Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

EFFECT OF MANAGEMENT PRACTICES FOR GREEN LAND AT Al-ZAWRA AND BAGHDAD ISLAND PARK IN SOME SOIL PRPOPERTIES USING GEOTECHNOLOGIES

Zainab Jaffer Saleh Alawji , Haleema Abdul Jabbar Almashhadani
Department of Soil Sciences and Water Resources, College of Agricultural Engineering Sciences, University of Baghdad, Baghdad, Iraq

ABSTRACT

This study was aimed to investigate variations in some soil properties characteristics of green spaces soils within Baghdad Island Park and Al-Zawraa parks in Baghdad province, Iraq, due to the variation in used management methods. Soil samples were obtained from 22 locations in each park at 0-30 cm depth using a GARMEN GPS device (Oregon650t). Satellite images (Landsat 8 satellite and an OLI sensor) were captured with a 30 x 30 m^2 spatial resolution. The research aims to study the effect of the management method of the two parks (BID and Al-Zawra) on some soil pedological characteristics. The results showed a variation in the spatial distribution of the soil texture classes at each park due to particle size distribution variation of the soil classes. The sand particle was dominant, followed by silt and clay, with a variation in the spatial distribution of the soil content of calcium carbonate equivalent and organic matter content. A decrease was recorded in the content of gypsum. The observed variation in the electrical conductivity values is attributed to the irrigation system used and similar management practices for each park's soil. Irrigation and fertilization systems are in correct and require management follow-up to reach green spaces that are fresh and soft in color. Using the NPK Nutrient Readiness Index for green spaces in parks showed that their soils had a low content of available nitrogen and potassium and medium range of available phosphorus.

Keywords: Baghdad Island Park, soil characteristics of green landscapes,Management practice.

***Part of M.Sc. thesis of the 1 st author**

Received: 12/3/2024, Accepted: 5/6/2024, Published: 31/3/2026

INTRODUCTION

A green landscape is any herbaceous plant that can survive when mowed at a suitable low height and forms a green cover above the soil surface (Anteneh,,et al 2023). Green Infrastructure (GI) has become increasingly important and prominent in the past decade and across science, policy and planning. It refers to a strategic approach to developing an interconnected network of green spaces that preserve the ecosystem's nature and provide associated benefits to residents. Historically, most cities were almost devoid of green space because cities are relatively small and most people lived in rural areas (Wu,et al. 2019).Nowadays, the concept of Urban Green Spaces (UGS) is essential for good and livable cities because they:

-it plays an entertainment role in daily life.

-Contributing to the conservation of biological diversity.

-Contributing to the cultural identity of the city.

-Help maintain and improve the environmental quality of the city (Barnes, and Watkins. 2022).

Iraq suffers from a decline in the area of green areas due to the annual increase in population size, an increase in demand for housing, as well as an increase in the size of medium and small industries at the expense of green land (Dawood. 2019). Baghdad also suffers from clear neglect in urban and architectural

P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

planning and the absence of vision from those concerned with this city, resulting in the appearance of randomness in planning and implementation. Many projects have been implemented in the city, especially recently, in a manner that shows a lack of concern for green areas, and their conversion to other uses, whether through violations by citizens or official violations by issuing laws to change the type of use, Therefore, monitoring and assessing the percentage of green spaces is necessary to achieve environmental, urban, and social balance. (Cegielska, and Kozieł. 2022), therefore, geographic information systems are used as they are the best in land evaluation processes, paving the way to eliminate spatial errors and the lack of Pedological and administrative studies on the nature of the land in both the Al-Zawraa and Al-Jazira parks. This study was conducted to determine the impact of land management on some Pedological features of the land in both parks.

MATERIALS AND METHODS

Study area : Al-Zawraa Park is located on the Karkh side of Baghdad, the capital of the Republic of Iraq. Al-Zawraa Park was previously an army camp until it was transferred to investment to become a park in 1971. It has an area of about 133.86 ha (16.6025 ha is the area of the lake). It is surrounded to the east by the Al-Salihiyah neighborhood and to the west by Al-Harithiyah; to the south is Al-Qadisiyah neighborhood; to the southeast is Karada Maryam; and to the north is Baghdad International Station. It represents the largest vegetation cover in the capital and is a natural park that includes nearly half a million diverse trees. The Baghdad Tourist Island Park is located in the middle of the Tigris River, 20 km north of Baghdad in the Al-Fahhama district, in the middle of the orchards. Finnish company YII established this island as one of the tourism projects in 1983, with an area estimated at (81.477) ha. (17.965) ha is the area of the lake). It has sedimentary soil and was connected to the international zone on the Karkh side, and a main road connects the island to both sides of the river on its western end. On the northern side of the island, there is a small dam and a recreational lake.

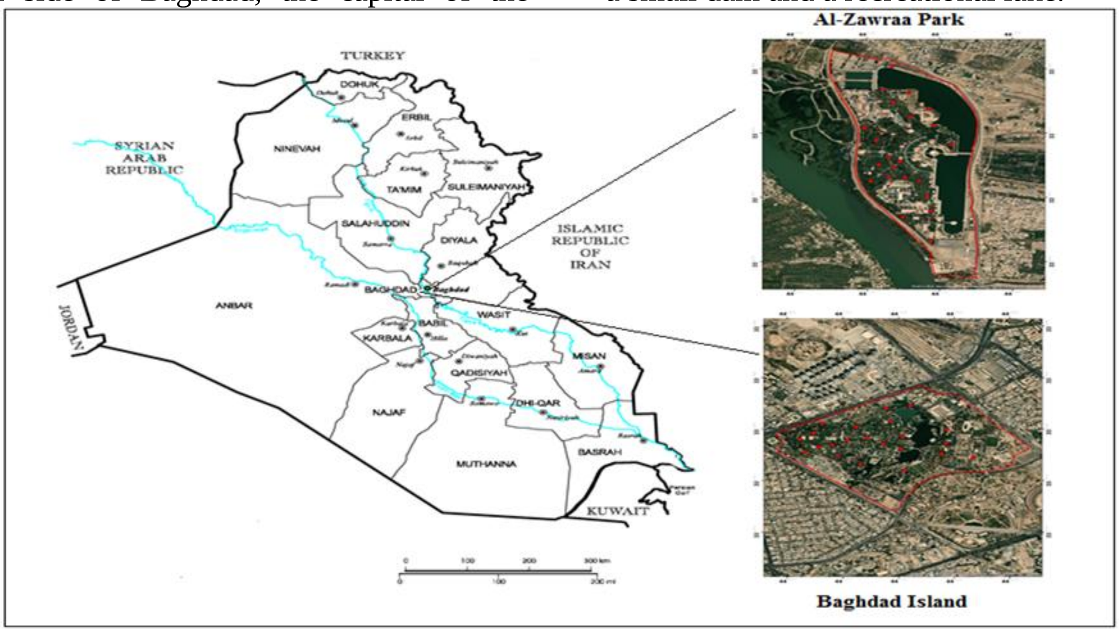

Figure 1. The map of Iraq shows Al-Zawraa parks and BTI Park

Data Source: A satellite image of the study area was obtained from the Landsat 8 satellite and the OLI sensor with a spatial resolution of 30×30 m^2 for the third and fourth spectral bands for October 2022. The Universal Transverse Mercator Projection (UTM) and WGS84 elliptical reference system in ArcGIS10.8 (Figure 1) were used to complete the processing and analysis. Weather information for Baghdad for 2022 was obtained from (The General Authority for Meteorology and Seismic Monitoring, 2022), and field information was obtained about the method of managing green areas for each park.

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

Field-works: Based on the satellite images interpretation and reconnaissance tours of the study area, 22 field drill holes were identified using a GPS device (GARMEN (Oregon650t)), taking into account selecting each site that represents the ground perspective of green spaces and covers all area of each park. It is essential to select samples without disturbing the vegetation cover of the green area. At each testing site, soil samples were obtained from 0-30 cm (the rhizosphere zone). The samples were packed in polyethylene bags, numbered, and transported to the laboratory for physical, chemical and fertility analyses. (Figures 2 and 3) represent the sites selected for testing at each park. The potential for using GIS in urban research is significant also regarding green space analysis if with the latest technologies, researchers can analyse anthropogenic areas and the benefits of UGS .reliably represent the current state of urban green space use. Their proximity is the traditional metric of greenness exposure, which today is measured precisely and comprehensively with GIS solutions.

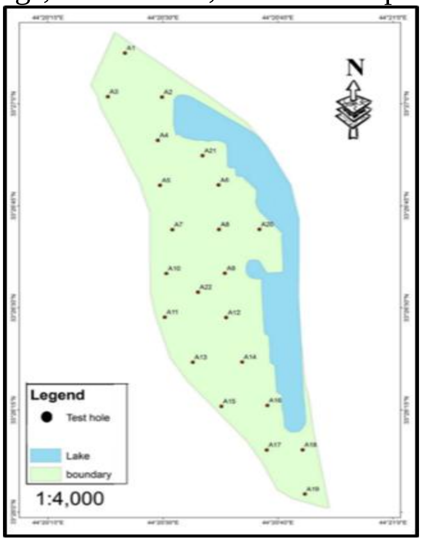

Figure 2. A map showing the locations of collecting soil and water samples from Baghdad Tourist Island Park

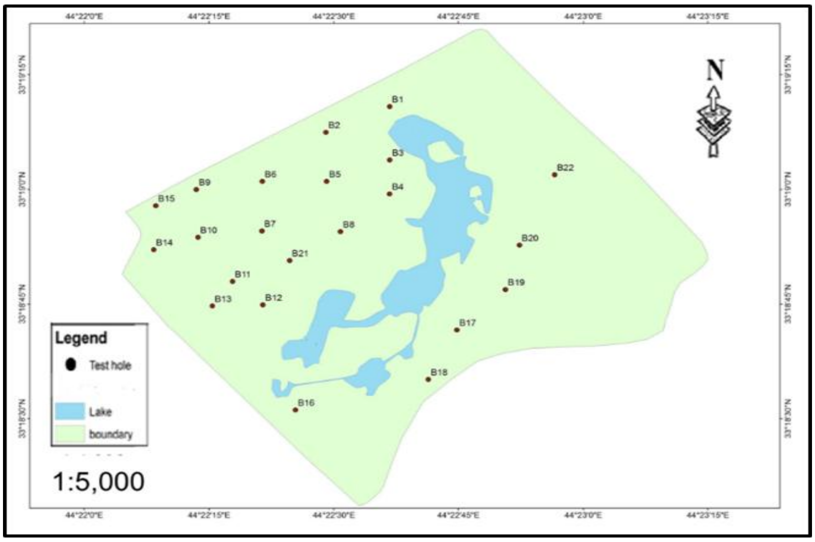

Figure 3. A map showing the locations of collecting soil and water samples from Al-Zawraa Park

Preparing soil samples for laboratory analyses and measurements: Soil samples obtained from each diagnostic horizon in 0-30 cm were air-dried, ground, and passed through a sieve with a diameter of 2 mm, then kept in plastic cans until laboratory analyses and measurements were performed. Some clods were isolated and kept undisassembled for bulk density measurements. Mechanical analysis of the soil samples was carried out using the hydrometer method according to (Black, 1965b.). The bulk density of the soil was estimated using the paraffin wax method given by (Jackson, 1958). The electrical conductivity of the 1:1 extraction was estimated according to (Black, 1965b). Soil pH was estimated by the pH meter according to the method presented in (Black, 1965b). The soil content of calcium carbonate equivalent, $CaCO_3$ was estimated by rectification with 1 M sodium hydroxide after adding 1 M hydrochloric acid, using the phenolphthalein index described in (Jackson, 1958). Gypsum content was determined by precipitation using an acetone solution and then the electrical conductivity of the formed precipitate was measured according. The wet oxidation method was used according to (Black, 1965b) to estimate the soil organic matter content by oxidizing it with potassium dichromate $K_2Cr_2O_7$ and adding concentrated sulfuric acid as a heat source and then by leaching with ferrous ammonium sulfate using the Ferrion indicator. Soil available nitrogen (NO_3 + NH_4) was determined by the KCl extraction method and semi-Micro Kieldahl distillation, according to (Bremner, and Mulvaney. 1982). Available nitrogen in the soil was estimated using a Micro Kieldhal device, according to (Bremner, and Mulvaney. 1982), and available

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

phosphorus (P) was estimated using a spectrophotometer, according to (Page, et al, 1982). Potassium was estimated using a Flame photometer according to (Martin, and Sparks. 1983.).

The availability of the elements from the equation is calculated:

Nutrient index = {(1xA) + (2xB) + (3xC)}/ NS

Where:

A = Number of samples in the low category.

B = Number of samples in the medium category.

C = Number of samples in high category.

NS= Total number of samples.

Office works: Maps of the spatial distribution of the characteristics measured were produced for each park and subjected to scientific interpretation and statistical comparisons. Statistical relationships were calculated, as required by each case of measurement, and the coefficient of variation (CV) was calculated according to the methods mentioned in (Steel, and Torrie. 1986). The MINITAB 1996 program in SPSS was used to analyze correlations and extract the best subsets regression statistical relationship.

RESULTS AND DISCUSSION

Climate of the study area: The climate of the study area is generally arid, hot and dry in the summer, and cold with little rain in the winter. Accordingly, the growth of plants in both parks will be determined by hot weather conditions in the relatively long summer and cold weather in the relatively short winter. The average lowest temperatures of winter in Baghdad were 4.2 °C in January and the average of the highest summer temperatures in Baghdad were about 43.4 °C in July (Table 2). The total rainfall amounted to 88.4 mm annually, beginning in late October and ending in May. Dry seasons start from May to the end of October and are accompanied by increased evaporation rates and an apparent decrease in relative humidity. This information shows that annual rainfall amounts are small, so both parks rely on irrigation. The average wind speed is 3.4 m/s ; the highest wind speed was 4.5 m/s in June and the lowest wind speed was 2.5 m/s in November. Based on the principles contained in the American soil classification system (Soil Survey Staff. 1999) and according to the climate data presented in Table (2), the soil temperature regime was the Hyperthermic type, and the soil moisture regime was the Aridic (Torric) type.

Table 1. Average climate data for the weather station in Baghdad

Months of the year	Average monthly temperature °C	Average maximum temperature ° C	Average minimum temperature ° C	Falling rate Mm	Average wind speed m/s	rate Relative humidity %
January	9.9	15.9	4.2	14.5	2.6	71
February	12.2	18.5	5.7	14.8	3.4	61
March	15.8	22.2	9.2	18.5	3.6	53
April	22.2	29.0	14.6	10.5	3.5	43
Mays	28.4	35.8	19.6	3.1	3.6	30
June	32.0	40.9	23.3	-	4.2	21
July	34.8	43.4	25.3	-	4.5	22
dad	34.5	43.5	24.7	-	4.0	22
September	30.7	39.6	23	-	3.4	26
October	24.7	33.6	16.2	-	2.9	34
November	17.2	24.5	10.6	11.5	2.5	54
December	11.2	17.7	5.2	15.5	2.6	71
annual rate	22.9	30.4	15.0		3.4	38
Annual total				88.4		

Management method used in each park

Grasshoppers family and is planted in both parks, is characterized as a plant adapted to various soil types, from sandy to clay, and prefers moist soils. It grows in alkaline and acidic soils and can withstand flooding and drought. The plant thrives in sunlight and dies with increased shade. Its growth increases in warm seasons, achieving the maximum growth at 38 C. The plant weakens in the event of cold weather, as it is damaged by snow. The plant grows in tropical rainy and arid areas along water channels and where people use irrigation. The plant can face long periods of

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

drought, but its productivity is weak in dry lands.Therefore, it is observed from the reconnaissance tours that this plant is cultivated and the affected areas are restored at the end of the summer after October through green reproduction. The Agricultural Departments have approved the plant variety as a Bermuda variety of American origin.These green spaces were irrigated by sprinkling with pop-up nets in the late evening or early morning, as cool, humid conditions and low winds distribute the water evenly. Specifically, irrigation was done between 10 p.m. and midnight or between 8 and 9 a.m. from observations and questionnaires, irrigation in both parks was one irrigation in summer and as necessary in winter. The lawn is mowed every 20-30 days/ month at 6-10 L/ m^2, according to different soil types and the annual season, then, NPK fertilizers are added according to what is available in local markets.

3. Soils physical characteristics of the two parks

Textural types and soil particles distribution: Figure (4) and table (2) indicate the highest sand content with a range of 916-900 g kg^{-1}, and the lowest sand content with a range of 113-200 g kg^{-1}, and it is noted that the highest clay content with a range of 250-273 g kg^{-1} as it represents very few sites and limited area almost represent impurities on the map, and the lowest clay content with a range of 44-100 g kg^{-1} which was prevalent in the southern part of the study area, while the most dominant clay content in the study area was a range of 150-200 g kg^{-1}, and it is clear From the spatial distribution map, the content of the clay separator is less heterogeneous compared to the content of the sand separator, because the predominant texture is (coarse fabric) sand (Hameed,et al. 2023, Sabti, .2021).

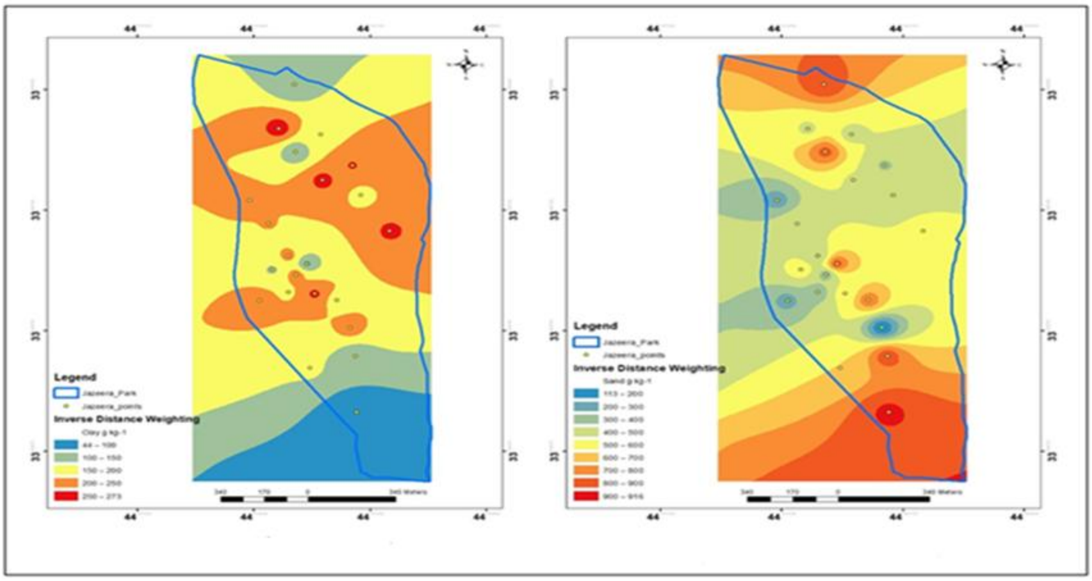

Figure 4. Spatial distribution of clay and sand content of BTI Park

Table (2) shows the volumetric distribution of soil separations of BTI the existence of sand dominance with a content ranging between 113-916 g kg^{-1}, while for alluvial content ranged between 21-668 g kg^{-1}, with a coefficient of variation of 45.93%, while for the soil content of clay, it ranged between 44-237 g kg^{-1} with a coefficient of variation of 43.26%. Figure (5) also shows a map of the spatial distribution of sand and clay content of Al-Zorah Park, where the highest sand content is observed with a range ranging between 800-960 g kg^{-1}. The lowest sand content is distributed in the range of 93.6-200 g kg^{-1}. While the most dominant sand content was 500-800 g kg^{-1}, the highest clay content was 300-369 g kg^{-1}, which formed a very small area that was considered impurities in the units within which it was located. While the lowest clay content has a range of 22-100 g kg^{-1}, while the most widespread range of clay content was 100-200 g kg^{-1}, it is noted that the clay separated content is less heterogeneous compared to the sand separated content

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

because the dominant tissue in the study area is medium and coarse fabric. As shown in Table (4) the volumetric distribution of soil separations for Al-Zawraa Park The sand content ranged between 93.6-960 g kg $^{-1}$ with a difference factor of 35.25%, as for the soil content of the clay separated, the results show that the clay content ranged between 22-369 g kg^{-1}, with a coefficient of variation of 71.09%, as for the silt content it ranged between 2-533 g kg^{-1} with a coefficient of variation of 106.52%, which indicates the difficulty of predicting the soil content of silt within Al-Zorah Park due to the large difference in its percentage with the variability of the examination site.

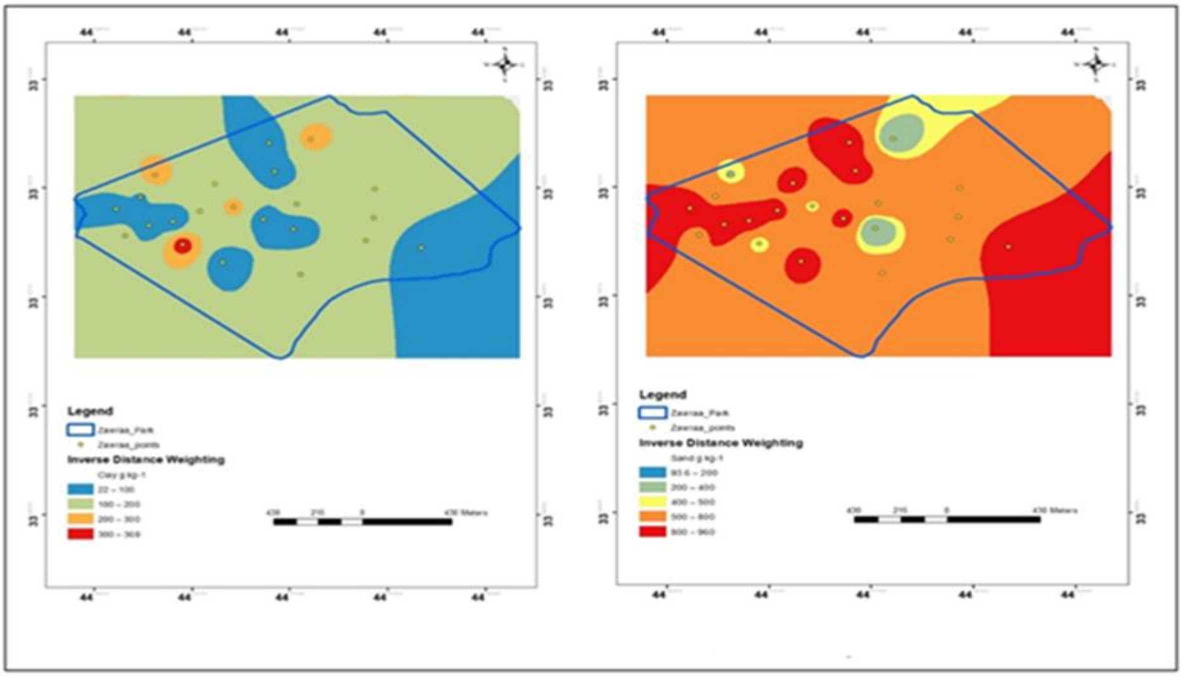

Figure 5. Spatial distribution of clay and sand content of Al Zawraa Park

Table 2. Soil physical properties of the green areas of the Baghdad Tourist Island Park

soil particles size distribution g Kg^{-1}

Pedon	X	Y	Sand	Silt gm kg^{-1}	Clay	Texture	Pp Mg m^{-3}
A1	44.343054	33.450714	874	21	105	Loamy sand	1.25
A2	44.342524	33.448755	479	248	273	Sandy clay loam	1.20
A3	44.345239	33.436124	736	220	44	Sand	1.62
A4	44.343614	33.438098	600	247	153	Sandy loam	1.52
A5	44.346399	33.444200	533	212	255	Sandy clay loam	1.46
A6	44.345401	33.445784	399	415	186	Loam	1.44
A7	44.344056	33.446451	494	244	262	Sandy clay loam	1.49
A8	44.343112	33.447719	718	194	88	Loamy sand	1.58
A9	44.343978	33.448487	460	366	174	Loam	1.40
A10	44.341483	33.445557	258	534	208	Silt loam	1.39
A11	44.342156	33.444518	490	309	201	Loam	1.38
A12	44.342859	33.443092	390	395	215	Loam	1.49
A13	44.342292	33.442464	571	287	142	Sandy loam	1.49
A14	44.343135	33.442250	340	437	223	Loam	1.43
A15	44.342844	33.441465	320	485	195	Loam	1.40
A16	44.341838	33.441098	257	519	224	Silt loam	1.38
A17	44.343768	33.441395	543	196	261	Sandy clay loam	1.35
A18	44.344553	33.441114	630	231	139	Sandy loam	1.49
A19	44.345018	33.439892	113	668	219	Silt loam	1.52
A20	44.345198	33.438606	700	191	109	Loamy sand	1.59
A21	44.345092	33.447118	390	358	252	Loam	1.41
A22	44.343499	33.442735	712	207	81	Loamy sand	1.55
C.V			43.12%	45.93%	34.26%	--------	%7.15

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

Table 3. Soil physical properties of the green areas of Al-Zawraa Tourist Park soil particles size distribution g Kg^{-1}

Pedon	X	Y	Sand	Silt gm kg^{-1}	Clay	Texture	Pp Mg m^{-3}
B1	44.377671	33.315536	730	130	140	Sandy loam	1.02
B2	44.370228	33.313903	770	110	120	Sandy loam	1.01
B3	44.374464	33.312555	890	62	48	Sand	1.61
B4	44.374134	33.316564	866	22	112	Loamy sand	1.54
B5	44.369841	33.315289	893	24	83	Sand	1.59
B6	44.370901	33.315908	780	125	95	Sandy loam	1.58
B7	44.371275	33.314458	960	8	32	Sand	1.63
B8	44.372306	33.314643	957	21	22	Sand	1.60
B9	44.373473	33.315172	846	53	101	Loamy sand	1.57
B10	44.374922	33.315396	450	309	241	Loam	1.48
B11	44.376216	33.314763	912	23	65	Sand	1.63
B12	44.377530	33.314246	936	23	41	Sand	1.62
B13	44.381015	33.314842	665	159	176	Sandy loam	1.49
B14	44.372713	33.313471	395	236	369	Clay loam	1.48
B15	44.371526	33.317021	370	372	258	Loam	1.42
B16	44.376735	33.317219	903	34	63	Sand	1.59
B17	44.376467	33.318660	918	36	46	Sand	1.62
B18	44.378287	33.318881	240	533	227	Silt loam	1.39
B19	44.381071	33.316329	698	126	176	Sandy loam	1.45
B20	44.380671	33.313657	755	118	127	Sandy loam	1.49
B21	44.383080	33.313299	901	63	36	Sand	1.61
B22	44.377836	33.311938	571	248	181	Sandy loam	1.52
C.V			35.25%	106.52%	71.09%	--------	11.46%

Bulk density of soil

It was noted from the results of the measured soil surfaces physical characteristics of both parks (Tables 2 and 3) that the soil bulk density values ranged between 1.20-1.62 $Megm^{-3}$, at Baghdad Tourist Island Park and between 1.01-1.63 $Megm^{-3}$, respectively for both parks, with a difference factor of 7.15% for Baghdad Tourist Island Park and 11.46% for Al-Zawraa Park.with a convergence in the coefficient of difference values for both parks. The variation recorded in the physical characteristic values is mainly due to several factors, the most important of which is the soil particle content. It is known that an increase in the sand content of the soil corresponds to a positive increase in bulk density, and on the contrary, for clay separation, in addition to the presence of another factor that affects a significant increase in the values of this characteristic is the soil organic matter content, which plays a positive role in reducing the values of physical characteristic (Mohammed,2018), as studies indicate that this characteristic is essential, especially in green spaces in parks.

Some soil chemical characteristics of stady areas

ECe: Tables (4 and 5) show that the electrical conductivity values measured for surface samples of green spaces in both parks ranged between 6.25-0.76 dS m^{-1} at sites A13 and A2, respectively, in Al Jazeera Park. In contrast, the values ranged between 0.91-6.58 dS m^{-1} at sites B21 and B6, respectively, in Al-Zawraa Park, with a trend towards an increase in the electrical conductivity value of the soils of Al-Zawraa Park compared to Baghdad Tourist Island Park. Soils classification, according to the (Solr,1982), showed that most of the testing sites within Baghdad Tourist Island Park were in the category of very little influence on salinity (S0) (4-0) dSm^{-1}, while in the sites of Al-Zawraa Park, many sites within the class that were slightly affected by salinity, Slightly saline (S1) (dS m^{-1} 4-8). The coefficient of variation was greater at Baghdad Tourist Island Park compared to Al-Zawraa Park, 60.92% and 50.57%, respectively. The reason for the decrease in ECe values for both parks is frequent irrigation management to maintain the greenness of these areas (Al-

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

Bayati, and Al-Azawi. 2017.). It agrees with because frequent agricultural exploitation washes sodium and chlorine ions away from the root zone during irrigation operations, thus reducing soil salinity more than soil not agriculturally exploited. The variation recorded in ECe is also due to the nature of materials and pollutants added to the river with varying locations and lengths of the Tigris River.

pH: Soil reaction values for the test sites, Tables (4 and 5) ranged between 7.30 and 8.20, and they agree with (Brady,.and Weil .2008) in that the degree of reaction in arid and semi-arid areas ranges between 7 and 9. In general, it was found that there was a trend for relatively higher soil interaction values with an increase in their calcium carbonate content due to the presence of a positive relationship between soil reaction and calcium carbonate content (Dregne, 1976). This was supported by a highly significant positive correlation between the soil reaction and calcium carbonate content (r=0.765**). The coefficient of variation was close in both parks, 3.43% and 3.55% for Baghdad Tourist Island Park and Al-Zawraa, respectively.

Soil content of calcium carbonate equivalent: The calcium carbonate equivalent soil content was high, ranging between 246-445 g kg^{-1} soil, at test sites A11 and A1, respectively. An average of 240 -398 g kg^{-1} to B2 and B4 of soil at BTI Park and Al-Zawraa parks, respectively, was due to the nature of the transported parent material that made up the soil, with heterogeneity in the spatial distribution of carbonate equivalent within the two parks. This is because the carbonate source in these soils is the mechanical erosion and weathering of limestone rocks and the transfer of products by running water, in addition to wind erosion and deposition in the region, confirmed by (Buringh, 1960). It was noted that there is a convergence in the distribution of calcium carbonate in the two study areas, (Tables 4 and 5).

Organic carbon: Tables (4 and 5) show the results of the organic carbon values for the surface samples, which ranged between 0.28-1.84 g kg^{-1} in A1 and A3 the island park, and it is noted from the figure that the low content of organic carbon was prevalent in the island and Al-Zawraa parks with a range of 0.24-1.24 g kg^{-1}, with a clear variation in the examination sites for both parks and a difference factor of 60.71% for the island park and 71.06% for Al-Zawraa park. The reason for this diagnosed heterogeneity in the soil content of this component in the study areas is due to the nature of the vegetation surrounding the green spaces at each park, which is observed from the field tours carried out in the area, as well as the high temperatures, which lead to oxidation of organic matter, its rapid decomposition and loss from the soil. As well as the management method used, as it does not include additives to organic materials necessary for the growth of the thiel and increase its freshness and color darkness .

Soil gypsum content: Tables (4 and 5) show the results of soil content of the gypsum ranged between 0.22-3.31g kg^{-1}, as the lowest content was recorded at test site A15 in Baghdad Tourist Island Park, while the highest value was recorded at test site B8 in Al-Zawraa Park. The decrease in the gypsum content was due to agricultural exploitation, which caused it to be washed from the soil. It was observed that there was no specific trend in the soil content of this component with varying locations spatially at both parks. The coefficient of variation reached 55.4% and 64.5% at Baghdad Tourist Island Park and Al-Zawraa parks, respectively. This was due to the irrigation method followed in both parks, which is constant regarding the amount of irrigation water and the irrigation schedule without taking into account the soil texture types at each site, which are very important in influencing the nature of salts and their distribution in the soil (Al-Mashhadani, 1994).

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

Table 4. Soil chemical characteristics of the BTI Park green areas

Pedon	N	P	K	$CaSO_4$	$CaCO_3$	O.C	EC (dS m^{-1})	pH
	mg kg^{-1} soil			(Cmolc kg^{-1} Soil)				
A1	21.00	6.80	98.50	1.74	445	1.84	0.88	8.00
A2	21.00	6.60	123.30	1.19	385	1.60	0.76	8.20
A3	12.00	23.00	78.20	0.54	302	0.28	2.41	7.50
A4	17.00	28.00	102.40	0.96	323	0.41	1.88	7.80
A5	24.00	26.00	188.50	1.54	298	1.17	2.91	7.40
A6	21.00	35.00	210.20	0.83	256	0.48	0.99	8.10
A7	18.00	32.00	225.70	0.35	288	1.22	1.54	8.00
A8	19.00	28.00	101.50	1.01	301	0.41	4.75	7.60
A9	25.00	45.00	181.60	0.66	337	0.44	5.01	7.50
A10	16.00	55.00	265.40	1.87	279	0.51	3.15	7.50
A11	17.00	42.00	205.60	0.84	246	0.55	2.81	7.60
A12	16.00	32.00	198.80	1.66	288	0.61	4.11	7.90
A13	24.00	21.00	112.40	2.51	301	0.43	6.25	7.60
A14	29.00	29.00	210.50	1.68	346	0.50	5.01	7.40
A15	16.00	19.00	199.80	0.22	347	0.48	1.87	7.40
A16	12.00	24.00	278.90	1.02	338	1.03	2.22	7.30
A17	12.00	54.00	255.50	2.03	397	1.13	3.12	8.10
A18	18.00	32.00	158.60	0.54	279	0.38	1.84	7.90
A19	14.00	42.00	201.50	0.32	388	0.67	0.87	7.60
A20	19.00	35.00	145.60	0.74	304	0.51	1.15	7.50
A21	18.00	39.00	189.80	0.92	299	0.55	1.11	7.40
A22	24.00	41.00	120.50	1.04	294	0.35	2.15	7.60
C.V	24.16%	39.77%	33.06%	55.43%	15.29%	60.71%	60.92%	3.55%

Table 5. Soil chemical characteristics of the green areas of Al-Zawraa Tourist Park

Pedon	N	P	K	$CaSO_4$	$CaCO_3$	O.C	EC dS m^{-1}	pH
	mg kg^{-1} soil			(Cmolc kg^{-1} Soil)				
B1	21.00	16.10	131.50	1.43	345	1.22	4.03	7.20
B2	28.00	18.70	105.20	1.11	240	1.22	2.7	7.50
B3	11.00	28.00	79.80	1.05	322	0.25	2.15	7.90
B4	12.00	34.00	110.20	1.65	398	0.29	3.56	8.20
B5	14.00	51.00	116.50	1.63	321	0.30	2.18	7.90
B6	11.00	35.00	177.70	2.16	389	0.26	6.58	8.00
B7	14.00	41.00	110.50	2.05	397	0.35	4.51	8.10
B8	12.00	31.00	101.40	3.31	284	0.29	3.11	7.50
B9	11.00	59.00	98.80	1.99	293	0.31	4.87	7.80
B10	13.00	38.00	186.80	3.12	311	0.45	6.55	7.80
B11	15.00	44.00	94.60	2.45	268	0.35	5.56	7.40
B12	12.00	46.00	88.40	2.94	262	0.28	6.21	7.60
B13	14.00	19.00	105.60	0.68	266	0.38	1.54	7.50
B14	13.00	24.00	210.50	1.84	301	1.12	2.48	7.80
B15	13.00	28.00	284.40	1.05	352	1.21	1.48	7.70
B16	17.00	19.00	90.10	0.82	296	0.36	1.98	7.70
B17	16.00	30.00	87.50	1.23	366	0.24	2.88	7.90
B18	19.00	34.00	298.80	2.99	389	1.24	4.05	8.00
B19	10.00	39.00	150.40	2.14	389	0.40	3.15	8.30
B20	13.00	46.00	189.20	3.01	376	0.48	3.54	7.90
B21	17.00	48.00	88.10	0.34	283	0.31	0.91	7.60
B22	12.00	27.00	108.60	0.42	288	0.38	1.05	7.80
C.V	%28.30	%33.83	%45.66	%50.72	%15.58	%71.06	%50.57	%3.43

Fertility status: The soil's available nitrogen content in Al Jazeera Park was between 12 and 29 mg kg^{-1} in A3 and A14, with a coefficient of variation of 24.16%. In Al-Zawraa Park, the

P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

soil's available nitrogen content ranged between 10-28 mg kg^{-1} in B14 and B2, and a coefficient of variation of 28.30% mg kg^{-1}, It is clear that both hikers need an integrated nitrogen fertilization program because field tours and preliminary information have shown that both hikers use an unsuccessful fertilization method that is evident through the heterogeneity and degree of greenness of the grass in the green spaces in both parks. As the addition of nitrogen to the Bermuda grass promotes the growth and increases the plant density and color and is often the most specific nutrients for the growth and development of grass and this is what studies have indicated (Ihtisham, et al,2018). Noted (38) low levels of nitrogen added to green spaces lead to a decrease in the growth of thiel leaves and chlorophyll content in the plant as well as a decrease in photosynthesis and biomass production. The results in Table (4 and 5) indicate that the available phosphorus content of the surface samples of the parks ranged between 6.60-55.00 A2 and A10 mg kg^{-1} in Baghdad Island Park and 16.10-59.00 mg kg^{-1} in B1 and B9 Al-Zawraa Park with a coefficient of difference of 39.77% and 33.83% for both hikers respectively. This indicates that both parks have sufficient content for cannabis to grow. He has noted (FryHarivandi and Minner.1989.). Significant effects of phosphorus deficiency on the quality of grass for green spaces have been observed, with short plant length and compartment leaves recorded in Bermuda grass when phosphorus is deficient. The study of the results of the analysis of this nutrient (potassium) in the soil of the island park has shown in tables (4) a range ranging between 78.20 – 278.90 mg kg^{-1} A3 and A16 with a coefficient of variation of 33.06% (low potassium content) due to sandy soils that are characterized by their low potassium content. As for the content of the soil of Al-Zawraa Park, the content of the soil of available potassium ranged between 79.80-298.80 mg kg^{-1} B3 and B18, with a coefficient of variation of 45.66%, which indicates that there is a significant difference in the distribution of this element within Al-Zorah Park. It is noted that both hikers have a low content of available potassium, which indicates the need to add this element to the soils of both hikers to improve the fertility status of this element in the soil, because of the element potassium of an important role in the growth of grass in green spaces (Jackson, 1958, McCarty, and Miller. 2002.).

CONCLUSION

The study aimed to evaluate the variation in some pedological properties of soils in the green spaces of Baghdad Island Park and Al-Zawraa Park due to differences in management practices. The results showed spatial variation in soil texture, with sand dominating followed by silt and clay, along with differences in calcium carbonate and organic matter contents and a decrease in gypsum content. Electrical conductivity varied according to irrigation practices, while the NPK nutrient readiness index indicated low available nitrogen and potassium and a moderate level of available phosphorus in the park soils.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

AUTHOR/S DECLARATION

We confirm that all figures and tables in this manuscript are original. Any figures or images that are not originally produced by the authors have been used with the necessary permissions for re-publication.

The author has signed the Ethical Approval Statement.

Ethical Clearance and Animal Welfare: Not applicable.

Funds: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

AUTHOR'S CONTRIBUTION STATEMENT

The author was responsible for the study design, field sampling, laboratory analysis, data interpretation, and manuscript preparation.

REFERENCES

Al-Bayati, A.H.I. and F. H.H. Al-Azawi. 2017. Effect of physiographic position on the suitability of land for Cotton production in some agricultural projects within Iraqi Mesopotamians. Anbar Journal of Agricultural Sciences.15(2): 317-333. DOI:10.32649/aagrs.2017.143600

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

Al-Mashhadani, A.S.M. 1994. Soil Survey and Classification, Ministry of Higher Education and Scientific Research, University of Mosul. Iraq. pp: 47.

Al-Quraishi, A. R. .2012. Spatial Variations of the Properties of some Soils in the Middle of the Sedimentary Plain Using the Concepts of Geostatistics. Ph.D. Dissentation. College of Agriculture. University of Baghdad. pp:53.

Anteneh, M. B., D. S. Damte, S. G. Abate and A. A. Gedefaw. 2023. Geospatial assessment of urban green space using multi-criteria decision analysis in Debre Markos City, Ethiopia. Environmental Systems Research. 12(7): 1-21. DOI:10.1186/s40068-023-00291-x

Barnes, M. R. and E. Watkins. 2022. Differences in likelihood of use between artificial and natural turfgrass lawns. Journal of Outdoor Recreation and Tourism. 37(4): 1-9. https://doi.org/10.1016/j.jort.2021.100480

Black, C. A., D. D. Evans and J. L. White. 1965b. Methods of soil analysis: Chemical, Biological and Mineralogical Properties (No. 631.410287/B627 V. 2).

Brady, N.C.and R.R. Weil .2008. The nature and properties of soils (Vol. 13, pp. 662-710). Upper Saddle River, NJ: Prentice Hall.

Bremner, J.M. and C.S. Mulvaney. 1982. Nitrogen total. In: methods of soil analysis. Part2 chemical and microbiological properties. 2nd edition. Page, A.L. (Ed.). American Society of Agronomy, No. 9, Madison, WI, USA. pp: 595-624.

Buringh, P. 1960. Soils and Soil Conditions in Iraq. Ministry of Agriculture, Baghdad, Iraq.pp:64

Cegielska, K. P. Piotr. and A. Kukulska-Kozieł. 2022. Urban green spaces: how geospatial information can help identify diversity. A case study from eastern Lesser Poland. Bulletin of Geography. Socio-Economic Series. (58): 7-29. doi.org/10.12775/bgss-2022-0031

Dawood, I. T. 2019. The temporal variation of the change of green areas in baghdad city for the period (2011-2016). European Journal of Sustainable Development. 8(1): 211-211. DOI:https://doi.org/10.14207/ejsd.2019.v8n1p211

Dregne, H. E. 1976. Soils of Arid Regions. Elsevier Scientific Publishing Co., Amsterdam. pp: 237.

Fry, J.; M. A. Harivandi and D.D. Minner. 1989. Creeping bent grass response to P and K on a sand medium. Hort Science. 24(4): 623–624.

Hameed, I. A., H. A. J. A. Rahman. and A. Anmar. 2023. Study of the variations in the vertical and horizontal distribution of heavy sand minerals in the hilla river sediments. Journal of Ecological Engineering, 24(7):318-330. DOI:10.12911/22998993/164752

Ihtisham, M.; S. Fahad; T. Luo; M.L. Robert; Y. Shaohua and C. Longqing. 2018. Optimization of nitrogen, phosphorus and potassium fertilization rates for over seeded perennial ryegrass turf on dormant bermuda grass in a transitional climate. front. Plant Sci. 9(487): 1-14. DOI: 10.3389/fpls.2018.00487

Jackson, M. L. 1958. Soil chemical analysis prentice Hall. Inc., Englewood Cliffs, NJ. 498. 183-204. https://doi.org/10.1002/jpln.19590850311

Jasim, S. N. and A. M. Alfatlawi .2023. The application of geospatial technologies in the study of vegetation cover, assessment and comparison of plant diversity in the al-jadriyah complex “University of Baghdad and Al-Nahrain”. IOP Conference Series: Earth and Environmental Science. 1215(1): 012043. IOP Publishing. DOI:10.1088/1755-1315/1215/1/012043

Martin, H. W. and D. L. Sparks. 1983. Kinetics of non exchangeable potassium release from two coastal plain soils. Soil Sci. Soc. Am. J. 47(3):883-887. https://doi.org/10.2136/sssaj1983.03615995004700050008x

McCarty, L.B.; and G. Miller. 2002. Managing Bermuda grass Turf: Selection, Construction, Cultural Practices, and Pest Management Strategies; John Wiley and Sons: Hoboken. NJ. USA. pp:56.

Mohammed, R. J. 2018. The spatial variability of some chemical properties of gypsiferous soils by using GIS. International Journal of Agricultural & Statistical Sciences, 14(1). DOI:10.4108/eai.28-6-2020.2298163

P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI: https://doi.org/10.36103/cbag3r82

Page, A.L., R.H. Miller and D.R. Kenny. 1982. Method of soil analysis, part 2 Agronomy No 9. ASA Madison. DOI:10.2134/agronmonogr9.2.2ed.

Sabti, A.J.A.R. .2021. Spatial and Temporal Variations in the Productivity and Land Use of Some Agricultural Districts from Ramadi City using GIS. M.Sc. Thesis. Collage of Agriculture. Anbar University pp: 88.

Soil Survey Staff. 1999. Soil Taxonomy. A Basic System of Soil Classification for Making and Interpreting Soil Surveys, 2nd Edition. Agricultural Hand book 436. Natural Resources Conservation Service. USDA. Washington. DC. USA. pp: 869.

Solr, A. 1982. Specification for soil surveys and hydrological investigations in Iraq. General Establishment for design and Research. Selma Press. Baghdad. Iraq. pp: 67.

Steel, R. G. and J. H. Torrie. 1986. Principles and procedures of statistics: a biometrical approach. McGraw-Hill. pp: 43. DOI:10.2307/2287561

Wu, Z.; R. Chen, M. E. Meadows, D. Sengupta and D. Xu. 2019. Changing urban green spaces in Shanghai: Trends. drivers and policy implications. Land Use Policy. 87. 104080: 1-11. DOI:10.1016/j.landusepol.2019.104080

Zhao, D.; K.R. Reddy; V.G. Kakani and V. Reddy. 2005. Nitrogen deficiency acts on plant growth, leaf photosynthesis and hyper spectral reflectance properties of sorghum. Eur. J. Agron. 22. 391–403. DOI:10.1016/j.eja.2004.06.005

Iraqi Journal of Agricultural Sciences –2026:57(3):882-894
P-ISSN: 0075- 0530 /E-ISSN: 2410-0862
DOI:

تأثير أسلوب إدارة المسطحات الخضراء في منتزهي الزوراء وجزيرة بغداد السياحية في بعض صفات التربة بأستعمال التقانات الجيومكانية

زينب جعفر صالح العلوجي حليمة عبد الجبار المشهداني
العراق/ جامعة بغداد/ كلية علوم الهندسة الزراعية/ قسم علوم التربة والموارد المائية

المستخلص

نفذت دراسة حقلية لدراسة التغايرات في بعض الصفات البيدولوجية لترب المسطحات الخضراء ضمن منتزهي الجزيرة والزوراء في محافظة بغداد بسبب تغاير اساليب الادارة المتبعة، لذلك تم استحصال عينات ترابية من العمق 0–30 سم بعد تحديد مواقعا جغرافيا 22 موقع حفرة مثقابيه فحص عند كل منتزه باستخدام جهاز GPS من نوع GARMEN (Oregon650t). وتم التقاط صورة القمر الصناعي لمنطقة الدراسة بواسطة القمر الصناعي لاندسات 8 ومستشعر OLI بقدرة تمييز مكاني تبلغ 30 × 30 مترًا مربعًا، ويهدف البحث الى دراسة تاثير أسلوب إدارة منتزهي (الجزيرة والزوراء) في بعض صفات التربة البيدولوجية. اظهرت النتائج وجود تباين في التوزيع المكاني لأصناف النسجة المتواجدة عند كل منتزه بسبب تغاير التوزيع الحجمي لمفصولات التربة والتي كانت السيادة فيها لمفصول الرمل يليه الغرين واخيرا الطين، مع وجود تباين في التوزيع المكاني لمحتوى التربة من مكافئ كاربونات الكالسيوم والمادة العضوية، بينما سجل انخفاض في محتوى ترب الدراسة من الجبس. وان استعمال الاسلوب الاداري المشابه لجميع ترب كل منتزه من خلال جدولة الري والتسميد غير صحيح ويحتاج الى متابعة ادارية للوصول الى مساحات خضراء اكثر نضارة ودكانة في اللون. ان استعمال دليل جاهزية المغذيات NPK للمساحات الخضراء في كلا المنتزهين قد اظهرت انخفاض مستوى تربهما من النيتروجين والبوتاسيوم وبمدى متوسط من الفسفور الجاهز.

الكلمات المفتاحية: منتزه جزيرة بغداد السياحية، منتزه الزوراء، خصائص تربة المسطحات الخضراء، الممارسة الإدارية.

***جزء من رسالة ماجستير الباحث الأول**