

The title of M.Sc. Thesis is:

“Effect of some soil characteristics on water relations in some soils of Fayoum”

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Abstract:

Sixty soil samples were collected from different location at Fayoum Governorate, and analyzed for their physical and chemical characteristics. On basis of their properties, fourteen samples of them were chosen to study the effect of soil texture and salinity on soil- water characteristics, pore size distribution and soil structure. The chosen soil samples were divided into two groups: **the first** included eight samples representing the main soil texture classes (sandy, sandy loam, sandy clay loam, sandy clay and clayey soils) to study the effect of soil texture on soil water relations, pore size distribution and soil structure, and **the second** group included six clay soil samples approximately similar in their clay content and mainly differ in their level of salinity to study the influence of soil salinity on soil water relations, pore size distribution and soil structure.

The obtained results could be summarized in the following:

1- Effect of soil texture:

Multiple regression analyses were used to describe the partial combined effect of the different soil mechanical fractions (coarse sand%, X_1 ; fine sand%, X_2 ; silt%, X_3 and clay%, X_4) on the values of field capacity% on volume basis (Y_1), wilting percentage% (Y_2), available water% on volume basis (Y_3), useful pores% on volume basis (Y_4), hydraulic conductivity (cm/hr.) (Y_5) and aggregation index (Y_6) the following relations were obtained:

$$Y_1 = 49.82668 - 0.29223 X_1 + 0.05340 X_2 - 0.25596 X_3 + 0.04201 X_4$$

$$Y_2 = 11.42055 - 0.02327 X_1 + 0.18137 X_2 - 0.00535 X_3 + 0.33634 X_4$$

$$Y_3 = 19.73294 - 0.00223 X_1 + 0.13875 X_2 + 0.01612 X_3 - 0.02759 X_4$$

$$Y_4 = 15.58669 - 0.05735 X_1 + 0.01964 X_2 - 0.06081 X_3 - 0.01534 X_4$$

$$Y_5 = -1.17018 + 0.04047 X_1 + 0.04342 X_2 + 0.00943 X_3 + 0.00734 X_4$$

$$Y_6 = 0.55234 - 0.00476 X_1 - 0.00460 X_2 - 0.00318 X_3 + 0.00353 X_4$$

2- Effect of soil salinity:

There are significant positive correlation between the concentration of divalent exchangeable cations in the soil (Ca, Mg) and each of the available water%, useful pores%, hydraulic conductivity (cm/hr.) and aggregation index. On the other hand, significant negative correlation were found with the concentration of monovalent exchangeable cations (Na, K) in soil. Multiple regression showed the following relations between the concentrations of monovalent cations (X_1), divalent cations (X_2) and both of the hydraulic conductivity (Y_1) and aggregation index (Y_2):

$$Y_1 = -0.21411 + 0.00474 X_1 - 0.00110 X_2$$

$$Y_2 = -0.30629 + 0.00966 X_1 - 0.00376 X_2$$