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STATUS OF AGRICULTURE ENVIRONMENT IN NEW BURG EL-ARAB, ALEXANDRIA, EGYPT.

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ABSTRACT

The studied area of New Burg El-Arab city is located south west of Alexandria between King Maryut and El-Hammam. The soils under consideration belong to physiographic unit as follows:
I. Order beach ridge soils which have:
a) Order beach ridge predominantly shallow over rock which classify according USDA 2014 as:
- Lithic Haplocalcids, loamy skeletal, mixed, thermic.
b) Order beach ridge predominantly very shallow over subsoil which appear three taxonomic units as follows:
- Typic Haplocalcids, fine loamy, mixed, thermic.
- Typic Haplocalcids, coarse loamy, mixed, thermic.
- Typic Haplocalcids, clayey, mixed, thermic.
c) Complex (a) and (b): the representative profile for deep soils classify as follows:
- Typic Haplocalcids, fine loamy, mixed, thermic.
II. Soils of the plain: A vast plain just behind the ridges and emphasize to two subunits:
D) Marine lacustrine shallow plains, which have the following taxonomic class:
- Lithic Haplocalcids, fine loamy, mixed, thermic.
F) Marine lacustrine very deep plains which appear the soil classification as follows:
- Typic Haplocalcids, clayey, mixed, thermic.
III. Windblown soils: These soils are corresponding to taxonomy class as follows:
- Typic Haplocalcids, sandy, mixed, thermic.
Data of land evaluation reval to the limitation of suitability following trend.
Soil depth > Calcium carbonate contents > Texture > Wetness > Salinity & alkalinity > Gypsum content > Topography.
Evaluation of irrigation water appeared that the sample has no problem in generally.
Keywords: status, Agricultural environment, Burg El-Arab.

INTROUDUCTION

The meteorological data of the studied area, representing the mean of 34 years record total annual rainfall 199.4mms and the maximum monthly rainfall is 55.6mms in December, while during June and July is traces. The highest monthly temperature of 30.6 ºC was recorded during August, while, the lowest one of 9.1 ºC was observed in January, with an annual mean of day 19.8 ºC. The highest monthly evaporation occurs in September (5.9mms/day), while, the lowest (3.8mms/day) was that of December. Wind velocity varies from 6.1 to 8.9 Knots, the highest was realized in March. The soil moisture regime is Aridic or Torric. In the aridic moisture regime, moisture control section in most years is dry in all parts more than half the time that the soil temperature at a depth of 50cm is above 5 ºC and never moist in some or all parts for as long as 90 consecutive days when the soil temperature at a depth of 50 cm is above 8 ºC, on the other hand, the soil temperature regime is Thermic, where, the annual soil temperature is 15 ºC or higher but lower than 22 ºC and the difference between mean summer and mean winter soil temperature is more than 5 ºC at a depth of 50cm, according to USDA, 2014.

The coastal zone west of Alexandria shows a succession about five limestone ridges at varying distances from each other parallel to the coastline. The ridges are marine coastal beach ridges formed throughout the Pleistocene in successive periods of high sea level – i.e. interpluvials – as the result of off-shore currents. These ridge, through originally consisting of loose material, now from more or less hard limestone, while the underlying beach plain subsoil below the more clayey deposits is also more or less indurate. The limestone is described as oolitic the individual sand grains which formed the deposit making up the structure of the stone; in this case the grains were of lime. The plains of coarse sandy loam and clay loam soils from part of landscape of the coastal zone of the Mediterranean seaboard which is marked by a number of limestone ridges running at varing distances from each other, parallel to the present coastline (FAO, 1963). The surface of the Mediterranean coastal area is built mainly of various Tertiary and Quaternary sedimentary deposits El Shazly et al., (1975); Swanberg et al., 1984; and Gindi and Abd-Alla, (2000). The study area is characterized by a series of three parallel Pleistocene oolitic limestone ridges separated by shallow depressions ranging in depth from 0 to 35 m. The ridges are formed of limestone with a hard crystallized crust. The most prominent ridges are the Coastal, Abu-Sir, and Amiriya ridges. Most of the study area is located in a plain "Frontal Plain" located between Amiriya ridge to the north and Maryut Tableland (limestone up to +100 m in elevation) to the south. The Frontal Plain varies in width from 300 to 1,750 m. It is covered by calcareous soil accumulations overlying an evaporite series of alternating thin gypsum and clays (Gindi, 1989). The study area is a part of the rapidly developing northwestern coastal zone of Egypt. In the study area, the water-bearing formations are belonging to the Quaternary (El Shazly, et al., 1975; and Ministry of Irrigation, Desert Irrigation Department, 1976). These exposed rocks are building into the following

lithological forms: 1) Holocene alluvial beach sediments and sand dunes that are characterized by yellow color and fine to very fine texture. The sediments are limy in composition. They have fresh groundwater floating on top of saltwater. Thickness of the freshwater zone is being controlled by its height above sea level, and the quality of rain water that contributes beach aquifer through direct infiltration. 2) Holocene alluvial loamy deposits that are composed of almost homogenous calcareous loam and concretionary gypsum. 3) Pleistocene Alexandria Formation that forms the coastal beach of the Mediterranean Sea. It is composed of detrital oolitic limestone and is characterized by fine, medium to coarse texture and mostly of light to grey colors. The Pleistocene Alexandria Formation is composed of gypsum and clays (calcareous gypsum with soluble salts) forming pockets to the south of the Mediterranean coast by about 10- 12 km, at Burg El Arab. It forms the bed-rock of Alexandria City. To the east, the detrital oolitic limestones possess an indurated crust giving a brown compact rock unit with dark gray surface tarnish (0 to 60 m thick). 4. The Miocene-Pliocene rock unit forms isolated brown compact sandy limestone with some gypsiferrous limestones on top of small hills.

The current investigation aimed to focus main taxonomic units of the studied area. Evaluate the potentiality of the soils of the studied area.

MATERIALS AND METHODS

New Burg El-Arab locate, about 60%, south west of Alexandria governorate between King Maryut and El-Hammam from east to west, respectively. While, it is bounded by Bahig Canal from north and International high way from south. It covers about 225Km^2 (about 54000 feddans). El-Nasr Canal passes through the western sector of the city. New Burg El-Arab city Fars from the old city about 1.5Km, Map1.

The physiographic analysis using visual interpretation was carried out Landsat-8, Path 178, Raw 41 acquired in 2015. The visual analysis is based on developing techniques of Lueder, (1959); Vink 1963; Goosen, (1967) and Sabins (1978), in addition to Map, FAO, (1963), and ERDAS, (2008)

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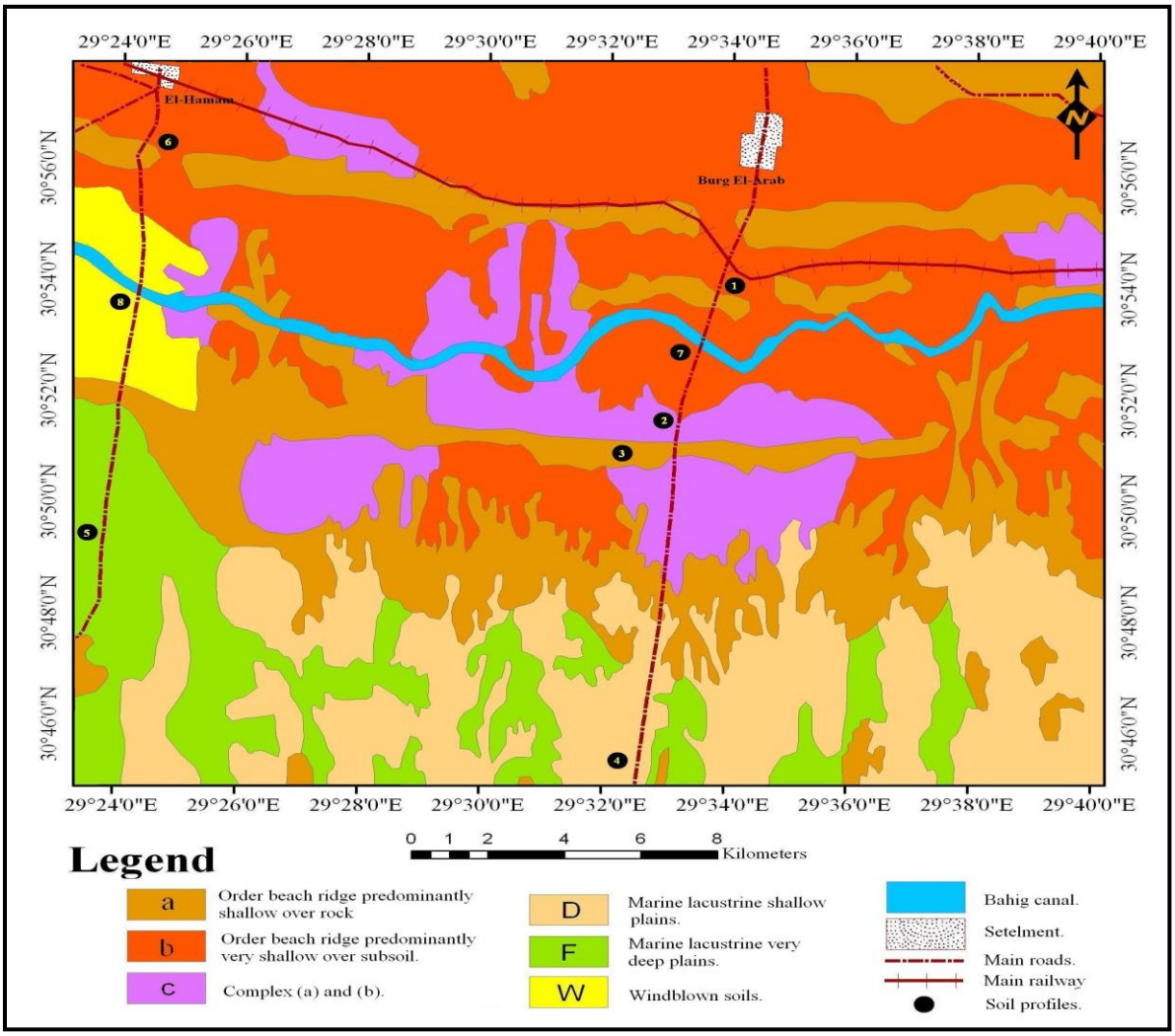

Map (1). Physiographic units and locations of the representative soil profiles of the studied area.

Eight representative soil profiles are selected to represent different physiographic units of the studied area, (Map1).

Soil profiles were dug to hindered layer or hardpan, according to USDA (1993) and FAO (1994).

The soil samples were collected, air dried, crushed, sieved through a 2mm sieve and subjected to physical and chemical analysis.

- Gravel contents were determined by volume percent.
- Particle size distribution is carred out according to Black (1982) using sodium hexametaphosphate as a dispersing agent.
-Soil pH values were measured in the saturated soil paste according to Black (1982).
- Total salinity (ECe) and soluble cations and anions in saturated soil paste extract were determined according to the methods described by Black (1982), except soluble sulphate anions were calculated by subtracting total anions from total cations.
-Organic matter contents were determined according to modified procedure, which recoded by Black (1982).
-Gypsum contents were determined by precipitation with acetone.
-Total carbonate contents were determined volumetrically by using collins calcimeter, according to Black (1982).
- The soil under consideration were classified to the family level according to USDA (2014).
- The soil evaluation are emphasize classified according to Sys and Verheye (1978).
- Evaluation of irrigation water is discussed according to Ayers and Westcol (1985).

RESULTS AND DISCUSSION

The main feature of different physiographic units of the studied area as follow:

I. Order beach ridge soils.

Order beach ridge soils appear shallow to moderately deep soil over limestone rock. In the lower depressions there are deeper profiles. The soil is very rich in lime. The relief is gently undulating to undulating, sometimes rolling. The surface more or less is stony and may be cover with small and thin sheet of wind-blown sand. The ridges are mostly moderately to severely affected by erosion and show many gullies. Nomenclature of older due to it have been cementation than the younger beach ridge. These soils in the studied area are differentiated to:

a)Order beach ridge predominantly shallow over rock:

Soil of profile 3 is the representative profile of the unit. The relief is undulating, sometimes rolling mostly sloping; moderately to severely eroded with gullies. Little natural vegetation. Data in Table (1) appear that the depth of profile is shallow, the slope is sloping, colour is 10YR6/6, texture class is sandy clay loam; gravel content is about 40%. The soil is rich in lime, with few soft lime segregation and gypsum accumulations are observed. List of Tables (2 and 3) show organic matters content is 0.2%, gypsum content is 3.7%, lime content is 30%, soil salinity is 17.02 dS/m, pH value is 7.85, while SAR value is 15.96. The previous data reveal that the classification of these soils according to USDA, 2014 is

- Lithic Haplocalcids, loamy skeletal, mixed, thermic.

b) Order beach ridge predominantly very shallow over subsoil:

The depression between areas between the ridges have been with material deposited under marine conditions originating either from the weathering products washed in from the adjoining ridge slope or from suspended matter brought in by sea water flooding the salinas. Numerous rock outcrops in these salina soils from short ridges or local knolls. In spite of the many rock outcrops, the Salina soils were intensively cultivated in Roman times FAO (1963).

This unit is represented by profiles numbers 1, 6 and 7. Data of field description, physical and chemical properties are illustrated in Tables (1, 2 and 3), respectively and see Map 1.

The soils have almost flat topography, nearly level to level slope, vegetations 1.e clover, fig etc, few to many weeds or common stones, soil colour from 10YR7/3 to 10YR5/4, gravel contents from nil to 17%, texture classes between sandy loam to clay loam, organic matter contents from 0.5 to 1.3%, gypsum contents from 0.6 to 2.5% and lime contents between 24.2 and 48.5%. Soil pH values are from 7.62 to 7.92, soil salinity is from 1.26 to 6.49 dS/m, while SAR value from 3.4 to 10.05. According to USDA, 2014 the soils under consideration can classify as:

-Typic Haplocalcids, fine loamy, mixed, thermic (profile 1).
-Typic Haplocalcids, coarse loamy, mixed, thermic (profile 6).
-Typic Haplocalcids, clayey, mixed, thermic (profile 7).

c) Complex a and b:

The soil under consideration is complex of soil (a) and rock land (b). From 30 to 60% of the area is occupied by shallow soil over rock and narrow ridges or outcrops with rock at the surface. More irregular topography, sloping, medium eroded. Barren land on the (b) soils, fallow Arab field on the (a) soils. Data of field observation in Table (1) show that soil profile 2 is the representative profile which have slope as very gently sloping, colour from 10YR7/6 to 10YR6/8, loam texture class, gravel contents from nil to 8.0%. Soil physical properties in Table (2) show that organic matter contents between 0.3 to 0.4%, gypsum contents from 0.4 to 1.3%, while lime contents between 22.1 and 37.9%.

Data of chemical properties in Table (3) illustrate that pH values from 7.88 to 7.91, soil salinity from 6.43 to 7.99 dS/m, while SAR values between 8.59 to 11.40. The preceding data lead to the soil classification according to USDA, 2014 as follows:

- Typic Haplocalcids, fine loamy, mixed, thermic.

Table (1): Field observations and morphological description of the studied soil profiles

Physiographic Unit	Prof. No.	Depth (cm)	Slope	Soil colour dry - moist	Soil texture	Soil Structure	Soil consistency	Gravel %	Secondary formation				Effervescence	Boundary
									abandance	hardness	Size	Nature		
Order beach ridge very shallow over subsoil	1	0-10	Nearly level	10YR7/3	loam	massive	hard	4.0	-	-	-	-	+++	GW
		10-40		10YR5/4	loam	massive	friable	17.0	many	soft	fine	lime	+++	AW
		40-120		10YR6/8	clay loam	massive	firm	0.0	-	-	-	-	+++	
	6	0-20	level	10YR6/6	Sandy clay loam	massive	slightly hard	0.0	few	soft	fine	lime	+++	GW
		20-45		10YR5/6	Sandy clay loam	massive	firm	6.0	few	soft	fine	lime	+++	GW
		45-120		10YR5/8	loam	sub angular blocky	firm	9.0	-	-	-	-	+++	
	7	0-35	Nearly level	10YR5/4	Sandy loam	massive	friable	0.0	-	-	-	-	+++	CW
		35-70		10YR6/8	clay loam	massive	firm	0.0	common	soft	fine	lime	+++	
Order beach ridge shallow over rock	3	0-25	sloping	10YR6/6	Sandy clay loam	massive	hard	40.0	few	segregation	fine	lime $ gypsum	+++	AW
Complex	2	0-15	Very gently sloping	10YR7/6	loam	Weak sub angular blocky	hard	0.0	few	soft	fine	lime	+++	CW
		15-120		10YR6/8	loam	massive	hard	8.0	few	soft	fine	lime	+++	
Marine lacustrine shallow plain	4	0-30	Nearly level	10YR8/6	Sandy clay loam	massive	hard	0.0	few	soft	fine	lime	+++	AW
Marine lacustrine very deep plain	5	0-15	Nearly level	10YR7/7	Sandy clay loam	massive	friable	0.0	few	soft	fine	lime	+++	AW
		15-120		10YR6/6	clay loam	massive	hard	3.0						
Windblown dunes	8	0-15	Nearly level	10YR6/6	loamy sand	massive	friable	0.0	-	-	-	-	+++	AW
		15-70		10YR6/8	sand	massive	friable	0.0	few	soft	fine	lime	+++	

Boundary: AW: Abrupt wavy. CW: Clear wavy. GW: Gradual wavy.

Table (2): Some physical analyses of the representative soil profiles.

Physiographic Unit	Profile No.	Depth (cm)	Gravel %	Particle size distribution %				Texture class	O.M %	Gypsum %	$CaCO_3$ %
				Coarse sand	Fine sand	Silt	Clay				
Order beach ridge very shallow over subsoil	1	0-10	4.0	11.86	28.85	49.41	9.88	Loam	1.3	1.5	24.2
		10-40	17.0	14.03	28.14	40.10	18.67	Loam	0.8	0.6	35.0
		40-120	0.0	4.61	23.78	33.46	38.15	Clay loam	0.6	0.7	23.9
	6	0-20	0.0	21.00	51.53	6.11	21.37	Sandy Clay loam	0.9	2.5	36.2
		20-45	6.0	18.23	38.08	12.48	31.21	Sandy Clay	0.6	0.7	48.5
		45-120	9.0	5.07	34.99	43.60	16.35	loam	0.5	1.1	44.0
	7	0-35	0.0	13.20	58.81	9.00	19.00	loam Sandy loam	1.2	1.1	40.9
		35-70	0.0	4.25	35.35	23.24	37.16	Clay loam	0.7	1.2	41.9
Order beach ridge shallow over rock	3	0-25	50.0	12.53	43.43	16.94	27.10	Sandy Clay loam	0.2	3.7	30.0
Complex	2	0-15	0.0	19.40	24.44	29.66	26.66	loam	0.4	1.3	37.9
		15-120	3.0	5.78	37.23	30.40	26.60	loam	0.3	0.4	22.1
Marine lacustrine shallow plain	4	0-30	0.0	28.20	20.43	26.32	25.10	Sandy Clay loam	0.2	1.3	47.6
Marine lacustrine very deep plain	5	0-15	0.0	2.57	55.52	20.30	21.62	Sandy Clay loam	1.1	1.1	31.7
		15-120	3.0	4.52	28.18	29.18	38.12	Clay loam	0.7	2.8	31.0
Windblown dunes	8	0-15	0.0	52.12	58.91	2.66	13.30	loamy sand	0.8	1.1	33.5
		15-70	0.0	17.95	69.48	5.64	6.93	sand	0.6	0.7	50.3

II. Soils of the plain:

A vast plain lies just behind the fifth ridge. This landscape extends eastwards up to the cultivated land and the lake Maryut swamps of the Nile delta. The soils are probably marine soils of early Pleistocene age, laid down like the salina soils in a lagoon behind the fifth beach ridge (FAO, 1963). These soils show:

D. Marine lacustrine shallow plains:

Soils of profile 4 consider as representative profile. Data of Table (1) show that the slope gradient is nearly level. Soil colour is 10YR8/6 and have few soft fine lime segregation.

Soils physical properties in Table (2) appear that the soils have sandy clay loam texture class, 0.2 organic matter contents, 1.3%, gypsum contents and 47.6% lime content. On the other hand, chemical properties in Table (3) show 7.69 pH values, 6.66 dS/m ECe value and 6.93 SAR value. According to USDA, 2014, the representative may be classify as:

- Lithic Haplocalcids, fine loamy, mixed, thermic.

F. Marine lacustrine very deep plains:

Marine soil characteristic of this unit which illustrated in Table (1, 2, 3) and Map 1,.are nearly level slope gradient, soil colour from 10YR7/4 to 10YR6/6, soil texture class between sandy clay loam in the surface and clay loam in the subsurface, gravel contents from nil to 3%, few soft fine lime segregation, 0.7 to 1.1% organic matters contents, 1.1 to 2.8%, gypsum contents, 31.0 to 30.7%, calcium carbonate contents, pH value from 7.7 to 7.79, soil salinity from 5.6 to 13.30ds/m and sodium adsorption ratios between 7.42 and 12.74 of profile 5. These soil characteristics reveal to soil classification according to USDA, 2014 as follows:

- Typic Haplocalcids, clayey, mixed, thermic.

Table (3): Some chemical analyses of the representative soil profiles.

Physiographic Unit	Prof. No.	Depth (cm)	pH	ECe (dS/m)	Soluble Cations				Soluble Anions				SAR
					Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	CO^{2-}_3	HCO^{-}_3	Cl^{-}	SO^{2-}_4	
Order beach ridge very shallow over subsoil	1	0-10	7.65	5.12	16.99	11.24	22.56	0.48	0.0	2.0	20.5	28.73	6.00
		10-40	7.62	2.56	7.50	4.67	13.08	0.39	0.0	1.5	11.0	13.14	5.29
		40-120	7.80	2.55	8.20	5.33	11.71	0.28	0.0	1.5	9.5	14.52	4.50
	6	0-20	7.82	6.49	15.60	11.75	37.13	0.51	0.0	2.0	39.0	23.99	10.05
		20-45	7.84	2.11	6.52	4.72	9.60	0.29	0.0	1.5	11.0	8.63	4.05
		45-120	7.92	1.26	4.21	2.05	6.10	0.28	0.0	1.0	6.5	5.14	3.46
	7	0-35	7.78	2.25	7.50	3.40	11.40	0.27	0.0	1.5	14.0	7.07	4.87
		35-70	7.75	2.29	7.00	3.71	11.92	0.31	0.0	2.0	13.5	7.44	5.13
Order beach ridge shallow over rock	3	0-25	7.85	17.02	69.50	35.29	115.6	0.87	0.0	2.5	138.0	80.76	15.96
Complex	2	0-15	7.91	7.99	37.30	15.60	44.19	0.69	0.0	2.5	42.5	52.78	8.59
		15-120	7.88	6.43	14.50	9.23	40.24	0.35	0.0	2.5	36.0	25.82	11.40
Marine lacustrine shallow plain	4	0-30	7.69	6.66	21.70	14.90	29.68	0.41	0.0	2.0	43.0	21.69	6.93
Marine lacustrine very deep plain	5	0-15	7.74	5.76	19.14	9.77	28.40	0.37	0.0	1.5	31.0	25.18	7.42
		15-120	7.79	13.30	54.10	23.81	79.60	0.76	0.0	2.5	92.0	63.77	12.74
Windblown dunes	8	0-15	7.83	0.78	2.92	1.65	2.96	0.28	0.0	1.0	3.5	3.31	1.96
		15-70	7.65	0.75	2.40	1.67	3.23	0.22	0.0	1.0	2.5	4.02	2.27

The formation history of the clay loam soils of this plain may be due to same previous of landscape extension to Lake Maryut.

III. Windblown soils:

The original material of soils is limestone. The soils of Salinas are derived from weathering products washed down from these secondary limestone ridges and perhaps also from material brought in by the sea, however, again mainly of limestone origin. In places the coast may have been too shallow even for the deposition of sand. For to 30 to 40% of the area shallow over rock FAO (1963).

Soils of profile 8 which appear undulating to nearly flat relief, nearly level sloping, 10YR 6/8 to 10YR 6/6, soil colour and few soft fine lime segregation. Data of physical analysis Table (2) show loamy sand over sand texture classes, 0.6 to 0.8% organic matter, 0.7 to 1.1% gypsum contents and 33.5 to 50% lime contents. Data of chemical analysis in Table (3) vary between 7.65 and 7.83 pH values, 0.75 and 0.78 dS/m soil salinity and 1.96 and 2.27 sodium adsorption ratio values. These data are corresponding to soil taxonomy, according to USDA, 2014 as follows:

- Typic Haplocalcids, sandy, mixed, thermic.

Land Evaluation

Using the Sys and Verheye 1978 system, in Table (4), soils of the studied profiles may fit into classes N_2, S_2, S_3 and N, which are related to current suitability. On the other hand, potential suitability appear classes S_1, S_2, S_3 and N. Such a classification is on the basis of their limitations, if suitable irrigation water is gravity irrigation. The widespread limitations appear a follow: Soil depth > Calcium carbonate contents > Texture > Wetness > Salinity & alkalinity > Gypsum content > Topography.

Evaluation of irrigation water:

According to Ayers and Westcot (1985), data in Table (5), show the main characteristics of irrigation water will discuss. Irrigation water have no salinity problem (0.36 dS/m), this value reveals to increasing problem with related to permeability, while data of adj SAR appear no problem corresponding to permeability. Value of Adj SAR reveals to sodium contents, chloride concentration and boron contents show specific toxicity from roots absorption.

Table (4):Soil limitations and land suitability for irrigated agriculture.

Physiographic Unit	Prof. No.	Topography (T)		Wetness (W)		Physical Characteristices				Salinity & Alkalinity (n)		Suitability index (Ci)		Suitability class		Profiles Soil limitation
		C	P	C	P	Texture S_1	Soil depth S_2	$CaCO_3$ S_3	$CaCO_4$ S_4	C	P	Index	P	C	P	
Order beach ridge very shallow over subsoil	1	100	100	95	100	96	90	90	90	100	100	66	70	S_2	S_2	S_2, S_3, S_4.
	6	100	100	95	100	92	90	90	100	100	100	71	75	S_2	S_1	S_1, S_2, S_3.
	7	100	100	80	100	88	75	90	100	100	100	48	59	S_3	S_2	W, S_1, S_2, S_3
Order beach ridge shallow over rock	3	90	100	65	100	85	55	100	100	85	100	21	42	N	S_3	T, W, S_1, S_2, S_3.
Complex	2	95	100	95	100	90	90	100	90	95	100	62	73	S_2	S_2	T, W, S_1, S_2, S_3, n.
Marine lacustrine shallow plain	4	100	100	65	100	95	55	90	100	95	100	29	47	S_3	S_3	W, S_1, S_2, S_3, n.
Marine lacustrine very deep plain	5	100	100	95	100	90	90	90	100	90	100	68	80	S_2	S_1	W, S_1, S_2, S_3, n.
Windblown dunes	8	100	100	80	100	75	90	90	90	100	100	15	19	N	N	W, S_1, S_2, S_3, S_4.

C= Current, P= Potential, S1= ci + 75, S2= ci 50 – 75, S3= ci 25 – 50, N= Not suitable.

Table (5): Chemical analyses of irrigation water of Bahig Canal.

pH	ECe (dS/m)	Soluble Anions me/l CO^{2-}_3	HCO^{-}_3	Cl^{-}	SO^{2-}_4	Soluble Cations me/l Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	SAR	pH	Adj SAR	B ppm
7.5	0.36	0.0	1.0	1.5	1.1	1.64	0.82	0.95	0.19	0.86	8.09	1.1266	0.022

Concentration of both sodium and chloride have no problem from toxicity by foliar absorption (sprinkler). Value of pH is in a normal range. On the other hand, pHc value below 8.4, which indicate a tendency to precipitate lime from water applied.

Thus, it can be concluded that land suitability is ranged from moderately suitable (S_2) to marginally suitable (S_3) except for dunes and shallow soils are not suitable (N).

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حالة البيئة الزراعية فى مدينة برج العرب الجديدة – الأسكندرية - مصر

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معهد بحوث الأراضي والمياه والبيئة - مركز البحوث الزراعية

تقع مدينة برج العرب الجديدة جنوب غرب الأسكندرية بين كينج ماريوت والحمام. وقد دل التحليل الفزيوجرافى لمنطقة الدراسة على وجود الوحدات التالية:-

I - أراضى التلال الشاطئية القديمة والتى تميزت إلى نوعين من الأراضى:-

a- أراضى التلال الشاطئية القديمة غالبا ضحلة فوق طبقات صخرية والتى قسمت حسب التقسيم الأمريكى USDA, 2014 إلى:-

- Lithic Haplocalcids, loamy skeletal, mixed, thermic.

b- أراضى التلال الشاطئية القديمة غالبا ضحلة فوق تحت تربة والتى أظهرت وجود ثلاث وحدات تقسيمية هى:

- Typic Haplocalcids, fine loamy, mixed, thermic.
- Typic Haplocalcids, coarse loamy, mixed, thermic.
- Typic Haplocalcids, clayey, mixed, thermic.

c- أراضى مختلطة بين a ،b وقد تم تمثيلها بقطاع عميق وقد قسم الى:

- Typic Haplocalcids, fine loamy, mixed, thermic.

II - أراضى السهول والتى تتميزبإتساعها خلف التلال الشاطئية والتى تميزت إلى:-

D السهول البحرية الضحلة والتى قسمت حسب التقسيم الأمريكى USDA, 2014 إلى:-

- Lithic Haplocalcids, fine loamy, mixed, thermic.

F السهول البحرية العميقة جداًَ والتى إنتمت إلى:-

- Lithic Haplocalcids, fine loamy, mixed, thermic.

III - الأراضى المنقولة بالرياح والتى إنتمت إلى الوحدة التقسيمية التالية:-

- Typic Haplocalcids, sandy, mixed, thermic.

دلت بيانات تققيم الأراضى أن محددات صلاحية الأراضى بمنطقة الدراسة تتبع التسلسل التالى:

عمق القطاع الأرضى > المحتوى من كربونات الكالسيوم > القوام > الابتلال > الملوحة والقلوية > المحتوى من الجبس > الطبوغرافيا.أظهرت نتائج تحليل عينة المياه صلاحيتها على وجه العموم.