5. SUMMARY AND CONCLUSION

The aim of this investigation was to study the nutrient supplying power of different layers of calcareous soils as influenced by quality of irrigation water and its effect on yield and chemical composition of some forage plants variable in their nature specially root system.

To achieve the purpose of this study, representative soil samples were taken from two profiles representing the calcareous soils of Noubaria Agricultural Station Farm and Abou-Massoud village at profile depths of 0-30, 30-60 and 60-90 cm. Seven Kgs. Portions of each soil layer were packed in 24 pots divided into two groups. The first group was planted with sudangrass (Sorghum vulgare) and the other one was planted with alfalfa (Medicogo sativa) . Each group was then subdivided into four sets (3 pots set -1) to be irrigated with tap water or saline water having a concentration of 1000, 2000 or 4000 ppm as NaCl. The soil moisture content was maintained at the field capacity throughout the whole period of the experiment . Four cuts of each crop were taken after 50, 100, 150 and 200 days from planting and analyzed for N, P and K. In addition to the descriptive physical and chemical analyses of each soil layer , a soil sample from each pot was taken just after removing the plants and chemically analyzed to follow up the changes that might have occurred in some of the soils properties as result of putting them under cultivation and irrigation with saline waters.

The following is a brief summary for the obtained results :-

A) The physical and chemical properties affecting the nutritive supplying power of the different layers of the studies soils :

1- $CaCO_3$ is present mostly in the silt and fine sand fractions which indicates that $CaCO_3$ may play an active role in controlling the nutritive supplying power of different soil layers .

2- Organic matter contents of the investigated soils were generally low and tended to decrease with depth.

3- Values of pH of the different soil layers were slightly alkaline and did not differ widely with depth. This alkaline soil reaction has its undesirable effect on reducing availability of about all the nutritive elements .

4- Soluble salt content of the investigated soils was highest in the surface layers and tended to decrease with depth.

5- Sulphate dominated the anionic composition and tended to decrease with depth in both Noubaria and Abou-Massoud soils . Chloride and bicarbonate which generally did not follow a certain trend with depth in Noubaria but decrease with depth in Abou-Massoud soil.

6- Calcium was frequently the dominant soluble cation followed by Na, Mg and K .

7- Although all layers were of relatively low cation exchange capacity, yet the middle layers showed slightly higher values than the other ones.

8- The highest contents of the nutritive elements were found in the surface layers whereas the lowest contents were achieved in the deepest ones.

B) Changes in soil chemical properties due to cultivation and irrigation with saline water :

1- Salinity of all layers of both the investigated soils increased to different extents, dependent on quantity of water retained and its concentration of soluble salts .

2- Soil content of Na , Cl and SO_4 increased and the increase was more noticeable by increasing salinity of the irrigation water.

3- Values of sodium adsorption ratio (SAR) increased . The increase was more obvious in the soil layers planted with alfalfa than in the ones cultivated with sudangrass.

4- Values of soil pH increased slightly and the increase was more obvious by increasing salinity of the irrigation water.

5- Exchangeable sodium percentages (ESPs) increased with increasing salinity of the irrigation water.

6- Soil contents of available N, P and K decreased with depth. The decrease in N was more pronounced in the soils cultivated with sudangrass than those cultivated with alfalfa.

7- Salinity of the irrigation water exerted a negative effect on soil contents of available N and P. Available K Content took a bell shape as a result of increasing salinity of irrigation water .

C) Effect of salinity of irrigation water and age of plant on plant material yield and N, P and K soil supplying power :

1- Increasing salinity of the irrigation water decreased plant fresh and dry weights (plant material) .

2- The surface soil layers gave the highest plant material yield .

3- Increasing salt stress affected the plant material yield negatively.

4- Nitrogen uptake was highest in the first cut and lowest in the fourth one.

5- The plant grown on the surface layers showed the highest uptake of N.

6- Increasing salinity of irrigation water decreased N uptake by alfalfa and sudangrass.

7- P uptake followed the descending order : 1st cut > average of 2nd and 3rd cut > 4th cut .

8- P uptake decreased significantly with depth of soil layer.

9- Salinity adversely and significantly affected P uptake by alfalfa and sudangrass.

10- Potassium supplying power was affected by level of salinity of the applied water, depth of soil layer and age of plant in a way similar to that of N and P.