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SOIL POTENTIALITIES AS USEFUL MEAN FOR PLANNING AGRICULTURAL DEVELOPMENT IN "SAHL BARAKA"- FARAFRA OASES, NEW VALLEY:
I- EXPLORATION, SURVEY AND CLASSIFICATION

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ABSTRACT

The study area of "Sahl Baraka" covers about 10.000 feddan at Farafra oasis- New Valley. Forty two soil profiles have been selected to represent the variation in the soils of the study area. According to the morphological description, climatic conditions, physical and chemical analyses and USDA (1999), these soil can be classified as the following: *Typic Torripsamments*, Typic Quartzipsamments, Typic Haplocalcids, Gypsic Haplocalcids, Typic Calcigypsids, Lithic Calcigypsids, and Gypsic and Calcic Aquisalids.

In general more than 50% of the study area are sandy soils (*Typic Torripsamments* and Quartzipsamments). These soils can be easily cultivated. The second soil units of Aridisols contain Calcids, Gypsids and Salids suborders. The soils of Calcids covers more than 25% of the study area. Gypsids suborder included of 5 soil profiles. There is a small area (about 20 fed.) identified as Lithic Calcigypsids subgroup which characterized by calcareous rocky profile. The suborder of Salids represented by wet calcareous shale, Salic Calcic and Salic Gypsic horizons are present in most layers. This type of soil is very limited and covers about 20 feddans, from the studied area.

It can be concluded that soil survey and classification are very essential and important for investing any virgin area for agricultural development and rural rehabilitation as in the case of Sahl Baraka in Farafra oasis.

Keywords: Geology and meterology of Farafra oases, soil survey and classification

INTRODUCTION

The location of the investigated area belongs to "Sahl Baraka" Farafra oasis- New Valley governorate (Fig.1). The studied area cover about 10.000 fed, and located 8 km, south of the site with coordinates: N.27° 01′ 40″, E. 28° 15′ 32″, which lies 35 km east of Farafra city (N.27° 03′ 55″, &. E 27° 58′ 13″) along well constructed Farafra- Assiut main road.

The meteorological data of Farafra oasis can be summarized as follows:

The minimum monthly temperature ranged between 5°C- 22°C in January and December, the maximum in July and August (20°C- 38°C). The rainfall is very rare during winter (0.9 mm). The relative humidity is maximum during November-January. The evaporation rate reaches the maximum value of 25 mm at the summer months. The maximum rate of wind speed is 5.5 km/h during April-May which known as khamaseen wind (Meteorological data of Egypt. 1991). Farafra depression, from the geological point of view, lies in the Western Desert, 300 km west of Assiut. It has an irregularly triangular shape with the apex to the north, its breadth increases as one goes south.

Figure (1): Location of the study area, "Sahl Baraka", Farafra oases in the Western Desert.

The floor of the depression has three rock units, these are from top to bottom: Farafra limestone, Esna formation (shale) and chalk. (Said & Kerdany 1961). Overlying the chalk are series of green shale that belonging to the Esna formation unit, ranges from 120-160 meter thick.

The extension of rehabilitation in Egypt into the vast desert areas is a must to enhance the agricultural income after the overwhelming increase in population on the limited cultivable land of the Nile Delta and Valley. The oases of the Western Desert are the most promising and prospective regions for agricultural development investing the Nubian water reservoir.

The Farafra oasis has very distinct ecological conditions for its location, geomorphology, land and water resources. However few investigations have been conducted mostly from geological point of view.

In this respect, Luo-Wei (1995) pointed to the field and remote sensing observation demonstrate the depressions of the Western desert of Egypt are mainly occupied by shales that are impermeable but easily erodible by rainfall and runoff, whereas the surround in plateaus are composed of limestones that are permeable and more resistant to fluvial erosion under semiarid to arid conditions. Mohamed (1995) concluded that Farafra oasis and the surrounding areas present extensive development of duricrust and karst products. Silcretic duricrust caps scattered isolated hills covering the floor of the low-areas and as in-place deposits in the lower horizon of the Tarawan formation (late Paleocene). Sallam *et al.* (1995) added that El-Farafra depression is a sandy landscape interlayer with gray and red shale deposits of clay texture (clay content 72% for gray shale and 56% for red shale), suggesting their possible suitability as soil conditioners. Dealing with soil texture, Asma (1995) studied the evaluation of the grain size parameters in selected areas affected by aeolian activities. The dominant sand fraction of El-Farafra depression samples was 0.5 mm. The samples were well sorted and skewed towards a coarse admixture. The statistical grain size parameters were not always consistent in designating the aeolian depositional environment. Also Beshay and Sallam (1994) studied the characteristics of different sand fractions formed in aeolian, alluvial and lacustrine sedimentation environments in El-Farafra depression. They found that the sand fraction of aeolian deposits were dominated by medium sand (5-0.25 mm), followed by fine sand (0.25-0.05 mm) and then coarse sand (2-0.5 mm). The sand fraction of the lacustrine deposits was dominated by fine and very fine sand. The alluvial environment was characterized by irregular grain size distribution with depth. Soils formed in the aeolian environment had uniform parent materials. Throughout, but soils formed under the alluvial and lacustrine environments showed heterogeneity of parent material with depth.

MATERIALS AND METHODS

Soil Sampling: A semi-detailed survey for 10.000 fed. in “Sahl Baraka”, Farafra oasis area and selection of 42 soil profile sites has been done using Geographic Position System (GPS). Location of the investigated soil profiles and the geographic position of the study area laid out in (Fig.2). A profile has

been dug in each site to a depth of about 150 cm or to the present of hard layers. Detailed morphological description for the suecessive layers of each profile and the surrounding features are cited.

Laboratory Analyses: Soil analyses were carried out on the various layers of 42 soil profiles (100 samples) as follow:

Grain size distribution and texture classes of soil samples according to Soil Conservation Service 1984.

Soil chemical analyses as pH (1:2.5 suspension), EC (1:1 extraction), gypsum and total calcium carbonate, organic mater content and Soluble cations and anions meq/L (Black *et al.* 1982)

- Classification of the soil profiles according to USDA (1999).

Figure 2: Location of the investigated soil profiles and the geographic position of the study area

RESULTS AND DISCUSSION

The main objective of this study is to classify and estabishing soil map to provide a comprehensive knowledge about the potentialites of these areas. Adequate soil classification is very useful mean for planning agriculture, irrigation and economic development.

According to the climatic conditions of the study area, the morphological soil description in the field and USDA (1999), the physical and chemical data which provided through laboratory analyses and applying the most recent and well established as well as widely accepted system of classification (USDA 1999). The soils of "Sahl Baraka" can be classified to the following great soil subgroups:

***Typic Torripsamments*:**

This subgroup of soil covers relatively the largest area in the study area and represented by profiles no.1, 2, 3, 6, 7, 8, 9, 11, 12, 13, 19, 20, 21, 22, 27, 28, 32, 36, 37 and 38. Windblown sands with level surface form these areas. The natural vegetation is very few, and present as small dry shrubs covered with sands. They are characterized by deep profile, naturally well drained due to its coarse soil texture, mostly coarse sand. These soils are non saline. The precipitation of lime is found in some profiles and $CaCO_3$ % ranges between 5-15% (Table 1).

Typic Quartzipsamments:

Profiles no. 14, 25, 26 and 30 represent this soil subgroup. This limited area covered with windblown sand. The soil profiles are deep, homogeneous. The soil surface is level, without natural vegetation. These soils are bright yellowish brown colour (10YR 7/6). The coarse sandy texture has more than 95% quartz and other resistant material. Calcium carbonate content is very low (<5%) and free of soluble salts and gypsum (Table 2).

Typic Haplocalcids:

This subgroup represented by soil profiles no. 4,5,15,17,18,23,29,31,34 and 41. Calcic horizon is forming one or more layers of these profiles, $CaCO_3$ % is > 15 %.

Due to stratification in some layers of the soil profiles, the drainage conditions range from perfect to moderately drained (Table 3).

Gypsic Haplocalcids:

This subgroup of soils includes profiles no 24 and 39. Calcic horizon is present in one or more layers of the profiles. Also gypsum precipitation are present and cementing soil particles forming friable gypsum aggregates (Table 4).

Table 1: Representative soil profile description of *Typic Torripsamments* and some of its chemical and physical analyses

Profile No.: (1)
Location:Long.: 28° 16` 42`` E Lat.: 26° 55` 40`` N
Elevation: 120-m (396 F) (a.s.l.)
Topography: Nearly level
Parent material: Landenian (upper Paleocene) deposits
Natural vegetation: None
Drainage conditions: Well drained (naturally)
Profile depth: Very deep
Remarks: Some patches of black coarse sand cover the surface

Depth (cm)	Description Colour-texture-structure-consistency-$CaCO_3$-mottles-concretions-root distribution-boundary
0 – 30	Light yellow orange (10YR 8/4 dry), bright yellowish brown (10YR 7/6 moist); sandy; single grains; loose; slight effervescence with HCl; many, fine, soft aggregates of sand with salt; diffuse wavy boundary.
30 – 60	Dull yellow orange (10YR 7/4 dry), bright yellowish brown (10YR 6/6 moist); sandy; structure-less; single grains; loose; slight effervescence with HCl; few, fine, soft aggregates of sand with salt and gypsum; diffuse smooth boundary.
60 – 150	Dull yellow orange (10YR 7/4dry), bright yellowish brown (10YR 6/6 moist); fine sand; structure-less; single grains; loose; slight effervescence with HCl; regular thin, smooth stratification of coarse and fine sand.

Some Chemical Properties

Depth (cm)	pH 1:2.5	EC dS/m 1:1	O.M. %	Soluble cations & anions meq/L						
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$ + HCO_3^{-}	Cl^{-}	$SO_4^{=}$
0 – 30	8.00	2.3	<0.5	6.1	4.5	10.6	1.8	1.0	14.4	7.6
30 – 60	7.83	3.7	<0.5	14.5	5.0	15.3	2.2	1.6	24.4	11
60 – 150	7.90	3.6	<0.5	11.2	7.3	16.0	1.5	1.1	20.1	14.5

Gypsum, $CaCO_3$ contents and particle size distribution by dry sieving method

Depth (cm)	Gypsum %	$CaCO_3$ %	Particles size distributions %				Texture Class
			C. sand 2-0.5 mm	M. sand 0.5-0.1	F. sand 0.1-0.05	Silt+ clay <0.05	
0 – 30	---	11.0	49.1	44.2	4.7	2.0	Coarse sand
30 – 60	2.5	13.4	32.0	64.9	2.6	0.5	Coarse sand
60 – 150	3.0	7.7	39.5	58.5	1.6	0.4	Coarse sand

Table 2: Representative soil profile description of Typic Quartzipsamments and some of its chemical and physical analyses

Profile No.: (14)
Location: Long.: 28° 16` 55`` E Lat.: 26° 56` 52`` N
Elevation: 120 m (394 F) (a.s.l.)
Topography: Level
Parent material: Landenian (upper Paleocene) deposits
Natural vegetation: Very few scattered dried small shrubs covered with sand
Drainage conditions: Well drained (naturally)
Profile depth: Very deep

Depth (cm)	Description Colour- texture-structure-consistency-$CaCO_3$-mottles-concretions-root distribution-boundary
0 – 20	Light yellow orange (10YR 8/4 dry), dull yellow orange (10YR 7/4 moist); sandy; structure-less; massive, soft; non-calcareous; diffuse, smooth boundary.
20 – 150	Dull yellow orange (10YR 7/4 dry), bright yellowish brown (10YR 7/6 moist); sandy; structure-less; single grains; loose; non-calcareous; regular thin, smooth stratification of coarse and fine sand.

Some Chemical Properties

Depth (cm)	pH 1:2.5	EC dS/m 1:1	O.M. %	Soluble cations & anions meq/L						
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$+ HCO_3^{-}	Cl^{-}	$SO_4^{=}$
0 – 20	8.38	2.4	<0.5	7.5	4.1	11.3	1.1	0.7	15.0	8.3
20 – 150	8.30	1.7	<0.5	5.5	3.8	6.7	1.0	0.6	10.0	6.4

Gypsum, $CaCO_3$ contents and particle size distribution by dry sieving method

Depth (cm)	Gypsum %	$CaCO_3$ %	Particles size distributions %				Texture Class
			C. sand 2-0.5 mm	M. sand 0.5-0.1	F. sand 0.1-0.05	Silt+ clay <0.05	
0 – 20	---	3.3	54.4	40.6	3.7	1.3	Coarse sand
20 – 150	---	4.2	33.2	64.4	2.0	0.4	Coarse sand

Table 3: Representative soil profile description of *Typic Haplocalcids* and some of its chemical and physical analyses

Profile No.: (4)
Location: Long.: 28° 18` 31`` E Lat.: 26° 56` 11`` N
Elevation: 129 m (422 F) (a.s.l.)
Topography: Nearly level
Parent material: Landenian (upper Paleocene) deposits
Natural vegetation: None
Drainage conditions: Very well drained (naturally)
Profile depth: Very deep
Remarks: Few patches of black coarse sand cover the surface

Depth (cm)	Description Colour-texture-structure-consistency-$CaCO_3$-mottles-concretions-root distribution-boundary
0 – 30	Light yellow orange (10YR 8/4 dry), bright yellowish brown (10YR 7/6 moist); medium sand with few coarse black sand; structure-less, single grains; loose; moderate effervescence with HCl; diffuse, smooth boundary.
30 – 80	Bright yellowish brown (10YR 7/6 dry), bright yellowish brown (10YR 6/6 moist); fine sand; structure-less, single grains; loose; moderate effervescence with HCl; no changes with depth.
80 – 150	Bright yellowish brown (10YR 7/6 dry), bright yellowish brown (10YR 6/6); very fine sand; structure-less, single grains; loose; non-calcareous; no changes with depth.

Some Chemical Properties

Depth (cm)	PH 1:2.5	EC dS/m 1:1	O.M. %	Soluble cations & anions meq/L						
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$+ HCO_3^{-}	Cl^{-}	$SO_4^{=}$
0 – 30	8.00	2.2	<0.5	6.2	4.3	9.8	1.7	1.1	15.0	5.9
30 – 80	7.93	3.4	<0.5	11.0	7.0	14.6	1.4	1.0	25.3	7.7
80 – 150	8.10	1.1	<0.5	3.3	2.4	4.7	0.6	0.4	6.3	4.3

Gypsum, $CaCO_3$ contents and particle size distribution by dry sieving method

Depth (cm)	Gypsum %	$CaCO_3$ %	Particles size distributions %				Texture Class
			C. sand 2-0.5 mm	M. sand 0.5-0.1	F. sand 0.1-0.05	Silt+ clay <0.05	
0 – 30	---	26.0	38.7	48.5	8.8	4.0	Coarse sand
30 - 80	---	20.5	36.3	39.9	9.1	4.7	Coarse sand
80 – 150	2.5	4.1	54.6	39.1	5.3	1.0	Coarse sand

Table 4: Representative soil profile description of *Gypsic Haplocalcids* and some of its chemical and physical analyses

Profile No.: (24)
Location: Long.: 28° 19` 02`` E Lat.: 26° 58` 05`` N
Elevation: 129 m (422 F) (a.s.l.)
Topography: Level
Parent material: Landenian (upper Paleocene) deposits
Natural vegetation: None
Drainage conditions: Very well drained (naturally)
Profile depth: Very deep
Remarks: Very friable small gypsum forms, some died roots

Depth (cm)	Description Colour-texture-structure-consistency-$CaCO_3$-mottles-concretions-root distribution-boundary
0 – 30	Bright yellowish brown (10YR 7/6 dry), bright yellowish brown (10YR 6/6 moist); sandy; structure-less, single grains; loose; moderate effervescence with HCl; diffuse, smooth boundary.
30 – 50	Dull yellow orange (10YR 7/4 dry), dull yellow orange (10YR 6/4 moist); sandy; structure-less, single grains; loose; few, fine, died roots moderate effervescence with HCl; diffuse, smooth boundary.
50 – 150	Bright yellowish brown (10YR 7/6 dry), bright yellowish brown (10YR 6/6 moist); sandy; structure-less, single grains; loose; moderate effervescence with HCl; common, fine, died roots; common, medium, strong and fine aggregates of sand with salts and gypsum.

Some Chemical Properties

Depth (cm)	pH 1:2.5	EC dS/m 1:1	O.M. %	Soluble cations & anions meq/L						
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}+HCO_3^{-}$	Cl^{-}	$SO_4^{=}$
0 – 30	8.10	3.5	<0.5	10.8	6.5	16.1	1.6	1.1	22.2	11.7
30 – 50	8.37	3.4	0.65	10.5	6.0	16.0	1.5	1.0	21.1	11.9
50 – 150	8.04	7.2	0.65	17.5	10.1	41.6	2.8	2.0	43.3	26.7

Gypsum, $CaCO_3$ contents and particle size distribution by dry sieving method

Depth (cm)	Gypsum %	$CaCO_3$ %	Particles size distributions %				Texture Class
			C. sand 2-0.5 mm	M. sand 0.5-0.1	F. sand 0.1-0.05	Silt+ clay <0.05	
0 – 30	---	21.5	40.1	43.0	5.1	1.8	Coarse sand
30 - 50	9.3	22.5	43.3	48.7	6.3	1.7	Coarse sand
50 - 150	11.1	15.4	42.8	49.1	6.4	1.7	Coarse sand

Lithic Calcigypsids:

This soil type covers a limited area (profile no. 10) of about 20 feddan only. Have shallow soil profile (less than 40 cm), usually rocky area. The calcareous rock, mostly limestone, is hard to be ground for analysis (Table 5).

Table 5: Representative soil profile description of *Lithic Calcicgypsids* and some of its chemical and physical analyses

Profile No.: (10)
Location: Long.: 28° 18` 19`` E Lat.: 26° 56` 42`` N
Elevation: 120 m (393 F) (a.s.l.)
Topography: Nearly level, no vegetation.
Parent material: Landenian (upper Paleocene) deposits
Natural vegetation: Some dry scattered small shrubs covered with sand dunes.
Drainage conditions: Poor
Depth of hard Pan: After 30 cm of blown sand.
Profile depth: Shallow
Remarks: Common, irregular, distributions of limestone patches (O 2-4 m^2) cover 2-3% of the area of this site, black gravels cover the surface

Depth (cm)	Description Colour-texture-structure-consistency-$CaCO_3$-mottles-concretions-root distribution-boundary
0 – 30	Bright yellowish brown (10YR 6/6 dry), bright yellowish brown (10YR 6/8 moist); sandy; structure-less; single grains; loose; moderate effervescence with HCl; few, fine, irregular aggregates of sand with salts and gypsum; many, fine platy of limestone fragments; diffuse, smooth boundary.
> 30	Limestone rock rich in gypsum precipitations, platy, hard; very strong effervescence with HCl. Calcareous Rock

Some Chemical Properties

Depth (cm)	pH 1:2.5	EC dS/m 1:1	O.M. %	Soluble cations & anions meq/L						
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}+HCO_3^{-}$	Cl^{-}	$SO_4^{=}$
0 - 30	8.15	8.6	<0.5	20.1	13.4	49.0	3.5	2.7	52.9	30.4

Gypsum, $CaCO_3$ contents and particle size distribution by dry sieving method

Depth (cm)	Gypsum %	$CaCO_3$ %	Particles size distributions %				Texture Class
			C. sand 2-0.5 mm	M. sand 0.5-0.1	F. sand 0.1-0.05	Silt+ clay <0.05	
0 – 30	18.8	16.3	54.9	40.7	3.6	0.8	Coarse sand

Gypsic and Calcic Aquisalids:

This group is repressed by profile no. 42. This profile is described in the field as wet saline soil (EC>30 dS/m) which satisfy the requirement of Salic horizon, besides the present of Calcic and Gypsic horizons. The texture in this soil is clayey particularly in subsurface layer (Table 6).

Table 6: Representative soil profile description of *Gypsic*_and *Calcic Aquisalids* and some of its chemical and physical analyses

Profile No.: (42)
Location: Long.: 28° 18` 20`` E Lat.: 26° 59` 39`` N
Elevation: 110 m (361 F) (a.s.l.)
Topography: Nearly level – few little hills (7-10%)
Parent material: Landenian (upper Paleocene) deposits
Natural vegetation: Many, dry scattered shrubs, covered by small sand dunes
Drainage conditions: Poor
Depth of water Table: At 2 – 2.5 m
Profile depth: Shallow
Remarks: Most of the area is sand sheet covers the subsurface of the calcareous deposits. Location of the profile is in calcareous deposits hill (2-3 m height and with total area about 25 feddan), 3 Palm trees.

Depth (cm)	Description Colour-texture-structure-consistency-$CaCO_3$-mottles-concretions-root distribution-boundary
0 – 20	Light yellow orange (10YR 8/4 dry), dull yellow orange (10YR 7/4 moist); sandy; structure-less, single grains; loose; moderate effervescence with HCl; abrupt, irregular boundary.
20 - 150	Grayish yellow (2.5Y 7/2 dry), grayish yellow (2.5Y 6/2 moist); clay; soft and hard, large and medium, platy, covered with dark precipitations; and coarse, hard, blocky white, soft, crystalline, gypsum and lime precipitations of about (20-25%); very strong effervescence with HCl.

Some Chemical Properties

Depth (cm)	pH 1:2.5	EC dS/m 1:1	O.M. %	Soluble cations & anions meq/L						
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}+HCO_3^{-}$	Cl^{-}	$SO_4^{=}$
0 – 20	7.94	3.3	<0.5	10.1	7.2	14.2	1.5	1.0	19.4	12.6
20 - 150	7.60	32.5	<0.5	73.4	55.6	189	6.9	4.2	266	55.3

Gypsum, $CaCO_3$ contents and particle size distribution by dry sieving method

Depth (cm)	Gypsum %	$CaCO_3$ %	Particles size distributions %				Texture Class
			C. sand 2-0.5 mm	M. sand 0.5-0.1	F. sand 0.1-0.05	Silt+ clay <0.05	
0 – 20	2.8	14.3	59.4	33.4	5.0	2.2	Coarse sand
20 - 150	18.7	72.8	Calcareous Deposits				Clay Calcareous

CONCLUSIONS

From the field observation and semi detailed survey as well as laboratory analysis for some soil parameters the classification until the subgroup level could be obtained. It is obvious that most of the area of Sahl Baraka in Farafra oasis which are included in the suborder of Psamments (Torripsamment and Quartzipsamment) are characterized by sandy texture, homogeneous deep profile, non saline, free or slightly calcareous. This group of soils can be easily cultivated if enough ground water can be provided. However, good production is expected to be obtained under favorable management condition. The calcareous soils (Typic Haplocalcids and Gypsic Haplocalcids) require careful selection of crops and amendment of nutrients through fertilization program.

The limited area, which is classified as Lithic Calcigypsids, can be invested as infrastructure or utility buildmap for the farm. The clayey wet saline location (Aquisalids) is due to subsurface hard layer as indicated from field observation. Such shallow profile can be excluded from cultivation of field crops or any fruit trees, usually it require specific remediation.

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الاستفـادة من القدرة الكامنة للتربة فى التخطيط الزراعى المتطور لسهل بركه - واحة الفرافرة ـ الوادى الجديد

١- حصر وتقسيم الأراضى

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الهدف الرئيسي من الدراسة هو حصر وتصنيف الأراضي لسهل بركه وتحديد أنواع الأراضي السائدة بها بهدف التعرف على نوعية الأراضي السائدة لوضع السياسات الزراعية المثلى لها.

تقع منطقة الدراسة على مساحة ١٠,٠٠٠ فدان في سهل بركه بواحة الفرفرة- محافظة الوادى الجديد. ولدراسة المنطقة تم أخذ عدد ٤٢ قطاع أرضى تمثل التباين الموجود فى أراضى المنطقة. وتم دراسة كل من الطبوغرافية- نوع النبات النامية طبيعيا- عمق القطاع- منسوب الماء الأرضى- مادة الأصل وتم وصف القطاعات الأرضية مورفولوجيا وأخذ عدد ١٠٨ عينة تربة للتحليل.

وبناء على الوصف المورفولوجى للقطاعات وبيانات الأرصاد الجوية ونتائج التحاليل المعملية على عينات التربة تم تحديد الصفات العامة لكل قطاع وتقسيمه حسب التقسيم الأمريكي للأراضى لعام ١٩٩٩ كالتالى:

1- الأراضى الرملية Psamment والتى تمثل اكثر من ٥٠% من المساحة الكلية المدروسة والتى تشتمل على الوحدات Typic Torripsamment, ويمثل هذه الوحدة القطاعات ارقام ١،٢،٣،٦،٧،٨،٩،١١،١٢،١٣،١٩،٢٠،٢١،٢٢،٢٧،٢٨،٣٢،٣٦،٣٧،٣٨.
Typic Quartzipsamment ويمثل هذه الوحدة القطاعات ارقام ١٤،٢٥،٢٦،٣٠.

2- الأراضى الجيرية Typic Haplocalcids والتى تميزت بوجود أفق كلسى وتمثلها القطاعات ارقام ٤،٥،١٥،١٧،١٨،٢٣،٢٩،٣١،٣٤،٣٩.وتحتوى على تكوينات جبسية Gypsic Haplocalcids ويمثلها القطاعات ارقام ٢٤،٤١. وهى تمثل حوالى ٢٥% من المساحة المدروسة.

3- الأراضى الجبسية Gypsic وتتميز بأحتوائها على آفاق كلسيه تعلو أفاق جبسيه ويمثلها القطاعات ارقام ١٦،٣٣،٣٥،٤٠. Lithic Calcigypsids, Typic Calcigypsids (قطاع رقم ١٠) حيث يوجد أفق جيرى صلب على عمق اقل من ٤٠ سم ويغطى مساحة ٢٠ فدان.

4- الأراضى الملحية Salids ويمثلها بالوحدة Gypsic and Calcic Aquisalids (القطاع رقم ٤٢) وتغطى مساحتها اقل من ٤٠ فدان.