

Spatial analysis of the effect of soil on natural plant diversity and used in traditional medicine in the Najaf district center

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ABSTRACT

Plants synthesize hundreds of chemical compounds for functions including defence against insects, fungi, diseases, and herbivorous mammals. Soil is considered to be a habitat for living organisms, whether they are plants, animals or people. Some of them depend on their food and are considered a shelter for them, and since the subject of the study is limited to one type of organisms, which is natural plants that grow on the soil without human intervention and feed and grow on the soil. The plants varied according to the type the prevailing soil in the study area, including annual plants and permanent plants, as the natural plant in the study area is characterized by its poverty and lack of density and its types vary according to the factors and the quality of the soil and the natural plant is of great importance in protecting the soil from erosion. The natural plant works to reduce the percentage of evaporation of the ground water from the soil surface. It has a great impact on increasing the salts present on the surface of the soil and reducing them. Most of the natural plant is the study area of desert plants that resist drought and salinity, and that some of these plants have long roots that help them absorb water from the depths of the soil. As well as their different leaves, of which they are pointed or axial in shape. The leaves are coated with a waxy layer to prevent moisture from escaping and retaining as much water as possible. Natural plants may add great importance to the soil, as it acts as a source of wind and also works in contact with the soil from erosion, especially the study area is within the dry desert areas, and also these plants are a source of animal food and some of them are used for medicinal purposes. Also, the density and diversity of the natural plant is due to the type of soil and the amount of water available in it. It has a great concentration in the low area of the Baher AlNajaf and gradually decreases as heads towards the desert.

Keywords: Desert, Baher AlNajaf, organisms, grow, leaves, diseases,

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INTRODUCTION

Soil is the environmental medium on which organisms live on it and affect it, and it derives all its basic requirements. Thus, the soil is a natural resource, no matter how geography is concerned with its study of its importance first, and because it is considered a relatively recent study, and the soil is defined as a natural body with depth and surface area and it is one of the products of nature soil is a complex natural formation that occurred during complex mechanical and chemical natural processes, in which everything on the surface of the earth and everything below it was shared to a small depth. Whether it was inanimate, plant or animal. Whether it is solid, liquid, or gaseous, the importance of soil comes as a natural resource that has a close relationship with other resources. The human being had an important role in the development of the soil and there are many attempts to define the soil as it was known as the disjointed part of the earth's crust, because it was considered a geology product that it is the fragmented layer of rock. The soil is a fragmented surface layer of rocks of the earth's crust that ranges from several centimeters to several meters and is a mixture of rock and organic materials, water and air in which plants grow and derive its food from them and on it the animals live and on both people depend on what needs food, shelter and food. Soil is also defined as the mixture consisting of mineral, organic, water and air materials. Thus, it consists

of solid materials and interstitial voids in which the dissolved substances and air are found, and since the soil is of great importance. It provides humans, plants and animals with all the requirements of living. Therefore, naturally, the soil suffers from many problems that must be addressed and disposed of. These problems change the characteristics of natural, chemical, physical, and biological soils. Soils are of great importance in agricultural activity as without soil, the agriculture that humans and animals depend on for their food would not be. The study area with diversity is represented by (marsh soils and swamps - mixed gypsum desert soils - sand dunes soils - soils filled with silt) which are influenced by many factors and represented by natural factors (surface - climatic factors - water resources - natural plant). Therefore, the effect of soil diversity on natural plant diversity in the study area will be studied

The Study Problem

Here, the researcher asks about the spatial variation of soil properties and their effect on natural plant diversity. The study area is as follows:

- 1- Do the soil properties have an impact on the natural diversity of plants? Study area?
- 2- Is there a variation in the types and genera of the natural plant in the study area?

The hypothesis of the study

The research hypothesis is a preliminary solution to the problems raised, and on this basis the researcher developed the hypothesis as follows:

- 1- The soil properties have an effect on the natural diversity of the plant.
- 2- There is a clear diversity in the genera and species of the natural plant in the study area

Purpose of the study

The study aims to reveal the characteristics of the soil of the study area by indicating the factors affecting it and showing the extent of the diversity of the natural plant in it.

The importance of studying

The importance of the study lies in considering the soil an important component of the environment and the human being who exercises all its various activities and the fact

that the study area is part of the province of Najaf. So the characteristics of the soil and its spatial contrast and the extent of the diversity of the natural plant in it were studied because the soil is the basis for all activities, whether it is agricultural or industrial or service areas, so studying the soil for this area is of great importance.

The boundaries of the study area

The study area is the center of the Najaf district, and it extends between the longitude (44.2700-43.4700) in the east and between the two latitude (32.09-31.44) in the north. The area of the Najaf district center is 1133 km² of the Najaf area of 28824 km², as shown in Figure 1. The boundaries of the study area include the Najaf district center with all its residential units. The actual field of study is determined in areas with industrial, agricultural and civil activity.

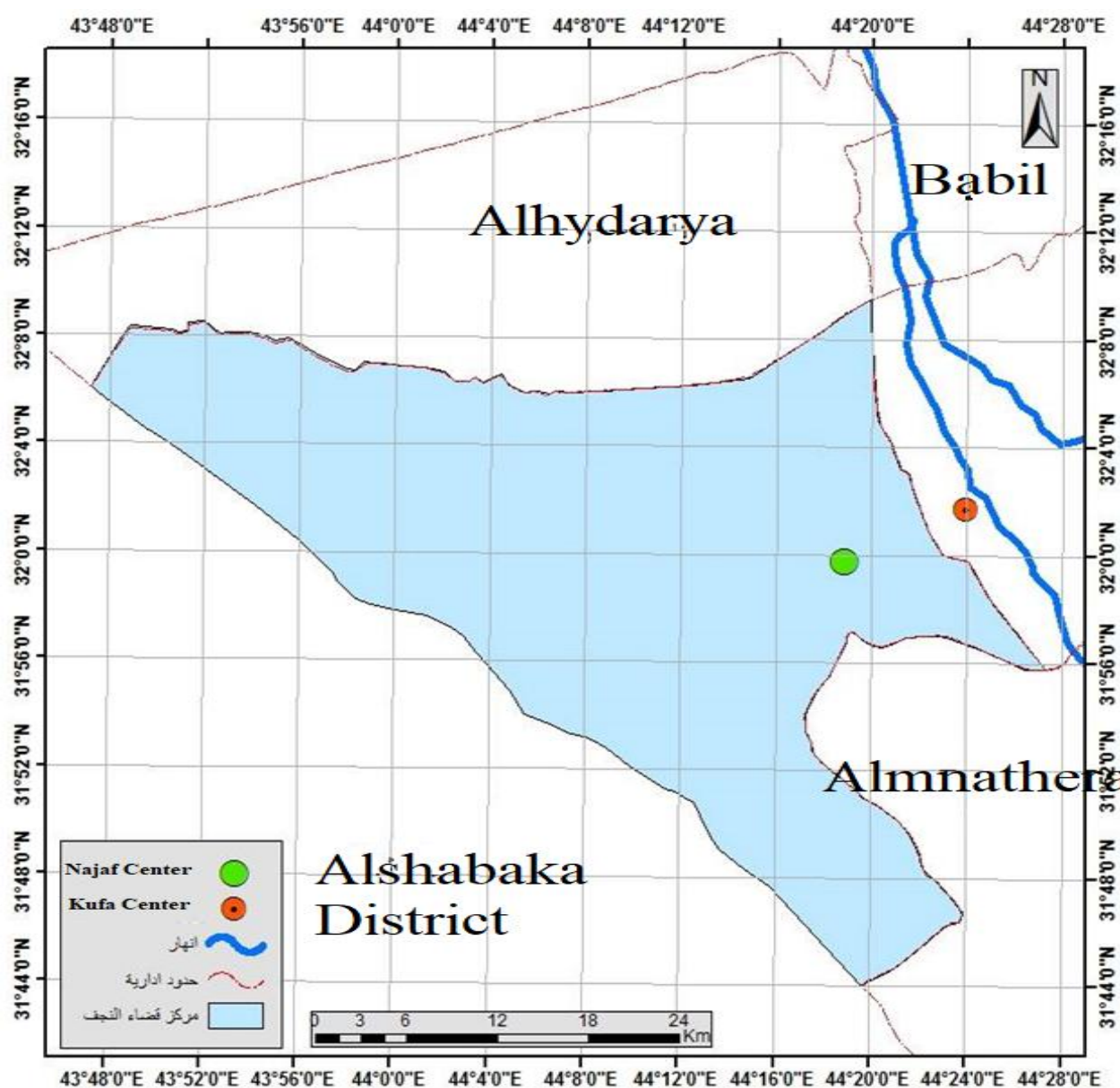


Figure 1. The administrative boundaries of the Najaf District Center. Source: Building on GIS, Land SaT7 Satellite View, Scene 38-160, Arc Gis

Structure of the study

The research was divided into several axes:

First: Soil characteristics in the Najaf district center

Second: The natural plant diversity in the soils of the Najaf District Center

Third: The results of the study

First: Soil characteristics in the Najaf district center

The soil of the study area is divided into four types, as follows:

A) Soils of marshes and swamps:

These soils cover more than 75% of the area of the sedimentary plain in the governorate. These soils are distributed over the lands of the Baher ALNajaf as shown in Figure 2. These lands are low and have been subject to frequent floods. Which is part of tectonically active decline that passes during the phase of subsidence or continuous decline with the presence of small localized lifting movements, and that a portion of these newly emerging tectonic movements are due to the sediments of these modern soils of the Euphrates river and its branches. As well as of the sediments transported by wind from the Western desert, and the degree of slope of these soils is less than 0.0002 m on average. It is poorly discharged and when exposed to drought it's the surface cracks. It appears from the physical analysis of these soils that the content of sand is about 2.4%, clay is 38.1%, and silt is 59.5%. According to the tissue triangle, these soils are of alluvial mixture and poor drainage. These soils are

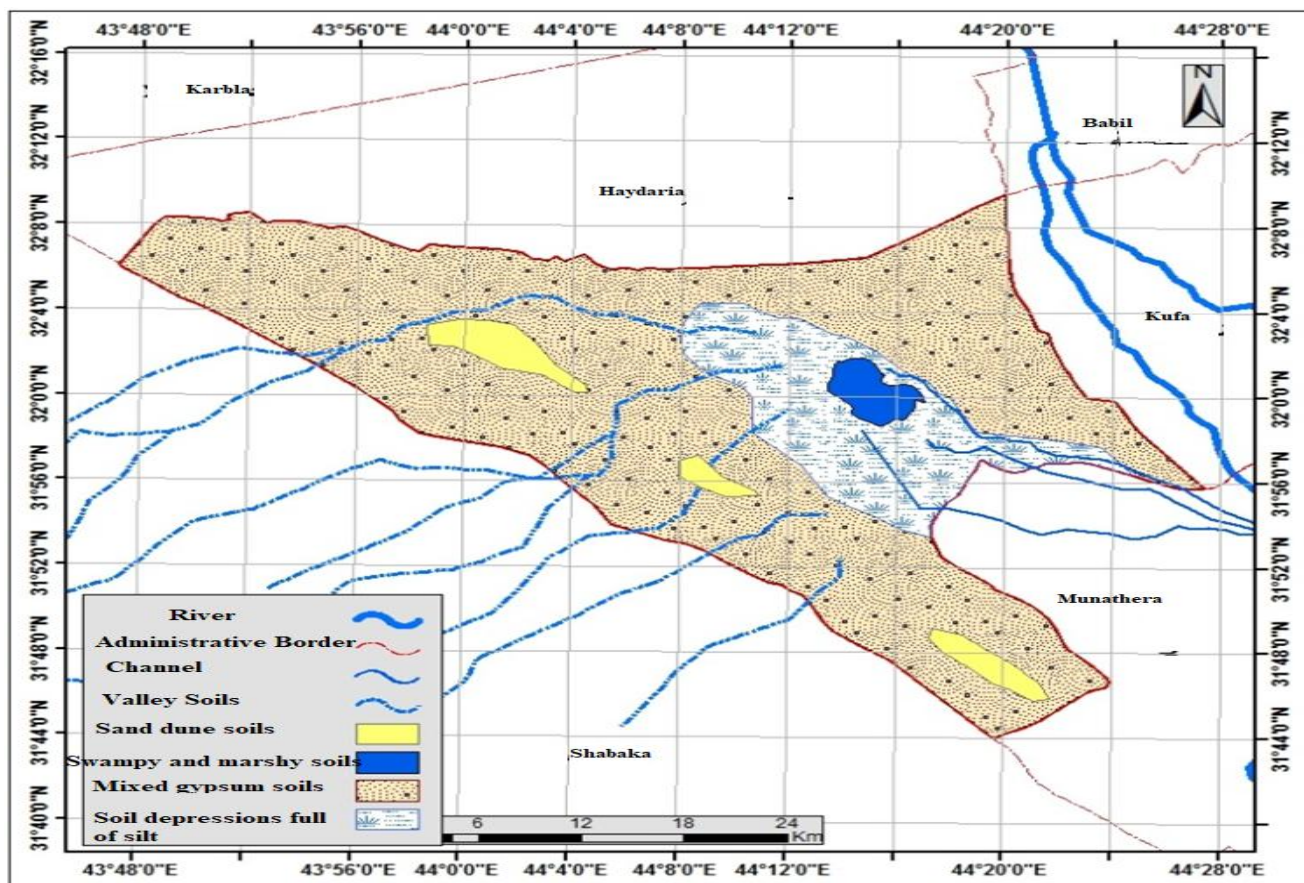
due to the low level of their surface and the high level of the groundwater, making them suitable for specific types of agricultural crops and that the rise of groundwater has changed the characteristics of natural soil (1).

B) Mixed Gypsum Desert Soil

This soil is represented in the study area and it is part of the Euphrates river deposits that are characterized by its coarse texture and consists of clay loamy sandy crumbs of varying sizes as well as some limestone and gravel materials. Within this range there are chains of sand dunes, this soil is characterized by high gypsum content in it as it reaches 25%. The height of the gypsum is due to the evaporation of groundwater near the surface of the earth and is loaded with calcium sulfate salts (2).

C) Sand dune soil

This soil is located in the sand dune range that extends (15-25 km) west of the city of Najaf, it rises above the lands by the limits of (12 m) and is characterized by fluctuation of its height depending on the speed of the wind formed from the fragmentation of sand rocks and its rough texture because it is a mixture of quartz and lime, the proportion of gypsum in it to (1.69%) and the proportion of lime in it is about (8.89%) and is characterized by its poverty in the organic matter ranging (0.3-0.7%) due to the scarcity of vegetation on it due to its high permeability as it ranges between (30-40% cm / hour) and less clay materials are in it



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Figure 2. Geographical distribution of soils of the study area. Source: Reliance on Geographic Information Systems, Satellite Video, Land Sat7, Scene 38-160, Arc GIS

It is a fragile soil that is quickly destroyed by the wind and its inability to retain water, and this soil is dry even in the event of rain or not falling, where the content of mineral materials and air is high because of the low rainfall and its high permeability (3).

D) Soil-filled depressive soils

This soil is found in the lands of the Baher ALNajaf. These soils are characterized as being transported by the waters of the Euphrates river and by the winds from the western plateau. They differ in the size of their atoms, their sediments and their directions, due to the different sedimentary layers of the succession of the floods. Basal (7-8.3) the percentage of calcium carbonate in it ranges (2-36%) and the percentage of gypsum in it (9%) and its permeability (14.4) cm / day is characterized by its hardening and cracking due to its physical properties and the high level of the groundwater in it due to the high summer temperatures (4).

Second: the natural plant diversity in the soils of the Najaf District Center

The natural plant has a great effect on the properties of the soil, as the natural plant contributes to improving the properties of the soil, as some of them add organic matter, especially seasonal plants, and some of them work to increase salts on the soil surface through the growth of

plants that absorb water by the roots, leaving the salts at the root layer and there are plants that work on extending their roots to different depths in the soil (5). Natural plants absorb the salts from the soil and collect them in the root zone. When decomposing, they leave a significant amount of salts gathered on the soil surface and that the positive side of the natural plant, such as weeds, for example, reduces the intensity of evaporation from the soil surface (6). The natural plant in the study area varies in terms of its species and density, as its geographical distribution is irregular, as it grows at the highest intensity in the areas where the rains fall in abundance and moderate temperatures. The study area appears poor with the natural plant for the rule of the dry climate and the lack of rainfall and that the natural plants are important large in the study area, despite its small number, it protects the soil from erosion and erosion by returning running water to the surface and then water leakage. There are several types of natural plants in the study area, the most important of which are: (7).

A) Seasonal swamp plants:

This type of plants spreads in areas that collect drainage and rain channels from the Baher ALNajaf, where they are lower than the general surface level and the reed plant grows in them, as shown in Figures (3 and 4).



Figure 3 Reed plant on the banks of the Sadeer River **Figure 4** Reed plant near Baher ALNajaf

B) Valleys

It can be seen at the end of the seasonal valleys, and it appears in the form of a vegetation that does not exceed (0.5 m) in height and most of it is Thorns, A. Abrotanum, Haloxylon salicornicum, and Tamarix, as shown in Figures 5 and 6.



Figure 5 *Haloxylon salicornicum* in the study area **Figure 6** *Tamarix* in the study area

C) Desert plants

These plants occupy most of the area of the study area because their plants are of the type that resists the harsh environment ([Figure 7](#)).



Figure 7 *Astragalus* plant in the study area

Among the other types prevalent in the study area (*Capparies spinosa* L., grapes of the wolf, and ascendants as well as *Mentha pulegium* catnip, thorns, *Juncus*, *Malva*, and Alajam thorns that act as windbreaks. Because of the severe drought of these soils, these plants have grown

during the rains and endured harsh environmental conditions, as in the [Figure 8](#) for the *Capparies spinosa* L. plant, [Figure 9](#) for thorns, and [Figure 10](#) for *Acacia etbaica*.



Figure 8 for the *Capparies spinosa* L. plant



Figure 9 for thorns



Figure 10 for *Acacia etbaica*

D) Plants of fields, lands and lowlands:

These plants are spread in the fields and agricultural lands adjacent to the banks of the Sudair branch and the lands adjacent to it, and they are in the form of weeds such as halfa, wild thorns, and tomato, and inferred from some plants, happiness and limbs. As well as from the natural plants that grow in these lands are Athan Al-Sakhla, as farmers who have experience refer to some plants determine the extent of soil viability for cultivation

(9), for example, plants of thyme and saplings are evidence of soil viability for cultivation, and Tamaricaceae plants as an indication of saline soils, as the dense vegetation has an effect in reducing the speed of salt accumulation in the upper sections of the soil by reducing the rate of evaporation as shown in [Figure 11](#) for Al-Saad plant, Schanginia plant and its ([Figure 12](#)) Athan Al-Sakhla or Al-Rablah ([Figure 13](#)).



Figure 11 for Al-Saad plant



Figure 12 Schanginia plant



Figure 13 Athan Al-Sakhla

Results and Discussion

The research dealt with a study and a geographical distribution of the difference in the qualitative characteristics of soils in the Najaf district center through discussion and analysis of the sources of this difference, whether natural or human, and through that the researcher reached a set of results, which are as follows:

1- It was found through the research that natural factors play a major role in influencing the soil properties in the study area through their direct and indirect impact on soils.

2- It turns out that there is a great diversity of natural plant species that grow in the study area.

3- It was found that each soil has natural plants that grow in it and has different characteristics from the other type.

4- Most of the natural plants are seasonal, that is, they grow and thrive during the spring and die during the winter.

5- It was found that the natural plant that grows on the bank of the Al-Sadir River is of permanent type, not seasonal.

6- Humble also that there are natural plants that add organic matter to the soil after its death, and there are other types that increase salt in the soil.

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