Pedochemical studies on soils of some depressions in the weastern desert

Abd EI-Rahman Haasaan EI-Hamdl

The studied area lies between 24° south to 26° north, Latitudes and 30027= west to 300 47= east longititudes.This area including soils of Kharga, Genah, Bulaq and Baris.Oases.The aim of the current investigation is to study thepedochemical characteristics of Kharga Oases soils, and findout the better land using of these soils.To get more infOl:mation on such area,twelve 5011profiles were selected from the prevalent two geomorphicunits namely: peneplain and pediplain.The soil profiles were morphologically described andsubjected to the physical, chemical and mineralogicalanalysis.The obtained results could be summarized as follows:1. The soils of El-Kharga depression can be classifiedaccording to the geomorphic unit into pediplain,peneplain and sand dunes. The frist unit has a rolling165land form with soil components of El Aguz soils andinclusion Ain El Gazal and Qasr Zaiyan soils. Thesecond unit has been divided into three types of landforms; plat area which includes El Kharga soils ,ElGazair and Baris soils as inclusion, undulating areawhich include El Kharga,El Gazair and Baris soils whileAin El Gazal and Ain El Siwa soils as inclusion, androlling area which two main soils, El Kharga and QasrZaiyan with El Gazalr and Baris as inclusion soils.2. Soil texture ranges widly from one profile toanother, it ranges from sand to clay. The soils ofprofiles 7,9 and 11 are of coarse texture (sand toloamy sand), while profile 6 is clay in texture. Soilsof profiles 2,3,8,10 and 12 are of medium texture class(sandy loam and sandy clay loam),and 1,4 and 5 aremedium over fine texture class.3. Sorting values indicate that the sediments are poorlysorted, moderately to moderately well sorted and wellsorted sediments, suggesting that transportation anddeposition of par enb material either take place bywater action or fOl:med by wind with little action and /or formed under bo1:h water and wind act ion.Skewness values J.ndlcate that the studied soils areIGGcommonly Positively skewed.Kurtosis values are usually more than 0.59 C very platykurtlc, Mesokurtlc, Leptokurtic and vAry Leptokurtlc)indicating that the sediments have coarse mode withless fine mode.Appli~g the discirrninant functions ofreveals that the sedim~nts forming theSahu (1964)investigatingsoils are mostly deposited under aqueous environments.4. The obtained results of soil physical andcharactreristics of the area under study, i.e, fieldcapacity, wilting pointclose relationship withcontent, through theirformation.and available waterclay and solubledirect influenceshow asaltson the5. Soil salinity differs appreciably from one proflles toanother or throughout the profile layers. Ec rangedbetween 0.6 and 104.9 rn.mhos/cm.,profiles 4,7,8,9,10and 11 are non-saline throughout the whole profilelayers,profiles 1,5 and 6 are moderately saline.Profiles 2,3 and 12 are extermely saline throughout thedifferent layers.6. Solubleand M9+++cations are dominated by Na followed bywhile K+ is the least abundant exceptca++forprofiles 5,8Na.+ Solublest-+ IIand 11 where Ca and / or Mg exceedsanions are generally follow the order> HC03 •7. Soil reaction (PH) ranged between 7.3 and 8.6 indicatedthat the studied soils are slightly to moderatelyalkaline.8. Total carbonate content varies widely from one profileto another. Its ranges from 0.86 to 28.87 t·, thisindicates non calcarous to highly calcarous nature ofsoils. This is mainly due to the difference of soilrelief,so11 sediment types and their environmentalcondition of sedimentation.9. Gypsum content are generally low,it ranges from 0.01 to3.39%, whereas profile 3 having the highest contenty.10. Organic matter content is generally very low in allprofile layers Except for the surface layers of thecultivated soils ,owing to the prevailing aridity ofthe region and its scanty vegetation.11. Cation exchange c:apacity ranges between 3.87

and 49.11eq/IOO g soils. The highest values are found in thefine texture soils, while the lowest values are foundin the croase texture soils.With regard to the exchangeable cations, CaJ+ is showthe predominate ++ + followed by Mg and Na ,while theexchangeable K + represents the lowest one.12. X-ray diffraction analysis indicates that Kaolinite isthe predominant clay minerals in the coarse clayfraction and the total clay fraction which found in thesoils of EI-Kharga Oasis specially in the northernparts, followed by sepiolite,montmorillonite andvermiculite with few accesory minerals (quartz andfeldspars.).Montmorillonite and vermiculite are the main clayminerals in the fine clay fraction and total clayfraction which are presented in the soils of Baris,Bolaq and Genah Oase~ in the midle and southern partsof the depression, followed by sepiolite,palygorskite, interstratified minerals, hydrous mica,quartz and feldspare.13. Amorphous inorganic materials content are rangedbetween 1.72 and 4.44 %. Broadly iron is the mostabundant, followed by silica and alumina. The molar169ratio: rangs widly between 0.42 and 10.86 .14. The coefficient of linear extensibility ”COLE,” showshigh values were observed for montmorillonltlc soilswith high clay content.15. Based on the soil morphological, physical, chemical andmineralogical properties,’ the 50115 were classlf iedaccording to ”soil taxonomy (1975), indicated that mostof the studied soils are related to the order”Entlsols, suborder Otthents and psamments.On the family level. six families are distinguished.a. Typic torriorthents,. ~ over fine loamy, mixed,hyperthermic 15 recognized in the soils of profiles 5and 12.b. Vertic torr iorthentE~, clayey, mixed hyperthermic isfound in the soils of profile 6.c. Typic torriorthents, fine loamy over ~, mixed,hyperthermic is found in the salls of profile 2 .d. Typic torriortbents, sandy, mixed, hyperthermic ispresent In the profiles of 7 and 9 .170e. Typic torriorthents, fine loamy, mixed, hyperthermic isfound in the soils of profiles 1,3,4,8 and 10.f. Typic, torripsamnents, mixed, hyperthermic is found in thesoils of profiles 11.16. land capability classification of El-Kharga soils fromthe agricultural point of view, soil productivity ofthis area has been classified according to ”USDA”system into four classes:a. Class II, soils of peneplain with an area of about321524 feddan, can be cultivated with most of fieldcrops, orchards, and range. It needs little soilconservation.b. Class III soil of peneplain with an area of about386511 feddan, can be cultivated with some field crop,fruit trees and pasture. It needs improving of thewater holding capacity, fertility, drainage of theheavy soils and stabilization of moving sand dunetoward it.c. Class VI Soils of peneplain with an area of about 21310feddans, it is unsuitable to the common cultivation andmore suitable for pasture with leaching salts axcessfrom the soils and protect the soils from the creepingof sand dunes and wind erosion.d. Class VII Soils233690 feddans.purposes.of pediplain with an area of aboutIt is not suitable for any agriculture