SUMMARY AND CONCLUSION

The experimental farm of the Faculty of Agriculture, at Sohag which represented the study case covers an area of approximately 200 feddans. The farm lies in the south eastern direction of Sohag city and El-Kawsar region being a part of the eastern desert plateau.

The farm occupies two almost equal locations. The first location (new farm) is nearby the first industrial region and is cultivated with field crops and fruit trees and irrigated by sprinkler and drip irrigation systems. The second location (old farm) is located near to the second industrial area and is cultivated with field crops, vegetables, fruit trees and floriculture crops. Both locations have received various amounts of Nile alluvium added to the surface in order to improve soil characters.

The present study was carried out in order to characterize certain soil properties related to the fertility status of the experimental farm. Therefore, forty soil profiles, representing both farms of study according to their morphological characteristics, with an average of 5 feddans for each profile. Soil samples were taken from each layer of profiles (133 sample) for analysis. Data obtained could be summarized in the following:-

1-physico - chemical properties:-

1-Soils of the both farms are mostly coarse in texture. Soil texture becomes finer with depth in some profiles.

2-Soil of the studied farms have pH values greater than 7.0, it ranges from 7.13 to 9.49 with an average of 8.33 for the new farm and from 7.09 and 9.78 with an average of 8.63 for the old farm. This indicates that most soil samples of both farms are generally moderately or strongly alkaline.

3-Soils of the new farm showed to be variable being non saline to very strongly saline where it ranged between 0.63 and 56.58 dS/m with an average of 9.37

dS/m. However, soils of the old farm ranged from 0.40 to 7.3 dS/m with an average of 1.44 dS/m (slightly to moderately saline).

4-For both farms soluble cations, are dominated by calcium and magnesium followed by sodium, then potassium where concentration was in general, very low.

5-Soluble anions are dominated by chlorides, followed by bicarbonates then sulphates in soils of old farm, while sulphates preceded bicarbonates in soils of the new farm. Wide variation is noted in both farms.

6-Soils of both farms are highly calcareous, being widely variable. The total carbonates in soils of the new farm ranged between 51.20 and 87.70 % with an average of 70.78% and from 27.90 to 88.20 % with an average of 52.62 % in soils of the old farm.

7-Organic matter content in soils of both farms ranged from 0.12 to 2.90 % with an average of 0.80 % for the new farm, and from 0.18 to 3.20 % with an average of 1.12 % for old farm. Most of the soil samples contained O.M of less than 1% and decreased with depth.

2- Status of some macronutrients in soils:-

1-The total nitrogen content in the studied soils are widely variable where, it ranged from 0.007 to 0.52 % with an average of 0.09 % and from 0.007 to 0.58 % with an average of 0.07 % for the new and old farms, respectively. According to the method of Metson (1961) these soils are characterized as low and very low fertile in N indicating need to apply more N through fertilization. The total nitrogen decreased with depth in all soil profiles of both farms. Correlations differed depending upon the soil properties, being positive in case of organic matter content and negative with sand fraction as well as total carbonates.

2- According to the limits of Cooke (1967) examination of the individual values reveal that most of these soils exhibit moderate to very high values of P (>21

ppm) indicating no need to apply more P through fertilization. High positive significant correlation coefficients were found between Na HCO_3 –extractable –P and the percentage of both clay and silt, while these coefficients were negative between Na HCO_3 –extractable –P and each of ECe values, sand, $CaCO_3$ and O.M content. The correlation between Na HCO_3 –extractable –P and pH values were not significant. This was inconsistent with respect to the old and new farms representing the case study.

3-Water soluble potassium values in the studied soils ranged from 1.12 to 32.09 ppm (mg/kg soil) with an average of 5.87 ppm (mg/kg soil) and from 0.09 to 45.45 ppm (mg/kg soil) with an average of 6.02 ppm (mg/kg soil) in the old and new farms, respectively. Positive correlations were detected between soluble K and each of ECe values, silt, clay, O.M, total K and exchangeable K contents in soils of the old farm. However negative correlations were found between soluble K and sand fraction and these were insignificant between soluble K and both of clay and $CaCO_3$ contents. All of these correlations were non-significant in soils of the new farm.

4-Exchangeable potassium in soils of the old farm shows that the concentration of exchangeable K ranged from 65.82 to 470.19 ppm (mg/kg soil) with an average of 197.28 ppm (mg/kg soil) and from 101.68 to 985.91 ppm (mg/kg soil) with an average of 413.57 ppm (mg/kg soil) in soils of the new farm. According to the data sit by Metson (1961) most of soil samples of the old farm contain low to high levels of extractable K. While, those of the new farm showed very high levels. Positive correlations were found between exchangeable K and each of clay, silt, O.M, ECe, total and soluble K in the old farm, which showed negative correlations with sand fraction and $CaCO_3$ cantents. The exchangeable K in soils of the new farm exhibited non-significant correlations with each of sand, silt, clay, O.M, ECe, $CaCO_3$ contents and soluble K.

5-Total potassium content of the soil samples ranged from 0.02 to 1.57 % with an average of 0.65% and from 0.04 to 1.97 % with an average of 0.95% in the soils of the old and new farms ,respectively. In soil samples of the old farm, positive correlations were found between total K and silt, O.M and exchangeable K contents, which it was negative in the case of sand fraction. All other correlations were non-significant.

3- Status of some micronutrient in soils:-

1-The total Fe content in soils of the new farm ranged from 0.45 to 10.85 % with an average of 4.29 % , and from 0.99 to 12.79 % with an average of 5.77 % in the old farm. Values of total iron tended be higher in the surface layers. Values of DTPA-extractable Fe ranged from 0.60 to 10.21 ppm (mg/kg soil) with an average of 2.92 ppm (mg/kg soil) and from 0.73 to 9.89 ppm (mg/kg soil) with an average of 3.88 ppm (mg/kg soil) in soils of the new and old farms, respectively. According to the limits sit by Vites and Lindsay (1973) 35.71% and 61.90% among total samples collected from both old and new farms, respectively are Fe-deficient, while 64.29% and 38.10% of those samples are Fe-marginal. Soils of the old farm showed a highly significant negative correlation between total iron and sand fraction, while positive significant correlations were obtained between fine fractions (clay and silt) and total Fe content. On the other hand, there was no significant correlation between the different particle size fractions and total Fe in soils of the new farm. Meanwhile, the soil contents of sand were negatively correlated with the soil contents of DTPA-extractable Fe in both farms. This was reversed in the case of DTPA-extractable Fe. Highly significant positive correlations were obtained between O.M and both total and DTPA-extractable Fe for the old farm. The situation was inconsistent in the new one. A highly significant negative correlation between $CaCO_3$ content of the studied soils and DTPA-extractable Fe were

found in both farms. Insignificant correlation coefficients were observed between total Fe and $CaCO_3$ contents in soils of both farms.

2-The total content of Mn in the soil samples of the old farm ranged from 121.50 to 1282.00 ppm (mg/kg soil) with an average of 489.25 ppm (mg/kg soil), while it ranged from 70.30 to 1150.00 ppm (mg/kg soil) with an average of 471.08 ppm (mg/kg soil) in soils of the new farm. Higher levels were found in the surface layer of profiles in both farms. The DTPA-extractable manganese content in all soil samples ranged from 0.46 to 90.60 ppm (mg/kg soil) with an average of 14.25 ppm (mg/kg soil), and from 0.14 to 89.20 ppm (mg/kg soil) with an average of 11.05 ppm (mg/kg soil) in soils of new and old farms, respectively. Results showed that 35.86% and 15.87% of all soil samples taken from the old and new farms, represent Mn-deficiency according to Vites and Lindsay (1973). A positive significant correlation between the percentage of clay and the soil content of DTPA-extractable Mn existed in soils of the new farm. The reverse was true in the case of sand. Meanwhile, no significant correlations were observed between the percentage of other size fractions and either total or DTPA-extractable Mn. The presence of positive significant correlation between the percentage of fine fractions (clay and silt) and the soil content of total Mn cannot be overlooked. On the other hand, a significant negative correlation was found in the case of sand fraction. The organic matter content of the studied soil samples was highly significantly positively correlated with both total and DTPA-extractable Mn in soils of both farms. The correlation coefficients calculated between the soil content of $CaCO_3$ and the levels of total and DTPA-extractable Mn were highly significant negative in soils of the new farm. On the other hand, the total carbonate in soils of the old farm exhibited no significant correlations with either total or DTPA-extractable Mn .

3-The total zinc content in the studied soils ranged from 0.30 to 254.50 ppm (mg/kg soil) with an average of 70.06 ppm (mg/kg soil) and from 28.40 to 298.23 ppm (mg/kg soil) with an average of 73.00 ppm (mg/kg soil) in soils of

the new and old farms, respectively. The content of DTPA-extractable Zn ranged from 0.41 to 3.18 ppm (mg/kg soil) with an average of 1.12 ppm (mg/kg soil) for soils of the new farm and from 0.58 to 9.24 ppm (mg/kg soil) with an average of 1.21 ppm (mg/kg soil) for those of the old farm. According to Viets and Lindsay, 1973 all soil samples collected from both farms are Zn non-deficient. As expected there was a highly significant positive correlation between the soil content of total Zn and the fine fractions (clay and silt). Meanwhile, the sand fraction was highly significant negatively correlated. Similar trends were obtained for the soil content of DTPA-extractable Zn and both clay and silt fractions. Correlation coefficients obtained between the different particle-size fractions were insignificant for both total and DTPA-extractable Zn in soils of the new farm. Levels of the total and DTPA-extractable Zn in soils of both farms were positively correlated with O.M content. The correlation coefficients between total carbonates ($CaCO_3$) and either total or DTPA-extractable Zn were insignificant in soils of the old farm. On the other hand , the situation was reversed in soils of the new farm. Meanwhile a highly significant positive correlation was obtained between total zinc and the level of DTPA-extractable zinc in old farm. However no similar significant correlation was found in soils of the new farm.

4-Values estimated for total copper in soil of the new farm ranged from 1.40 to 143.50 ppm (mg/kg soil) with an average of 69.21 ppm (mg/kg soil) and from 3.50 to 204.90 ppm (mg/kg soil) with an average of 36.21 ppm (mg/kg soil) in soils of the old farm. The estimated concentration of DTPA-extractable Cu was much lower being from 0.38 to 2.65 ppm (mg/kg soil) in soils of the old farm, whereas it was from 0.02 to 7.52 ppm (mg/kg soil) in soils of the new farm. The average values obtained for soil samples of the old farm was much higher than that for soils of the new farm (1.02 ppm (mg/kg soil) compared to 0.87 ppm (mg/kg soil)). According to the criteria of Viets and Lindsay (1973), all studied

soils contain more than 0.2 ppm DTPA-extractable copper indicating no Cu deficiency. No definite trends were detected between the soil contents of both total and DTPA-extractable Cu and the various size fractions. An exception was that of the fine fractions (silt and clay) and DTPA-extractable Cu being significantly positive. A highly significantly positive correlation was obtained between organic matter content and either total or DTPA- extractable Cu in both farms. Non significant correlation was observed between total carbonate and total Cu in soils of both farms. A negative significant was found between total carbonate content and DTPA-extractable Cu in soils of the old farm.