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Cartographic analysis and heterogeneity of the cultivars of the Western (Jadwal) in Holy Karbala Governorate using classical statistics

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ABSTRACT

This study was carried out in the soil of the Western (Jadwal) in the holy province of Karbala conducted a cartographic analysis of the map of soil. Each unit of soil has been selected 14,400 meter long course, which passes through the largest units, has been chosen for the most frequent area. The results showed that the series DW56 is the most frequent series, and the largest area with an area of 1969.316 hectares and accounted for 17.67% of the total area and studied the spatial variations of fertility characteristics and different depths and the use of the traditional census, where there were variations in fertility characteristics, since fertility qualities are high in the degree of heterogeneity. The difference in the available nitrogen ratio ranged between 19.4 - 21.9% and the phosphorus available between 13.9 - 26.5% and the potassium ready between 11.6% 25.7%.

Key words: *Cartographic analysis, Western Jadwal, Classical statistics.*

Introduction

The study of spatial heterogeneity of soil characteristics is very important in the management of soils for various agricultural applications, and studies of spatial variations today are an important means to increase the efficiency of soil surveys and classification and that interest and study has emerged in recent years because of their significant impacts on soil survey and management, Cartography is a science that searches the maps for its various purposes and deals with the history of the development of maps and their essence, methods of production and dissemination, as well as the possibility of their various uses. Eid (1997) explained that cartography uses scientific methods to analyze data orgeographical data on the one hand and uses laws and scientific methods to represent the surface of the earth. According to Sun *et al*., (2003), the traditional statistics allow analysis of soil variability. When studying surface soil in Jiangxi Province, China, for a total area of112 ha, the difference coefficient for phosphorus is 302.5% and for ready-made potassium 54.5% (Kilic and Kocyigit, 2012) found that ready-made phosphorus was more heterogeneous than ready-made nitrogen and potassium in grass soils in India, and Tagore *et al*., (2014) showed that ready-made nitrogen was higher than phosphorus-ready in soil in India, while Ouyang *et al*., (2017) showed that ready-made phosphorus is more heterogeneous than the nitrogen available in the forest soils of southern China, as (Dlugosz *et al*., 2016) noted in his study of Poland soil that the CV difference of the ready-made nitrogen was 16.2%. Ramzan *et al.,* (2017) found that ready phosphorus is more heterogeneous than ready nitrogen, ready-made potassium and organic matter, with a difference coefficient of 56.87, 38.47, 40.20 and 37.91% respectively. As a result of the importance of cartographic analysis and spatial heterogeneity. The study of cartographic analysis and spatial heterogeneity of the nutrients in the soil of the western table in the holy province of Karbala.

Materials and Methods

Information was obtained from the Directorate of Agriculture of the holy province of Karbala. A field visit was conducted to spend the western table which is located in the area which is located between the long lines 415656 to 426008 east and the 3597981 showrooms to 369564 north. With an area of 15252ha, with 100 sites and four depths of 0-30 cm, 30 - 60 cm, 60 - 90 cm and 90 - 120 cm were determined by the Oger drilling and the engineering net working system required by the proposed spatial analysis (Lark, 2009), using the space image to conduct the survey, and the location coordinates were determined. The samples were obtained from each depth. A cartographic analysis of the map was then carried out to determine the ratio and frequency of each unit of soil. The samples were taken to the laboratory and prepared for the following laboratory measurements:

Available nitrogen: Ammonium N-NH_4: The ammonium ion prepared in the soil was estimated by the solution of potassium chloride (M2) and by the use of magnesium oxide (Mgo) and then fused after evaporation and by using the microkeldal (Keeney and Bremner, 1965)

N-No3: After extracting the ammonium ion, the nitrate of the nitardate was removed from Devardyalloy and then distilled with the microkjeldal (Bremner and Keeney, 1965)

Available phosphorus: The soil phosphorus was extracted using 0.5M $NaHCO_3$ and pH 8.5 and the color of the extract was developed using optical spectrometer along a wavelength of 882 nm

Available potassium: Potassium was extracted from the prepared soil by using ammonium acetate and by using the Flame photometer as described in (Page *et al*., (1982).

Statistical analysis included the following conversion of the map of the judiciary to the GIS system in order to be able to isolate the soil units -1-and conduct a cartographic analysis to identify the most units of soil plots and the most frequent and map the series of soil units series to spend the Western table classical statistical analysis for the calculation of the mean, the upper value, the minimum value, the variance, the standard deviation, and the C.V. Which was calculated from the following equation:

$$C.V. = SD / X \times 100 \quad .. (1)$$

As C.V. vairsion coefficient, SD Standard Deviation isthe root of variance, average X

The vairsion coefficient through the following equation:

$$Skew.=3(x- median)/\sigma^2 \quad .... (2)$$

That's skew. torsion coefficient, ,²Ãvariance

Results and Discussion

Cartographic analysis of the Western table

The mapping of the area of each series was calculated using the GIS program. The ratio of each unit and its frequencies and its areain hectare was calculated as shown in Table 1 and Figure 1, showing that the number of series in the study area was 8. The series DW56 is the most frequent series, followed by the series TM876, then the DM96 series, DM116, TM456, DP1276, and the DM57 series, the least being the TP956 series. The largest series was the DW56 series, which was 196.316 hectares, repre-

Table 1. Cartographic analysis of the study area

Percentage %	Area (ha)	Freqence	Symbol	T.
15.21	1695.579	24	TM876	1
17.67	1969.316	25	DW56	2
12.33	1374.206	13	DM116	3
10.05	1120.464	6	DP1276	4
17.66	1967.845	15	DM96	5
5.00	556.7159	3	TP956	6
5.36	597.2423	4	DM57	7
16.72	1863.214	10	TM456	8
100%	11144.5822	100	ÇáãÌãæÚ	

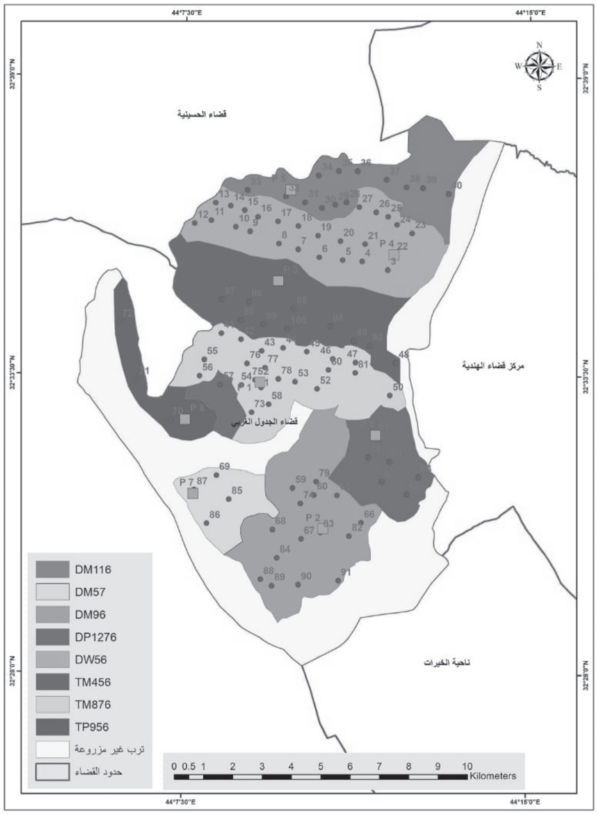

Fig. 1. Illustrates the series of soils in thewestern table

senting 17.67% of the total area followed by the DM96 with 1967.845 ha and by proportions 17.66% of the total area and then the series TM876 with an area of1695.579 ha and by 15.21% followed by the series TM456 with an area of 1863.214 ha and by 16.72% and DM116 with 1374.206 ha and 12.33% and DP1276 with 1120.464 ha and 10.05% and DM57 with 597.2423 ha and 5.36% TP958, with an area of 556.7159 hectares and by 5.0%, as these series included agricultural soils in the Western Table district, while the rest of the soils were not cultivated with an area of 11144.5822 hectares. Thes over eignty of the series DW56 in terms of area and frequency due to the fact that the soil salinity is low salinity. These series are different and their existence explains that A formed due to localized factors ranging from limited Nsjadtha between the soft and medium softness, with an internal exchange between good and medium to deficient in some soils series.

Spatial heterogeneity of fertility characteristics using traditional statistics

Available Nitrogen

The results of Table 2 show that the nitrogen content in the soil for the depths of 30, 60, 90 and 120 cm was 61.85, 54.49, 57.96 and 60.33 mg/kg^{-1} respectively. The heterogeneous nitrogen concentration was very high. The difference coefficient is 79.34, 142.10, 130.97 and 165.91% for the depths of 30, 60, 90 and 120 cm on the relay, and is strongly attributed to the rapid nitrogen loss by nitrates and ammonia and is susceptible to loss, washing, movement and volatilization of the soil body so it is highly heterogeneous, Nitrogen in the depths of the soil of the study has been torsion negative that the values deviate to the left has an abnormal distribution at all depths, and attributed. The reason is that nitrogen is fast moving and losing.

Phosphorus Available

The results of the statistical analysis in Table 2 show that the average phosphorus content in the studied

Table 2. Statistical analysis of the fertility characteristics of the soil of the study using traditional statistics

Skew.	C.V%	SD	Variance	Mean	Median	Max.	Min.	Depth (cm)	Element
-0.90	14.41	8.91	79.34	61.80	63.21	75.70	35.70	0 – 30	N
-0.49	21.88	11.92	142.10	54.49	60.21	68.52	33.92	30 – 60	
-0.56	19.74	11.44	130.97	57.98	61.55	76.0	36.81	60 – 90	
-0.99	21.35	12.88	165.91	60.33	62.96	77.39	71.44	90 – 120	
0.12	13.94	2.96	8.75	21.21	20.89	30.0	13.22	0 – 30	P
1.28	16.66	3.01	9.04	18.04	16.98	25.90	14.90	30 – 60	
-0.23	26.56	8.99	80.76	33.84	38.47	44.82	19.17	60 – 90	
-0.91	18.75	7.03	49.49	37.52	39.41	46.90	18.25	90 – 120	
0.63	47.21	25.65	657.98	220.41	215.50	299.0	175.0	0 – 30	K
0.28	25.66	35.47	1120.52	140.70	140.65	203.60	90.50	30 – 60	
0.31	21.15	30.50	930.41	144.21	133.22	195.61	104.90	60 – 90	
0.34	17.04	24.09	580.42	141.39	137.15	182.33	109.0	90 – 120	

soils was 21.21, 18.04, 33.84, and 37.52 mg^{-1}, for the depths of 30, 60, 90 and 120 cm respectively. The phosphorus is gradually increasing (Wilding *et al.*, 1994). The values of the difference coefficient for these depths were 13.94, 16.66 and 18.75% for depths 30 and 60. And 120 cm on the relay, while at the depth of 90 cm, the phosphorus ready was very heterogeneous, with a difference coefficient of 26.56%, but its distribution in the depths of the soil was the coefficient of torsion is positive at the depth of 30 cm and 60 cm, so that the values deviate to the right and are distributed abnormally, while the coefficient of torsion is negative in the depths of 90 cm and 120 cm, that the values deviate to the left and distribution is abnormal.

Potassium Available

The results of the statistical analysis Table 2 indicate that the content of the prepared potassium in the studied soils was high with soil levels of 222.41, 140.70, 144.21 and 141.39 mg/kg^{-1}. The values of the difference coefficient describing the variation in soil depths were the difference in the potassium variant was moderately heterogeneous, with a coefficient of difference of 17.04%, with a difference of (0.05) and (25), and 21.15% for the depths of 30, 60 and 90 cm respectively

Conclusion

We conclude that the ready-made nitrogen is more heterogeneous than ready-made phosphorus and ready-made potassium and that the analysis of the cartography is useful for the study of spatial heterogeneity in soil.

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