

SUMMARY

Seven profiles were taken from the area of ElQaa Plain, Sinai Peninsula. There were 34 layers identified in those profiles. The profiles were described, and field determination of the rate of water infiltration was conducted. Soil samples were analysed for the following : salinity, soluble cations and anions, texture, clay (c), silt (si), coarse sand (cs), fine sand (fs), CaCO_3 , organic matter (om), cation exchange capacity (CEC), exchangeable sodium percent (ESP), porosity including distribution of pore size. Quickly drainable pores (QDP), $>28.8 \mu\phi$; slowly drainable pores (SDP), $28.8 - 8.62 \mu\phi$; water-holding pores (WHP), $8.62 - 0.19 \mu\phi$; and nonuseful pores (NUP), $<0.19 \mu\phi$ were all determined. Field capacity (FC), and wilting point (WP), were determined and the difference between them (available water "AW") was calculated. Moisture retention curves relating moisture at tensions of 0, 0.1, 0.33, 0.66, 1.00, and 15.00 bars were prepared. Some other properties including pH, and hydraulic conductivity (HC) were also determined.

Effect of soil properties on moisture constants, HC, and infiltration were assessed mainly by carrying out

correlation analysis, relating those properties to the soil water parameters.

FC and WP as well as HC showed close relation with a number of soil properties i.e. fs, cs, si, c, CaCO_3 , om, NUP, and QDP. Values of "r" (correlation coefficient) for each water constant related with each of the above properties, respectively, are as follows :

FC : -0.469^{**} , -0.815^{***} , 0.856^{***} , 0.897^{***} , 0.416^{**} ,
 0.569^{***} , 0.934^{***} , and -0.722^{**} .
 WP : -0.485^{**} , -0.841^{***} , 0.892^{***} , 0.948^{***} , 0.500^{**} ,
 0.608^{***} , 0.969^{***} , and -0.605^{***} .
 HC : ns , 0.841^{***} , -0.814^{***} , -0.845^{***} , -0.481^{**} ,
 -0.412^* , -0.819^{***} , and -0.484^{**} .

Available water (AW) was correlated significantly only with porosity; with r values of 0.889^{***} , 0.535^{**} , and -0.602^{***} relating to WHP, SDP, and QDP respectively.

CaSO_4 only affected HC ($r = -0.443^{**}$). Infiltration rate ranged between 0.47 to 15.20 cm/h and was greater with lighter soils which possess more QDP. Moisture curves were smooth in heavy soils. Moisture contents showed the following ranges :

FC : 6.3 - 48.1% w/w, WP : 4.6 - 40.5% w/w,

AW : 1.8 - 13.6% w/w.

Hydraulic conductivity HC ranged from 0.7 to 11.4 cm/h, and basic infiltration rate ranged from 0.47 to 15.2 cm/h.

The most important factor affecting all of the moisture parameters and the soil-water relationship constants is porosity, particularly pore size distribution. It was the only parameter affecting AW. The indirect effect of constituents like clay on AW was not obtained in the light of the majority of the soils being structureless. The soils were either massive or single grain; the only profile with natural peds was the clay one, with platy or subangular structure.

One profile was clay, another was a sandy clay loam over loamy sand and five were mainly sands to loamy sands.