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A pedological study attempting to combine soil taxonomy and WRB classification systems

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Abstract: The study area is located in the North-Eastern part of the Nile Delta, northern of Ismailia canal and western Suez Canal. It comprises an area of about 3,058.8 km^2 (728,285.38 feddans). This work aims to identify the main physiographic units and its features, as well as emphasise the importance of combining soil taxonomy (2014) and WRB classification (2022) systems.

Two main physiographic units were distinguished in the study area according to the previous studies, interpretation of satellite image and digital elevation model (DEM) as well as field observations; the first consists of fluvio-marine flats and the second river terraces which include the fluvial and deltaic origin.

According to field morphological descriptions as well as chemical and physical analyses, representative profiles are classified by using both Soil Taxonomy and WRB systems. The current study is the third manuscript to emphasise the importance of using both systems together in order to obtain maximum possible characteristics of the earth. Below are examples that illustrate this importance.

Soils of profile No. 4 which represent the fluvio-marine soils are classified according to soil taxonomy as follows: Typical Haplosalids, fine silty, mixed, thermic.

While these soils are classified according to WRB as follows: Fluvic Sodic Solonchaks (Siltic/Loamy/Clayic, Chloridic, Evapocrustic, Ochric, Hypersalic).

Soils of gypsiferous which represent soils of profile No. 6 are classified according to Soil Taxonomy as: Gypsic Aquisalids, loamy over sandy, mixed, thermic, whereas the application of the WRB system reveals the following: Fluvic Calcic Gypsic Sodic Gleyic Solonchaks (Loamic, Chloridic, Hypersalic).

Keywords: North-East Nile Delta, pedological study, physiographic units, soil classification

INTRODUCTION

The study area became a concern of the state as regards agriculture, in particular the goal was to improve soil, increase drainage efficiency, and irrigation. The El-Salam canal is one of most important irrigation projects in the area. Therefore, the area is very promising as it is close to residential development, markets, production facilities, export ports, etc.

According to Said (ed.) (1990), the Nile area near the coast is truly deltaic due to the presence of the Pliocene and Pleistocene, supplied with sand and mud from integrated river. Before the Pliocene, sediment is more typical of trailing-edge (Atlantic-type) continental margin, and streams were relatively small and not integrated into a major regional drainage like the present Nile. Pliocene facies in the delta area indicate an overall depositional regression. Deeper-water muddy sediments occur near the base of the Pliocene section and are overlain by inclined beds of prodelta muds and finally fluvial and shoreline sandy sediments. Said (1990) explains that the study area is not affected by the Aswan or high dams.

The UNDP and FAO (1963) have reported that fluvio-marine clay flats and swamps occupy the area under consideration in the north around the lake, while sandy-gravelly terrace soils of fluvial and deltaic origin occur in the south. Between these two formations, wide transitional zone of flat sandy plains, gypsum swamps and gypsiferous sand and clay can be found.

Hammam and Mohamed (2020) studied soil salinisation east of the Nile Delta to enhance management strategy programme using geographical information system (GIS). The study used two different classifications of salt-affected soils, i.e. agronomic classification and Russian classification. The data and salinity maps of the studied area presented that according to agronomic classification salinity levels in the area concerned were as follows: 60% non-saline, 15% slightly saline, 13% moderately saline, 2% strongly saline, and 10% for extremely saline level. Nevertheless, according to Russian classification soil salinisation degree was as follows: 71% non-saline, 10.5% slightly saline, 9% moderately saline, 3.8% strongly saline and 5.7% for very strongly saline. Finally, precise soil salinity management should take into account the concentration of total toxic salts and chemical composition of salts.

Amira *et al.* (2021) identify the geomorphological characteristics and classification of soils in some areas in Ismailia governorate, Egypt. The integration of Remote Sensing (RS) and Geographic Information System (GIS) techniques was used to achieve the result. The geomorphic map produced by processing and identifying the Landsat 8 image indicates that the studied area has six main geomorphic units with different landforms. The studied area has almost flat with deep to very deep and well drained soils. Most of the studied soils have loamy sand texture and some parts have clay loam texture. The analytical data revealed that the studied soils are slightly alkaline, mostly non-saline and do not have sodicity effect. The soils are moderately calcareous having low gypsum and organic matter contents. All studied soils do not have any diagnostic horizons, therefore they affiliated to Entisols and classified as Typic Torripsaments for 89.4% and as Typic Torriorthents for 10.6% from the studied area.

This work aims to identify the main physiographic units and its features as well as emphasise the importance of combining Soil Taxonomy and WRB classification systems.

MATERIALS AND METHODS

The study area is located in the North-Eastern part of the Nile Delta, northern of Ismailia canal, while the Suez Canal from Port Said to Ismailia runs along the eastern side of the area (Fig. 1). It comprises an area about 3,058.8 km^2 (728,285.38 feddans).

The climatic conditions play an important role in predicting the soil characteristics, such as the relationship between cumulative daily runoff and cumulative daily rainfall, most hydrologic models involve a balancing between precipitation and infiltration rates with runoff being the difference, soil temperature exerts a strong influence on biological activity. It also influences the rates of chemical and physical processes within the soil etc. (Soil Survey Staff, 2017).

Meteorological data of Abu Sueir station (Tab. 1) reveal a long hot rainless summer, mild winter with low amount rainfall. Data in Table 1 show that the mean maximum and mean minimum annual temperatures are 28.4 and 14.8°C, respectively. Total rainfall varies between 0.0 mm in July and 7.5 mm in January. The relative humidity differs from 46% in April and May to 64% in January. Natural evaporation per day is between 6.0 and 21.1 mm. Wind speed changes from 6.2 km·h^{-1} in September to 8.9 km·h^{-1} in April. According to the taxonomy system (Soil Survey Staff, 2014), the study area belongs to the "Thermic" temperature regime and "Torric or acidic" moisture regime. The
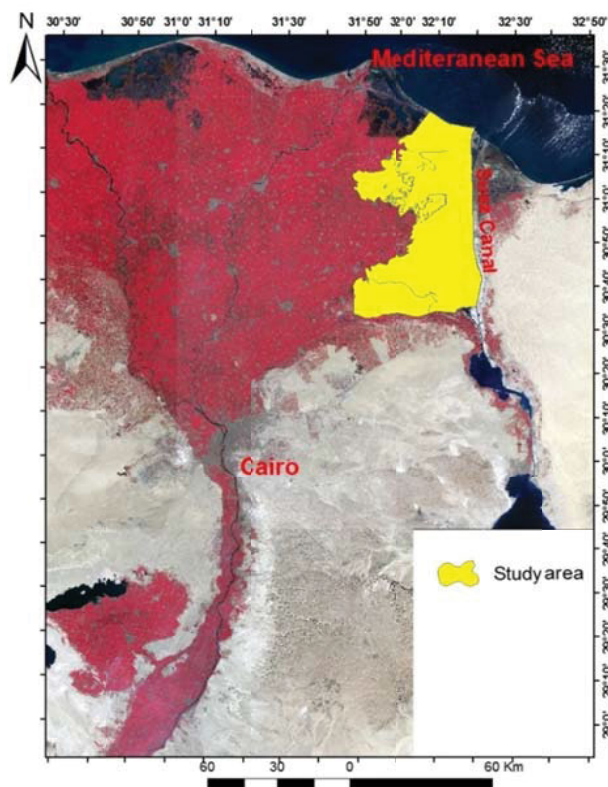

Fig. 1. Location of study area; source: own elaboration

same conclusion was achieved by Kottek *et al.* (2006), as they mentioned that the main climate of Egypt is arid, the precipitation is desert and the temperature is hot arid (BWh in the Köppen–Geiger climate classification (Peel, Finlayson and McMahon, 2007)). In the arid Mediterranean areas like Egypt, there is a great concern about further problems, including wind erosion, salinity, low organic matter, and increase calcium carbonate and gypsum contents (Mohamed, Belal and Saleh, 2013; Fadl and Abuzaid, 2017).

The current study was carried out in the northern part of the Eastern desert of Egypt (Fig. 1), as described below.

- **Physiographic analysis**: physiographic units were extracted in the study area using high resolution (10 m) digital Sentinel-2 image data of 2020 and digital elevation model (DEM) by Arc GIS 10.6 software and the methodology of Dobos *et al.* (2002) and Kalogirou (2002). The latter was documented by previous studies and field observations. The DEM was extracted from contour maps (1:50 000).

- **Field work:** field description was emphasised by FAO (2006). Many mine pits were dug to check the validity and accuracy of boundaries between adjacent units. Fifteen soil profiles are representative profiles only, however more than 70 profiles were dung but the soils tend to be homogeneous and a lot of these profiles are similar. The soil profiles were dug down up to 150 cm unless by coincidence water table or rock was encountered.

- **Laboratory work:** different samples of representative soil profiles were collected, air dried, crushed and passed through 2 mm sieve; then, the fine earth samples were kept for analysis. Physical and chemical properties were determined as follows:
  - physical analyses included particle size distribution and contents of organic matter, gypsum and total carbonate (Burt (ed.), 2004);

Table 1. Climatological data of Abu Sueir Station

Month	Relative humidity (%)	Temperature (°C)			Rainfall (mm·day^{-1})	Evaporation (mm·day^{-1})	Wind speed (km·h^{-1})
		max.	min.	mean			
Jan	64	19.6	7.0	13.2	7.5	6.0	7.5
Feb	56	21.0	8.3	14.3	4.1	7.2	7.9
Mar	50	24.4	10.5	17.1	5.4	9.7	8.6
Apr	46	28.4	13.4	20.6	3.3	11.8	8.9
May	46	31.9	16.6	23.8	1.9	13.3	7.9
Jun	47	34.8	19.9	27.0	trace	13.9	7.4
Jul	54	35.4	21.4	28.0	0.0	21.1	6.9
Aug	56	35.6	21.8	28.2	trace	11.2	6.3
Sep	58	33.3	20.1	26.2	trace	9.8	6.2
Oct	59	30.3	17.0	23.4	1.0	8.5	6.5
Nov	63	25.7	13.0	19.6	3.1	6.5	6.3
Dec	59	21.6	9.0	14.9	3.6	6.4	7.4
Total	–	–	–	–	29.9	–	–
Annual mean	55	28.4	14.8	21.3	–	9.7	7.3

Source: Ministry of Civil Aviation – Meteorological Authority of Egypt (1980).

– chemical analyses included soil reaction (pH), soil salinity (expressed as electrical conductivity, *EC*), soluble cations and anions and exchangeable sodium percentage (ESP) according to Burt (ed.) (2004), while soluble sulphate anion calculated by subtraction total anions (CO_3^{2-}, HCO_3^- and Cl^-) from total cations (Ca^{2+}, Mg^{2+}, Na^+ and K^+).

• **Soil classification:** according to the recommendation of Zayed *et al.* (2020) and Zayed *et al.* (2021), both soil taxonomy (Soil Survey Staff, 2014) and IUSS Working Group WRB (2015) systems were applied in the current study.

RESULTS AND DISCUSSION

The study area occupied 3,058.80 km^2 (728,285.38 feddans) as shown in Table 2. Two main physiographic units were distinguished in the study area according to previous studies, interpretation of a satellite image and DEM, as well as field observations. The first unit included fluvio-marine flats and the second the river terraces of fluvial and deltaic origin. There was a wide transitional zone between the two previous units, i.e. gypsum swamps or gypsiferous sandy soils, windblown sand deposits with dunes or hummocky relief which were affected by wind action or flat sandy plains. The other units, such as urban, fish bonds, sewage station and water bodies, were distinguished by visual interpretation of a satellite image (Fig. 2). The study area slopes to the north except a low part of Ismailia which gently slopes toward the Suez Canal.

Finally, the study area, according to field observation, was originally deposited by water, but most of it is strongly influenced by wind and redeposit.

• **Soils of fluvio-marine unit**

These soils are clayey and found along the landward side of Lake Manzala. Some shore ridges are also present, indicating former beach lines, which are mostly sandy with shells. Therefore,

Table 2. Physiographic units and other features and their surface areas

Physiographic units and other features	Area		
	km^2	feddan	%
Fluvio-marine	885.32	210,789.40	28.94
Gypsiferous	89.50	21,308.32	2.93
River terraces	423.53	100,840.12	13.85
Deltaic stages of river terraces	367.77	87,563.65	12.02
Windblown deposits	358.23	85,298.41	11.71
Fish bonds	484.87	115,443.77	15.85
Water body	301.54	71,796.41	9.86
Sewage station	14.30	3,404.73	0.47
El-Salam Canal	2.95	702.74	0.10
Suez Canal	53.09	12,641.35	1.74
Bahar El-Bakar Drain	3.92	932.89	0.13
Urban	73.77	17,563.59	2.41
Total	3058.80	728,285.38	100.0

Source: own study.

these soils have been affected by both the Nile river and the sea and locally by wind (clay dunes). This unit occupies about 885.32 km^2 (210,789.4 feddans) as shown in Table 2.

This unit is represented by soil profiles 1, 2, 3, 4 and 5 (Tab. S1, https://www.jwld.pl/files/Supplementary-material-Zayed.pdf). Soils of this unit have flat topography and level slope. Topography is a significant constraint to the proper use of modern irrigated systems, leading to surface runoff problems
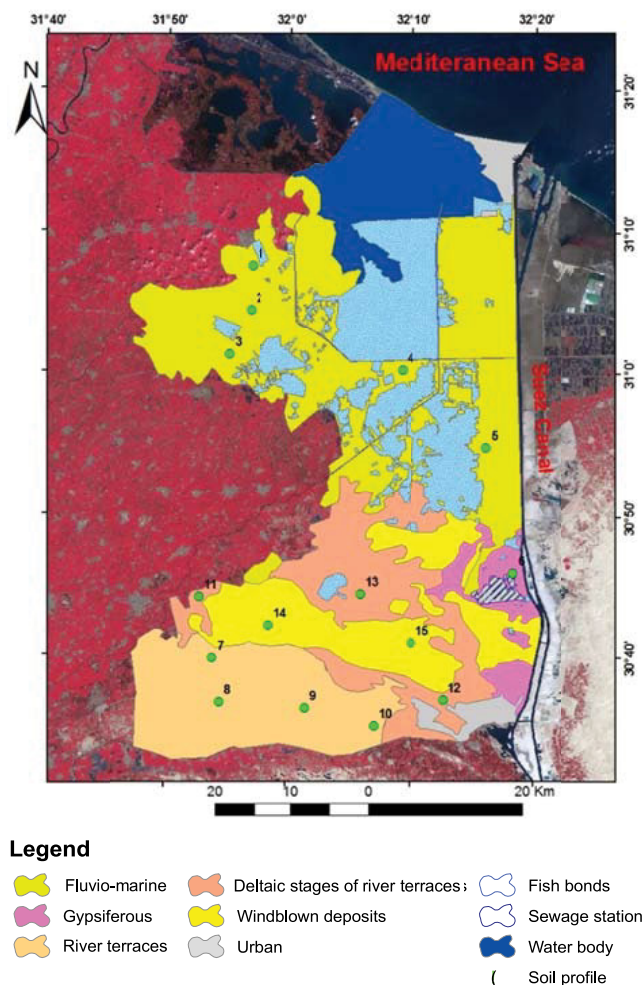
Fig. 2. Physiographic units and locations of soil profiles in the study area; source: own study

(Silva, 2017). The slope is an important element of landform and plays a vital role wherever the mechanisation is concerned. Catchments exhibit topography changes that affect hydrodynamics, hydrology and in particular runoff (Ghomash, Caviedes-Voullieme and Hinz, 2019). Surface features include the presence of shells in soils in profile No. 2, which correspond with sea effect and hummocks in profiles 3 and 5. This reflects the sea effect on clay Nile deposits. These soils are between newly reclaimed soils or those under reclamation. The clay texture class is the predominant feature. Clay contents vary between 14.7 and 74.3% and tend to increase with depth, silt contents ranges from 18.3 to 79.6, while sand contents are between 3.8 and 24.1% (Tab. S2). Salt efflorescence is considered the main phenomenon in the fluvio-marine unit associated with salty native vegetation, e.g. *Salicornia*. Soil salinity refers to the occurrence of soluble salts in soil that adversely affect plant growth (Hardie and Doyle, 2012). No diagnostic horizons (e.g. calcic or gypsic) or pedogenic features, except salic horizons, are observed. It is worth to mention that genetic horizons are not equivalent to diagnostic horizons of the Soil Taxonomy (Soil Survey Staff, 1993).

Organic matter contents are between 0.2 and 2.4% and tend to decrease with depth which is in line with finding by Hazelton and Murphy (2016). They mentioned that organic matter was from extremely low to moderate. Gypsum contents vary from 0.3 to 3.7%, which tend to increase with depth except in soils of

profile No. 5 which shows an opposite trend. Total carbonate contents range between 0.2 and 4.7%. Contents of gypsum and calcium carbonate are low according to FAO (2006). Electric conductivity (*EC*) values fluctuate widely between 4.9 (slightly saline) and 142.0 dS·m^{-1} (strongly saline) according to the Soil Science Division Staff (2017). They tend to decrease with depth except soils in profile No. 2 which show an opposite trend. These variations of soil salinity reflect the status of each site, i.e. cultivated, virgin or under reclamation. Values of exchangeable sodium percent (*ESP*) vary between 7.79 and 57.0% indicating slightly to extreme sodicity (FAO, 1980; Abrol, Yadav and Massoud, 1988). Soil reactivity changes from 7.0 (neutral) to 8.8 (strongly alkaline), Table S3.

According to field description data, physical and chemical composition, and the representative soil profiles of fluvio-marine unit are classified depending on the soil taxonomy (Soil Survey Staff, 2014) and IUSS Working Group WRB (2015). This has been shown in Table 3.

• **Soils of gypsiferous unit**

These deposits are located in the area west of the Suez Canal, northern Ismailia, and they occur in a low, partly swampy and frequently flooded area (Said, 1990). These sediments consist of gypsiferous sand or clay and also pure gypsum. They are recent regarding their age. The UNDP and FAO (1963) mention that the gypsiferous deposits can be considered as sea bottom deposits in a lagoon. Another source might be underlying Tertiary formations, which can be also very gypsiferous. This occurs when the coastline moves north and the sea bottom becomes dry. Another reason is the consequence of high evaporation in a hot dry climate when gypsum crystallises at the surface. On the other hand, the higher crusty plateau remnants are presumably the relic of older sea bottom deposits at a higher elevation. The crust layers are predominantly made of lime and gypsum (Tab. S1). This unit occupies an area of about 89.5 km^2 (21,308.32 feddans) as shown in Table 2.

Soils of profile No. 6 may be considered as an example of a representative profile in this unit. These soils have flat topography and level slope, and water table is observed at 60 cm from surface. Soil textures show some stratification. Clay contents vary from 1.1 and 20.5%, silt between 6.4 and 39.6%, while sand contents between 39.9 and 92.5% as predominant constituents. Gypsum includes many crystals at different layers and vary between 10.6 and 26.4%. It decreases with depth. Soils that have significant amounts of gypsum occur in particular in the driest areas and restrict plant growth (FAO, 1990). Contents of total carbonate are between 1.2 and 11.8%, which correspond with texture softness. Organic matter appears as a trace constituent which does not exceed 0.1% in all layers (Tab. S2).

Soil reaction through a profile is neutral, while its values range between 7.2 and 7.3. Soil salinity vary between slightly saline (6.6 dS·m^{-1}) and strongly saline (40.8 dS·m^{-1}), according to the Soil Survey Staff (2014). Exchangeable sodium percent (*ESP*) values range between 11.6 and 41.7% (Tab. S3).

The representative profile of the unit (profile No. 6) may be classified according to the Soil Taxonomy (Soil Survey Staff, 2014) and IUSS Working Group WRB (2015) as shown in Table 3.

• **Soils of river terraces unit**

These terraces have rather higher elevation in the study area, and are located north of the Ismailia Canal. The river terraces have fluvial origin and presumably Pleistocene age and are strongly

Table 3. Soil classification of different representative profiles in the study area

Profile No.	Soil taxonomy (Soil Survey Staff, 2014)	IUSS Working Group WRB (2015)
Soils of fluvio-marine unit		
1	Typic Haplosalids, coarse silty over clayey, mixed, thermic	Fluvic Sodic Solonchaks (Siltic / Clayic, Chloridic, Evapocrastic, Hypersalic)
2	Typic Torrifluvents, fine clayey, mixed, thermic	Calcaric Fluvisols (Clayic, Aric, Drainic, Ochric, Magnesic)
3	Typic Torrifluvents, fine loamy, mixed, thermic	Calcaric Fluvisols (Alcalic, Clayic / Loamic, Aric, Drainic, Ochric, Magnesic, Sodic)
4	Typic Haplosalids, fine silty, mixed, thermic	Fluvic Sodic Solonchaks (Siltic / Loamic / Clayic, Chloridic, Evapocrastic, Ochric, Hypersalic)
5	Typic Haplosalids, very fine – clayey, mixed, thermic	Fluvic Sodic Solonchaks (Clayic, Chloridic, Evapocrastic, Ochric, Hypersalic)
Soils of gypsiferous unit		
6	Gypsic Aquisalids, loamy over sandy, mixed, thermic	Fluvic Calcic Gypsic Sodic Gleyic Solonchaks (Loamic, Chloridic, Hypersalic)
Soils of river terraces unit		
7	Typic Torrifluvents, fine loamy, mixed, thermic	Calcaric Fluvisols (Loamic, Aric, Drainic, Ochric, Sodic)
8	Typic Haplosalids, sandy-skeletal, siliceous, thermic	Yermic Fluvic Sodic Solonshaks (Loamic / Arenic, Chloridic, Calcaric, Hypersalic, Skeletic)
9	Typic Torrifluvents, sandy-skeletal, mixed, thermic	Calcaric Yermic Skeletic Fluvisols (Loamic / Arenic, Aric, Drainic, Ochric)
10	Typic Torrifluvents, sandy-skeletal, mixed, thermic	Yermic Skeletic Fluvisols (Arenic, Aric, Drainic)
Soils of deltaic stages of river terraces unit		
11	Typic Calcigypsids, sandy over clayey, mixed, thermic	Lyptic Calcic Yermic Gypsisols (Arenic / Clayic, Aric, Fluvic, Ochric, Sodic)
12	Lihic Torrifluvents, sandy-skeletal, mixed, thermic	Yermic Lyptic Fluvisols (Arenic, Aric, Ochric, Sodic)
13	Sodic Haplocalcids, sandy-skeletal, mixed, thermic	Yermic Lyptic Fluvisols (Arenic, Aric, Protocalcic, Drainic, Ochric, Sodic)
Soils of windblown deposits		
14	Typic Torripsamments, siliceous, thermic	Sodic Solonshaks (Arenic, Chloridic)
15	Typic Torripsamments, siliceous, thermic	Sodic Solonshaks (Arenic, Chloridic)

Source: own study.

affected by wind and water erosion. This unit is located in an area about 423.53 km^2 (100,840.12 feddans) as shown in Table 2.

Soils of profiles 7, 8, 9 and 10 are representative profiles of the unit. Their topography vary between almost flat, gently undulating and undulating, while soils inclinations range from nearly level to sloping (Tab. S1). According to FAO (2006), the soils are moderately deep ranging from 100 to 150 cm. Fischer *et al.* (2008) mention that soil depth limitations affect root penetration and may constrain the yield formation of roots and tubers. Soils of river terraces show higher contents of gravel of up to 58% and tend to increase with depth except in soils of profile No. 7 which show an opposite trend. Data regarding the particle size distribution reveal the content of clay, silt and sand, which vary from 3.3 to 27.5%, from 0.4 to 14.2% and from 64.1 to 91.9%, respectively. The pedological feature is not observed except in surface layer of profile No. 7 which has common medium lime segregation. Organic matter contents tend to decrease with depth and vary between 0.1 and 0.7%. Gypsum contents are from 0.1 to 4.2%. Total carbonate contents are between 0.1 and 8.8% (Tab. S2).

Data in Table S3 show that soil reaction is between 7.0 and 7.3 and indicate a neutral designation. Soil salinity of saturation extract varies widely between 2.6 dS·m^{-1}, which corresponds to very slightly saline class, and 79.6 dS·m^{-1}, which shows a strongly saline class. Exchangeable sodium percentage very from 10.0 to 52.9% (Tab. S3). Soil profiles of river terraces may be classified according to the soil taxonomy (Soil Survey Staff, 2014) and IUSS Working Group WRB (2015), as shown in Table 3.

• **Deltaic stages soils of the river terraces unit**

Formation of these soils is influenced by both sea and river. They have a lower elevation than soils of river terraces, so they are younger and generally less gravelly. The deltaic deposits are not all sandy, but they also include clay and gypsiferous deposits. This unit comprises an area about 367.77 km^2 (87,563.65 feddans), as shown in Table 2.

Field description data in Table S1 show that profiles 11, 12 and 13 are representative profiles. They have almost flat topography and nearly level to level slope and a desert pavement on the surface. Gravel contents are between 5 and 40%. The texture class varies between sand and sandy clay. Secondary

formations are either never observed, few common lime segregation, or common gypsum crystals. Soil physical properties in Table S2 show that clay contents change between 2.8 and 43.7%, silt contents vary from 4.3 to 17.6, while sand represents higher contents and vary between 47.5 and 90.1%. Organic matter contains trace constituents which vary between 0.1 and 0.8 % and gypsum has the same range, except in the deepest layer of profile 11 which has 8.9% and increases with depth. Total carbonate contents vary widely between 0.4 and 16.8%, and have the same distribution of gypsum with depth. Lime plays an important role and affects nutrient availability to plants (Naik and Das, 2007). Chemical properties data (Tab. S3) show that soil reactivity is neutral, except in the deepest layer of profiles 11 and 13 (slightly alkaline) and a surface layer of profile 13 (moderately alkaline). Soil appears slightly saline except in surface layer of profiles 12 and 13, which is very slightly saline. Exchangeable sodium percentage >15% except in the surface layer of profile 12 where it is 9.3%. The distribution of soluble cations is follows: $Na^+ > Ca^{2+} > Mg^{2+} > K^+$, while anions follow: $Cl^- > SO_4^{2-} > HCO_3^-$. The representative soil profiles are classified according to the soil taxonomy (Soil Survey Staff, 2014) and IUSS Working Group WRB (2015), as shown in Table 3.

- **Soils of windblown deposits**

These deposits show relief between hummocky, dune and nearly level plains. They are of recent age and show no profile development of local origin. According to the UNDP and FAO (1963), these deposits are mainly derived either from Nile terraces or from sandy deltaic deposits. They cover a large part of the deltaic sandy and clayey materials which are present locally at the surface in the small patches between dunes. This unit is located in an area about 358.23 km^2 (85,298.41 feddans), as shown in Table 2.

Soils of profiles 14 and 15 are representative profiles of almost flat topography and level slope. They include hummocks *Salicornia* as native vegetation. These soils have sand texture class and no pedoginic features (Tab. S1). The profiles consist of coarse sand as a predominant constituent (66.8–86.7%), followed by fine sand (6.5–24.4%), while fine particles of silt and clay are considered as trace constituents (1.1–4.9 and 1.9–6.7, respectively). Organic matter is not found in profile 14, and 0.1% in soil of profile 15. A poor fertility occurs in the sand unit and results from low organic matter and clay contents affecting soil fertility (Blume *et al.*, 2016). Gypsum contents are between 0.2 and 0.3%. Total carbonate contents vary from 0.8 and 1.3% (Tab. S2).

Data in Table S3 show that soil reactivity vary between neutral and slightly alkaline. Values of electrical conductivity are from moderately to strongly saline. The exchangeable sodium percentage is more than 31.4%. The distribution of soluble cations is follows: $Na^+ > Ca^{2+} > Mg^{2+} > K^+$, while anions: $Cl^- > SO_4^{2-} > HCO_3^-$ (Tab. S3). The representative profiles may be classified according to the soil taxonomy (Soil Survey Staff, 2014) and IUSS Working Group WRB (2015), as shown in Table 3.

CONCLUSIONS

A comparison between the two classification systems indicates that the Soil Taxonomy System (2014) highlights the importance of the mineralogy class and soil temperature regime, while the WRB System (2022) shows an importance of soil salinity, sodicity and type of associated anions. Both systems agree on soil texture and soil moisture regime. The Soil Taxonomy System ignores soil salinity less than 30 dS·m^{-1}, while the WRB system recognises salinity of 15 dS·m^{-1}.

For example, according to the Soil Taxonomy System, soil classification in profiles 1, 4, 5, 6 and 8 includes soil moisture regime, salic horizon, texture class, mineralogy class and temperature regime, while the WRB System provides important characteristics, other than salic horizon and texture class, and soil origin (Fluvial) which signifies a land formation factor or environment deposition, sodicity, type of associated anions, indication of salt concentration and possibly some surface features, such as salt efflorescence (evapocrusting). The Taxonomy System is based on mineralogy class and soil moisture regime.

Additionally, soil taxonomy focuses on diagnostic horizons only, while WRB classifies the content of materials which correspond to different levels of diagnostic horizons, e.g. soil of profile 11 has a gypsic horizon (belong to Gypsisols) and in supplementary qualifiers give category of Hypogysic in the WRB, while in Soil Taxonomy gypsic horizon only in a large group as Calcigypsids.

Previous observations confirm the importance of adopting both Soil Taxonomy and WRB to obtain broad soil characteristics. This shows that both systems are complementary.

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