Zagazig J.Agric. Res., Vol .30 No.(4) 2003 1605-1618

CLASSIFICATION OF THE SOILS OF EL-SALAM CANAL, NORTH SINAI PENINSULA

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Soil, water and Environment Res. Inst., A.R.E.

Received 5 / 6 / 2003 *Accepted 30 / 6 / 2003*

ABSTRACT: The soils along El-Salam Canal territory in North Sinai peninsula are considered as one of the most promising areas for agricultural expanstion. It is characterized by certian geomorphic units and certain soil types which are developed upon them. The aim of the present study is to determine the morphological, physical and chemical properties in order to classified according to USDA (1998). The soils of the studied area belong to the following taxonomic units.

1) **Soils of South El-Qantara, Rabaa and Bir El-Abd are classified into the:**

- **Order : *Entisols*:**

a) Suborder: Psamments.

Great group: Torripsamments

Subgroup: Typic Torripsamments (profiles 4,5,7,8 and 9).

b) Suborder: Aquents

Great group: Psammaquents

Subgroup: Typic psammaquents (profile 6).

2) **Soils of El-Tina plain contain a saline horizon and the soils of El-Ser and El-Qawarir are formed on calcareores deposits and contain calcic horizon, therefore, these soils are classified into the Order: Aridisols:**

a) Suborder : *Salids*

Great group: Aquisalids

Subgroup: *Gypsic Aquisalids (profiles 1 and 2).*

Great group: Haplosalids

Sub group: *Typic Haplosalids (profile 3).*

b) Suborder: *Calcids*

Great group: Haplocalcids

Subgroup: *Xeric Haplocalcids (profiles 10 and 11).*

INTRODUCTION

The governmental authorties of Egypt give great attention to the reconstruction of the Sinai Peninsula, which occupies about one thenth of the total area of Egypt. Since then great efforts have been started to develop the Sinai peninsula socially and economically. One of the area for future projects of horizontal expansion is that situated along El-Salam Canal in the north part of Sinai peuinsula. El-Salam canal is one of the main promising projects for reusing the drainage water in irrigation, namely Hadus and El-Serw drains after mixing their water with Nile water delevered from Damitta branch.

- General information about the studied area;

1- Location:

Eleven soil profiles were dug in the North of Sinai Peninsula representing the soils of El-Salam Canal project. The location of the studied profiles are shown in Fig. (1).

2- Climate:

The climate of the studied area is almost Mediterranean, with dry mild summers and fairly cool and rather wet winters. The mean annual temperature is 24.7°C, the air temperature rises to 30.9 °C during summers days and falls to 11.2°C during the coldest winter night. The average rainfall, however which occurs mostly from November to February is only about 73.3 mm. Evaporation plays on important role in concentrating the salts on the soil surface.

3-Geology and geomorphology:

From a geological point of view, these soils are formed from different sources namely: limestone with marl intercalations, sand limestone, dolomite limestone, clay, loose quartizitic sand and gypsum alternating with sand and clay beds.

The studied area is characterized by conspicuous geomorphic units which are quite different than those existing along the northern coast of Egypt. The geomorphic formation given by Dams and Moore (1985) pointed out that the studied area has four distinct geomorphic units namely:

1- Coastal sand beach which extends from east to west just parallel to the Mediterranean coast with a complex of shore bars. It is almost flat of variable width and essentially composed of loose sand mostly affected by salinity due to sea water intrusion.

2- Mobile elevated sand dunes which covers a relatively large area. It is composed of mobile elevated crescented sand dunes related to longitudinal barckhar and complex types with no specific direction pertaning to certain locality. Topographically their terrains are almost flat to undulating.

3- El-Tina plain extends in a northwest direction for about 75 km. with a width not exceeding 25 km. The surface of this plain is accasionally dotted with low sand dunes, sand accumulation and loess hummocks and in some localities of this plain, quite large patches of salt evaporates are present as a result of a

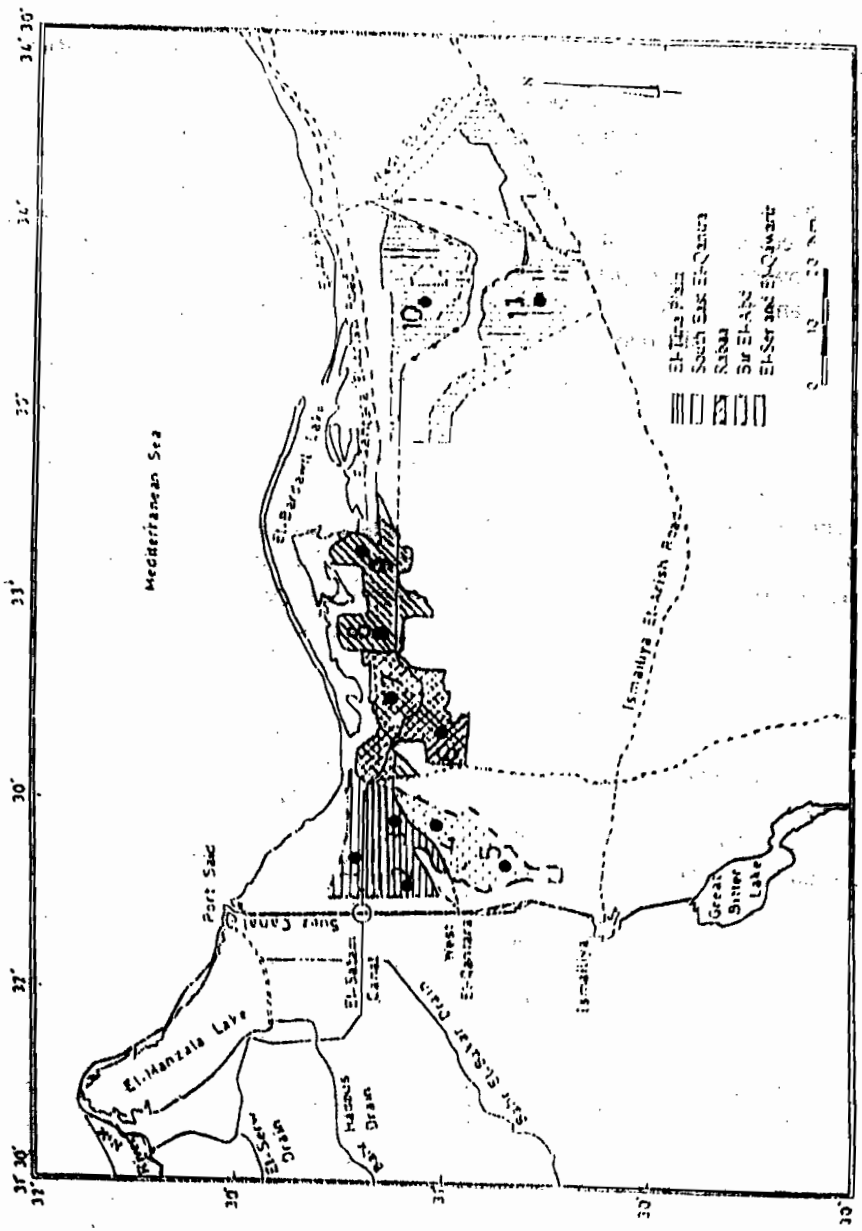

Fig. (1) : Location of the studied soil profiles.

complex cycle of leaching and evaporation.

4- Level trrain with eaolian sand deposits, it is accupies a relatively large flat area and located in the northeastern side of the Suez canal. It is cover with aeolian sand deposits. However, some parts, such as El-Qantara are dotted by highly vegetated salty flats.

Therefore, this study may be regarded as a basis for better understanding of the soil characteristics, classification, probable environments of deposition of these areas. Such a study is performed to present how to deal with the different soils in horizontal expansion for agricultural uses.

MATERIALS AND METHODS

Filed studied were carried out on two havdred augers and eleven representative soil profiles as their morphological features were examined and recorded on bases of FAO Guide lines (1990). 37 soil samples were collected and air dried, seived through a 2 mm. sieve and subjected to the following analyses:

1- Particle Size distribution was carried out for soil samples by Pipette method (Kilmer and Alexander 1949).

2- Calcium carbonate content was determined volumetrically using Collin's calcimeter.

3- Organic matter determinations were undertaken according to Wakley and Black method (Black, 1965).

4- Gypsum content was determined by the acetone method (Richard's 1954).

5- Electrical conductivity, pH, soluble cations and anions composition of the saturated soil water extract were conducted according to (Page. 1982).

6- The soils are classified as to the soil Taxonomy (1998).

RESULTS AND DISCUSSION

The diagnostic horizons and other relevent morphological features which are formed in the studied area are outlined as Salic, Gypsic and Calcic. Every diagnostic horizon of those mentioned before is discussed in the appropriate place. The presence of calcium carbonate accumulations as lime nodules and soft concretions, grayish mottles and gypsum crystals are features characterizing the soils of El-Tina plain and have salt crusts on the surface, while the other soils have desert pavement and few rock outcrops. The effect of erosion by wind is obviously noticed in the formation of desert pavement where coarse materials such as gravels and pebbles are left behind as well as the presence of ventifacts. On the other hand the effect of wind erosion was observed in the soils of sout east El-Qantara, Bir El-Abd and El-Ser and El-Qawarir. Generally the studied soils are deep.

Morphological descriptions of the studied soil profiles are summarized in Table (1). Data of some physical and chemical properties are shown in Tables 2 and 3.

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

Location	Profile No.	Depth No.	Colour		Texture	Structure	Consisteney		Lime and gypsum	Lower boundary
			Dry	Moist			Dry	Moist		
El-Tina plain	(1)	0-10	10 YR 5/1	10 YR 4/1	S.C.L	w.c.s.b.	So	ms , mp	v fe s co	c.s.
		10-65	10 YR 5/1	10 YR 4/2	S.C.L	w.c.s.b.	So	ms , mp	v fe s co M. cry. gyp.	c.s.
		65-90	10 YR 7/4	10 YR 5/3	S.L	s.g.	L	ss , sp	v fe s co V. Fe. cry. gyp.	c.s.
		90-150	10 YR 7/4	10 YR 4/3	L.S	s.g.	L	ns , np	v fe s co M. Fe. cry. gyp.	-
	(2)	0-20	10 YR 5/3	10 YR 3/3	S.C.L	m.	So	s , p	v fe s co M. cry. gyp.	c.s.
		20-50	10 YR 4/3	10 YR 4/1	C.	w.c.ab.	Fi.	vs , vp	v fe s co M. cry. gyp.	d.s
		50-90	10 YR 4/3	10 YR 3/1	C.	w.c.ab.	Fi.	vs , vp	v fe s co	c.s
		90-150	10 YR 5/6	10 YR 5/3	S.C.L	w.c.sb.	Fr	ss , p	v fe s co	-
	(3)	0-15	10 YR 5/6	10 YR 3/6	S.L	m.	So	ss , sp	v fe s co	c.s.
		15-45	10 YR 7/6	10 YR 6/6	S.L.	s.g.	L.	ss , sp	v fe s co	c.s.
		45-95	10 YR 4/3	10 YR 3/3	S.	s.g.	L.	ns , np	v fe s co Mod. cry. gyp.	c.s.
		95-150	10 YR 7/6	10 YR 6/6	S.L.	s.g.	L.	ss , sp	v fe s co F. cry. gyp.	-
South East El-Qantara	(4)	0-30	10 YR 6/3	10 YR 5/3	S.	s.g.	L.	ns , np	f s co co	d.s
		30-70	10 YR 8/4	10 YR 6/4	S.	s.g.	L.	ns , np	f s co co	d.s
		70-150	10 YR 6/3	10 YR 5/4	S.	s.g.	L.	ns , np	f s co	-
	(5)	0-20	10 YR 6/4	10 YR 4/4	S.	s.g.	L.	ns , np	f s co	d.s
		20-75	10 YR 5/4	10 YR 4/4	S.	s.g.	L.	ns , np	f s co	d.s
		75-150	10 YR 6/4	10 YR 4/4	S.	s.g.	L.	ns , np	f s co	-
Rabaa	(6)	0-10	10 YR 6/1	10 YR 5/2	S.	ma	So	ns , np	f s co F. cry. gyp.	c.w
		10-90	10 YR 6/1	10 YR 5/2	S.	ma	So.	ns , np	v f co	c.s.
		90-150	10 YR 6/1	10 YR 5/2	S.	s.g.	L.	ns , np	v f co	-
	(7)	0-25	10 YR 7/4	10 YR 6/4	S.	s.g.	L.	ns , np	v f s co	d.s
		25-70	10 YR 7/2	10 YR 5/1	S.	s.g.	L.	ns , np	v f s co	d.s
		70-130	10 YR 7/3	10 YR 6/4	S.	s.g.	L.	ns , np	v f s co	-

Table (1): Cont.

Location	Profile No.	Depth No.	Colour		Texture	Structure	Consistency		Lime and gypsum	Lower boundary
			Dry	Moist			Dry	Moist		
Bir El-Abd	(8)	0-35	10 YR 7/3	10 YR 6/4	S.	s.g.	L.	ns , np	m s co	c.s.
		35-65	10 YR 7/3	10 YR 6/4	S.	s.g.	L.	ns , np	m s co	c.s.
		65-150	10 YR 8/3	10 YR 6/4	S.	s.g.	L.	ns , np	m s co	-
	(9)	0.35	10 YR 8/4	10 YR 6/4	S.	m	So	ns , np	m s co	d.s
		35.85	10 YR 8/3	10 YR 7/3	S.	s.g	L.	ns , np	m s co	d.s
		85.150	10 YR 8/3	10 YR 7/3	S.	s.g	L..	ns , np	m s co	-
El-Ser and Qawarir	(10)	0.20	10 YR 8/4	10 YR 5/6	S.L.	s.g	L.	ss , sp	m s co	c.s.
		20.70	10 YR 8/4	10 YR 6/4	S.C.L	ma	So	s , p	m s co	c.s.
		70.150	10 YR 8/4	10 YR 6/4	S.L.	ma	Sh	ss , sp	m s co	-
	(11)	0.15	10 YR 7/4	10 YR 5/4	S.L.	s.g.	L.	ss , sp	m s co	d.s
		15.60	10 YR 7/4	10 YR 5/4	S.L.	s.g.	L.	ss , sp	m s co	c.s
		60.80	10 YR 8/6	10 YR 5/6	L.S.	s.g.	L.	ns , np	m s co	c.s
		80.150	10 YR 7/6	10 YR 5/6	S.L.	s.g	L.	ss , sp	m s co	-

Texture	Structure	Consistencey	Lime	Gypsum	Lower Boundary
S : Sand	sg : Single gain	So : Soft	v : Very	cry : Crystal	c : Clear
C : Clay	ma : Massive	L : Loose	fe : Few	v : Very	s : Smooth
SCL : Sandy clay loam	sb : Sub angular blocky	Fi : Firm	s : Soft	fe : Few	d : Diffuse
SL : Sandy loam	ab : Angular blocky	Fa : Friable	co : Concretinos	m : Many	
LS : Loamy sand	w : Weak	ms : Moderately sticky	m : Many		
	c : Coarse	mp : Moderately plastic			
		s : Slightly			
		n : Non			
		v : very			
		sh : Slightly hard			

Table (2): Particle size distribution, textural class, $CaCO_3$, O.M. and gypsum contents of the studied soil profiles.

Location	Profile No.	Depth (cm)	Particle size distribution (%)				Texture class	$CaCO_3$ %	O.M. %	Gypsum %
			C.S	F.S	Silt	Clay				
El-Tina plain	(1)	0-10	0.5	55.9	19.7	23.9	S.C.L	0.3	1.4	2.00
		10-65	37.9	25.0	13.4	23.7	S.C.L	0.2	0.9	6.70
		65-90	69.0	12.7	7.1	11.2	S.L	0.9	0.7	2.60
		90-150	74.0	12.0	8.0	6.0	L.S	1.7	0.6	2.60
	(2)	0.20	22.6	42.3	15.5	19.6	S.C.L	0.4	1.0	8.10
		20-50	16.1	35.4	18.9	29.6	C	0.2	0.8	9.60
		50-90	12.6	37.2	20.9	29.3	C	0.3	0.6	1.50
		90-150	19.0	51.3	10.2	19.5	S.C.L	2.5	0.2	1.50
	(3)	0-15	38.9	34.5	12.3	14.3	S.L	0.4	1.1	2.60
		15-45	71.7	11.1	7.1	10.1	S.L	0.3	0.9	0.80
		45-95	26.0	31.0	10.4	32.7	S.L	2.8	0.9	4.40
		95-150	68.7	15.3	7.0	9.1	S.L	1.1	0.4	2.10
South East El-Qantara	(4)	0-30	4.9	88.2	2.9	4.2	S	4.4	0.2	0.13
		30-70	4.5	89.9	2.4	3.2	S	2.6	0.1	0.17
		70-150	5.6	89.4	2.7	4.0	S	2.6	0.1	0.22
	(5)	0.20	15.7	81.4	0.6	2.3	S	6.1	0.1	0.18
		20-75	13.2	84.7	1.2	2.7	S	5.3	0.1	0.18
		75-150	9.3	86.4	1.1	3.2	S	6.6	0.1	0.22
Rabaa	(6)	0.10	11.1	85.1	3.2	2.8	S	2.4	0.6	2.90
		10-40	7.5	84.5	5.3	2.7	S	1.9	0.3	0.86
		40.70	9.2	86.3	3.3	1.2	S	0.5	0.2	0.61
	(7)	0-25	12.9	82.1	3.2	1.8	S	0.4	0.1	0.20
		25-70	7.8	85.2	5.3	1.7	S	0.6	0.1	0.50
		70-150	11.1	84.9	2.3	1.7	S	0.5	0.2	0.20
Bir El-Abd	(8)	0-35	15.9	80.1	2.8	1.2	S	22.4	0.2	0.20
		35-65	11.5	83.9	3.3	1.3	S	22.1	0.1	0.20
		65-150	8.9	87.1	2.2	1.6	S	24.4	0.1	0.60
	(9)	0-35	19.5	75.5	3.8	1.2	S	22.1	0.3	0.30
		35-85	20.8	72.2	4.8	2.2	S	21.1	0.2	0.20
		85-150	16.5	77.5	4.0	2.0	S	21.2	0.1	0.20
El-Ser and Qawarir	(10)	0-20	27.6	56.2	6.9	9.3	SL	25.2	0.2	1.20
		20-70	30.9	33.1	16.6	19.4	SCL	50.8	0.2	1.20
		70-150	33.9	34.4	17.7	14.1	SL	47.9	0.1	1.30
	(11)	0-15	61.6	22.2	6.3	9.9	SL	34.2	0.1	0.40
		15-60	44.1	37.5	6.5	11.9	SL	25.9	0.1	0.50
		60-80	10.3	79.8	4.5	5.4	LS	23.5	0.1	0.20
		80-150	33.1	46.8	8.5	11.7	SL	20.8	0.1	1.20

C.S.= Coarse sand **F.S.= Fine sand**

Table (3): Chemical composition of the soil saturation extract of the studied soil profiles.

Location	Profile No.	Depth (cm)	pH	EC dS/m	Cations (meq/L)				Anions (meq/L)			
					Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	$SO_4^{=}$
El-Tina plain	(1)	0-10	7.0	219	156	796	4500	23.0	-	1.6	5000	473
		10-65	7.5	171	156	692	2300	34.0	-	1.8	3000	180
		65-90	8.1	110	208	558	1100	23.0	-	2.8	1600	187
		90-150	8.2	133	364	506	1500	30.0	-	2.8	2000	389
	(2)	0.20	7.0	192	156	1302	3700	63.0	-	2.2	5500	281
		20-50	7.6	139	313	987	1600	30.0	-	1.2	2300	628
		50-90	7.5	143	413	1401	1400	27.0	-	1.6	2000	1242
		90-150	7.7	142	521	1250	1500	27.0	-	2.0	2000	1296
	(3)	0-15	7.9	104	156	1035	1400	14.0	-	1.2	1500	1104
		15-45	7.8	152	210	1695	2200	41.0	-	1.4	3500	645
		45-95	8.3	127	363	928	1600	32.0	-	1.6	2000	821
		95-150	7.0	206	263	1404	4700	55.0	-	1.0	4800	1621
South East El-Qantara	(4)	0-20	8.2	1.0	3.2	2.9	3.5	0.5	-	2.0	3.0	5.1
		20-70	8.1	1.3	4.1	3.5	5.0	0.4	-	1.2	4.0	7.8
		70-150	8.1	1.1	3.1	2.9	4.6	0.4	-	0.2	4.2	6.6
	(5)	0.20	7.6	0.5	1.2	1.0	2.3	0.3	-	1.0	2.9	0.9
		20-75	7.9	0.5	1.0	0.8	2.6	0.2	-	1.0	2.9	0.7
		75-150	7.8	0.3	0.8	0.7	0.9	0.3	-	0.6	1.4	0.7
Rabaa	(6)	0.10	8.5	31.0	70.0	75.0	163.0	2.0	-	3.0	300.0	7.0
		10-40	8.3	31.6	75.0	75.0	160.0	1.5	-	3.0	300.0	13.0
		40.70	8.2	39.6	90.0	93.0	212.5	0.4	-	4.4	380.0	11.5
	(7)	0-25	8.5	6.2	3.5	3.5	55.0	0.5	-	2.0	4.0	56.0
		25-70	8.5	5.5	2.1	4.0	44.0	0.3	-	2.0	3.1	50.0
		70-150	8.2	3.6	3.0	3.3	30.0	0.2	-	2.0	4.0	30.5
Bir El-Abd	(8)	0-35	8.7	2.6	8.2	7.3	10.0	6.5	-	4.0	18.0	4.0
		35-65	7.0	2.5	7.0	8.0	7.0	3.0	-	2.0	16.0	7.0
		65-150	9.2	2.0	6.0	6.5	6.5	1.0	-	2.0	17.5	0.5
	(9)	0-35	8.6	0.5	0.5	0.5	4.8	0.2	-	0.5	1.5	4.0
		35-85	8.8	0.4	1.0	1.5	1.2	0.3	-	0.5	1.5	2.0
		85-150	8.8	0.2	0.4	1.0	0.5	0.1	-	0.5	0.5	1.0
El-Ser and Qawarir	(10)	0-20	8.3	4.8	16.0	10.6	22.6	0.9	-	1.9	30.6	17.5
		20-70	8.2	13.6	29.0	27.1	110.3	0.5	-	0.9	124.1	41.7
		70-150	8.3	13.6	30.0	27.0	110.3	0.5	-	0.7	129.2	37.9
	(11)	0-15	9.1	6.9	4.0	2.7	61.9	0.3	-	1.9	39.1	27.7
		15-60	9.1	11.0	7.7	7.5	119.0	0.2	-	1.9	88.4	44.1
		60-80	8.9	4.8	4.0	2.7	42.5	0.2	-	2.9	34.0	12.3
		80-150	9.2	13.8	16.5	12.0	123.8	0.2	-	2.5	90.1	60.1

The soils under study have been developed under arid conditions. The prevailing arid climate, difference in the parent materials and the age of the area are the dominant factors affecting the formation and natural of the soils.

Applying soil Taxonomy (1975) and Keys of soil Taxonomy (USDA 1998), the soils of El-Salam Canal can be classified into two orders, *Entisols* and *Aridisols* (Fig. 2 and Table 4).

1- Entisols:

This order includes the soils of South east El-Qantara, Raba and Bir El-Abd. These soils are mineral soils devoid of any observable signs of soil development and do not have any diagnostic horizons. The texture is sand and the soils are usually dry in all parts of the year and do not have cracks or lithic and or paralithic contact within 50 cm of the soil surface. They are a torric moisture regime and thermic characteristic. Therefore, these soils are placed in the order *Entisols*, Suborder. *Psamments* and *Aquents*.

1- Sub order Psamments:

Soils of profiles 4 and 5 (South east El-Qantara, profiles 8 and 9 (Bir El-Abd and profile 7, (Rabaa) are deep sandy devoid of fragments of any diagnostic horizons and usually are dry in most of the year within one meter of the surface. These soils are suggested to be placed to the suborder *Psamments* and great group *Torripsamments* and sub group *Typic Torripsamments*. According to the particle size classes and mineralogy of these soils three families levels were distinguished as follows.

1- *Typic Torripsamments, siliceous, thermic* (Profiles 4, 8 and 9).

2- *Typic Torripsamments, mixed, thermic* (profile 3).

3- *Typic Torripsamments, sandy, thermic* (profile 7).

2- Sub order Aquents:

The Aquents suborder are permanently or esasonally wet (Saturation) and indicating the aquic condition within 50 cm of soil surface. The Aquent in the studied area is found in Rabaa soils (profile 6) in the low parts of sand dunes near El-Tina plain. These soils are characterized by deep sandy texture and could be classified as *Psammaquents* great group, *Typic psammaquents* subgroup and family level as *Typic Psammaquents, siliceous, thermic* (profile 6).

3- Order Aridisols

Aridisols are defined as soils having ochric epipedons and one or more of the following subsurface horizons, argillic, cambic, natric; gypsic, calcic, petrocalcic or duripan. They are dry or have a saturated extract conductivity of more than 2 dSm^{-1} at 25°C in the 18-50 cm layer or a bove a lithic or paralithic contact whichever is shallower.

Table (4): Classification of the studied soil profiles (according to Soil Taxonomy 1998).

Location	Order	Sub order	Great Group	Sub Group	Soil Family	Profile No.
El-Tina Plain	Aridisols	Salids	Aquisalids	Gypsic Aquisalids	Coarse loamy , mixed , thermic	1
					Fine loamy, mixed, thermic	2
			Haplosalids	Typic Haplosalids	Fine loamy, mixed, thermic	3
South east El-Qantara	Entisols	Psamments	Torripsamments	Typic Torripsamments	Siliceous, thermic	4
					Mixed, thermic	5
Rabaa	Entisols	Aquents	Psammaquents	Typic Psammaquents	Siliceous, thermic	6
		Psamments	Torripsamments	Typic Torripsamments	Sandy, thermic	7
Bir El-Abd	Entisols	Psamments	Torripsamments	Typic Torripsamments	Siliceous, thermic	(8,9)
El-Ser and Qawarir	Aridisols	Calcids	Haplosalids	Xeric Haplocalcids	Loamy, carbonatic, thermic	10
					Sandy, mixed, thermic	11

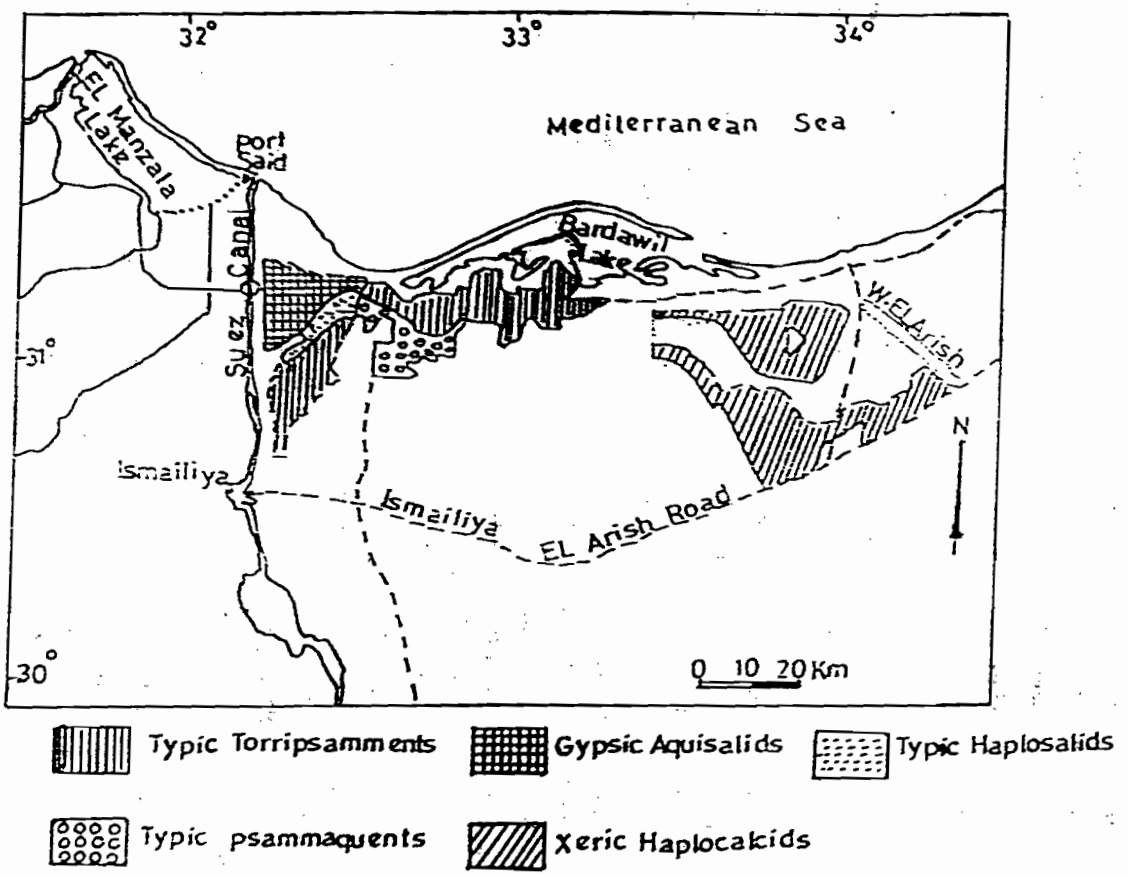

Fig. (2): Soil classification of El-Salam Canal

In the light of the relevent soil properties, two suborders can be distinguished under the order *Aridisols* namily *Salids* and *Calcids*.

1- Suborder Salids .

The soils of El-Tina plain (represented by profiles 1,2 and 3) are characterized by high salinity and covered with a salt crust, which contain very high amounts of soluble salts. These soils are virgin and formed on old Nile alluvium sediments (Profiles 1 and 2), while profile 3 is formed from sediments mainaly deposited by wind action. The soils have salic horizon within the upper 1 m, the soils are saturated within the upper 100 cm, depth for most of the year, and have gypsic horizon that has its upper boundary within 100 cm of the soil surface. Therefore, it could be classified as *Aquisalids* great group and *Gypsic Aquisalids* subgroup. At the family levels, they are placed into two families:

1- *Gypsic Aquisalids, fine loamy, mixed, thermic* (profile 2).
2- *Gypsic, Aquisalids, coarse loamy, mixed, thermic* (profile 1).

The examined El-Tina plain soils (Profile 3) don't have aquic condition, don't have gypsic horizon and its control section texture. class is sandy loam. These soils could be classified as *Haplosalids* great group and *Typic Haplosalids* subgroup. One family can be identified under this sub group in the studied soils.

1- *Typic Haplosalids, fine loamy, mixed, thermic* (profile 3).
2- Suborder Calcids.

The morphological aspects and analytical data of the soils of El-Ser and El-Qawarir are moderately saline and mineral soils. The texture varies from loamy sand to sandy clay loam. The soils have high content of calcium carbonate and organic matter content is very low. The soils have calcic horizon whose upper boundary is within 1 m, having thermic temperature regime and an aridic soil moisture regime. They do not have argillic or natric horizons and also do not have a salic horizon above the calcic horizon consequently, the soils is suggested to placed in the *Haplocalcids* great group these soils that are dry in all parts of the moisture control section for less than three – fourths of the time when the soil temperature is 5°C or higher at a depth of 50 cm and have a soil moisture regime that borders on xeric. The soils is placed in *Xeric Haplocalcids* subgroup. At the family levels, they are placed into two families.

1- *Xeric Haplocalcids, loamy, carbonatic, thermic* (profile 10).
2- *Xeric Haplocalcids, sandy, mixed, thermic* (profile 11).

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تقسيم أراضى ترعة السلام – شمال شبه جزيرة سيناء

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تعتبر منطقة زمام ترعة السلام فى الجزء الشمالى من شبه جزيرة سيناء من أهم المناطق المستهدفة للامتداد الزراعى حيث تميزت هذه المنطقة بتكوينات جيومورفولوجية معينة ذات أراضى متباينه الصفات. وقد استهدف هذا البحث دراسة الخواص المورفولوجية والطبيعية والكيميائية لأراضى ترعة السلام بغرض تقسيمها باستخدام التقسيم الأمريكى الحديث ١٩٩٨ وتشير نتائج الدراسة إلى مايلى:

١- أراضى جنوب القنطرة وبئر العبد ورابعة ثم تقسيمها ووضعها تحت رتبة الأراضي الحديثة *Entisols* حيث أنها لا تحتوى على أفاق تشخيصية. وقد أمكن تقسيم هذه الأراضي كالتالى :

1- Order : *Entisols*:

a) Suborder: *Psamments.*
Great group: *Torripsamments*
Subgroup: *Typic Torripsamments* (ويمثلها قطاعات ٤، ٥، ٧، ٨، ٩).

b) Suborder: Aquents
Great group: *Psammaquents*
Subgroup: *Typic psammaquents* .(ويمثلها قطاع ٦)

٢- أراضى سهل الطينة وجد انه يحتوى على أفق ملحى وكذلك أراضى السرو و القوارير تحتوى على أفق كلى لذلك تم تقسيمها ووضعها تبعا لرتبة Aridisols وقد تم تقسيم هذه الأراضى كالتالى:

2- Order: Aridisols:

a) Suborder : Salids
Great group: *Aquisalids*
Subgroup: *Gypsic Aquisalids*. (ويمثلها قطاع ١ ، ٢)
Great group: *Haplosalids*
Sub group: *Typic Haplosalids*. (ويمثلها قطاع ٣)

b) Suborder: *Calcids*
Great group: *Haplocalcids*
Sub group: *Xeric Haplocalcids* (ويمثلها قطاعات ١٠، ١١)