MINERALOGICAL COMPOSITION OF CLAY AND SAND FRACTIONS OF SOME SOILS OF EGYPT AND ITS EFFECT ON SOME SOIL CHEMICAL PROPERTIES

By

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ABSTRACT

Safaa Abd El- Barry Abd El-Kader: Mineralogical Composition of Clay and Sand Fractions of some Soils of Egypt and Its Effect on some Soil Chemical Properties. Unpublished Ph.D. Thesis, Department of Soil Science, Faculty of Agriculture, Ain Shams University, 2017.

Identification of mineralogical composition of sand and clay fractions of soil samples could provide useful information about physical, chemical and spectral reflectance properties. The aim of this investigation is to identify the mineralogical composition of soil fractions and their effect on some soil chemical properties i.e. cation exchange capacities. Also to examine the relationship between spectral reflectance measurements and some soil constituents i.e. clay content, organic matter, calcium carbonate and free iron oxides. Thirty three soil samples were selected from different areas of Egypt, Shalakan Farm (six samples), El-Khatatba (six samples), West Nubaria (four samples), the North Western Coast (nine samples) and the Northern part of Kafr El-Sheikh Governorate (eight samples). The selected soil samples were subjected to physical, chemical, mineralogical and spectral analyses.

Cation exchange capacities (CEC) were determined in clay samples before and after removal of some soil constituents, i.e. free iron oxides, amorphous materials and calcium carbonate.

Spectral reflectance was measured for the spectrum range from visible to near infrared in the laboratory with an FR-ASD FieldSpec 3 (Full Range-Analytical Spectral Devices) spectroradiometer (350-2500 nm). The sensitive wavelengths to each studied soil constituents were selected according to similar previous studies.

Results revealed that soils dominated by smectite minerals exhibited cation exchange capacity more than those dominated by any other mineral. CEC values of the studied soils increased after removal of free iron oxides and amorphous materials while, decreased after removal of calcium carbonate. The effect of amorphous materials on CEC values is greater than that of free iron oxides. The average spectral reflectance from Shalakan farm samples, is much lower than other samples that collected from different areas, due to the dark color, high content of clay and organic matter. The best relationship was found between soil average spectral reflectance and soil clay content with high correlation coefficient (R^2 = 0.722), while the other studied samples showed low correlation. The results concluded that the spectral reflectance behavior is a useful tool for detection of clay content in the studied soils and the relations between soil spectral reflectance and soil properties need more deep studies using more soil samples in order to reach more precise results.

Keywords:

Calcium Carbonate – CEC – Clay Fraction – Clay minerals – El-Khatatba –Free Iron Oxides – Organic Matter – Sand minerals– Shalakan Farm – Soil Constituents–Spectral Reflectance – West Nubaria (Bunger El-Sokker area)– The Northern part of Kafr El-Sheikh Governorate (Black Sand area)– The North Western Coast (Marsa Matruh).

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