pedochemical studies on soils of some plains in sinai

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The study concern the pedochemical characteristics of soil in El-Tina and EI-Qaa plain in the north western and south western parts ofSinai Peninsula.Twenty two soil profiles were taken to represent the differentgeomorphic units in the areas, and were morphologically described; andtheir physical, chemical and mineralogical properties were measured.1- Physical and chemical properties(I) Soils of EI- Tina plain geomorphic units:a-EI-Tina- plain.These soils have variable texture, sandy to clayey with increaseof clay with depths. Content of CaC03 varies from 0.02 to 6.4 %,organic matter was less than 1.4 %. Soils are neutral to moderatelyalkaline (pH 7.0 to 8.3.) values ofEC of saturation extract =110 to219 dSm-1 (extremely saline). Soluble ions Na+ >Ca++> Mg++>K+ ;CI> 804> HC03-(no cOtl. Gypsum: 0.3 to 9.9%.20Jb- The elevated sand dunesSoil textures mainly sands, with one sandy Ioam; content ofCaC03 = 1.8 and 6.6 % (no specific pattern with depth). Organic matter= 0.05 to 0.20/0. Soils are midly alkaline to moderately alkline (pH 7.6 to8.3); E C = 0.4 to 1.4dSm-1• Soluble ions: Na+ »ca" > Mg++>K+ ~S04-> cr >HC03- in two profiles and cr > S04- > HC03- in the other twoprofiles. Gypsum = 0.13 -- 0.280/0.(2) Soils of El- Qaa plain geomorphic units.a- The wadis.Soil txture varies from sand to silty clay; CaC03 = 6.8 up to 39.2%. The highest CaC03 is generally associated with the limestone parentmaterial. Organic matter content< 0.40/0.soils are midly alkaline(pH 7.6_ 8.0). EC = 0.65 to 32.5 dSm-' soluble ions: Na+ > Ca ++> Mg++ > K+ ;S04- »Cl' >HC03 in two profiles, Cl> S04- >HC03-.in one profile.Gypsum content = 0.080/0to 5.5%.b- Soils of the alluvial fan.These soils have coarser texture ranges from sand to loamy sand;Ca C03 = 1.7 and 10.3%. Organic matter < 0.04%. Soils are midlyalkaline (pH 7.5 to 8.0), Ee = OJ to 0.7 dSm-1. Soluble ionsc-Soil of the coastal plain.These soils have texture class varies from sand to sandy loam .CaC03 = 3.5 to 38.1 0,/0 no pattern with depth. Organic matter< 0.1 % Soils are mildly alkaline (pH 7.5 - 8.0). EC = 3.2 to 33.4 dSm}Gypsum content =0.2 to 0.80/0.2- Cation exchange capacity.Cation exchange capacity (CEC) = 16.5 - 53.2 me/IOOg EI-Tina~ plain, with Mg++being the dominate followed by Ca++.CEC in elevated sand dunes = 2.7 - 6.8 me/IOOg. Ca >Mg++>Na+ >K. In EI-Qaa plain, CEC = 1.5 to 9.8 me/100g; Ca >Na+3- The total amorphous inorganic materialsIn El-Tina plain content = 1.49-3.90/0ranged with the dominance ofsilica (0.9 _2.40/0)followed by iron oxides (0.14-1.2%) and alominaoxides(0.06-1.20/o). In the elevated sand dunes plain contents = 0.36-1.43% ranged with dominant of silica (0.29-1.16°.10)followed by ironoxides (0.04 - 0.25%) and alumina oxides (0.004 - 0.03).In EI-Qaa plain content = 0.45-L51~ with silica> iron oxides>alumina oxides. No specific depthwise distribution high contentsEl-Tina plain may be due to the long time of aqueous transportationprior to sedimantation and the low content in EI-Qaa is reflection ofthe arid conditions and the sandy nature dunes .4-Total of Fe, Mo, Zn,and Cu.Total Fe = 1.5- 74.4 g kg" highest in EI-Tina plain and lowest inEI-Qaa plain. Total Mn = 10 to 1200 mg kg" g highest in EI-Tina;lowest in El-Qaa. Cu = 2.0 -89.0 mg kg-l, highest in EI-Tina, lowestin EI-Qaa. Total Zn = 5.0to 85.3 mg kg", highest in El-Tina plain,, lowest in El-Qaa plain.The vertical distribution of trace elements is discussed in light ofthe statistical parameters of weighted mean "W", trend "T" andspecific range "R".5-Soil mineralogy.5.1 Mineralogy of the sand fraction.Light minerals are almost entirely of Quartiz (> 92.49 %),associated minerals are feldspars of which orthclase and plagioclase areprincipal members while microcline is the least abundant.Heavy minerals are dominated by opaques; the non-apques aredominate by proxenes,

amphiboles and epidotes. Zircon, grant, rutileand tourmaline are in moderate amounts, the others are less orabsent.Uniformity of soil parent materialsA test of uniformity and development of soil profiles is conducted bybased on evaluating the frequency distribution of resistant mineralsand weathering ratios, soils are heterogeneous (either due to theirmulti-origin or to the subsequent variations during theirsedImentation) being young pedologically.clay mineralogy.Mineralogical identification of 19 clay samples using x-raydiffraction showed smectite (montmorillonite) as the predominantminerals followed by Kaolinite then interstratified minerals, hydrousmica, vermiculite and chlorite. Accessory minerals are mostly quartizfollowed by feldspars, with calcite and dolomite in traces.<Mineralogyof clay sugg.ests the inheritance of clay minerals from parentmaterials, and variation of the clay minerals assemblages with depthreflects the multi-origin of the soils.6-Surface area of the clay fraction.Surface area = 96 _ 508 m2 I gm., highest in EI-Tina plain., lowestin the elevated sand dunes with values being as follow :El-Tina plain> EI-Qaa plain> elevated sand dunes.7- Cation exchange capacity of the clay fractionValues = 18.7 _ 52.2 me IIOOg., highest in EI-Tina plain, lowestin the elevated sand dunes; since smectite was greater the former thanthe latter geomorphic unite than the soil samples of elevated sanddunes and EI-Qaa plain.8-soil Taxonomy.Aridisols and Entisols.1-Aridisols1- Typic Aquisalids2- Gypsic Aquisalds3- Typic HaplosaUds4- Gypsic Haplosalids5- Typic Haplocakids11- entisols1- Typic Torri psamments.2- Typic Torri orthents9. Land evaluation(82) Good soils in part of the elevated sand dunes(El-Tina) andpart of the coastal plain (El-Qaa)(83) Fair soils in El-Tina plain the elevated sand dunes, wadis(EI-Qaa) and alluvial fan(N) Non agricultural soils, in part of the elevated sand dunes (EITina)