The Effect of physiographic units and Locations on the distribution of soil textures in Al -Siyahi area / Babylon governorate

Zaman Abbas Jawad1 Amal Radhi Jubier2
College of Agriculture, Al-Qasim Green University, Babylon, Iraq.
2Department of Soil Sciences and Water Resources, College of Agriculture, Al-Qasim Green University, Babylon 51013, Iraq. : https://orcid.org/0000-0002-9156-8405
*Correspondence to: Amal Radhi Jubier, Department of Soil Sciences and Water Resources, College of Agriculture, Al-Qasim Green University, Babylon 51013, Iraq
Email: amelradha@agre.uoqasim.edu.iq

Abstract

This study was conducted in the tourist area on the Hilla River in Babylon province, which included three secondary physiographic locations,(Levee river , river Basins and Depressions) extending between longitudes 44°26'36".724" - 44°27'14".220 east and latitudes 32°27'24".069 - 32°27'54".974 north. The area of the study area is 3820.10 hectar . Thirty drilling hole locations were identified by the uger machine to a depth of 0 - 30 cm. After that, nine pedons were detected, three in each physiographic location, and their coordinates were determined by GPS. The pedon horizons were described in a fundamental morphological description, and samples were obtained from each location to conduct the necessary laboratory analyses. The results of indicate of the sand content ranged between 730.12 - 44.93 g kg-1 , The results of indicate that the silt content in soils of physiographic units ranged between 587.86 - 86.34 g kg-1 , the clay content in the soils of physiographic units ranged between 71.86-832.35 g kg-1 , The results of show that the spatial distribution of the texture types in the soils of the physiographic units is that they were distributed in eight texture types. The Silt Clay Loam texture type SiCL occupied the largest area, amounting to 1101.11 hectares and a percentage of 28.82%, followed by the Silt Loam texture type SiL with an area of 966.35 hectares and a percentage of 25.30% of the total area of the region. As for the smallest area, it was occupied by the Clay Loam texture type CL, amounting to 41.81 hectares and a percentage of 1.09%, followed by the Clay texture type C with an area of 114.27 hectares and a percentage of 2.99 of the total area. It is noted from results that the fine and medium fine textures were distributed in the soils of the river basins and depressions, while the moderately coarse and moderate texture types were concentrated in River levee .

Keywords: physiographic unit , agricultural exploitation , soil texture , Alsiyahi area

Introduction

The loam soils in the alluvial plains and the sediments in the Iraqi alluvial plain were formed and are still formed from Quaternary sediments and from the load transported in the Tigris and Euphrates rivers (6 , 4). Most of them are soils transported from places exposed to weathering, and sedimentation processes occur by winds, rivers and floods, and sedimentation occurs after erosion and weathering processes. the last geological processes, and the sedimentary soils in the Iraqi sedimentary plain areas are newly formed soils formed from layered sedimentary materials of loam origin mainly from the Tigris and Euphrates rivers, and the sedimentation processes and the sedimentary environment affected the characteristics of the soil and the variation and distribution of its

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characteristics spatially, because the pedogenic processes in these soils are very limited, and the factor affecting their formation and development is the geological factor more than the pedological factor (1, 3). Sedimentary soils are characterized by the presence of differences in their morphological, physical and chemical properties from one location to another and vertically within the same location, due to the distance and proximity from the source of sedimentation and the presence of differences in the thickness of the horizons of those sedimentary soils and the types of prevailing textures in them and their content of carbonate minerals Due to the difference in its physiographic location, which affects the nature of sedimentation, and the agricultural exploitation of the land has a fundamental role in the environmental change occurring in all natural environmental systems, and these changes consequently affect soil management methods and change the properties of the soil as well as its different locations (8 and 9). The accuracy of soil surveys and the validity of their results are important in the conclusions of scientific research, and the completion of the steps is done by producing maps for the studied areas through the use of modern technologies, including geographic information systems, which help those conducting surveys to increase accuracy and reduce time and effort due to the huge amount of information they divide and analyze (2) . Due to the urban development and the rapid increase in population growth, which led to greater and intensive use of agricultural land exploitation and the impact of agricultural exploitation on soil characteristics and what is required in management and land use planning, especially physiographic units that indicate the nature of the topography of large areas in terms of the difference in their overall height and the geographical shapes that result from the gathering of a number of them to form a single physiographic unit and the difference in the characteristics of the soils of those units according to their heights, and in order to stand on the methods of soil management and the impact of agricultural exploitation of the soils of physiographic units in Babylon province, especially in sedimentary soils, considering that they represent the largest agricultural lands in Iraq and the abundance of their problems and what these methods will lead to in terms of improving or deteriorating soil characteristics and the impact Its physiographic location in its characteristics and the importance of the pedological and geomorphological approach to reveal the nature, characteristics and impact of the exploitation of these physiographic units and their importance in soil survey work. The research is directed to achieve the following aims:

-Identifying the physiographic units and agricultural exploitation , preparing maps of the texture and particales size distribuiton of the series of these units in the study area

Materials and methods

The study area was selected in Alsiyahi area on the Hilla River to include three secondary physiographic location, as the area is located between longitudes 440 26' 36.724" to 440 27' 14.220" east and latitudes 320 27' 24.069" to 320 27' 54.974" north, the study area is located in the village of Al-Ataij (Al-Ataiq) which is located on Alsiyahi road in Babylon governorate near the center of Hillah city, it is bordered to the north by the Kritaa area, to the south by the Al-Dulab village, and to the west by the Hillah River. It was named Al-Ataiq village after the shrine of Sayyid Abdullah Al-Ataiq ,

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Laboratory procedures

After bringing the samples to the laboratory, they were prepared by air drying, then ground with a wooden hammer and sifted with a sieve with holes diameter of 2 mm. After that, they were stored in special boxes for the purpose of conducting the necessary laboratory analyses on them, including:

-Partical size distribution

The partical size disitribution was estimated using the international pipette method according to (5.(

Results and Discussion

- The effect of the locations of physiographic units on the particals size distribution of soil

The results of Table (1) indicate that partical size distribution of soil detached parts in the three physiographic units in the study area was varied, where the sand content in the soils of the river levee unit for cultivated soils increased between 730.12 - 195.60 g kg-1, as the lowest content was in the C3 horizon of Pedon 2 and the highest content was in the Ap horizon of Pedon 1, while the sand content in the soils of the uncultivated Pedon (control) ranged between 980.94 - 473.10 g kg-1, as the lowest content was in the C3 horizon and the highest content was in the Ap horizon of Pedon 3. The reason for this is perhaps attributed to the effect of the cultivation process and plant roots on the movement and transfer of soft detached parts from top to bottom, which is what was found by (7 , 2). The sand content in the soil pedon in the physiographic unit of the river basins within the cultivated soils ranged between 300.10 - 176.95 g kg-1, as the lowest content was in the C2 horizon of the pedon 5 and the highest content was in the C1 horizon of the pedon 5 as well. As for its content in the pedon 6 within the same physiographic unit in the uncultivated soils, it ranged between 243.86 - 106.43 g kg-1, as the lowest content was in the C2 horizon and the highest content was in the A horizon of the pedon 6, as it is noted that the sand content decreased in the river basin unit compared to the river levee unit, and its content ranged in the depressions unit in the cultivated soils between 200.23 - 85.34 g kg-1, as the lowest content was in the C2 horizon of the pedon 8 and the highest content was in the C1 horizon of the pedon 7, as for its content in uncultivated soils (control), it ranged between 174.10 - 77.65 g kg-1, as the lowest content was in horizon A and the highest content was in horizon C3 of Pedon 9

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Table 1 Partical size distribution of soil in the study area pedons

Class texture	Clay	Silt	Sand	S.NO.	Pedon	physiographic units
	gkg^{-1}					
SL	157.52	112.36	730.12	Ap	P1	Levee river
L	253.92	416.52	329.56	C1		
SL	196.35	106.84	696.81	C2		
L	178.66	471.16	350.18	C3		
SL	182.75	100.32	716.93	Ap	P2	
SL	168.92	109.72	721.36	C1		
SL	196.29	114.26	689.45	C2		
SiL	274.12	530.28	195.60	C3		
SL	118.63	200.43	680.94	A	P3	
SL	131.76	157.82	710.42	C1		
SC	447.23	86.34	566.43	C2		
SCL	306.10	220.80	473.10	C3		
SiCL	295.68	508.65	195.67	Ap	P4	Basin river
SiCL	302.24	511.27	186.49	C1		
SiL	201.31	532.95	265.74	C2		
SiL	216.29	511.20	272.51	C3		
SiL	226.41	506.69	266.90	Ap	P5	
SiL	180.43	519.47	300.10	C1		
SiCL	304.84	518.21	176.95	C2		
SiCL	320.24	497.66	182.10	C3		
SiL	236.03	520.11	243.86	A	P6	
SiL	250.4	510.0	239.5	C1		

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	5	**1**	**4**			
SiCL	**305.71**	**587.86**	**106.43**	**C2**		
SiCL	**319.53**	**570.12**	**110.35**	**C3**		
SiC	**408.64**	**500.02**	**91.34**	**Ap**	**P7**	**Depressions**
SiCL	**342.28**	**498.78**	**158.94**	**C1**		
CL	**357.21**	442.56	200.23	**C2**		
SiCL	**338.92**	**488.94**	**172.14**	**C3**		
SiCL	**373.43**	**491.55**	**135.02**	**Ap**	**P8**	
SiCL	**393.33**	**479.86**	**126.81**	**C1**		
SiC	**416.55**	**498.11**	**85.34**	**C2**		
SiC	**403.64**	**506.24**	**90.12**	**C3**		
SiC	**430.25**	**492.10**	**77.65**	**Ap**	**P9**	
SiC	**402.65**	**510.00**	**87.35**	**C1**		
SiCL	**353.01**	**484.79**	**162.20**	**C2**		
SiCL	**333.35**	**492.55**	**174.10**	**C3**		

- Spatial distribution of soil texture and texture class in physiographic units

- Sand

Table 1 show that the sand content ranged between 730.12 - 44.93 g kg-1, as the lowest content was at location 24 within the river basin physiographic unit and the highest content was at the Ap horizon of Pedon 1 within the river levee physiographic unit, as it is noted that the further away we are from the river, the less the sand content. The results of Table (2) and Figure (1) indicate that the spatial distribution of sand content in the soils of the study area was distributed in three ranges, as the range 300 - 0 g kg-1 occupied the largest area of 253.76 at percentage of 66.27%, while the smallest area was occupied by the range 900 - 600 g kg-1, which amounted to 535.88 hectares at a percentage of 14.03%, as it is noted from the figure that the high sand content was in the shoulders of the rivers while the low content was in the depressions

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Table 2 Area and percentage of sand content in the soils of the physiographic units

Percentage	Area(ha)	Ranges (g kg^{-1})
66.27	2531.76	300 – 0
19.70	752.46	600 -300
14.03	535.88	900 – 600
100	3820.10	Sum

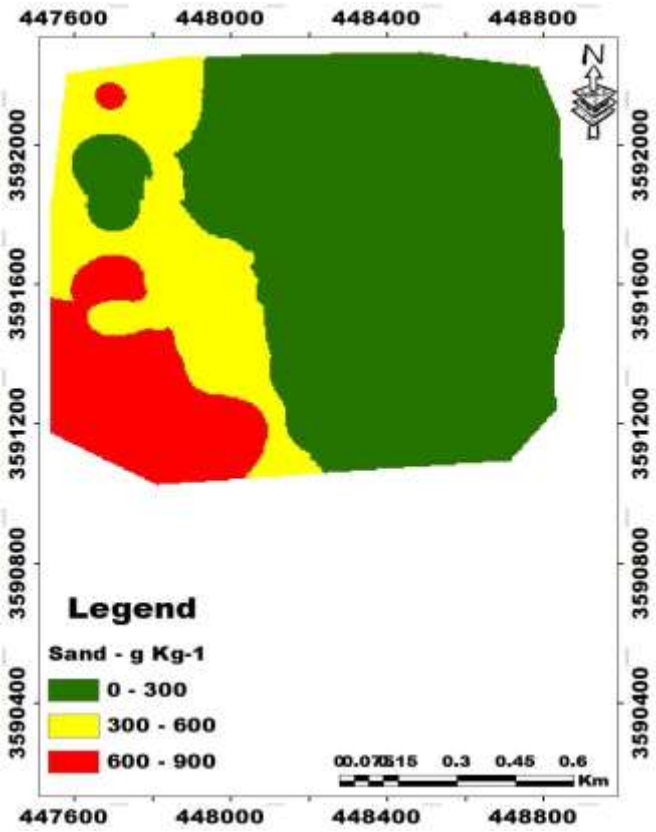

Figure 1 Spatial distribution of sand content in soils of physiographic units.

- Silt

The results of Table 1 indicate that the silt content in soils of physiographic units ranged between 587.86 - 86.34 g kg-1, as the lowest content was in the C2 horizon of Pedon 3 within the river levee unit and the highest content was in the C2 horizon of Pedon 6 within the river basins unit.

The results of Table 3 and Figure 2 showed that the spatial distribution of silt content in the soils of the physiographic units was distributed in two ranges, the range 600-300 g kg-1 occupied the largest area of 2918.42 ha and 76.40%, while the smallest area was occupied by the range 300-0 g kg-1 of 901.68 ha and 23.60%, as it is noted that the soils of the river basins and depressions unit had a high distribution of silt content, unlike the river levee unit, where it was low.

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Table 3 Area and percentage of silt content in the soils of the physiographic units

Percentage%	Area(ha)	Ranges (g kg^{-1})
23.60	901.68	300 – 0
76.40	2918.42	600 – 300
100	3820.10	Sum

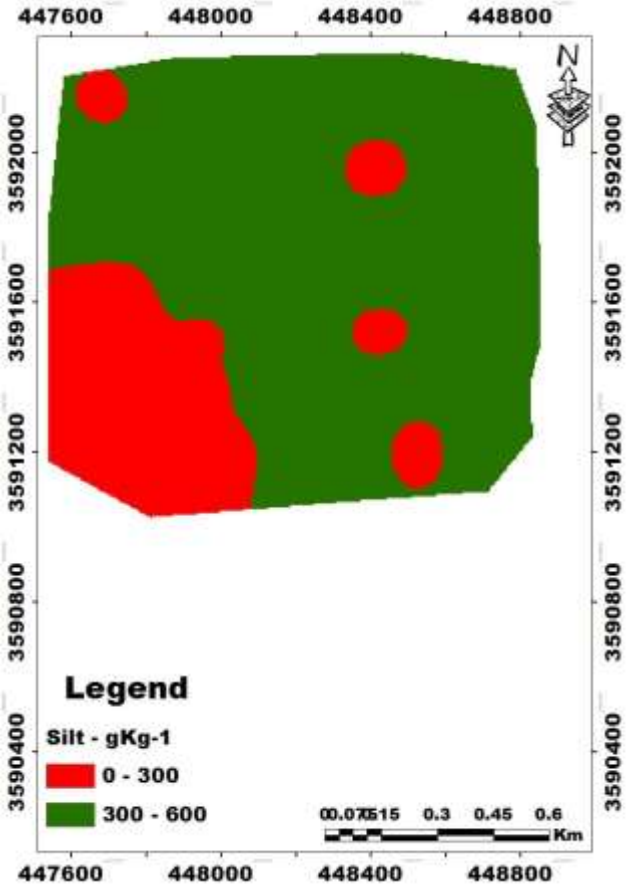

Figure 2 Spatial distribution of silt content in the soils of physiographic units

- Clay

The results of Table 1 showed that the clay content in the soils of physiographic units ranged between 71.86-832.35 g kg-1, as the lowest content was in location 14 within the river levee unit and the highest content was in location 24 within the river basin unit, which indicates a gradual increase in clay content the further away we are from the river.

The results of Table (4) and Figure 3 showed that the clay content was distributed in three ranges, as the range 0 - 300 g kg-1 occupied the largest area of 2098.24 hectares and a percentage of 154.93, while the range 600-900 g kg-1 occupied the smallest area of 120.25 hectares and a percentage of 3.14% of the total area of the region. It is noted from the figure that the clay content decreased in the river levee unit and increased in the river basins and depressions unit. (3(

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Table (4) Area and percentage of clay content in the soils of the physiographic units

Percentage%	Area(ha)	Ranges (g kg^{-1})
54.93	2098.24	300 -0
41.93	1601.61	600 – 300
3.14	120.25	900 – 600
100	3820.10	Sum

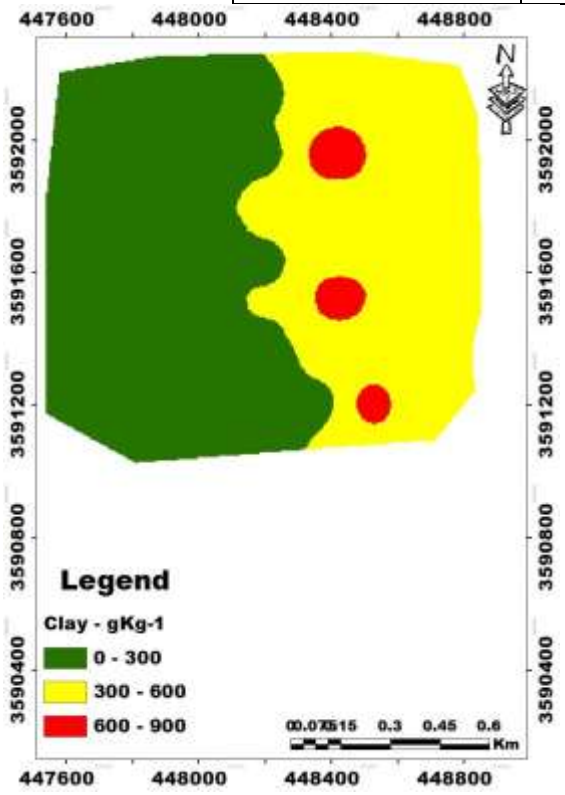

Figure 3 Spatial distribution of clay content in physiographic unit soils

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Texture classification

The results of Table 1 indicate that the dominant texture type in the physiographic unit soils is the Clay Silt Loam texture type SiCL with 18 repetitions and 27.27%, then the clay-silty loam texture Silt Loam SiL with 13 repetitions and 19.70%, then the Silt Clay SiC texture with 11 repetitions and 16.67%, then the Sand Loam SL with 10 repetitions and 15.15%, and the other texture types were distributed in the physiographic unit soils, as the least texture types were the Sand Clay Loam texture SCL, and the texture with one repetition for each and 1.52%, as it is noted that all textures contain Silt in Its particales

The results of Table 5 and Figure 4 show that the spatial distribution of the texture types in the soils of the physiographic units is that they were distributed in eight texture types. The Silt Clay Loam texture type SiCL occupied the largest area, amounting to 1101.11 hectares and a percentage of 28.82%, followed by the Silt Loam texture type SiL with an area of 966.35 hectares and a percentage of 25.30% of the total area of the region. As for the smallest area, it was occupied by the Clay Loam texture type CL,

amounting to 41.81 hectares and a percentage of 1.09%, followed by the Clay texture type C with an area of 114.27 hectares and a percentage of 2.99 of the total area. It is noted from the figure that the fine and medium fine textures were distributed in the soils of the river basins and depressions, while the moderately coarse and moderate texture types were concentrated in River levee

Table 5 Area and percentage of texture types in soils of physiographic units

Percentage%	Area (ha)	Types of texture
5.89	224.86	SCL
6.71	256.51	L
19.81	756.76	SiC
25.30	966.35	SiL
28.82	1101.11	SiCL
9.38	358.44	SL
2.99	114.27	C
1.09	41.81	CL
100	3820.10	Sum

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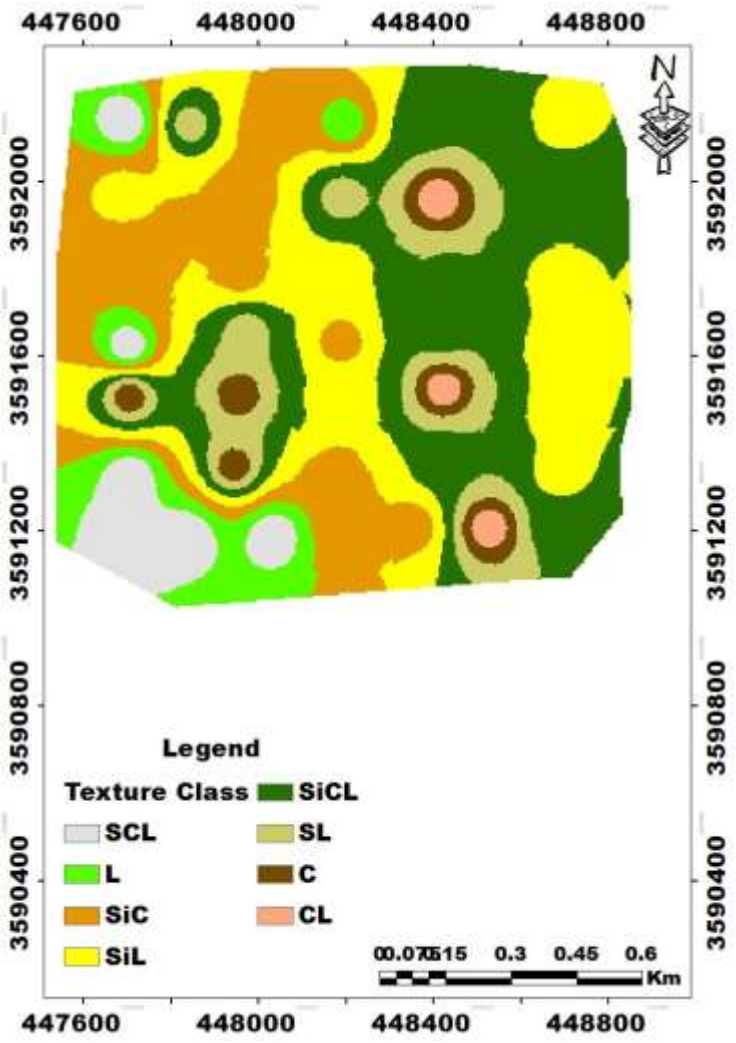

Figure 4 represents the spatial distribution of soil texture in the soils of the physiographic units.

Conclusions

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The river leeves unit has a high content of sand particles, as the coarse particles decrease the further away we are from the river. Agricultural exploitation has an effect on, the texture classes has a great effect on their variation within those units.

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