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Article

The effect of agricultural exploitation and physiographic location on the soil particle size distribution for soils in Diyala Governorate

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ABSTRACT

The study area was chosen to include three physiographic sites on the Diyala River, as it is located in the village of Umm Al-Azam between longitudes 33.71785 east and latitudes 44.6185 north. There are four pedons in each A physiographic unit, two of which are in cultivated sites and the other two are in unexploited agricultural sites, so the total of the studied pedons is twelve. The results of laboratory analyses showed that the sand content in the physiographic units of the cultivated soils ranged between 151.19 - 583.20 g kg^{-1}, as it was noted that the highest content was in the soils of river basins, while in the physiographic units of the abandoned soils, the sand content ranged between 146.62 - 600.50 g kg^{-1}, as its highest content was in soils River basins as well. As for the silt particle, the results showed that its content in the physiographic units of the cultivated soil ranged between 170.00 - 543.11 g kg^{-1}, as it was noted that its highest content was in the soils of the depression unit, while in the physiographic units of the abandoned soils, the content of the silt ranged between 54.42 - 553.01 g kg^{-1}, as the highest content was in pedons soils the river. As for the particle clay, its content in the cultivated physiographic units ranged between 52.10 - 375.67 g kg^{-1}, as the highest content was in the soils of river levee, while in the soils of the abandoned physiographic units, it ranged between 54.42 - 335.57 g kg^{-1}, which was the highest value for it. When soils levee of rivers.

Keywords: particle, distribution, physiographic location, agricultural exploitation

INTRODUCTION

Soil is one of the important economic resources, especially in the agricultural fields, and it is in various forms. It is studied and diagnosed by a specialist in soil management. Here, it is necessary to know the existence of these soils in the area or geographical location designated by the specialists in surveying and classifying soils, as sedimentary soils occupy the areas adjoining Rivers, flood basins, rivers, river deltas and valleys are composed of movable soil materials.

These soils have had an important role in the development of agriculture since ancient times and before the advent of the fertilization system, so they had a prominent role in the emergence of civilizations, as the newly formed sedimentary soils have a short period of action of soil-forming factors. So, the time available is not sufficient for the formation of developed soils and horizons that we perceive morphologically [1].

The pedological and geomorphological methodology was used to reveal the nature and distribution of the sediments of the Tigris and Euphrates rivers, the formation of soils from them, and raising its efficiency to manage it optimally [2].

Physiographic is a term used to denote the nature of the topography of large areas in terms of varying heights completely and the geographical forms that result from gathering a number of them to form one physiographic unit [3].

Agricultural exploitation has an important impact on the physical properties of the soil, as confirmed [4], the stability of the clusters was high in the cultivated soils, and the reason was attributed to the increase in the content of organic matter in it, thus increasing the linkage between the soil particles or between its aggregates.

The physical properties of soil develop under natural conditions from the effect of permanent vegetation cover over a long period, and these properties include soil texture, porosity, bulk density, aeration and movement of soil components, as these physical properties largely control the size and arrangement of soil particles [5].

Knowing the effect of agricultural exploitation and the physiographic location on the variation of the soil content of the separators is very important to study the effect of agricultural exploitation on the volumetric distribution of the soil separators, as well as to study the effect of the physiographic location on the volumetric distribution of the soil separators and to know the effect of the interaction between the study factors represented by the location Physiography and agricultural exploitation in the distribution of those separations.

MATERIALS AND METHODS

Location:

The study area was chosen to include three physiographic sites on the Diyala River, which is located in the village of Umm Al-Azam, between longitudes 33.71785 east and latitudes 44.6185 north, located in the northeast of Baghdad governorate and located 60 km northwest of Baghdad governorate. As in Figure (1)*:*

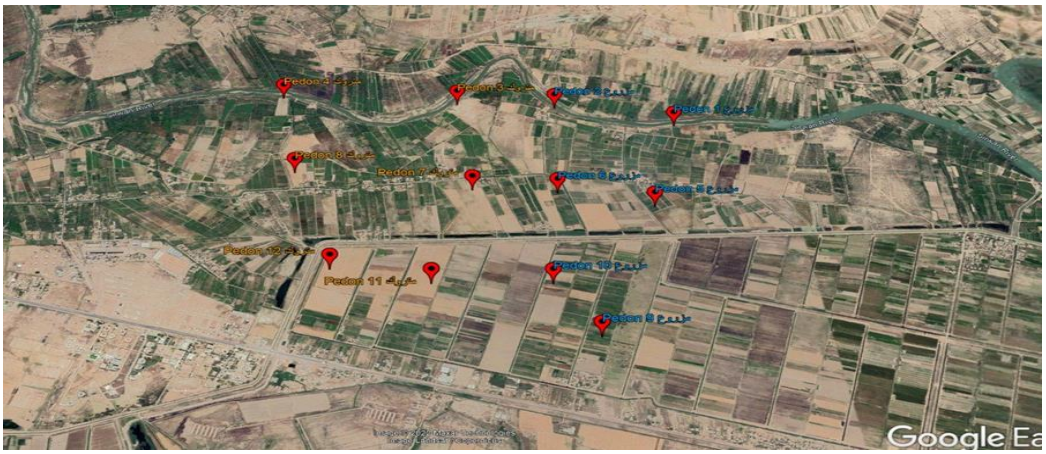

Figure 1. The locations of the pedons that represent the study area

Geology of the study area:

The lands of the study area are characterized by being of sedimentary origin, consisting of river sediments, with flat to semi-level topographical sediments, interspersed with relatively low areas processes and the emergence of layers of modern sediments that express the Quaternary era in Iraq [6].

The physiographic units were determined in relation to their height above sea level in the GPS device, as they were the following:

1 -River level

This physiographic unit was formed by sediments transported during floods along the bank of the Diyala River. This unit is generally characterized by flat topography, coarse and medium texture, well-drained and low salinity, except for the soils' uncultivated

2 -River Basin*:*

This physiographic unit includes a finer texture than the levee unit of rivers, has a slight slope, and was deposited by slow flood waters*.*

3 -Depressions*:*

The soils of this physiographic unit also belong to the soils of the river basin, and its soil represents topographically the end point of sedimentation*.*

Laboratory assessments

The particle size distribution of soil was estimated by the international pipette method as reported in [7].

RESULTS

Effect of agricultural exploitation and physiographic locations in sand particle

The results of the statistical analysis in Table (1) indicated that the study site, type of use, horizons and their interactions had a significant effect on the increase in sand particles, as the site had a significant effect in this characteristic, and that the impact of site 1 river levee amounted to 420.8 g kg^{-1} compared to site 2 river basins The third location 3 depressions which Their values were 364.83 g kg^{-1} and 324.93 g kg^{-1}, respectively. As for the type of use between cultivated and abandoned soils, there was no significant effect. There was also no significant effect between horizons, as for the effect of the bilateral interaction between the site and the horizon, the highest value of sand particles was at the first site, the rivers levee for the horizon C2, which amounted to 448.47 g kg^{-1}, while the bilateral interference for the third site gave the depressions of the horizon Ap less The value of the particle sand as it reached 298.59 g kg^{-1}, and the bilateral interaction between horizons and type of use and between type of use and sites was not significant for this trait, as it is noted from the same Table that the triple interaction between site and type of use and horizons was significant in increasing sand particles and that the highest value His was at the site of the first levee of the rivers ,For the soils uncultivated with the horizon C1, while the triple interaction of the type of use, horizons and location gave a significant effect for this trait, which did not differ significantly from the first site, the levee of rivers for the abandoned soils and for the horizon C3, which reached a value of 466.2 g kg^{-1}, while the triple interaction of the location, type of use and horizons gave the lowest value for particle sand ,For the soils of the depressions planted on the horizon C2, whose value reached 225.1 g kg^{-1}, the reason for this is due to the nature of the calcareous origin, whose sizes are close to the sizes of sand particles, and thus the dominance of this particle at the expense of the fine parts [9], in addition to that particle sand increase in units .

Average T-	T*D	the horizon: C				D :type of use	T: Location
		C3	C2	C1	Ap		
420.83	388.79	445.1	425.0	421.6	422.7	1 cultivated soil	1
	452.87	466.2	289.1	478.6	418.4	2 abandoned soil	
364.83	373.11	440.5	460.5	330.1	324.9	1 cultivated soil	2
	356.56	288.6	473.7	367.1	233.4	2 abandoned soil	
324.93	318.91	423.8	225.1	301.6	295.6	1 cultivated soil	3
	330.95	294.0	296.4	304.4	458.5	2 abandoned soil	
LSD:T = 94.78	LSD: T *D =122.42	LSD: T*C*D =268.1				LSD value	
						C x T	
LSD: T*C= 177.9		377.63	448.47	435.08	422.15	1	
		381.14	300.22	450.49	327.48	2	
		295.17	381.47	324.48	298.59	3	
D Average						C x D	
360.27		353.04	370.09	370.22	347.73	1 cultivated soil	
380.12		349.58	383.35	436.48	351.08	2 abandoned soil	
LSD: D= 77.393			LSD: D*C =151.69			LSD value	
------		351.31	376.72	403.35		-----	C Average
		LSD: C =109.45				LSD value	

Table 1. The effect of overlapping horizon, location and agricultural exploitation in the sand particle

Effect of agricultural exploitation and physiographic locations in the silt particle

The results of the statistical analysis in Table (2) indicated that all soil factors, represented by the location, type of use, and prospects, had a significant effect on the silt particle character g kg^{-1}, which did not differ significantly from site 2 river basins, while the lowest value was at site 1 river levee, which amounted to 393.43 g kg^{-1} with an increase of 22.07%. As for the effect of type of use, there was no significant effect between cultivated and abandoned soils. There is a significant effect between prospects and type of use While there was a significant effect between the site and horizons, the highest value of the silt particle was at horizon C3 in depressions soils, with a value of 511.17 g kg^{-1}, and the lowest value at horizon C1 in river levee soils, which amounted to 372.70 g kg^{-1}, as it is noted from, The same Table has the effect of the triple overlap of the study factors and the representation By location, type of use and horizons, it had a significant effect in increasing the character of silt particle for some sites and that the highest value of it was at site 3 depressions and for the type of cultivated use and horizon Ap, which reached a value of 519.4 g kg^{-1} as it did not differ significantly from the second site river basins for the type of use The planted 1 and for the horizon Ap Which had a value of 508.3 g kg^{-1}, while the triple interference of the site, type of use and horizons gave the lowest value for the silt particle at site 1 the levee of the rivers and the cultivated ones 1 and the horizon C2, which reached its value of 341.6 g kg^{-1}.

T-Average	T*D	the horizon: C				D :type of use	T: Location
		C3	C2	C1	Ap		
393.43	400.93	403.8	341.6	392.4	370.9	1 cultivated soil	1
	385.93	378.9	481.3	368.6	409.9	2 abandoned soil	
458.18	448.68	411.7	418.8	502.2	508.3	1 cultivated soil	2
	467.68	547.7	3.49	409.1	477.3	2 abandoned soil	
480.29	479.26	419.4	496.2	507.3	519.4	1 cultivated soil	3
	481.32	508.0	514.3	490.5	387.1	2 abandoned soil	
LSD: T=75.283	LSD:T*D=92.834	LSD: T*C*D = 212.93				LSD value	
						C x T	
LSD: T*C= 134.33		430.11	389.26	372.70	381.66	1	
		469.01	443.21	415.26	505.25	2	
		511.17	438.83	457.79	513.38	3	
D Average						C x D	
442.96		462.00	424.77	418.85	466.21	1 cultivated soil	
444.98		478.18	422.76	411.65	467.32	2 abandoned soil	
LSD: D =61.468			LSD: D*C =115.87			LSD value	
------	423.76	415.25		466.76		-----	Average C
		LSD: C =86.929				LSD value	

Table 2. The effect of overlapping horizon, location and agricultural use in the silt particle

Effect of agricultural exploitation and physiographic locations in the clay particle

The results of Table (3) indicated that the study factors had no effect individually. There was no significant effect of the study site, the type of use and the horizons, while it is noted from the Table that the binary interaction of the study site T and the horizons had a significant effect in increasing the clay particle and that Its highest value was at The bilateral interference of site 2 river basins and horizon C2, which reached a value of 256.69 g kg^{-1}, while the lowest value of bilateral interference for the study site and horizons represented by site 2 river basins and horizon C2, which amounted to 134.25 g kg^{-1}, while in terms of bilateral interference between type of use and prospects There was no effect Significantly, as it is noted from the Table also that the bilateral interaction between the horizons and the type of use had no significant effect on the character of the clay particle, as it is noted from the same Table that the effect of the triple interference between the location, the type of use and the horizons had a significant effect on the character of the clay particle and for some values of the same Table,And that the highest value of it was at the horizon Ap for the soils of the abandoned river basins, which had a value of 289.34 g kg^{-1}, which did not differ significantly from some values of the Table, including the horizon soils Ap and the soils of the abandoned river levee, which had a value of 206.35 g kg^{-1}, as well as from the horizon soils C2 For cultivated depressions soils, its value reached 278.69 g kg^{-1}, while the study indicators gave the lowest value of the clay particle for site 2 river basins and for the type of cultivated use and horizon C3, where its value was

147.81 g kg^{-1} with an increase of 95.75%—soil, which is one of the physical properties.

Average T-	T*D	the horizon: C				D :type of use	T: Location
		C3	C2	C1	Ap		
185.76	210.28	151.03	233.43	186.04	206.35	1 cultivated soil	1
	161.25	155.10	229.62	152.82	171.73	2 abandoned soil	
177.76	178.23	147.81	120.70	173.19	166.93	1 cultivated soil	2
	177.30	164.17	135.95	224.04	289.34	2 abandoned soil	
192.84	196.83	156.78	278.69	191.05	184.96	1 cultivated soil	3
	188.85	198.02	189.32	209.54	134.37	2 abandoned soil	
LSD: T=44.534	LSD:T*D=62.699	LSD: T*C*D =125.96				LSD value	
						C x T	
LSD: T*C =85.735		192.36	162.27	192.23	196.19	1	
		150.06	256.69	134.25	170.06	2	
		193.67	171.95	217.73	188.00	3	
D Average						C x D	
195.11		184.96	198.48	210.94	186.08	1 cultivated soil	
175.80		172.43	195.47	151.87	183.42	2 abandoned soil	
LSD: D =36.362			LSD: D*C =73.963			LSD value	
------		178.69	196.97	181.40	184.75	-----	Average C
		LSD: C =51.423				LSD value	

Table 3. Effect of overlapping horizon, location and agricultural use in the clay particle

DISCUSSION

The physiographic near on the river and its decrease in the distant physiographic units, depending on the size of the particles, so the sand content is low in the soils of the depressions far from the river, as it is noted through the results of the same Table to the variation in the distribution of soil particles, and the reason for this is due to the distance and proximity to the source of sedimentation as well About what It is contributed by the anthropogenic sedimentation processes resulting from irrigation operations during land cultivation and exploitation, in addition to the effect of river sediments, and the soils of the study area are sedimentary soils, which led to the predominance of fine and medium textures, so soil texture was of particular importance in assessing the suitability of the soil for agriculture, and also to herA strong relationship with the knowledge of the soil's ability to retain water and its readiness for plants, as the fine texture retains water for a longer period than the coarse texture and it has an effect on some physical and chemical properties of the soil such as tillage, the exchange capacity of positive ions in the soil, the readiness of macro and micro nutrients and other properties [2], and this was also confirmed by[8].

The reason for the discrepancy in these locations of the silt particle is due to the predominance of sand and silt in the study area due to the nature of the origin material and the prevailing environmental factors in the area, such as drought due

to high temperatures and lack of precipitation, which reduces the physical, chemical and biological weathering processes, and most of the prevailing textures in soils Study in the medium fine texture. As for the variation in the values of the silt particles in the study area, it was high in content due to the sedimentation of the rivers in these sedimentary soils and the size of the silt particles, which helped to transport and deposit it in the river basins and depressions unit [2]. Also, [11] showed that the presence of organic matter leads to an increase in colloidal particles, which increases the proportion of silt particles in the soil.

The basic and important, because of its connection with other soil characteristics and knowledge of soil conditions as well as its content of nutrients, which indicates an increase in clay particles within the study area [10], which shows that the dominant texture type in the soils of the study area is the fine and moderately fine textures for some sites. These results are in agreement with what was reached [12], as the fine texture has special importance and influence in many water and air relations, and the transmission of fine joints is easier due to their small size

CONCLUSION

Through this study, it was concluded that the fine and medium textures prevailed, as the predominant particles were silt, then clay, then sand, as well as the variation of the size distribution of soil particles and the absence of a specific pattern on the impact of water currents that vary in the ability and intensity of horizon loading.

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