ABSTRACT

The present work was carried out to throw a light on the mineralogical, geochemical and geotechnical characteristics of some soils located at branch two of Tushka area between latitudes 22° 54' 57" to 23° 07' 19" N and longitudes 31° 19' 18" to 31° 30' 21" E. Therefore two geomorphic units were identified. The first unit (The alluvial deposits over sandstone) is represented by ten profiles comprising twenty nine soil samples. The second unit (The pediplain deposits of sandstone) is represented by nine profiles including twenty five soil samples. These soils are morphologically described and their geochemical, mineralogical and geotechnical properties are studied. According to the obtained data it can be concluded that:

The textural classes varied from loamy sand to heavy clay. Statistical grain size parameters indicate that the studied soils had been transported and deposited under water action.

Quartz is the dominant light mineral, while opaques are the most common heavy minerals. The non opaques are represented mainly by zircon, rutile and tourmaline, while amphiboles, garnet, epidotes, sillimanite, andalusite, staurolite, kyanite and biotite are detected in pronounced amounts. X-ray diffraction and thermal analyses revealed that Ca-montmorillonite is generally the dominant clay mineral followed by kaolinite then vermiculite and illite. The frequency distribution of heavy and clay minerals indicate that the studied soils had been derived from multi origin with an effective role for the River Nile enrichment.

The salinity was varied from non-saline to very high saline soils and has a neutral to a moderately alkaline reaction. The order of soluble cations is generally $Na^+ > Ca^{2+} > Mg^{2+} > K^+$, while soluble anions are dominated by Cl^- and / or $SO_4^=$ that exceeds HCO_3^-. The order of exchangeable cations is $Ca^{2+} > Mg^{2+}$

$> Na^+ > K^+$. The amount and distribution of total trace elements revealed the heterogeneity of soil materials, while the chemically extractable trace elements revealed that those soils have generally adequate levels of iron and manganese; and attains low levels of zinc and copper.

Geotechnical properties are mainly affected not only by clay content but also by the type and amount of the clay minerals.

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