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PEDOLOGICAL STUDIES ON THE SOILS AT NORTH OF ABU SIMPLE-ASWAN.

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ABSTRACT

The current investigation aims to study the morphological, physical, chemical and mineralogical characteristics, in addition to recognize the origin and uniformity of materials for some soils of Tushka area. Classification and quantitative land evaluation for these soils are also carried out. Moreover, the suitability of these soils for growing creation major crops was achieved. This work could present important information about the potential land resources for proper sustainable agriculture in this area. The four of the studied area is between 184 to 190 m above sea level. The soils have almost flat, nearly level to gently sloping topography. They are moderately deep to deep with well drainage status. They have mainly sandy texture with common fine to coarse gravels and/or fragments. The main structure is weak fine granular to medium sub angular blocky. The consistence is soft to hard when dry and friable when moist. The main hue notation of the soils has reddish color mainly between 2.5YR to 7.5YR. The soils are non saline having alkaline reaction. Total carbonate content (CaCO3) are mostly low having narrow ranges in profiles layers. Organic matter (OM) content is low, decrease generally with depth. The cation exchange capacity (CEC) is mainly correlated with the fine fractions and

organic matter contents The morphological rating scale (RHD and RPD) indicates a slight distinctness between horizons mainly attributed to the depositional pattern and /or regimes of soil materials more than development. Statistical grain size parameters namely, graphic standard deviation (sorting), skewness and kurtosis were calculated to indicate the origion and uniformity of soil materials. This pattern indicates that the most of studied soil materials are physically

weathered, transported and deposited under a combined effect of both water and wind action. The scanty values of weathering ratios indicate and confirm the condition of weak weathering sequence and weak development of studied area. Clay mineral assemblage of the studied soils is dominated with kaolinite and illite where smectites are found in few amounts. The studied soils haven't any diagnostic horizons and therefore, they are classified under Entisols order up to family level according to Soil Survey Staff (2006). According to the land capability evaluation, the soils are categorized into grades from II to V. Land suitability evaluation for growing major sixteen field, vegetable and fruit crops was achieved for the soils having grades from II to IV.

INTRODUCTION

Tushka project is one from the important national projects of 21 century in Egypt. The aim of the project is to go out from the Nile valley, and to set up new agro-industrial activities centers in the south part of Western Desert. Shata,(1962). Indicated that, the general topography of the studied area Vicinity to Nasser Lakes is flat to undulating, with low hills and shallow depressions. The elevation data reveal that the studied sites are flat surface, ranging in elevation between 177.8 to 187.5 meters ASL. It is well known that sediments transported by wind and weathered in situ and usually poorly sorted (Inman, 1952). Aly (2005), found that the soils of some Tushka areas have very low content of organic matter and not exceeding 0.97%. Also found that in heavy minerals, opaque minerals are

the most common minerals followed by stable ones (ziron, rutile and tourmaline), pyroxenes and amphiboles, while the rest of minerals are detected in less pronounced amounts . It is noticed that the dominancy of the resistant minerals indicate that these soils are mainly derived from sedimentary rock and found that the smectites are the dominant clay minerals followed by kaolinite and vermiculite the identified accessory minerals are mainly domminted by quartz flowed by dolomite and gypsum, while feldspars and calcitc are detected in trace amounts and found that soil evaluation of some the studied area of Tushka appears that all the soils are suitable for irrigation (except some soils of pediplain of sandstone), and placed in S2 and S3 classes. Yousif (2006), stated that the soils of the studied area in Tushka are

classified as Aridsols, (Typic Haplosalids and Typic Haplocalcids) and Entisols (Typic Torriorthents). El-Sayed(2001), applied the capability on Tushka land and recorded them between grades IIand VI.

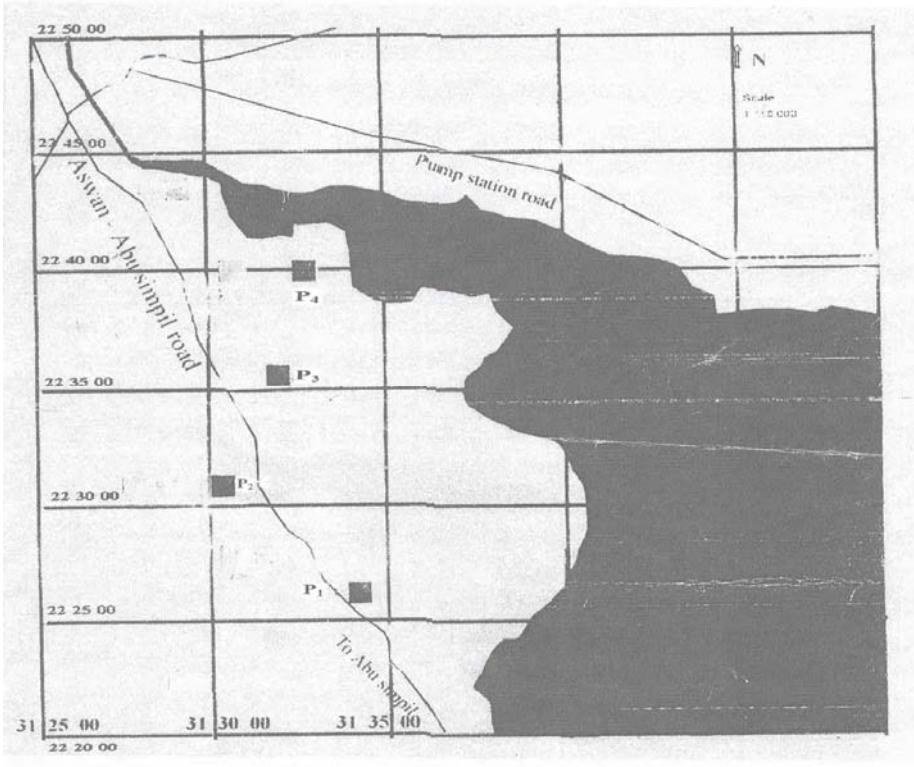
MATERIALS AND METHODS

Four soil profiles were selected to representing the soils of southern part in the Tushka. The general map of Tushka and location of studied profiles are shown in Map (1). The studied soil profiles were described according to the Guidelines of FAO Table (2) (1990). Samples of representative soil profiles were collected according to the vertical morphological variations. The soil samples were air dried, separately crushed and directly sieved to get the fine earth fractions (< 2 mm). These fine earth fractions were used for different physical and chemical analysis. Results were calculated based on oven dry matter (at 105 C^o).The important morphological properties such as soil color, texture, structure, consistence and the boundary between horizons were used for evaluating the pedological development according to Bilzi and Ciolkosz (1977). Particle-fractionation was achieved after the dispersion of soil particles according to Arnold (1986) and data was presented as textural classes following FAO (1990). Organic matter contents (OM) were determined using the wet oxidation procedure method described by Nelson and Sommers (Page et al, 1982). Total carbonate contents were measured using the Collin's calcimeter and calculated as $CaCO_3$ (Page et al, 1982). Cation exchange capacity (CEC) and exchangeable cations were determined according to the procedures described in Page et al., (1982) and the exchangeable sodium percentage (ESP) was calculated from the obtained results. The other chemical analyses were performed according to Page et al., (1982).

Fractionation of non-clay portion (sand) was carried out using a set of standard sieves. Size fraction of the non-fine portion were obtained and presented as plotted cumulative percentage curves against phi-diameter in semi-logarithmic form . Seven percentage Ø5, Ø16, Ø25, Ø50, Ø75, Ø84 and Ø95 were obtained form the cumulative curves of sand fractions.

Statistical grain size parameter namely, graphic standard deviation (Sorting, Skewness and Kurtosis) were calculated according

to Folk and Ward (1957).Sand fraction (63-125mm), which is most suitable for microscopical examination, was used for studying light and heavy minerals. Separation of the light and heavy minerals was carried out using the procedure described by Brewer (1964) after essential pretreatment (Jackson, 1968). Systematic identification of minerals was done using polarized microscope according to Milner,(1962). The relative amounts (percentage) of different clay minerals were estimated semi-quantitatively through measuring the area under peaks as outlined by Klute, A . (1986). The studied soils were classified up to family level according to the system of Soil Survey Staff,(2006). The land capability classification was achieved following the system performed by Storie (1964) and Sys et. al., (1991). Moreover, a suitability index for cultivation of 16 field, vegetable and fruit crops in studied soils was obtained suitability system of Syset.al.,(1993).



Map (1): Location of the studied soil.

RESULTS AND DISCUSSION

Soil morphology and morphological rating scale:

The morphological features of the studied soils (Table, 1) showed that the elevation of studied area is varied between 184 and 193 m ASL from the south to the north. The relief of these soils is almost flat with undulating surrounding land form and gentle sloping. In situ examination of the most studied soils shows that all profiles are deep and characterized as freely well drained. The main hue notation of the studied soil color is around reddish yellow having mostly 2.5YR to 7.5YR.

Table(1): Morphological description of the studied soil profiles in Tushka.

Locati-on	profile	Depth cm	Color		Texture	Structure	Consistence		Boundary	Elevation mASL	Drainage	Depth
			Dry	Moist			Dry	Moist				
15km north of Abu-Simple	1	0-20	5YR 6/4	4/4	l.sand	1vfgr	Soft	v friable	Gradual s	+ 184	Well drained	Very deep
		20-45	5YR 5/5	4/4	l.sand	1fgr	Soft	v friable	Gradual s			
		45-75	2.5Y R6/4	4/4	l Sg l.sand	1fsbk	Soft	v friable	Gradual s			
		75-120	2.5Y R5/4	4/2	l.sand	1msbk	Hard	friable				
25km north of Abu-Simple	2	0-20	7.5Y R7/5	4/4	Sg l.sand	1fgr	Soft	v friable	diffuse	+186		
		20-50	5YR 6/5	4/4	Sg l.sand	1fsbk	S hard	friable	diffuse			
		50-80	5YR 7/5	5/4	Sg l.sand	2msbk	S hard	friable	Gradual s			
		80-120	5YR 7/5	5/4	Sg l.sand	2msbk	S hard	friable				
35km north of Abu-Simple	3	0-10	7.5Y R6/ 5	5/4	G.sand	1fsbk	Hard	friable	clear	+189		
		10-30	7.5Y R7/ 6	4/6	G.sand	1fsbk	V hard	firm	clear			
		30-45	5YR 6/4	4/4	vg.sand	1msbk	Ex hard	v firm	clear			
		45-60	10Y R 6/6	5/6	G.sand	1msbk	Ex hard	v firm				
45km north of Abu Simple	4	0-25	7.5Y R6/ 6	5/6	Sg s.sand	1mgr	Soft	v friable	Gradual s	+190		
		25-55	5YR 5/ 6	4/6	Sg s.sand	1fsbk	S hard	friable	diffuse			
		55-90	5YR 5/ 6	4/6	Sg s.sand	1fsbk	Hard	friable	diffuse			
		90-130	5YR 5/ 6	4/6	Sg s.sand	1msbk	Hard	friable				

Abbreviations: Texture : l=loamy,sg=slightly gravely, g=gravely, Structure: 1=weak, 2=moderate, v=very,f=fine, =medium,gr=granular,sbk=subangularblocky, Consistence :s=slightly, v=very ex=extremely,Boundary: s=smooth.

According to Bilzi and Ciolkosz (1977), the morphological rating scale can be used to compare adjacent horizons to give a comparison of the relative distinctness of horizons (RHD). Also, it can be used to compare horizons in the solum to the C horizon in order to give a relative profile development (RPD)valuation .The RHD for the studied soil profiles are presented in Table (2) .The morphological rating scale (RHD and RPD), (Table,2) of the studied soils have relatively moderate values indicating a slight distinctness between horizons and weak profile

Table(2): Morphological description of the studied soil profiles in Tushka.

location	profile	Transition	Texture	Structure	Color		Consistence		Boundary	RHD
					Dry	Moist	Dry	Moist		
15km north of Abu Simple	1	1st/2nd	0	1	2	0	0	0	1	4
		2nd/3rd	0	1	3	0	0	0	1	5
		3 rd/4 th	0	1	1	2	1	1	1	7
25km north of Abu Simple	2	1st/2nd	0	2	2	1	1	1	0	7
		2nd/3rd	0	1	1	1	0	0	0	3
		3 rd/4 th	0	0	0	0	0	0	1	1
35km north of Abu Simple	3	1st/2nd	0	0	2	3	1	1	2	9
		2nd/3rd	0	1	4	3	1	1	2	12
		3 rd/4 th	1	0	4	5	0	0	2	12
45km north of Abu Simple	4	1st/2nd	1	1	2	2	1	1	1	9
		2nd/3rd	0	0	0	0	1	0	0	1
		3 rd/4 th	0	1	0	0	0	0	0	1
										RPD
15km north of Abu Simple	1	1 st/last	0	2	2	3	1	1	1	10
		2 nd/last	0	2	2	3	1	1	1	10
		3 rd/last	0	1	1	2	1	1	1	7
25km north of Abu Simple	2	1 st/last	0	3	2	2	1	1	0	9
		2 nd/last	0	1	2	1	0	0	0	4
		3 rd/last	0	0	2	2	0	0	1	5
35km north of Abu Simple	3	1 st/last	1	1	3	3	2	2	2	14
		2 nd/last	1	1	2	2	1	1	2	10
		3 rd/last	1	0	4	5	0	0	2	12
45km north of Abu Simple	4	1 st/last	1	1	2	2	2	1	1	10
		2 nd/last	0	1	0	0	١	0	0	2
		3 rd/last	0	1	0	0	0	0	0	1

development.The relatively high values in surface and/or sub-surface layers are mostly corresponded with color and could be mainly attributed to the stratification and depositional pattern of soil materials more than development.

Physical and chemical properties:

The analytical data of the studied soils (Table 3) show that these soils have mainly slightly gravelly and/or gravelly sandy to sandy loam texture. They are no saline as indicated by their EC values which ranged between 0.18 to 1.44 dS/m calculated as a

Table (3): Some physical and chemical properties of the studied soil profiles.

location	profile	Depth Cm	% Gravels	Particle size distribution			Texture	PH 1:2.5	EC ds\m	CEC meq\ 100g	ESP %	$CaCO_3$ %	O.M %	% Gyps-um
				Sand %	Silt %	Clay %								
15km north of Abu Simple	1	0-20	1.83	79.2	13.10	7.70	LS	8.85	0.63	7.96	42.59	2.45	1.51	0.41
		20-45	2.05	79.9	11.50	8.60	LS	9.22	0.51	9.02	49.22	3.09	1.43	0.15
		45-75	7.63	77.3	14.45	8.25	LS	9.30	0.42	8.31	49.70	1.82	1.15	0.10
		75-120	0.96	84.45	9.85	5.70	LS	9.43	0.30	4.43	31.63	0.42	0.80	0.08
		WPM	2.59	81.56	11.48	6.69	LS	-	0.40	6.44	39.74	1.43	1.05	0.14
25km north of Abu Simple	2	0-20	12.42	78.97	14.15	6.90	LS	9.20	1.08	10.42	37.24	1.64	0.84	0.09
		20-50	3.21	79.05	13.50	7.45	LS	8.84	0.61	11.0	37.91	2.00	0.76	0.31
		50-80	3.47	77.6	14.70	7.70	LS	8.70	1.80	8.30	25.06	2.82	0.68	0.54
		80-120	7.76	81.0	12.90	6.10	LS	8.49	1.75	7.14	25.35	6.00	0.63	0.50
		WPM	6.67	79.71	13.55	6.80	LS	-	1.44	8.58	29.39	3.98	0.69	0.42
35km north of Abu Simple	3	0-10	17.20	89.9	6.00	4.10	S	8.94	0.33	4.04	30.75	9.0	1.01	0.11
		10-30	43.56	92.45	5.15	2.40	S	9.60	0.34	2.98	40.0	4.55	1.0	0.12
		30-45	45.11	90.70	6.10	3.20	S	9.45	0.37	3.06	54.83	10.55	0.73	0.12
		45-60	74.33	90.0	6.25	3.75	S	8.53	1.35	3.70	53.38	15.64	0.67	0.99
		WPM	47.25	90.98	5.80	3.22	S	-	0.60	3.36	49.51	9.56	0.85	0.34
45km north of Abu Simple	4	0-25	11.62	78.30	12.50	9.20	LS	9.36	0.44	6.25	41.76	12.91	1.01	0.06
		25-55	11.70	70.20	17.25	12.55	SL	8.66	0.78	7.23	46.33	3.82	0.87	0.15
		55-90	9.48	71.50	15.40	13.10	SL	8.45	0.78	8.06	45.04	2.00	0.84	0.20
		90-130	5.26	73.1	14.00	12.90	SL	8.70	0.51	7.83	44.96	1.36	0.71	0.06
		WPM	8.59	73.02	14.73	12.16	SL	-	0.62	7.50	44.72	3.93	0.82	0.11

whole profile mean (WPM). Soil reaction is alkaline as indicated by pH values which they are more than 8.5 in all profiles layers. Total carbonate (CaCO3) content is mostly low and varies in

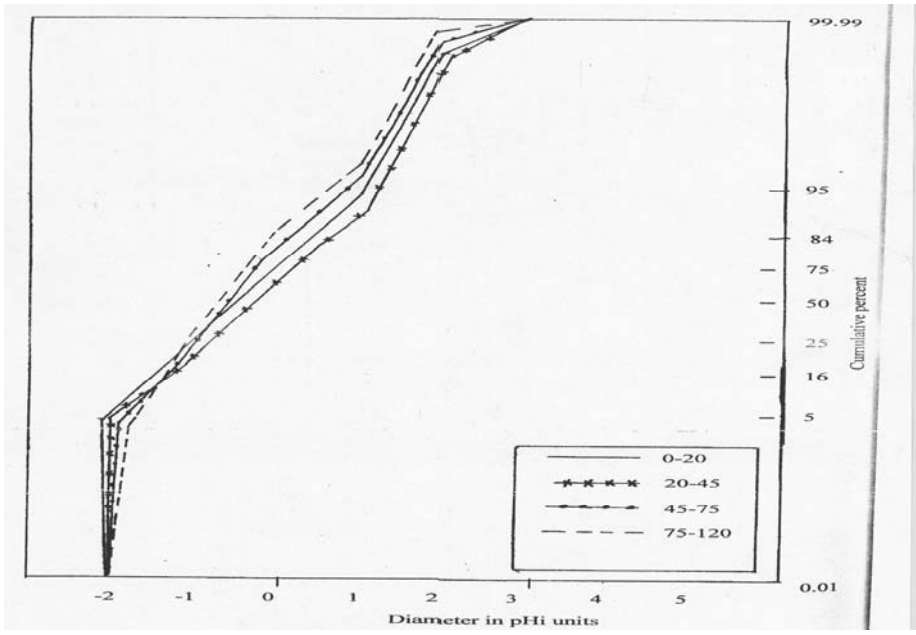
relatively narrow ranges between 1.0 and 9.6 %. Gypsum content is very low without specific distribution throughout profile depth in most of studied sites. Organic matter is very low owing to the prevailing aridity of the cation exchange capacity (CEC) is mainly dependent on the fine fractions and organic matter contents. The ESP values are more than 15 indicating prevailing sodicty condition in all the studied soils.

Origin and uniformity of soil materials:

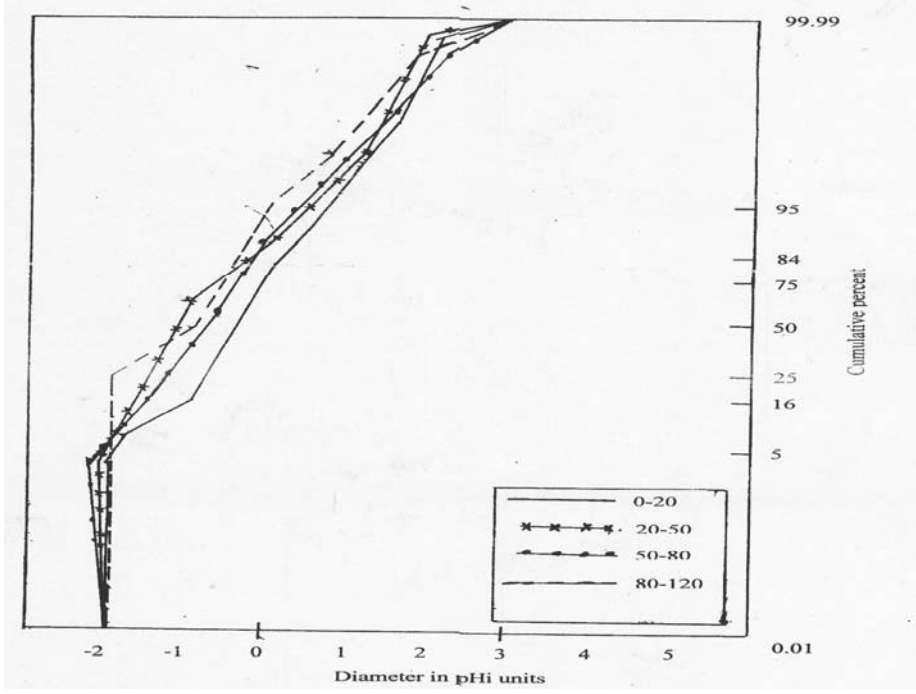
Their cumulative curves are illustrated in Figures (1-4). Calculated statistical size parameters (sorting, skewness and kurtosis) are presented in Table (4). The most skeleton grains materials of studied soil profiles are very coarse sand and moderately sorted with meso-to lepto kurtic pattern. This pattern indicates that the most of studied soil materials are physically.

Table(4):Statistical size parameters of the studied soil profiles.

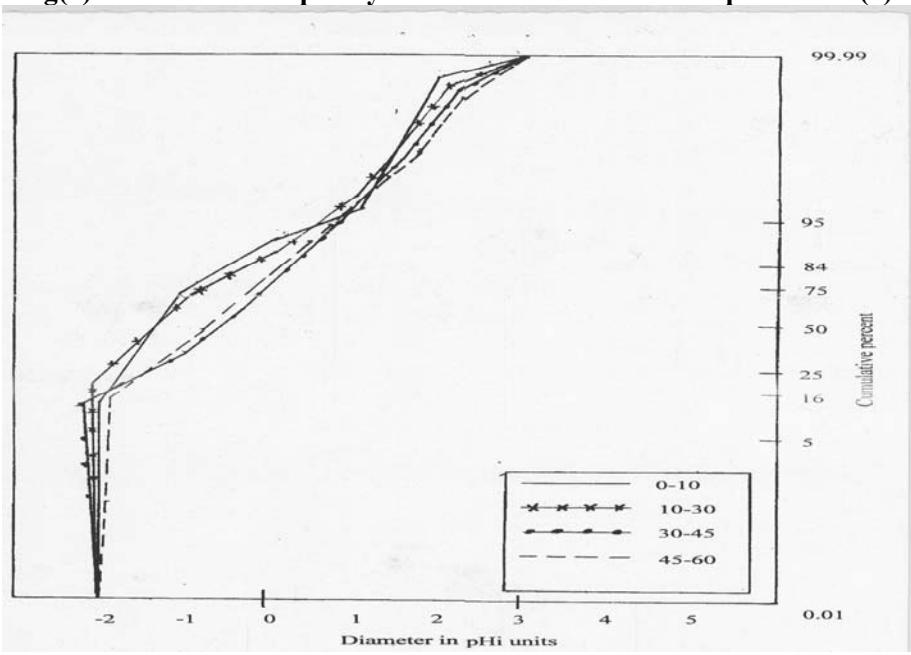
location	Prof No	Depth cm	MZ	QI	Nomenclature	Ski	Nomenclature	KG	Nomenclature
15km north of Abu Simple	1	0-20	-0.6	0.97	M.S	0.05	N.S	1.06	M.K
		20-45	-0.33	1.00	M.S	0.00	N.S	2.02	VLK
		45-75	-0.55	0.88	M.S	0.02	N.S	1.17	LK
		75-120	-0.62	0.70	M.S	0.03	N.S	1.31	LK
25km north of Abu Simple	2	0-20	-0.57	0.84	M.S	0 .08	N.S	1.49	LK
		20-50	-1.02	0.81	M.S	0.63	S.F.S	1.03	M.K
		50-80	-0.90	0.77	M.S	0.01	N.S	1.02	M.K
		80-120	-1.13	0.72	M.S	0.1 0	N.S	0.61	VLK
35km north of Abu Simple	3	0-10	-1.27	0.85	M.S	0.43	SFS	1.29	LK
		10-30	-1.20	0.89	M.S	0.51	SFS	0.88	MK
		30-45	-0.78	1.03	P.S	0.00	NS	0.68	PK
		45-60	-0.90	0.99	M.S	0.12	F.S	0.77	PK
45km north of Abu Simple	4	0-25	-0.52	0.70	M.S	0.14	F.S	1.91	VLK
		25-55	-0.37	0.96	M.S	0.05	F.S	1.10	MK
		55-90	-0.58	1.04	P.S	0.10	F.S	0.96	MK
		90-130	-0.50	1.10	P.S	0.07	F.S	0.76	PK



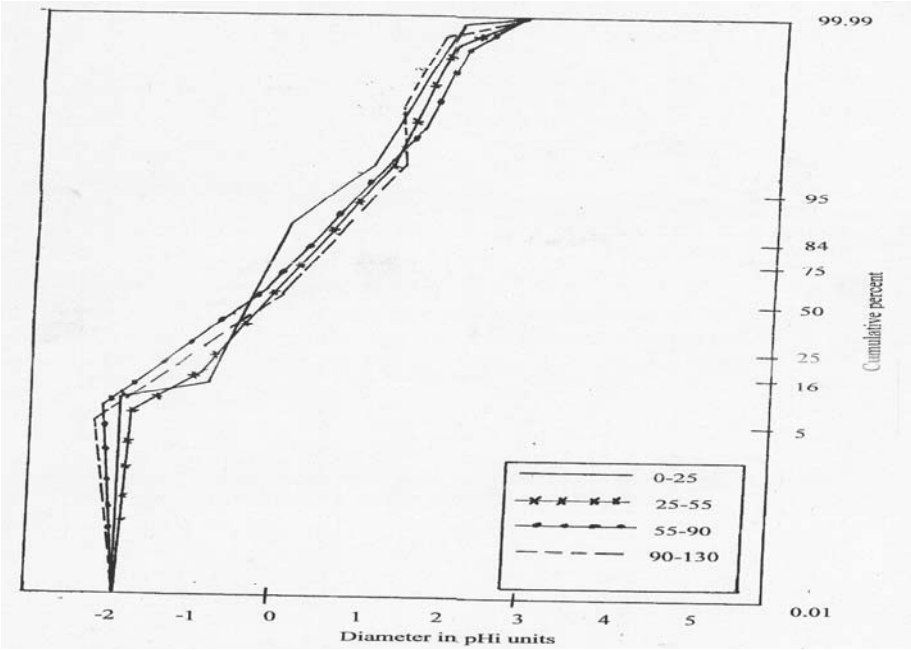
Fig(1):Cumulative frequency curves of sand fractions of profile No.(1)



Fig(2):Cumulative frequency curves of sand fractions of profile No.(2)



Fig(3):Cumulative frequency curves of sand fractions of profile No.(3)



Fig(4):Cumulative frequency curves of sand fractions of profile No.(4)

weathered, transported and deposited under a combined effect of both water and wind action except for the 30-45cm layer of profile3 and the deepest layers of profile4 which has poorly sorted sediments widcating that these layers are transported and deposit under water action.The skewness part of the studied area have a sign of non-uniformity as well as almost stratification and probably multi depositional regimes On the other hand, the skewness values and cumulative curves for the most soils representing the southern part nearly similar and symmetrical reflecting almost uniform and homogenous soil materials.

Mineralogy of soil fractions:

Light minerals:

Data in Table (5) reveal that the light minerals (sp. gr. <2.85 g/cm3) are almost entirely composed of quartz, which constitute more than 94% in

all studied profiles (calculated as a whole profile mean).In general, the highest content of quartz in most the studied profiles is detected in the surface layers. Other associated light minerals are mainly orthoclase, plagioclase and microcline.

Orthoclase and plagioclase minerals are present in few minerals (calculated as a whole profile mean).Microcline is found in minute amounts and having maximum value of 1.27%. The vertical distribution of associciated light minerals does not portray any specific pattern pertaining to any of the studied profiles. The dominance of quartz in soil materials of studied profiles is a reflection of its resistance to weathering and disintegration during the multi cyclic processes of sedimentation. Also, presence of feldspar could be taken as an indication of languished weathering during soil formation. The merked variations are mostly due to the nature of materials form which the soils are derived in conjunction with

Table (5): Frequency distribution of light minerals in the sand fraction (63-125u) of the studied soils.

location	Prof No	Depth cm	Quartz%	% Feldspars			Total
				Orthoclase	Plagioclase	Microline	
15km north of Abu Simple	1	0-20	95.00	1.90	1.75	1.35	5.00
		20-45	94.60	1.40	1.80	1.20	5.40
		45-75	94.83	2.50	1.60	1.07	5.17
		75-120	92.50	4.00	2.90	0.60	7.50
		WPM	93.65	2.99	2.30	0.89	6.35
25km north of Abu Simple	2	0-20	94.80	3.20	2.90	0.40	5.20
		20-50	94.60	3.40	2.20	0.70	5.40
		50-80	96.00	2.00	1.70	0.90	4.00
		80-120	93.44	3.60	1.50	1.46	6.56
		WPM	94.37	3.19	1.84	1.05	5.63
35km north of Abu Simple	3	0-10	95.2	2.00	1.50	1.30	4.80
		10-30	95.6	1.50	1.40	1.50	5.40
		30-45	94.83	1.80	1.60	1.07	5.17
		45-60	95.00	2.50	1.65	0.60	7.50
		WPM	95.19	1.91	1.53	1.13	5.77
45km north of Abu Simple	4	0-25	94.5	2.70	1.50	1.30	5.50
		25-55	95.36	2.00	1.18	1.46	4.64
		55-90	95.42	1.75	1.90	0.93	4.58
		90-130	94.00	3.30	1.50	1.20	6.00
		WPM	94.69	2.58	1.53	1.21	5.31

sedimentation regime and indtensity of weathering. Distribution of resistance minerals and their ratios as indicator for the uniformity of soil materials. The distribution of resistant minerals and their ratios throughout the most profiles representing the northern part of studied area show some variations. This could indicate that the materials of these soils are stratified and mostly formed under multidepositional regime.

Conversely, the results for most profiles of the southern part show some uniformity and homogeneity of their materials. These results may provide a fairly good confirmation to the results of the particle size distribution of skeleton grains and their statistical parameters. The scanty values of weathering ratios indicate and confirm the condition of weak weathering sequence and development of studied area Data in Table(5) and (6).

Table(6):Uniformity and Weathering ratios of the studied soils.

location	profile	Depth cm	Uniformity Ratio			Weathering Ratio		
			Zr \T	Zr\R	Zr\ T+R	W_1	W_2	W_3
15km north of Abu Simple	1	0-20	3.04	2.69	1.43	0.67	0.45	0.26
		20-45	2.13	2.12	1.06	0.43	0.31	0.16
		45-75	2.23	1.93	1.03	0.51	0.36	0.14
		75-120	1.69	1.49	0.79	0.58	0.40	0.09
25km north of Abu Simple	2	0-20	3.32	2.28	1.35	0.49	0.30	0.14
		20-50	2.36	1.49	0.91	0.51	0.28	0.13
		50-80	1.69	1.91	0.90	0.46	0.30	0.13
		80-120	2.35	1.94	1.06	0.72	0.43	0.10
35km north of Abu Simple	3	0-10	2.67	2.16	1.19	0.44	0.28	0.07
		10-30	2.89	2.62	1.37	0.38	0.21	0.07
		30-45	2.77	2.41	1.29	0.41	0.24	0.13
		45-60	1.86	1.56	0.85	0.41	0.26	0.15
45km north of Abu Simple	4	0-25	1.39	1.57	0.74	0.56	0.35	0.11
		25-55	2.02	2.51	1.20	0.51	0.36	0.13
		55-90	2.90	2.81	1.24	0.66	0.40	0.06
		90-130	2.29	1.54	0.92	0.58	0.43	0.11

Zr=Zircon
T=Tourmaline
R=Rutile
B=Biotite

W_1 =P+A\Z+T
W_2=H\Z+R
W_3 =B\Z+T

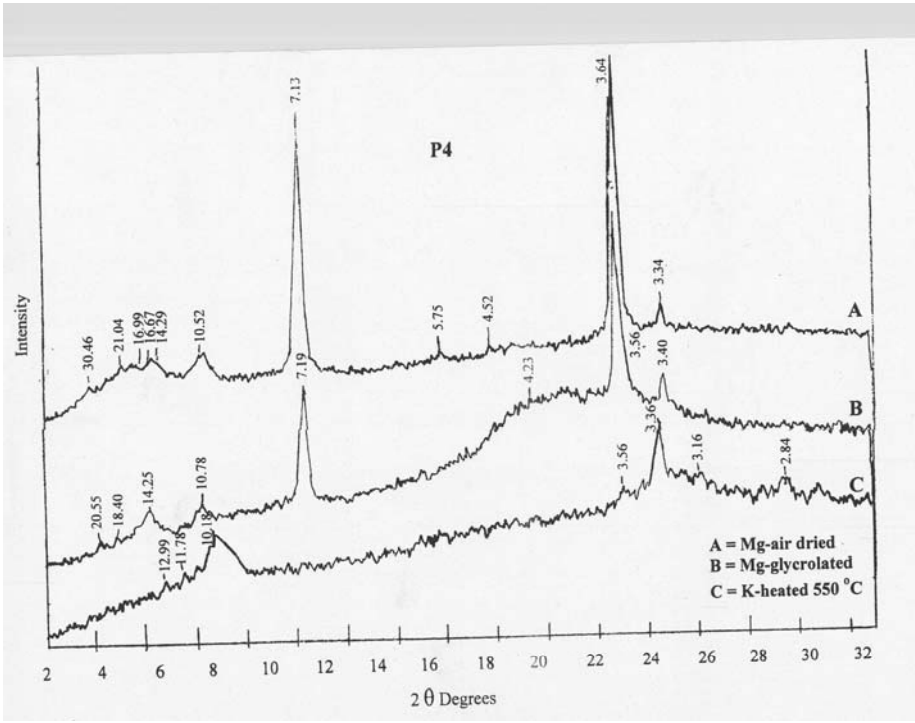
P=Pyroxenes
A=Amphiboles
H=Hornblende

In general, data indicate that kaolinite is higher and predominated in examined samples.Illite and smectite minerals are present by few amounts. Vermiculite and interstratified minerals are found by trace amounts in examinted samples. The accessory minerals, iI.e. quartz, feldspars, calcite and dolomite are also detected in the examined samples show in Table(7) and Fig(5).

Table (7): Semi quantitative mineral composition of clay fraction separated form some studied profile.

Profile No.	Relative amounts of clay minerals %				
4	Kaolinite	Illite	Vermicolite	Smectite	Interstatifiede

	54	13	8	18	7



Fig(5):X-ray diffraction pattern of the clay fraction separated from profile(2).

Soil classification :

The studied soils were classified on the basis of morphological descriptions, physical and chemical properties with respect to the meteorological information's of the studied area. The dominant soil moisture regime in this area is Torric with Hyperthermic soil temperature regime. All the soils haven't any diagnostic horizon within 1m from the surface. These soils have slightly weathered siliceous minerals. The soils of profile 4 has slightly gravely sandy loam texture. therefore, they classified as Typic Torriorthents, slightly gravely sandy loam, siliceous , hyperthermic. The soils represented by profiles 1, 2, 3and 4 have slightly gravely loamy sand and they could

be affiliated to Typic Torripsamments, slightly gravely loamy sand, siliceous, hyperthermic.

Land capability classification:

Land capability index was calculated for each profile according to the system described by Sys et. al. (1991) and the studied soils areclassified

Table (8): Capability index of the studied soils.

profile	Irrigation	Texture	Depth cm	Wetness	EC	ESP %	$CaCO_3$ %	Gypsum %	Slope %	Erosion	Capability indx
1	90	100	100	100	100	70	100	95	100	100	60
2	90	100	100	100	100	74	100	95	100	100	70.30
3	90	70	70	90	100	54	90	95	100	100	18.33
4	100	100	100	100	100	52	95	95	100	100	46.93

into their suitable grade according the ratings of Storie (1964) according the ratings of Storie (1964).

The capability index (Ci) of the studied soils and their grades are presented in Table (8) and Table (9). Data in Table (9) reveal that alfalfa, barley, onion and wheat crops are moderately (S_2) to marginally (S_3) suitable for growing in the soils of profiles 1, 2 and 4. All studied soils are suitable (varied between S_1 to S3) for growing potato crops .Watermelon

Table (9): Suitability of the studied soils.

location	profile	Suitability index for different crops								
		Field crops	Rate %	S_1	vegetables	Rate %	S_1	Fruits	Rate %	S_1
15km north of Abu Simple	1	Alfalfa	61.3	S2	Potato	51	S2	Olives	34.2	S3
		Barley	43.95	S3	Watermelon	28.9	S3	Citrus	38	S3
		Onion	48.45	S3	Pea	32.30	S3			
25km north of Abu Simple	2	Alfalfa	46.03	S3	Potato	43.35	S3	Olives	34.20	S3
		Barley	29.07	S3	Watermelon	20.19	N	Citrus	21.40	N
		Onion	46.03	S3	Pea	19.18	N			
35km north of Abu Simple	3	Alfalfa	26.24	S3	Potato	17.49	N	Olives	14.8	N
		Barley	10.93	N	Watermelon	10.3	N	Citrus	5.25	N
		Onion	21.00	N	Pea	12.35	N			
45km north of Abu Simple	4	Alfalfa	69.04	S2	Potato	65.21	S2	Olives	51.00	S2
		Barley	41.18	S3	Watermelon	25.00	S3	Citrus	19.20	N
		Onion	61.95	S3	Pea	18.22	N			

is marginally suitable (S_3) for growing in soils of profile 4. Pean is marginally suitable (S_3) for growing in soils of profile 1. Most of studied soils are moderately (S_2) to marginally (S_3) suitable for growing olives (except soils of profile 1). The soils considered currently not suitable (N_1) which having Si between 15 and 25 for studied crops could be improved by achieving a proper fertilization and management.

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دراسات بيدولوجبة على أراضى شمال أبوسمبل-أسوان

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يهدف هذا البحث الى دراسة الخصائص المورفولوجية و الفيزيائية و الكيميائية و المعدنية لتحديد أصل و مدى تجانس مادة التربة لبعض الأراضى الممثلة للجزء الجنوبى من منطقة توشكى ، كذلك التقسيم والتقيم الكمى لهذة الأراضى ، علاوة على دراسة مدى ملائمة تلك الأراضى لانتاج بعض المحاصيل الزراعية الرئيسية بها . أختيرت أربعة قطاعات أرضية لتمثل الجزء الجنوبي من منطقة توشكى (شمال أبوسمبل).

ولقد أوضحت النتائج أن هذه الأراضي تقع على منسوب يتراوح بين 184 – 190 متراً فوق سطح البحر ، طبوغرافية سطح الأرض شبه مستوى الى بسيطة التموج ، والقطاع الأرضي عميق إلى متوسط العمق ، والأراضي جيدة الصرف ، ذات قوام رملي إلى رملي طميي مع وجود بعض الحصى والقطع الصخرية ، ذات صلابة متغيرة من هشة إلى قوية ، يميل لونها إلى الأصفر المحمر ، والأراضي غير ملحية ، قلوية التأثير ، قليلة المحتوى من الكربونات الكلية ، منخفضة في محتواها من المادة العضوية ، السعة التبادلية تتوقف على محتوى الأرض من الحبيبات الدقيقة والمادة العضوية.

تدل المقاييس التصنيفية المورفولوجية على قلة التمايز بين الطبقات ، وتعزى الاختلافات في القيم أساساً إلى اختلاف ظروف ونوعية ونظم الترسيب أكثر من التطور. معظم الحبيبات الهيكلية لمواد التربة تحت الدراسة ذات رمل خشن متوسطة الفرز Moderately sorted بنظام ترتيب meso الى lepto kurtic ، وهذا يدل على ان هذة المواد تعرضت لسيادة التجوية الطبيعية و نقلت و ترسبت تحت التاثير المشترك لفعل الماء والرياح أو الماء فقط ويمثل الكوارتز أكثر من 94% محتوى المعادن الخفيف لمجموعة الرمل (63-125 ميكرون) فى كل القطاعات الارضية المدروسة، وتتواجد الفلسبارات بنسبة قليلة فى كل القطاعات على صورة أورثوكليز وبلاجيوكيز كما يوجد الميكروكلين بنسبة

ضئيلة، وكذلك تدل سيادة المعادن عالية المقاومة عالية الثبات خاصة الزركون للمعادن غير المعتمة بالاضافة لوجود البيروبولات بنسبة متوسطة على أن زمن التكوين وعمليات التجوية السائدة لم تكن كافية للتحليل الكامل لهذة المعادن مما يمكن على عدم النضج وقلة التطور حيث تعتبر هذة الاراضى حديثة من الوجهة البيدولوجية والتركيب المعدنى للطين يشير الى سيادة الكاؤولينيت فى معادن الطين الأقل من 2 ميكرون المفصولة من بعض القطاعات المثلة لمنطة الدراسة مع وجود نسبة بسيطة من الاليت والسمكتيت.

لم تظهر بالأراضي أي نوع من الآفاق التشخصية ولذلك قسمت الأراضي طبقاً للنظام الأمريكي (2006) تبعا لرتبة الاراضى الحديثة .Entisols حتى مستوى العائلة

أوضح تقدير معامل القدرة الإنتاجية للأراضي أنها تتبع الدرجات من الثانية إلى الخامسة ، ولقد قيمت الأراضي ذات الدرجات من الثانية إلى الرابعة لمدى ملائمتها لزراعة ثمانية محصولاً من محاصيل الحقل والخضر والفاكهة.