic conductivity (HC) increased by increasing rates of added soil amendments. These increases were varied from amendment to another and arranged according to the following order: gypsum > compost > H_2SO_4.
4. Stable aggregates increased for higher diameter compared for lower diameter and also total stable aggregates, aggregation state, aggregation degree and aggregation index were increased with application amendments and the highest values were arranged as follows: compost > H_2SO_4 > gypsum.

- Effect of leaching water salinity levels and different application of soil amendments on the chemical properties of the studied soils could be summarized as follows:

5. Soil pH decreased with the two studied soils and the decrease in the surface layer was higher than those of subsurface one and different soil amendments can be arranged according to their effect on the decrease of soil pH as follows: H_2SO_4 > gypsum > compost.

6. EC (dSm^{-1}) and soluble cations and anions decreased with the increase rate of added amendments. This decrease also was more clear in the surface layer of two soils. Soil amendments can be arranged based on their effect on decrease soil EC as follows: Gypsum > H_2SO_4 > compost. The highest decrease was found with Na^+ followed by K^+ for soluble cations and for Cl^- followed by HCO_3^- for soluble anions.

7. Cation exchange capacity (CEC) and exchangeable cations (meq/100 g soil), data appeared a little decrease associated the application of gypsum and H_2SO_4. On the other side application of compost appeared increase of soil CEC and the content of exchangeable cations as meq / 100 g soil.

8. Also, the values of ESP (%) were clearly decreased and this decrease was more clear with the surface layer compared with subsurface layer. The highest decrease of ESP was found with application of gypsum followed by H_2SO_4 and compost.

9. Available nitrogen (N) was increased with the increase of added amendments rate and the high increase was found with the

surface layer of the studied soils. The amendments according to their effect on the increase of available N takes the following order: compost > gypsum > H_2SO_4. Available P was increased and more higher at high application rates of these amendments and available P in the surface layer was higher than in the subsurface one and soil amendments can be arranged according to their effect on the increase of available P in soil as follows: compost > gypsum > H_2SO_4. Available potassium was increased by application different soil amendments. The increases were varied from amendment to another and can be arranged according to their effect on the increase of the available K as follows: gypsum > H_2SO_4 > compost.