suitabllity of some land evaluation systems in newly reclaimed areas of egypt

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Sixteen sites representing four newly reclaimed areas were chosen for this study. The studied areas are located in Fayoum, Noubaria, Salhia and Ismailya regions. Four sites from each region were studied and each site was represented by one profile. Each profile was described at the field and was sampled for laboratory analysis.Fayoum samples showed a medium texture; sandy loam to sandy clay loam with total clay contents varying from 22.55 %. However, some soils were slightly gravel to gravelly.The soil bulk density values ranged from 1.13 to 1.68 Mg/m3. Hydraulic conductivity ranged between 3.12 and 12.13 cm/h. Both moisture contents at field capacity, wilting point and available water reached to 13.56-25.94, 5.07-13.72 and 4.49-9.55 %, respectively. Total porosity ranged between 36.60 and 61.13 %The electrical conductivity values for the studied soils of Fayoum varied between 4.52 and 11.68 dS/m i.e., saline to moderately saline soils. Calcium carbonate and gypsum reached to 40.48 and 22.02 %, respectively indicating the occurrence of calcic and gypsum horizons in these soils. The cations order are mainly Ca' > Mg-± > Na' > IC while, the anions are SO4- > C1-> HCO3-. In the relatively high saline samples the cations trend was Na-> Cal > Mg-± >SAR values reached from 1.60 to 11.36, except lowest layer Cky from profile No. 3 more than 13.0, soil reaction is nearly natural range between 7.41 and 7.90. Organic mattercontent was low range from 0.31 to 1.43 %. The CEC with the fine particles profiles 3 and 4 range from 11.65 to 31.54 cmolc/kg.Exchangeable cations the descending order of Ca++ > Mg'. > Na+ > K. Exchangeable sodium percentage is less than 15, i.e., no sodicity, except the lowest layer Cky from profile No. 3.They could be classified as Leptic Haplogypsids (profiles Nos. 1, 2 and 4) and Typic Calcigypsids (profile No. 3).The studied Noubaria soils had a light to medium texture i.e., sandy to clay loam. The values of sand ranged between 43.02 — 84.5 %, whereas the clay contents varied between 7.78 to 30.02 %.The bulk density values ranged between 1.23 and 1.55 Mg/m3 whereas the soil Hydraulic conductivity values ranged between 3.06 and 12.11 cm/h.. The values of moisture contents at field capacity, wilting point and available water were 13.30 —31.50, 5.55 — 13.15 and 7.85 — 18.35 %, respectively. The total porosity were 31.15 to 59.38 %.The salts content varied between 0.85 to 2.85 dS/m which were non-saline to very slightly saline. Total carbonate and gypsum contents reached to 21.6 and 5.82, respectively indicating the occurrence both calcic and gypsic horizons. The cations order are mainly Ca" > Na+ > Mg++ > K+ while, the anionic trend was SO4- > Cl- >= HCO3-.Organic matter content was low range from 0.15 to 1.57 %. The CEC in proportional with the fine particles such as profiles No. 5, 7 and 8, the CEC values range from 13.65 to38.93 cmolc/kg. The distribution of exchangeable cations that they follow Ca++ > Mg' > Na4 > K. ESP is less than 15, i.e., no sodicity conditions.They could be classified as Typic Calcigypsids (profile No. 5) and Typic Haplocalcids (profiles Nos. 6, 7 and 8).The soil texture of the studied Salhia soils was light i.e., sandy to loamy sand. The sand contents reached to 93.79 %. The bulk density values ranged between 1.59 and 1.74 Mg/m3, whereas soil hydraulic conductivity between 6.35 and 13.8 cm/h.The moisture contents at field capacity, wilting point and available water reached to 11.76 — 22.35, 4.85 — 8.41 and 6.91 —13.44 %, respectively. Total porosity were 33.58 — 49.43 %.The electrical conductivity values for these studied soils of Salhia varied between 0.95 to 7.14 dS/m which were non-saline to saline soils. Both contents of carbonates and gypsum were low not exceeding 2.56 %, indicating undevelopment of diagnostic horizons. The cations trend was Na+ >

Ca’ > Mg” > K in salt effected soils, Ca++ > me+ > Na+ > I(± in non saline soils. While, the anionic trend was SO4 > Cl > HCO3- in the non-saline soils. SAR values reached from 1.35 to 3.88, except the surface layer Apk from profile 11 more than 13, it is 24.9.Organic matter content was low with range from 0.07 to 1.0 %. The CEC ranged from 4.6 to 18.1 cmolc/kg. Concerning the distribution of exchangeable cations order are Cat- > Mg’ > Nat > K. ESP is less than 15, i.e., no sodicity conditions.These soils could be classified as Aquic Torriorthents, except profile No. 12 Typic Torripssaments.El-Ismailya studied soils had textured ranged between sandy to sandy loam. The sand content reached to 91.40 % and clay content reached to 19.69 %. The bulk density values varied between 1.19 and 1.72 Mg/m3, whereas soil hydraulic conductivity ranged between 5.51 and 16.62 cm/h. the moisture contents at field capacity, wilting point and available water reached to 10.20 — 24.91, 4.07 — 8.89 and 61.30 — 16.02 %. The total porosity was 31.13 — 58.11 %.The electrical conductivity values for these Ismailya soils varied between 0.82 and 4.5 dS/m, which were non-saline to saline soils. Both calcium carbonates and gypsum reached to 58.56 and 4.88 %, respectively, indicating the occurrence of calcic horizon. Concerning ionic composition, Na+, is usually, the dominant cation, especially in the salt affected soils, horizon Ap profile 14, usually Ca++ > Mg++ > Na+ > K.’. The anionic dominated by SO4 > cr > HCO3-. Organic matter content was very low, it ranged from 0.03 to 0.88 %. The CEC was low, it ranged from 5.50 to 17.7 (course texture). Exchangeable cations order are Ca’ 4 > > Na+ > K. ESP is less than 15, i.e., no sodicity conditions.These soils could be classified as Typic Torriorthents (profile No.13), Typic Torripsamments (profile Nos. 14 and 16) and Typic Haplocalcids (profile No. 15).Using land evaluation method of Sys and Verheye (1978), the studied soils are classified into class Sl, S2, and S3. The subclass are S2sw, S2sw1, S2s1, S2s14, S3sw1, S3s1 and S3s14. The limitation factors are:1- w, profile 9, 10, 1, 12 and 142-s1, for all studied profiles, except of profiles4 and 113-s4, for all profiles representing El-Fayoum soils.According to FAO 1985 ”Land Use Requirement”, ALES software showed a parallel trend for both the predicted and actual production of wheat, except for soils of profile sites 1, 3, 11 and 13 than are exhibited less values of the actual yield. It is quite to noticeable that the suitable classes of the laters were recorded S3 according to the ALES software via N for the actual soil productivity of wheat. These sites represented two areas at (1 and 3), an area at Salhia (10 and 11), another one at Ismailya (13). These sites contributed 31.25 % of the all studied soils.Using the procedure of land evaluation for crop requirements of Sys et al. (1993), revealed a parallel trend for both the predicted and actual production of wheat, except for soils represented by profiles 5, 10 and 13 that are showed less value of actual yield for soil sites 5 and 13 as compared to the predicted one. The reverse was true for the soil site No. 13. It is quite noticeable that the suitable classes of soil sites 5 and 13 were recorder S2 and S3 according to the Sys et al. 1993, via S3 and N for the actual soil productivity of wheat, respectively. On the other hand, for site No. 10 the suitable class to Sys et al. 1993 recorded S3 via S2 for actual production.These sits contributed 18.75 % of the all studied sites Sys et al. 1993 system > FAO 1985, ALES software system > Sys and Verheye 1978. With regression coefficient value of; 0.9522, 0.2638 and - 0.0446, respectively.Combining the three systems together in composited relation yielded the most accurate relation with wheat yield according to the equation:Y = — 1.4511— 0.446 Si + 0.2638 S2 + 0.9522 S3 (Wheat grain yield)With R2 = 0.8341** and R = 0.9133**.