

Effect of vegetation on the composition of some soils Rehab region southwest province of Muthanna

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Abstract:

There were selected four pedons southwest Iraq in Rehab region of Muthanna province to carry out this study, as it obtained the samples to conduct the physical, chemical and mineral analysis and results showed that the soil texture ranged from sandy to sandy clay loam and bulk density ranged between (1.20-1.70) $Mgm.m^{-3}$. Results showed that the chemical characteristics of the soil pH values ranged from (7.2- 7.9), which are classified as moderate basal soil, while the salinity values ranged between (2.3 - 168) $Ds.m^{-1}$ has the values reached between TDS (4.9 - 151), while the lime content was between (175-450) $gm.kgm^{-1}$ and gypsum content between (1.20-8.50) $gm.kgm^{-1}$. Results showed the mineralogical composition the presence of primary minerals calcite and dolomite, quartz and feldspar in addition to the

presence of metal halite in surface horizons of soils pedants unimproved. As for secondary metals has been observed the presence of metals Kaolenite and Montmorillonite and Mica This refers to the activity of weathering operations and soil formation.

Key words: pH, EC, Carbonate, Gypsum, Halite, Quartz, Dolomite, Kaolenite, Montmorillonite, Mica.

INTRODUCTION

Pedological studies are the basis on which should start from the rest of the science related to soil. As these studies provide information on the nature and composition of soils identify some of the characteristics of the different chemical, physical and metal, and thus provide users soils wide range of information to make the right decision in the use of these soils. Rehab is the area of the most fertile agricultural areas in the province of Muthanna, located in what is known badah South (southern desert) that fall within the western plateau of the physiographic, this area was not subject to the study pedologic intensive, so this study came for the purpose of standing on the nature of the composition of these soils and to identify the most important problems facing them, and determine the administrative ways to address them in order to keep maintain the high productivity. Indicate El-Asmar et al [1] that the soils desert region characterized by surface soil dry pedes fragile disjointed prone to erosion and featuring built by the poor and increase sand ratio, especially in the surface layers with a decrease in the proportion of the mud and the lack of organic material associated with scarce vegetation and high temperatures. Rifai, [2] also stressed in a study of soils of Western desert in Iraq that the light metal to an unbroken fine sand, are quartz and Mscovite and Gert and Biutayt and chlorite, while the heavy metal containing opaque minerals and zircon and Bairoxin and Tourmalin and kranit and Abidotit.

Salameh showed 2004 effect of physical weathering by repeating drying and humidification of the rocks and soils at the bottom of the depressions leading to cracks in soils containing clay minerals such as metal (Montmorillonite). Showed Abosmor [3] to soils desert formed under dry climatic conditions, in the areas of less rainfall about (250) mm per year, and therefore the rain is able to melt the basal salts removed by filtration and the advantage of this soils its proximity to the low levels of organic matter and the degree of interaction neutral to mild alkaline and low biological effectiveness and the presence of many affecting agricultural production where the determinants of private accumulation of salts that affect the growth of plants and operates these areas more than (30)% of the earth's surface. And showed Al-Rawi [4] to soils desert depressions vary in their characteristics morphological depending on the variation of effective soil formation factors and processes composition, in general, the more soil formation factors effective under the desert conditions, Topographical factor and the effect of the gradient and shape of the slope, which impact on the soil and the depth of the presence of Hobo limestone depth and where gypsum, and the most important conditions prevailing in the desert soil formation processes are the sintering process and noted that there was some development in soils depressions is not due to the circumstances currently prevailing, but its development is attributed to the climate that prevailed during the rainy periods circumstances. Ganimy[5] also noted to the presence of primary minerals calcite and dolomite, quartz and feldspar in addition to the presence of metal halite in surface horizons of soils pedons is reclaimed As for secondary metals has been observed the presence of metals Kaolenit and Samkitit and chlorite, and mica in addition to the presence of unregular interstratified metals regular, both regular and is in Western Plateau.

2-MATERIALS AND METHODS OF WORK:

- a- Four sites Pedons selected in the Rehab area, which lies south-west of Iraq, as pedons located (1 and 2) within the cultivated barley land while pedons located (3 and 4) within the land is cultivated and as shown in Figure (1), obtained the samples of soil excited each horizon for the purpose of conducting physical, chemical and mineral analysis laboratory, as follows:
- b- **Physical properties:** Estimate the distribution of sizes of minutes using an pipette described in Kilmer and Alexander [6] Contained in (USDA Handbook No. 60 ‘ 1954) And estimate bulk density according to the methods described in Black [7] and Richards [8]
- c- **chemical properties:** As soil ph soil sample extract with water (1: 1) in a manner Mclean described in Ryan et al [9] and electrical conductivity and total dissolved salts TDS, according to the manner set forth in Richards [8] , Calcium carbonate estimated rasterization with sodium hydroxide and as stated in Jackson [10] , as a way of gypsum precipitation mediated acetone solution and as stated in Richards[8].



Figure (1) satellite image of the study area showing locations pedons study

d- Mineral Estimates: Through taking soil samples of superficial horizons and subsurface in powder and examined in the device (X-Ray diffraction) In the General body of Geological and mining and primary and secondary metals were estimated according to the method Jackson [11] It has been using of the following table, which shows the contents of metals depending on the severity of the curve Peak Intensity and as is the case in the laboratory of the soil survey - and the US Department of Agriculture to estimate the metal content of the soil semi-quantitative. it's has reproach of items in order to reflect the area under the curve (Area Under Curve) in line with the nature of the relationship between the height and width of the curve.

No.	Class	Approximate Mineral %	Peak Height above Beak Ground (count s ⁻¹)
5	Very large	>50	>1800
4	Large	30-50	1120-1800
3	Medium	10-30	360-1120
2	Small	3-10	110-360
1	Very small	<3	<110

3-RESULTS AND DISCUSSION:

a-physical properties for horizons study Pedons:

a.1 volumetric distribution of pedes soil:

The distribution study volumetric for pedes soil from the primary task of the association with the rest of the recipes and other soil physical properties and therefore knowledge of soil conditions, composition and indicated results table (1) the existence of a slight difference in the distribution of pedes soil Home generally within the Bedouin per soil or between pedons other study. And in general did not show pedes pattern specific distribution with depth and this shows the weakness of

Pedogen processes responsible for soil composition and evolution as a result of the negative impact of the factors prevailing in the area of drought and high temperatures and the Palace of chronological age and this is in line with Al-Ani[12]. It is observed sovereignty pedes sand followed by silt and clay, the fact that the study area is located in desert areas, and this reflects the nature of the Parent material formed including these soils Figure(3) , it has attributed the reason for the rule Texture coarse Pedons study to increase the content of the minerals calcium carbonate, which helped to increase the degree of roughness and this is in line with Al-Jubouri [13]. The values ranged from sand in Pedons study between (390-890) gm.Kgm⁻¹ as the highest value in the horizon C_k of pedon (3) and the lowest value in the horizon A_p of pedon (2) The percentage of silt ranged between (60-380) gm .Kgm⁻¹ as the highest value in the horizon A_p of pedon (2), Ranged the proportion of clay in all horizons between Pedons study (30-310) gm.kgm⁻¹ as the highest value in the horizon B_{k2}of the pedon (1) and less valuable in the horizon C_k of pedon (3). Have shown Clay values a relative increase in the horizon and this may be due to the conditions of the surface sediments rich by pedes soft derived from wind erosion from nearby areas. And that the disparity in the distribution of the three Pedes soil due to the momentum of the floods derived from the adjacent desert areas, especially Saudi Arabia areas at high precipitation period which often brings with it a ragged minutes affected tissues soil, plus the fact that the area originally are effective and valleys of the region, as well as exposed to the movement of sand dunes constantly Ganimy [5].

a.2 Bulk density:

The results showed, according to the table (1) that the bulk density values did not show a clear divergence within the horizons per pedons or between pedons study, as associated density values in all pedons with metal carbonate and gypsum

content of the soil and texture and with high salt percentage, especially in pedons (3 and 4) in uncultivated land, Ranged values the bulk density between (1.20 - 1.70) $Mgm \cdot m^{-3}$ as recorded the highest value on the horizon B_{k2} of Pedon (1), to the rule of pedes clay in this horizon, while the lowest value in horizon B_k of Pedon (3) This may be due to the rule of pedes sand in all Pedons, as observed Convergence values bulk density in most horizons were generally low due to rising salts, as well as lack of exposure to soil tillage operations or washing This is consistent with what indicated by Al-Atap [14].

Table (1) some of physical properties of the horizons Pedons study

Texture	clay	silt	sand	Bulk density $Mgm \cdot m^{-3}$	Depth cm2	Horizon	Land use	Pedons
	$gm \cdot Kg^{-1}$							
SCL	290	260	450	1.34	10-0	A_p	Soils planted barley	P1
SCL	240	260	500	1.22	25-10	B_{k1}		
SCL	310	110	580	1.70	60-25	B_{k2}		
SL	190	210	600	1.24	60+	C_k		
L	230	380	390	1.45	10-0	A_p	Soils planted barley	P2
SCL	250	270	480	1.50	39-10	B_{k1}		
SCL	230	210	560	1.49	82-39	B_{k2}		
LS	190	150	660	1.32	+82	C_k		
SCL	210	230	560	1.39	10-0	A_2	Uncultivated soils (Poor)	P3
SL	120	220	660	1.21	30-10	B_2		
SL	100	120	780	1.20	50-30	B_k		
S	30	80	890	1.25	50+	C_k		
SL	100	300	600	1.30	15-0	A_2		
LS	100	80	820	1.21	35-15	B_{k2}	Uncultivated soils (Poor)	P4
SL	120	80	800	1.33	66-35	B_2		
LS	80	60	860	1.34	66+	C_k		

b- Chemical properties for horizons study Pedons:

b.1- The salinity of the soil:

Studied this trait using two criteria are important, namely the electrical conductivity of the soil (EC) and (TDS) as results indicated agenda (2) The electrical conductivity values ranged between (2.3 - 168) $ds \cdot m^{-1}$ as the lowest value appeared on the horizon B_{k2} of pedon (1), while the highest value appeared on the horizon A_Z of pedon (4), While ranging values TDS between

(4.9 - 151) gm. L⁻¹ as lower values appeared on the horizon B_{k1} of pedon (2) and the highest value appeared on the horizon A_z of pedon (4), that the cause of high salinity values in these soils back to being considered part of the southern desert so it is affected by the dry desert climate in addition to the topographic location of the study area and the decline of a few layers of the Sahara toward the Euphrates River and the alluvial plain Ganimy [5].

b.2-pH of the soil :

Results shown in Table (2) that the value of the degree of pH of the soil in the study area ranged from (7.20-7.90) and so is the soil Law Alkaline Soil based on the NRCS [15]. The interaction neutral or italics base in soils study, primarily due to the nature of soil formation factors, especially Parent material calcareous and dry climate which works to increase the content of calcium carbonate, which in turn is working to increase the number of soil reaction.

Table (2) some of chemical properties of the horizons Pedons study.

Cysum	Carbonates	TDS	Ec db.m ⁻¹	pH	Depth cm2	Horizon	Land use	Pedons
gm.kg ⁻¹								
2.3	175	260	14.1	7.3	10-0	A _p	Soils planted barley	P1
3.2	375	260	3.5	7.2	25-10	B _{k1}		
4.6	420	110	2.3	7.5	60-25	B _{k2}		
4.9	368	210	4.7	7.6	60+	C _t		
2.5	275	380	8.0	7.1	10-0	A _p	Soils planted barley	P2
5.6	325	270	3.4	7.2	39-10	B _{k1}		
8.5	360	210	3.3	7.2	82-39	B _{k2}		
6.5	410	150	4.2	7.1	+82	C _k		
4.9	260	230	27.3	7.8	10-0	A _z	Uncultivated soils (Poor)	P3
3.8	210	220	15.4	7.9	30-10	B _z		
1.2	390	120	5.7	7.9	50-30	B _k		
1.6	410	80	5.2	7.3	50+	C _k		
3.3	330	300	168	7.7	15-0	A _z	Uncultivated soils (Poor)	P4
2.3	450	80	59	7.6	35-15	B _{tz}		
4.6	300	80	43	7.8	66-35	B _z		
3.6	350	60	10	7.7	66+	C _k		

b.3- Metal carbonate content of the soil:

Results shown in the table (2) to study the soils calcareous soils with a tight content both within the prospects per pedon or between different pedons ranging between (175.0-450.00) gm.cgm⁻¹ and appeared less valuable in the horizon A_p of pedon (1) and the highest values appeared on the horizon B_{KZ} of pedon (4), The reason for the high soil content of calcium carbonate minerals was mainly due to the nature of Parent material for this rich soil carbonate minerals, Especially calcium carbonate, which increased due to the nature of the geological formations of this region rich in these minerals, As he pointed out Al-Basrawi [16], and Al-Dulaimi [17] to sovereignty limestone and porous calcareous and dolomite, as well as stone formations in this region.

b.4- Gypsum content in the soil:

Results shown in Table 2, the values of gypsum and distributed vertically in Pedons study, generally is observed all low gypsum content in horizons Pedons where gypsum values ranged between (1.20-8.50) gm.kgm⁻¹ and appeared less valuable in the horizon B_k of pedon (3), while the highest values appeared on the horizon B_{k2} of pedon (2), It was a decrease with depth in the gypsum pedon (1 and 2) as a result of irrigation and agriculture continuing operations, which led to decline with depth on the contrary pedons uncultivated. In general, the decline gypsum values in the study area due to the accumulation of calcium carbonate on gypsum account where the ionic carbonate and sulfate compete for the calcium ion to form the gypsum or lime as sovereignty of the Ionic carbonate or sulphates This is consistent with Al-Adami [18].

c-The mineral composition of the soils study:

With a view to determine the status of the variation in the content and type of minerals in the soils study, the method was used X-Ray in the laboratories of the Iraqi Geological Survey

(USGS), it has been used method Intensity of Peak to express the proportion of metals presence in the form instead of the method of calculating area under peak And so little space diffraction and diffraction, especially those representing the minerals quartz sand and calcite and dolomite, so the intensity of the diffraction method is used, expressed in units Count Per Second (CPS) And calculate the proportion of metals in the soils study models according to the table that shows the content depending on the severity of the curve. Through the results sovereignty metal quartz followed by calcite and dolomite in the surface horizons models A_p for Pedons cultivated the surface horizons A_z for Pedons uncultivated were Sovereignty resides in Dolomite followed by halite, with recorded values quartz intensity diffraction (1050, 1100, 1300, 2400 CPS) and by more than (40%) in surface horizons, which is expected to rule in the pedes coarse soil that the soils desert nature study area as shown in Figure (2). The presence of metal halite only in pedons uncultivated and strongly diffraction up to (1800 CPS) and by more than (35%) refers clearly to the high salt content in the surface horizon A_z, which amounted to (168) ds.m⁻¹, also that he was not in pedons cultivated refers to the role of the reclamation process for these soils, as well as agriculture. As for horizons the subsurface there was a pattern of distribution, as was the sovereignty of the mineral quartz followed by calcite and dolomite except horizon B_{K2} were Sovereignty resides in Calcite as recorded the highest intensity diffraction of Quartz (3200 CPS) and by more than (50%) on the horizon B_K of pedon (3) this was confirmed by the texture of this horizon too. It was also noted there is one pattern of distribution between calcite and mineral dolomite in Pedons study because there was an increase of mineral calcite offset by a decline in metal dolomite and this may be due to differing holds solubility between the mineral calcite and dolomite Dixon et al [19]

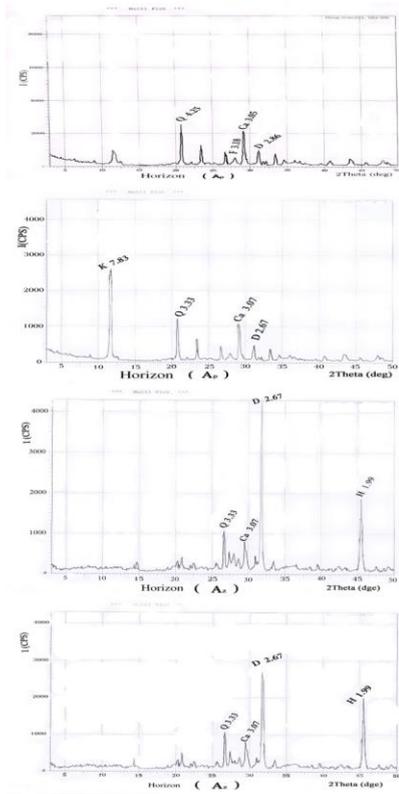


Figure (2): X-ray diffraction curves for models for surface horizons Pedons (1, 2, 3 and 4).

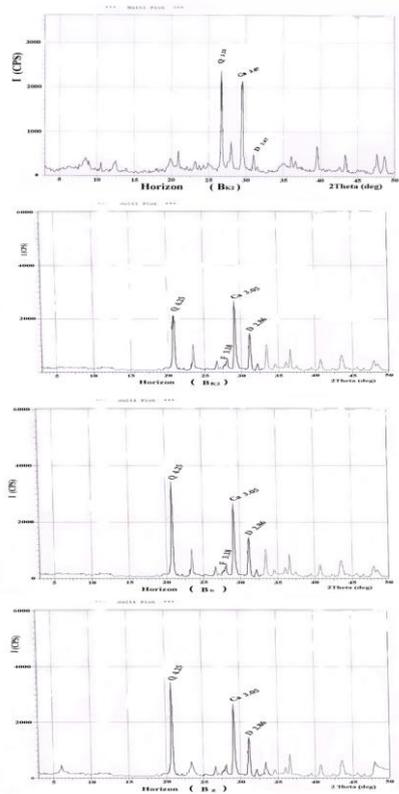


Figure (3): X-ray diffraction curves for models for subsurface horizons Pedons (1, 2, 3 and 4).

Either for the metal feldspar it was distinguished low quantities in all horizons, whether surface or subsurface as its recorded highest value (700 CPS) and by more than (10%) Figure (3). As for the distribution of clay minerals in the surface horizons indicate the results of analysis of soil metal to rule metal montmorillonite followed by Mica then Kaolinite in surface horizon A_P of pedon (1) either horizon A_P of pedon (2) was Kaolinite sovereignty, While the sovereignty of the mineral Mica followed Montmorillonit then Kaolinite in surface horizons Az of pedon (3 and 4) as recorded Montmorillonit intensity of diffraction values (110, 345, 440, 700 CPS) and by more than (18%), while recorded the Mica intensity values diffraction

(180, 350, 400, 600 CPS) and by more than (14%), This variation in the sovereign may be due to several reasons, such as we mentioned the case of use of the land reclamation and agriculture, which could affect the case of turning metals as well as their movement within the soil body as well as the fact that these horizons contact with the weather conditions of temperature and humidity Figure (4) can be attributed to this difference to the case of transfers from nearby areas during periods of flooding or flash floods Al-Mohsen [20].

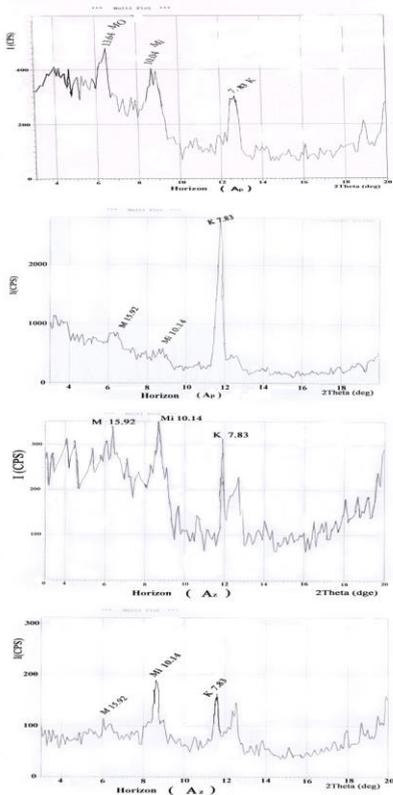


Figure (4): X-ray diffraction curves for models for surface horizons Pedons (1, 2, 3 and 4).

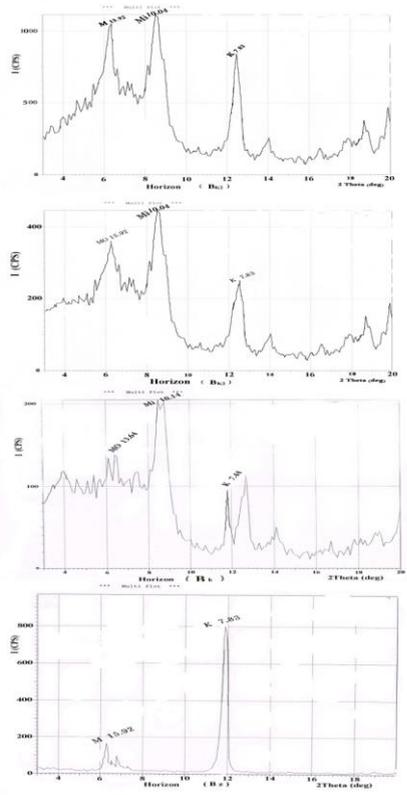


Figure (5): X-ray diffraction curves for models for subsurface horizons Pedons (1, 2, 3 and 4).

Either horizons subsurface was sovereign of metals Mica followed montmorillonite then Kaolinite. All pedons except horizon B₂ was sovereignty metal Kaolinite as recorded. Mica intensity values diffraction (210, 450, 1200 CPS) and by more than (40%) on the horizon B_t of pedon (2) this was confirmed by the results of Texture and the values of bulk density while recorded metal montmorillonite diffraction intensity values (135, 180, 350, 1100 CPS) and by more than (30%). It notes that ratio metal Mica approached many of the ratio of metal Montmorillonite, and mastery of metals Mica on the rest of the other clay minerals in these pedons primarily due to two reasons: first to increase the already accounted for in the parent material of the soil second reason may be due to the lightness of weight pedon metal which may wash stuck with water Figure (5). It observed the presence of metal Kaolinite in this Pedons quantities felt compared to the rest of the clay minerals, in the case of increasing the severity of the reading of the X-ray machine, which leads to show existing metals high quantities in the model while it affects the procedure in non-low-content metal appearance which prevents the emergence and mastery of identified as could explain the presence of Kaolinite to an increase in the rate parent material of those out of soil, or as a deposition geologist at what time Baqer [21].

4-CONCLUSIONS:

1-It was a case of land use and reclamation impact on chemical characteristics particularly salinity as well as influencing the operational activity Pedogenic (reverse calcification and calcification Adding to the diversity of primary and secondary metals that comprise the Rehab area soils.

2-Results confirmed the need and importance of reclamation of soils in these areas in order to response to the process of reclamation of soils and low salt content and this will provide large areas of agriculture and increase agricultural production.

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