Studies on the nature of interference between the alluvial and desert soils on the eastern border of nile delta

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the preant Work &1maat, evaluating the nature ofinterference between tbe deltaic sediment. and the desertsoils of the eastern border of the Nile Delta. To·tollowthe possible variations 10 such area, t~elve protileswere selected alOOI three lines traversing the studiedarea in easte'.rn and north easterl1 di.rections. The1 st. .~traverse extends t1"OllDikernls eastwards to El-Tina "a.adil-Tina plain. The •• cOl1dtraver •• ext.enda trom Z&18z1gnorth eastllards to Bl-8alh1a and West Ka.ntara. Also, the3 -rd-. traver.. extends from Toukheastwards to Belbe1st lad1 ll-Tum.il,at and ends at Abu SWlr •.The studied profiles were thoroughly examined ,morpbologlcal11~ described, and '+6 samples represent1n.gthe var1at1Olls throUCholllt their entire depths ~8re collected.the •• 8amples were subjected to pby'.lcal, chemical~d mineraloglcal investigations. fbe obtained resultscould be sWllD&rized as tollows t1. M~chan1cal composition. reveals that the protiles ortho 1 !!. traverse line are clay-textured. Those or the? 2~. traverse Une are 108117 sa.D.d to s11~ clay (1nzagaz11) a.nd change 'to aaad7 tex'bu'e aaatvards, exceptthe layers or profUe 6 or Kl-8alh1a who•• texture 1sclay- The 3 -rd-. traverse 11ne includes the clay protile at Toukh changing to sandy-textured protiles, except protile11 or EI-TUmeilat depression which displays apparenttexture dlscont1nuit,v.2. Total carbonate content attains its~ highest value atDikernls, where 1t ranges trom 2.,8 to 10.32%, while theother protiles, regardless ot their localities, shoWlowcontents ot total carbonate, ranging from traces to ~.67~.It shows no specific pattern that could be used tor 80ild1tterentlatlo.n.3. Organic matter co.o.tent ls generally ve'l'7 low. It ranee.troaa aa low aa 0.01 to 1.81$ due to the prevailing arid1 t1which contribute. eftectivel, to its rate ot decompo8itlOll,thus dalni.hes its conten'" in the 80118 ot the studiedarea.It. So11 reaction (pH) 11. quite variable along the stud1edtraverse linea. Though He,ll rea~tlo.n 18 slightl)" to mildlyalkaline in most prof11(s, yet protile 2 (El-Tina) and 3eEl-'lina plain) are nellcral to slightly acid. This ",asexplained OA the preaj,t.e that these latter solls aresaline-alkali, cl1splarLng some a:tages or deterioration.In addition, the preu41C8 ot gypsUill either in the torm otcrystauaria or 8Ab1(.rite .a7 attect. their so11 reaction5. So1l sal1n1't7 al'(,WS ita highest level e152-25Ommhos/em.)at El.~1na and El-~1na plain protiles, whereas the lo~estlevel 1s characterizing the sandy soils at Belbels, WestEI_Kantara and the stratif'ledprof'11e ot Wadi El·TUIlel1c1t.With respect to the lateral pattern ot s811n1 ty along th~studied traverse lines, data indicate that salinity incrt'eases eastward along tbe 1 -s-t. traverse. Along the 2 n-d~.traverse, however, soil salinity decreases until reaehin!its lo~est level at West El-Kantara• SolI sa11n11y alongthe 3 -r-d. traverse 11ne, .shOWls a alight decrease on pBss •• ing trom Toukh to Belbe1s and Wadi EI-Tumellat, tollo~edby a relative increase at Abu Swire Topographical variat-10ns encoWlUred throughout the studied area 1s shown toplay an 1mport~t role in 8011 sBllnization.6. Exchanae charac .• :r1stiC8 indicate that the .value ot~ C.E.C. ranges tram 3.2 to ;7.0 me/lOOg depending on &011texture. Exchangeable ca dominated the exchangeablecations or the Nile alluvial salls and most ot the investigatedprotiles, while ~ dominated those of El-T1n8 andEl-tina plain. Exchangeable cations follow the patterns,Kg> Na> Ca> K tor the tormer and latter s011s, respectively.At Abu Swir, however, Ha predolJl1nate,ex~hangeablecat~.on followed bY'Ca, Me &Ad K.7. The.~ntent oramorpbous inorganic materials variesconsiderably trom one protile to another.

Generally,s111ca1s the most abwu1ant,tollowed by iron,While al.umjna 1s theleast. Along the 1 -s-t. traverse line, amorphous silica and iron are quite high ,at Dikernis ~d decrease on the'border tringe. Along the 2-n-d. and 3 r-d-. traverses, amorphousiron tollows a trend characterized by.continualdecrease on passing eastwards. Other amorphous materials,however, have no specific trend.&!gh~__!!n!!!!! t These minerals constitute more than89.6% of the sand minerals. They are dominated by quartzwhich torms more than 97% or the light mineralh Theother associated minerals are related to feldspars whichare dlstinguiaped into orthoclase,plag1oclase and microcllne.The predominance ot orthoclase ~ong this groupis remarkable. Computation of the weighted mean (profilemean) indicates that orthoclase increases progress1vlyeastward along the 1 -s-t. traverse, while it d08S not tollow any trend with respect to other traverses. Thepresence ot t.ldsp8rs leads to the suggestion that thestUdied soils are young trom the pedological point ofview.~~!y_~!g!!!!!Th!e content and distribution of thesemLnerals vary considerably from one protile to aootherand even in the subsequent layers or the same pro tile •Weighted meSA or opaqu.es along the 1 st. traverseindicates a tendency of slight increase on passing fromthe n.lta to the eastern tringe. Along the 2!!g. and 3 !2·traverses, opaques tend to increase abruptly on movingtoward the eastern border. Augite 1s the most representativeof pyroxene" it constitutes more than 90% ot suchminerals. Its protile mean indicates an 1nc,;re8se eastwardalong the 1 ,~. traverse, while it decreases north-eastward$longthe 2.!l4. and 3 Eg. traverses. Hypersthene and.d10pside are absent in ~he deltaic sediments ot Dikern!s,zagazlg and 'roukh, 'While 1t appears in those ot the easterntringe. Hornblende, which 18 tb, most predominantamphibole, shows a general decreasing tendenC7 on pas.ing·from the Delta eastward. or north-eastwards, Glaucophane·shoWI a tendenc1ot decrea.e on passing e8stli8rd or northea8tw~rd along the 1 ~. and 3 ~. traverse 11nes, ~hlle'1t 1l1creases along the 2~. traverse. Epidote group 1srepresented by epidote, z01a1te and cl1nozois1 te. Weightedmean or epidote shows a distinct pattern of decrease onpassing along the 2 D4. traverse trom zagazlg, while anopposite tr-od i8 maintained along the 3 £9. traverse.The 1!!. traverse, however, displays a rluctu~tlng trendWith resg8ct' to that mineral. Prof118 !Deans tor zircon ischar.ct&rized by an increase in that mlneral,on passingtrom the Delta eastwards along the studied three traverses.Witl11.o. the studied travers.a, rutile is absent in somepretl1 •• er lay&ra while displays an irrigular distributionin the others. Tou~allne distribution reveals no specificpattern pertaining to locality nor to soil depth.Tne latter three minerals indicate an apparentdiscontinuity ot the studied profiles, even those repra'8Atingthe deltaic sediments. This is explained on basis otthe v~iation. in multi-depositional regime or the deltaicsediments and/or tne multi-origin or sediments in the easternborder.computation or weathering ratios. indicates thatWr1and figure index are the most suitable ratios. Wr1reveals that the delt_ic sediments display similar valueswhich are q,uite different from. those consti tutlng the easternborder ot the Nile Delta. This 1s also evident fromthe figure index, however it sho~s some discrepancy Withinthe deltaic sediments.~!2!!!2'l_2!_g!!I_~£!g~!22~The data sbows that lnter$tratifled minerals and/or mont-!porillonl te dominate the 1~.Layminerals suite or the stUdiedclars, irrespective of lo:~ation. Other associated minerals, -however. var.y with locali;y, are commonly identified ashydrous mica, kandi tet virmlcull te and chlorite.S£~!!£!T!h!e c18) fractions of soil ~rorl1es locatedalong this traverse are dominated by Interstratlf1ed minerals.~ectlte'montmor1l1onlte} dominates the clay trac~tion of Dikernia, while it only dom1nates ia some layersof protiles locatedeastw8rds along that traverse. Hydrousmica is present as a second predominant clay mineral.Kandlt8(kaollnite) is a180 detected in moderate to rewquantities. Vermicul1te and chlor1te are commonly presentin traceable amounts.This identical pattern of clay mtnerals SUite,may 10 tact suggest a unique origin or parent material,mainly the deltaic deposits. The minute variation, withinthe profiles are attributed mainly to the depositionalregime a~ well 8S the local environments ot each profile.-2--n-d-.---t-r-a-v-e-rs..e_r--mineralogical data indicate a markedchange on passing eastward trom El-Zagaz1g. In tact,thedominant minerals ot the deltaic sediments are changeableas in El-Salhi8t where smectite(montmorillon1te) 1s shownto be the dominant. The differences in clay mineralsassemblage are a true reflection of the multi-origin otsediments in El-Salhia as well as the multI-depositionalregimes prevailed in the area during soils formation.J_~g~_!!!~!!!!Th!e clay fractions of soil profiles locatedalong this traverse are characterized by the dominance

ofinterstratif1ed minerals + smectlte(montnorillon1te) and1s somewhat disturbed on passing north east~ards to WadiEI-Tumellat and ~bu Swir. The mineralogy of clay in thelatter sediments is dominated by interstr8tltled mineralstollo~ed by smectite(monbnorillonlte),l.e., deltaic sndprobably lacustrine and aeolian deposits.Noteworthy to mention that the multi-origin otsediments 1n the eastern-fringe and/or the multi-depositionalregime have had their influence on the accessoryminerals assemblage, as all of them, except quartz, d1splaydiscontinuity throughout the entire depth of thestudied profiles.