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CHARACTERIZATION OF SOME NILE ALLUVIAL SOILS AT ASSIUT, EGYPT

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ABSTRACT

An area of 50 fed located at The Experimental Station, Fac. Agric., Al-Azhar Univ., Assuit Governorate was chosen to represent the Nile alluvial soils. Five representative soil profiles were selected to asses the morphological features and the soil physio-chemical properties. The obtained results indicate that there are no wide variations in the morphological descriptions among the studied soil profiles and within each profile. Matrix color varies from dark brown (10 YR 3/3) to dark yellowish brown (10YR 4/4) when was dry and from very dark grayish brown (10YR3/2) to very dark brown (10 YR 2/2) when was moist. The Ap horizon is hard to very hard (dry), firm to very firm (moist) and slightly sticky to slightly plastic (wet). The subsurface horizons (C, C_1 and C_2) are very hard to extremely hard (dry), very firm to extremely firm (moist) and sticky plastic to very sticky very plastic (wet). The structure varies from moderate subangular blocky to medium or strong angular blocky. The boundary differs from clear smooth to diffuse smooth. The soil represented by profile one was grown by grapes, citrus and fig, while it was grown by wheat for profiles No.2, 3 and 4. The soil of profile 5 was grown by clover. The soil texture class varies from silty clay to clay, with a multi-depositional regime in some localities due to the differences in the media of sedimentation. Soil bulk density ranges from 1.19 to 1.39 g/cm3 and mostly shows a regular increase with depth. Plastic limit ranges from 51.34 to 61.48 %, while elastic limit differs from 17.32 to 25.46% and they increase with soil depth. The plasticity index ranges from 31.49 to 40.09%. The wide variation in these parameters is more related to the high clay content as well as its activity. The organic matter content is relatively low (1.24 -1.96 %) and decreases with soil depth. Soils are salt-free (EC_e = 0.96-1.43 dS/m), non-calcareous ($CaCO3$ < 2.55 %) and soil pH is moderately alkaline (7.99-8.14). The values of exchangeable sodium percentage range from 1.76 to 6.67 % and tend to increase with depth. Available macro (N, P & K) and micronutrients (Fe, Zn, Mn &Cu) are adequate in the upper layers but low downwards.

According to the suitability classification of Erian *et al.* (1991), the studied soils can be grouped into two suitable classes S2 and S3 which include those of deep profiles, clay textured, non-saline well drained and almost leveled surface. The workability is greatly affected and accordingly, these soils should be improved and ploughed at suitable soil moisture content. Finally, it can be concluded that the studied area is mostly considered suitable for cultivating a wide range of crops.

Keywords: Morphological description, physio-chemical properties, clay soil, land suitability.

INTRODUCTION

Soil survey is an important source of data that can be used to improve farm planning and environmental protection (Wu, *et al.*, 2001). Land evaluation is important in establishing land use and agricultural development programs. It defines the suitable alternative land utilization types under a particular farming system on a sustained basis. Soil survey provides an inventory of the soil, using concepts of natural soil bodies that enable soil scientists to determine the place of a particular soil among all other known soils. On the other hand, the appraisal of soils for agricultural uses on the basis of soil inventories is called soil survey interpretation. A common feature of comprehensive soil survey interpretation systems is that the soil surveyor has to estimate to what degree a given soil can support a particular farming system (Ghabour, *et al.*, 1994).

The purpose of soil survey interpretation is to make predictions of soil performance to guide profitable management on each type of soil (Steele, 1968). Land evaluation moves much further in the direction of recommending particular uses of land (Van Diepen, 1982). However, more often soil units continue to serve as land evaluation units, and they are only separated by agro-climatic zones if large areas are involved. Verheye (1987) reported that land suitability evaluation deals with a comparative suitability rating of the land for a given range of utilization types, using an objective evaluation scale that covers the major growth requirements.

The changes in soil structure (size and shape) are due to tillage practice and are useful in differentiating shallow or deep tillage, and no-tillage (Beshay and Sallam, 2001). Panyachart (1986) studied the vital soil characteristics affecting cropping practices and concluded that the fertility should not be considered as a major factor affecting cropping practices in the area. However, soil characteristics affecting cropping practices were soil texture and characteristics derived from soil development responding to topography.

The studies of Edwards *et al.* (1992) and Nagarajarao and Jayasree (1994) demonstrated that long-term soil management practices affect soil pH, organic matter, bulk density, and nutrient availability. They further show that different tillage and crop rotations may require distinctly different soil fertility management. Kobkiet *et al.* (1993) stated that the soil productivity and fertility degradation are mainly related to specific soil characteristics and applied mismanagement practices.

This work was undertaken to clarify the characterization of some Nile alluvial soils at northwest of Assiut City, Assiut Governorate, Egypt. Such studies may help the users to put suitable plans and find a guideline for the features of agriculture utilization projects.

Materials and Methods

The studied area (50 fed) is located at The Experimental Farm, Faculty of Agriculture, Al-Azhar University that lies at northwest of Assiut City, Assiut Governorate between Nile river and El-Ibrahimya canal. It is bounded by longitudes 31° 11' and 31° 13' E and latitudes 27° 13' and 27° 11' N (Fig. 1). Topographically, the area is almost flat (55 m asl). Landform associated with this elevation is structural and alluvial plain. The soils in this area have been formed from the sedimentation of the suspended matter, which was carried by the annual Nile flood during the most recent geological period. This suspended matter is the product of physical and chemical weathering of the igneous and metamorphic rocks forming the Ethiopean plateau (Kishk, 1972).

Metrological data reveal that the prevailing climate is corresponding to hot desert; the maximum temperature varies from 18°C in January to 39.4°C in July and the minimum temperature varies from 4.5°C in January to 22°C in July. The average value of high relative humidity is about 78.92% while the low one is about 18.17%. A pan evaporation is about 1910.2 mm per year (Ainer and Eid, 2003). According to Soil Survey Staff (1999), soil moisture and temperature regimes are torric and thermic, respectively. Groundwater is the main source of irrigation (EC = 1.0 dS/m) that is applied by flooding irrigation system.

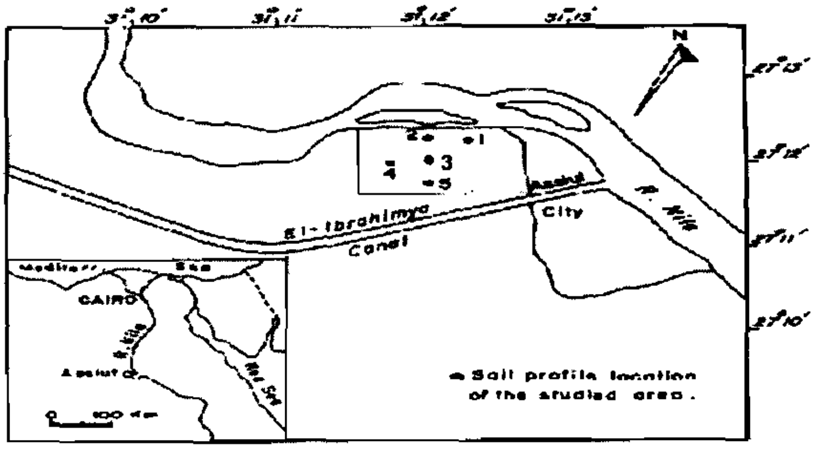

Fig.(1) Location of the studied area and soil profiles .

Five soil profiles were selected to represent the investigated area. The representative profiles were morphologically described according to Soil Survey Staff (1999). Undisturbed soil cores were taken to determine bulk density according to Klute (1986). Soil samples were prepared for some physical and chemical analyses as described by Page (1982) and Klute (1986). The liquid and plastic limits were determined on air-dry soils according to Lambe (1960), after which the plasticity index was calculated by difference. Available (NO3 and NH4) and total nitrogen were determined according to Page (1982). Available P and K were extracted and determined according to Soltanpour and Schwab (1977). DTPA-extractable iron (Fe), zinc (Zn), manganese (Mn), copper (Cu), boron (B), lead (Pb) and nickel (Ni) were carried out according to the method described by Lindsay and Norvell (1978) and determined using atomic absorption (model Perkin-Elmer 1999). In order to evaluate the land suitability, the following parameters were used: effective soil depth, availability of oxygen for roots, salinity, alkalinity, workability and nutrients availability through an evaluation system undertaken by Erian *et al.* (1991).

The climatic normals of the studied area can be defined as thermic and torric, since a) the mean annual soil temperature is lower than 22° and the difference between mean summer and mean winter is more than 5°C, and b) soil moisture through the profile control section is dry in most of the year, where the moisture regime is torric (Soil Survey Staff, 1999).

The morphological descriptions of the studied soil profiles (Table, 1) indicate that there are no wide variations among the studied soil profiles and within each profile.

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

Profile No.	Land use	Horizon		Color			Soil texture class	Soil structure	Consistency			Boundary	Notes
		Depth (cm)	Symbol	Hue	Dry	Moist			Dry	Moist	Wet		
1	Grapes, Citrus and Fig	0 – 10	Ap	10YR	3/3	2/2	sic	mo m sbk	ha	fir	sstpl	cs	fe f to m r
		10– 50	C	10YR	3/2	2/2	c	mo m bk	vha	vfir	stpl	-------	fe f to m r
2	Wheat	0 – 10	Ap	10YR	3/3	3/2	c	mo m bk	ha	vfir	vstpl	ds	co f to m r
		10– 50	C	10YR	3/2	2/2	c	s m bk	xha	xfir	vstpl	-------	fe f to m r
3	Wheat	0-10	Ap	10YR	3/3	3/2	sic	s m bk	vha	vfir	stpl	cs	co f to m r
		10-50	C1	10YR	4/4	3/3	c	mo m sbk	ha	vfir	vstpl	cs	fe f to m r
		50-150	C2	10YR	4/2	3/2	sic	mo m sbk	vha	vfir	vstpl	-------	-----
4	Wheat	0-10	Ap	10YR	3/2	2/2	c	s m bk	vha	vfir	vstpl	cs	co f to m r
		10-150	C	10YR	3/3	3/2	c	s m bk	xha	xfir	vstpl	-------	fe f to m r
5	Clover	0-10	Ap	10YR	4/2	3/2	sic	s m bk	vha	vfir	stpl	cs	co f to m r
		10-90	C1	10YR	3/3	2/2	c	mo m bk	xha	vfir	vstpl	cs	co f to m r
		90-150	C2	10YR	4/2	2/2	sic	mo m sbk	vha	vfir	vstpl	-------	-----

Structure: grade (mo: moderately, s: strong), size (m: medium) and type (sbk: subangular blocky, bk: angular blocky)
Consistency: dry (ha: hard, v: very, x: extremely), moist (fir: firm) and wet (sst: slightly sticky, st: sticky, pl: plastic)
Texture sic: silty clay, c: clay Boundary cs: clear smooth, ds: diffuse smooth
Notes fe: few, f: fine, m: medium, co: common and r: root

The elevation of the studied area is 55 m asl with water table deeper than 100 cm indicating that this soils could be classified as moderately drained. Matrix color of profiles 1, 2 and 4 varies from dark brown (10 YR 3/3) to very dark grayish brown (10YR3/2) when was dry and from very dark grayish brown (10YR3/2) to very dark brown (10 YR 2/2) when was moist. However, for profiles No. 3 and 5, it varies from dark brown (10 YR 3/3) to dark grayish brown (10 YR 4/2) to dark yellowish brown (10YR 4/4) when dry and from very dark grayish brown (10YR3/2) to very dark brown (10 YR 2/2) when moist.

RESULTS AND DISCUSSION

Regarding the structure for most layers of the studied soil profiles, the grade is moderate to strong, the size is medium and the type is angular blocky to sub-angular blocky. The consistence varies from hard and very hard to extremely hard (dry), but it changes from firm and very firm to extremely firm (moist) and it is sticky to very sticky and plastic to very plastic (wet). The boundary differs from clear smoothing to diffuse smoothing. The soil represented by profile No. 1 was cultivated by grapes, citrus and fig, while for profiles No. 2, 3 and 4 was cultivated by wheat and it was cultivated by clover for that represented by profile 5.

Physical properties of the studied soil profiles (Table 2) reveal that coarse sand fraction ranges from 0.05 to 5.89 %, while the fine one varies from 5.48 to 17.44 %. All sand fractions decrease with soil depth except the fine one for profile 5 where it increases with soil depth. Silt fraction ranges from 31.62 to 41.0 % while clay content differs from 40.0 to 58.4 %. The distribution pattern of these soil fractions shows the nature sedimentations process of Nile river. The texture class varies from silty clay to clay. The previous characteristics are mainly due to the sedimentation pattern of the Nile valley, beside the local environment. Soil bulk density ranges from 1.19 to 1.39 g/cm3 and mostly shows a regular increase with depth.

It appears from Table (2) that the plastic limit increases with increasing clay content. The elastic limit stays rather constant. So, the plasticity index shows the same tendency as the plastic limit. Plastic limit ranges from 51.34 to 61.48 %, while elastic limit differs from 17.32 to 25.46% and they increase with soil depth. The plasticity index ranges from 31.49 to 40.09%.

A common value to indicate the plasticity index of the clay fraction of the soil is the clay activity, which is the ratio of the plasticity index to the clay fraction percentage. According to Skempton (1953), the investigated soil profiles No. 1 and 5 belong to the active clays (activity > 0.73) while the investigated soil profiles No. 2, 3 and 4 belong to the inactive clays except the surface layer of profiles 2 and 3, indicating that internal friction is more responsible for strength than cohesion.

Table (2). Some physical properties of the studied soil profiles.

Profile N0.	Depth (cm)	Particle size distribution %				Soil texture class	Bulk density (g/cm^3)	Plastic limit %	Elastic limit %	Plasticity index %
		Coarse sand	Fine sand	Silt	Clay					
1	0-10	1.76	15.48	40.36	42.40	Silty clay	1.19	61.34	17.32	44.02
	10-150	0.82	10.98	35.40	52.80	Clay	1.28	68.11	18.46	49.65
2	0-10	0.81	9.86	37.24	52.00	Clay	1.25	68.74	19.22	49.52
	10-150	0.39	9.59	31.62	58.40	Clay	1.36	71.32	28.97	42.35
3	0-10	2.32	10.56	43.92	43.20	Silty clay	1.20	61.25	20.67	40.58
	10-50	0.22	8.00	39.78	52.00	Clay	1.27	67.12	25.46	41.66
	50-150	0.04	5.48	40.08	54.40	Silty clay	1.39	68.85	24.08	44.77
4	0-10	5.89	13.01	37.10	44.00	Clay	1.21	62.49	21.00	41.49
	10-150	0.35	7.71	34.43	57.60	Clay	1.38	70.51	23.20	47.31
5	0-10	3.18	15.82	41.00	40.00	Silty clay	1.19	59.34	17.97	41.37
	10-90	0.32	12.22	27.46	60.00	Clay	1.31	74.48	21.39	53.09
	90-150	0.05	12.95	39.90	39.10	Silty clay	1.38	56.44	17.96	38.48

Organic matter content is relatively low (1.24-1.96 %) and decreases with soil depth (Table 3) indicating a normal value that almost found in the valley. The soils are considered non-calcareous (CaC03 < 2.55 %) and soil pH is moderately alkaline (7.99-8.14). Exchangeable sodium (ESP) values range from 1.76 to 6.67 % and tend to increase with depth. Generally, ESP values are beyond the critical value (15%).

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

profile No.	depth (cm)	O.M. %	$CaCO_3$ %	pH*	CEC**	ECaP	EMgP	ESP	EKP
1	0 - 10	1.45	1.97	8.03	36.79	60.63	36.84	1.76	0.77
	10 - 150	1.24	1.46	8.00	44.41	56.73	36.78	5.28	1.21
2	0 - 10	1.65	1.67	8.01	44.05	60.00	35.16	3.47	1.37
	10 - 150	1.34	1.71	8.05	43.92	57.20	37.03	4.69	1.08
3	0 - 10	1.83	2.34	8.03	48.08	55.33	40.72	2.39	1.56
	10 - 50	1.58	2.51	8.01	45.53	57.03	39.74	2.13	1.10
	50 - 150	1.26	2.55	8.02	52.51	47.73	48.23	3.10	0.94
4	0 - 10	1.96	1.88	8.05	53.21	49.92	46.05	2.32	1.71
	10 - 150	1.29	1.46	8.00	55.59	53.34	40.42	5.26	0.98
5	0 - 10	1.95	1.88	7.99	43.94	48.25	48.81	1.88	1.06
	10 - 90	1.28	1.59	8.14	47.55	51.21	43.99	3.97	0.83
	90 - 150	1.24	0.33	8.11	44.42	42.63	49.77	6.67	0.93

*pH (1:1 soil water susbention) ** CEC (meq./ 100 g soil)

It can be stated that the soils are salt-free where the EC_e values (0.96-1.43 dS/ m) are less than 2 dS/m (Table, 4). In general, the dominant anions follow the order of Cl = HCO3 > SO4 > CO3 while the dominant cations follow the order of Ca = Mg > Na > K. The sodium adsorption ratio (SAR) is relatively low (< 4.0) which realize non-alkalinity hazerd.

Table (4): Chemical analysis of soil paste extract for the studied soil profiles

Profile No.	Depth (cm)	EC (dS/m)	soluble ions(meq/l)								SAR
			CO_3	HCO_3	Cl	SO_4	Ca	Mg	Na	K	
1	0 - 10	1.20	1.50	3.75	4.50	2.18	4.50	3.50	3.60	0.33	1.80
	10 - 150	1.37	1.00	4.50	3.50	4.76	3.00	3.50	7.10	0.17	3.94
2	0 - 10	1.18	1.50	3.25	4.00	2.90	4.50	3.50	3.50	0.20	1.75
	10 - 150	1.10	1.00	5.50	2.50	2.00	3.00	4.00	3.75	0.22	2.00
3	0 - 10	1.25	2.00	4.50	4.50	1.50	4.00	3.50	4.85	0.16	2.69
	10 - 50	1.08	1.00	5.50	2.50	1.80	3.00	4.50	3.10	0.15	1.72
	50 - 150	0.96	1.00	3.50	2.00	3.10	2.50	3.00	4.00	0.12	1.71
4	0 - 10	0.97	1.50	3.75	3.00	1.50	3.00	3.50	2.95	0.22	1.64
	10 - 150	1.34	1.00	6.00	2.50	3.80	2.50	2.50	8.25	0.12	3.69
5	0 - 10	1.18	2.00	4.75	3.50	1.50	4.00	4.00	3.60	0.17	1.80
	10 - 90	1.10	1.00	6.00	2.50	2.00	2.50	3.50	4.88	0.12	2.82
	90 - 150	1.43	1.00	7.00	2.00	4.27	2.00	5.00	7.15	0.12	3.82

Table (5). Some available macronutrients of the studied soil profiles.

Profile No.	Depth (cm)	Total N %	NH_4 (mg/kg)	NO_3 (mg/kg)	P (mg/kg)	K (mg/kg)
1	0-10	0.0230	44	131	17	408
	10-150	0.0215	34	140	13	412
2	0-10	0.0227	28	168	15	451
	10-150	0.0217	27	148	13	481
3	0-10	0.0231	41	117	17	421
	10-50	0.0218	34	129	15	489
	50-150	0.0211	28	135	13	473
4	0-10	0.0223	39	122	18	599
	10-150	0.0213	36	128	15	412
5	0-10	0.0246	27	124	15	473
	10-90	0.0233	27	155	13	422
	90-150	0.0227	18	167	15	442

Available nitrate (NO_3) fluctuates from 122 to 168 ppm while the available ammonium (NH_4) ranges between 18 and 44 ppm (Table 5). Generally, nitrogen in NO_3 form exceeds that of NH_4 one and both followed the trend of total nitrogen. Available phosphorus varies from 26 to 36 ppm while available potassium changes from 412 to 599 ppm. Amounts of available phosphorus, potassium and total-Nitrogen are adequate in the upper layers but low downwards. These are attributed to the exhaustion of organic matter, fast absorption by plant roots and/or loss by leaching (Abd-Ellatief, 1965).

DTPA-extractable trace elements of the studied soils are shown in Table (6). Extractable Mn represents the major micronutrient and it flocculates from 11.04 to 33.73 ppm, followed by Fe (10.65–16.57 ppm), then Cu (2.65–3.94 ppm). Comparing to the above mentioned elements, Zn, B, Ni and Pb concentrations are much lower in all studied sites and range from 0.69 to 2.84, 0.85 to 1.47, 0.51 to 1.32 and from 0.12 to 0.72 ppm, respectively. According to the limits of Viets and Landsay (1973), these soils are considered non-deficient in Mn, Fe, Cu and Zn. While, some layers (the surface one of profiles 3, 4 and 5) are marginal with respect to Zn. In general for most sites, extractable Fe, Cu, Zn, B, Ni and Pb increase with soil depth, whereas extractable Mn decrease with soil depth. However, the available amounts of these elements are quite enough for agriculture production. Generally, agricultural practices, particularly leveling, manuring, fertilization and flood irrigation can cause favorable elemental changes in the soil profile of this area.

Land improvements are activities, which cause beneficial changes in the qualities of the land itself. The land suitability of this area is presented in Table (7). The data indicate that, since the soil texture of these soils is silty clay to clay, the workability is greatly affected and accordingly, these soils should be improved and ploughed at suitable soil moisture content. Also, there is a need for applying more manure to increase the organic matter content in the soil as well as mineral fertilization, especially iron and zinc, to overcome the problem of fertility status of this area. It can be concluded that most of the studied area is considered suitable lands for cultivating a wide range of crops. According to the suitability classification of Erian *et al.* (1991), the studied soil can be grouped into two suitable classes S2 and S3 which include those of deep profiles, clay textured, non-saline, well drained and almost leveled surface.

Table (6). Some chemical extractable trace elements(ppm) of the studied soil profiles

Profile No.	Depth (cm)	Fe	Mn	Zn	Cu	B	Pb	Ni
1	0 - 10	11.90	25.61	1.02	3.01	1.47	0.72	0.64
	10 - 150	12.92	17.87	1.10	3.03	1.34	0.62	0.94
2	0 - 10	10.65	11.04	1.66	2.45	1.03	0.70	0.65
	10 - 150	12.83	16.19	2.84	2.78	1.06	0.59	0.51
3	0 - 10	18.00	30.32	0.81	3.25	1.22	0.68	0.72
	10 - 50	13.38	11.64	0.92	2.65	1.25	0.12	0.73
	50 - 150	13.73	13.15	1.05	2.69	1.33	0.58	0.89
4	0 - 10	13.88	27.39	0.76	3.64	1.14	0.36	0.69
	10 - 150	14.30	22.64	1.59	3.11	0.85	0.64	1.16
5	0 - 10	14.03	33.73	0.69	3.72	0.96	0.47	1.14
	10 - 90	16.57	29.90	1.49	3.94	1.01	0.71	1.32
	90 - 150	14.76	23.39	1.19	3.04	0.87	0.65	0.86

Table (7). Some land suitability parameters of the studied soil profiles.

Suitability parameter			Profile 1	Profile 2	Profile 3	Profile 4	Profile 5
Effective soil depth		Cm	100	100	100	100	120
		D	2	2	2	2	1
Availability of oxygen		O	2	2	2	2	2
Salinity		(dS/m)	1.29	1.14	1.10	1.16	1.24
		S	1	1	1	1	1
Alkalinity		ESP (a1)	3.52	4.08	2.54	3.79	4.17
		EMgP(a2)	36.81	36.10	42.90	43.24	47.52
		A	2	2	3	3	4
Workability	Consistence	Dry (W1)	3	4	3	4	4
		Moist (W2)	3	4	3	4	3
		Wet (W3)	3	4	3	4	3
	Structure	W4	2	2	2	2	2
	Texture	W5	4	4	4	4	4
Nutrients availability	O.M.%	N1	3	2	2	2	3
	P (ppm)	N2	1	1	1	1	1
	Ex K	N3	2	1	1	1	2
	Fe (ppm)	N4	3	3	3	3	3
	Zn (ppm)	N5	5	4	5	5	5
	Cu (ppm)	N6	1	2	2	1	1
Limiting factor			w5, n5	w5, n5	a2, w5, n5	a2, w5, n5	a2, w5, n5
Suitability class			S2	S2	S3	S3	S3

d : 1=>150, 2= 100-150, 3= 80-100, 4= 50-80, 5= <50
Ex. K= exchangeable potassium (meq./100g soil)
o : 1= very high, 2= high, 3= moderate, 4= low, 5= very low
s : 1= <2, 2= 2-4, 3= 4-8, 4= 8-16, 5= >16 a1: 1= <10, 2= 11-15, 3= 16-20, 4= 21-30, 5= >30
a2 : 1= <30, 2= 31-39, 3= 40-45, 4= 46-50, 5= >50 w1 : 1= slightly ha, 2= ha, 3= vha, 4= xha
w2 : 1= loose friable, 2= friable fir, 3= vfir, 4= xfir
w3 : 1= non stpl, 2= sstpl, 3= stpl, 4= vstpl
w4 : 1= crump, 2= fine to medium blocky, 3= coarse blocky, 4= platy to massive
w5 : 1= coarse, 2= moderate coarse to medium, 3= moderate fine, 4= fine
N1 : 1= >3.0, 2= 1.5-3.0, 3= 0.8-1.5, 4= 0.5-0.8, 5= < 0.5
N2 : 1= >20, 2= 15-20, 3= 10-15, 4= 5-10, 5= <5
N3 : 1= >1.2, 2= 0.6-1.2, 3= 0.3-0.6, 4= 0.1-0.3, 5= < 0.1
N4 : 1= >21, 2= 16-21, 3= 10-16, 4= 5-10, 5= < 5 N5 : 1= >5.3, 2= 4.2-5.3, 3= 3.1-4.2, 4= 2.1-3.1, 5= <2.1 N6 : 1= >3, 2= 2.2-3, 3= 1.5-2.2, 4= 0.8-1.5, 5= < 0.8

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توصيف بعض الأراضى النهرية الرسوبية بمحافظة أسيوط، مصر

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تقع المنطقة المدروسة غرب نهر النيل وتمتد من ترعة الإبراهيمية الى نهر النيل شمال غرب مدينة أسيوط فى مساحة حوالى ٥٠ فدان بمحطة البحوث الزراعية، كلية الزراعة، جامعة الأزهر بأسيوط وهى تمثل الأراضى النهرية الرسوبية. تم اختيار ٥ قطاعات أرضية ممثلة للمنطقة المدروسة بهدف تحديد الصفات المورفولوجية والخواص الطبيعية والكميائية للمساحة تحت الدراسة بهدف مساعدة المزارعين لوضع خطة زراعية مناسبة للاستغلال الأمثل للمشاريع الزراعية المستقبلية بالمنطقة.

وقد أظهرت النتائج المتحصل عليها أنه لا يوجد اختلافات كبيرة فى الصفات المورفولوجية المختبرة سواء بين القطاعات الأرضية المدروسة أو داخل القطاع الواحد. وأن لون التربة عند الجفاف قد تغير بين البنى الداكن الى البنى المصفر الداكن وكان بين البنى الرمادى الداكن والبنى الداكن فى الحالة الرطبة. وكانت الطبقات السطحية صلبة الى صلبة جدا عند الجفاف وبلاستيكية ملتصقة قليلا عند الابتلال بينما كانت الطبقات التحت سطحية صلبة الى فائقة الصلابة عند الجفاف وبلاستيكية ملتصقة الى بلاستيكية ملتصقة جدا عند الابتلال. واختلف بناء التربة من البناء الكتلىالزاوى القوى الى البناء الكتلى تحت الزاوى المعتدل وأن قوام التربة يتغير بالنسبة للقطاعات الأرضية تحت الدراسة بين قوام سلتى طينى الى قوام طينى مع تجانس القطاع الأرضىالواحد مع تعدد مناطق الترسيب فى بعض القطاعات نتيجة اختلاف بيئة الترسيب. وحيث أن التربة ذات قوام ناعم فإن عمليات الخدمة الزراعية تكون صعبة ولذلك يجب إجراء عمليات الخدمة عند نسب رطوبة أرضية مناسبة. وتراوحت قيم الكثافة الظاهرية للتربة من ١,١٩الى ١,٣٩ جم/سم٣ وتزيد غالبا مع العمق وحد الليونة يتراوح من ٥١,٣٤ الى ٦١,٤٨% بينما حد اللدونة يختلف من ١٧,٢٣ الى ٢٥,٤٦% وهذه القيم تزيد مع العمق. ودليل البلاستيكية يتراوح من ٣١,٤٩ الى ٤٠,٠٩% وهذا الاختلاف الواسع بين حدود البلاستيكية له علاقة أكبر بالمحتوى الطينى بالاضافة الى نشاط الطين الذى ظهر فى قطاعات التربة رقم ١، ٥ وكان غير واضح فى باقى القطاعات ليدل على أن الاحتكاك الداخلى بين الحبيبات هو المسول عن تماسك الحبيبات أكثر من قوة التلاصق. وأظهرت النتائج أيضا أن محتوى التربة من المادة العضوية منخفض (١,٢٤-١,٩٦%) وأن هناك حالة ملحة لإضافة مخلفات المزرعة الى التربة لرفع محتواها من المادة العضوية، وأن التربة غير ملحية (EC <2) ونسبة كربونات الكالسيوم أقل من ٢,٥٥% وأن pH التربة يميل الى القلوية (٧,٩٩-٨,١٤) والنسبة المئوية للصوديوم المتبادل تزيد مع العمق وهى فى الحدود الأمنة ولا تزيد عن ٧ وتتوفر العناصر الغذائية الكبرى (نيتروجين، فوسفور، بوتاسيوم) والصغرى (حديد، زنك، منجنيز، نحاس) بصورة مناسبة لنمو النباتات فى الطبقة السطحية وتقل فى الطبقات التحت سطحية ولذلك يفضل تسميد هذه الأراضى بعنصرى الحديد والزنك لرفع مستوى خصوبة التربة. ويمكن القول عموما بأن الأرض تحت الدراسة مناسبة بدرجة جيدة للاستغلال الزراعى حيث يمكن أن تجود فيها معظم الحاصلات الزراعية سواء كانت حقلية أو خضر أو بساتين على أن يراعى اتباع سياسة مزرعية جيدة من حيث عمليات الخدمة المزرعية بالطريقة وفى الوقت المناسب بالإضافة الى الإدارة المائية السليمة وبرامج التسميد المناسبة.