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Environmental analysis of soil contamination with pathological bacteria in Mishkab District Center

Zainab A. Alzarfi[1], Safaa M. Almudhafar [2], Basim A. Almayahi[3]

[1,2]Department of Geography, Faculty of Arts, University of Kufa, Najaf, Iraq
[3]Department of Physics, Faculty of Science, University of Kufa, Najaf, Iraq
basim.almayahi@uokufa.edu.iq; safaa.almudhafar@uokufa.edu.iq

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Abstract
This study is an environmental study of soil contamination with pathological bacteria in the Mishkab district center, where the impact of geographical factors on the distribution of these bacteria was analyzed. The research aims to study the types of pathological bacteria in the soil of the region, and determine the extent to which natural factors such as organic matter, mineral elements, climate, agricultural processes, and the degree of soil interaction (pH) affect the presence and distribution of these bacteria. The results showed that the soil in the Mishab district is contaminated with pathological bacteria, with a variation in its distribution based on the type of soil.

Keywords: Soil pollution, pathological bacteria, geographical factors, spatial distribution, Mishkab district.

Introduction
This research is an environmental study of soil contamination with pathogenic bacteria in Mishkab District Center. The impact of the geographical factors constituting the soil on the spatial distribution of pathological bacteria in the study area. Pollution is defined as a quantitative or qualitative change or a defect in the system of soil components and a change in their characteristics. As for pollutants, they are substances, microbes, or bacteria that disturb the ecosystem, endanger human life, and threaten human safety. As for the sources of pollution, they are air, water, and soil. The cause of pollution is due to poor human management of soil, ecosystemsand agriculture in recent decades.
The problem of the study:

The problem of the study is to analyze the environmental impact of soil-contaminating pathogenic bacteria in the Mishkab district center. The extent to which natural geographical factors affect the distribution of bacteria.
Research Hypothesis:
We assume that the presence of pathological bacteria contaminating the soil in the center of Mishkab district affects its geographical characteristics.
Aim of research
The research aims to study the distribution of pathological bacteria, evaluate them environmentally and know their types in the soil of Mishkab district

2 - Limits of the Study Area
Mishkab District is located in the southeastern part of Najaf Governorate. Astronomically, it is located between the latitudes (54 39 31_20 52 31) north and the longitudes (58 25 44_ 37 29 44)east, bordering the study area from the north and west in Najaf district, and from the south in Qadisiyah governorate and from the northeast in the center of Manathira district. The area of the study is (375) km (map (1)).
First: Geographical factors affecting the formation of soil in pathological bacteria

The presence and type of bacteria are affected by geographical factors affecting the formation of soil in the Mishkab district center.

Organic matter
Metal elements.
Climate.
Farm operations
Soil interaction degree pH
% Organic matter
Bacteria within the soil body work to break down raw organic materials and convert them into dubal and other organic materials. The decomposed organic materials are also oxidized and converted into other metallic materials (1). Lack of soluble organic matter in the soil solution is impossible for microorganisms to represent, and the absorption of some organic substances such as protein and their binding by clay minerals such as montmorillonite. When organic matter adheres to such substances and keeps them away from the effect of enzymes, it reduces their readiness for microorganisms (2)
Metal elements.
Sometimes the bacteria in the soil body need mineral elements such as (sodium, magnesium, phosphorus, iron, nitrogen) and other elements. Fertilizers added to the soil also increase the number of nitrification bacteria ready in the soil and return traces

(1) Hass N Abu Samour, Biogeography and Soil, Amman, Dar Al-Mayassarah for Publishing and Distribution, Second Edition, 241,2009 p.
(2) Abdullah Salem Al-Maliki, Najm M. Abdullah, Geography of Soil, Al-Wadah Publishing House, Amman,133,2015p.

Negative on the characteristics of the soil on the other hand because of the acidity that results from the oxidation of ammonium to nitrate (3).
Climate
Humidity and temperatures are elements of the climate affectingthe presence and distribution of bacteria in the soil body. Bacteria need moisture to build, multiply and grow their bodies. Therefore, increasing humidity generates anaerobic conditions that help the growth of anaerobic bacteria only. As for aerobic bacteria, they either die in these conditions or may remain dormant until oxygen is available. As for temperatures, bacteria are characterized by that each of their genera has a suitable temperature for growth. In general, most soil bacteria fall within the average temperature range and their best growth is between (25-35 m) and they can also grow between (15-45 m). There is even a type of bacteria that prefer high temperatures as their best growth is between (45-60 m) (4)
Agricultural operations.
Improves soil composition and permeability and thus helps the movement of air and water Generates air conditions that contribute to the increase in the number of aerobic bacteria and because of the volatility of the soil and the inversion of plant residues and jungles and provides a good source of food Bacteria (5).
pH
Neutral soil is the best type of soil for the growth of most types of bacteria, and when the degree of soil interaction ranges between (5-5,5), its numbers begin to decrease. At the degree of reaction (4), their number decreases significantly and it was found that the addition of lime (calcium carbonate) to acidic soils will increase the number of soil bacteria.

(3) Basim Ilya Abel, Agricultural Geography, Al-Yazouri Publishing and Distribution, from Jordan, 62,2019 p.
(4) Kazem Shenta Saad, Geographyof the soil, Maysan University, Faculty of Education, 53, 200
(5) Al-Sabad Khaled Al-Matari, Geographyof the Soil, Saudi Press, First Edition, 53, 2004p.
(6) Nazem Anis Issa, Geographyof the soil, Dar Al-Baath Press, Damascus University, 124,20014
Second: Pathological bacteria in the soil of the Mishkab District Center

This aspect of the research shows the study of the spatial distribution of pathological bacteria spread in the types of soil in the study area by taking samples of the types of soil in it. (7) samples from different locations were selected and collected by the random sample method intended in Table (1).

It appears from the spatial distribution table of bacteria samples in Mishkab district center that there is a spatial distribution of different types of bacteria according to the type of soil from one sample to another. We find that the bacteria (bacillus) are a genus of bacteria that live in the form of two negative and gram-positive groups depending on the thickness of the cell wall. Gram-positive bacillus bacteria are usually known in soil, waste, air and dust. Gram-negative bacteria live inside the human and animal body, specifically in the intestinal area, and enter the human body by eating foods contaminated with these types of bacteria (1).

As for the menstrual or fusiform (clostridium) bacteria. E Compulsory anaerobes, that is, they are parasites that live on the living tissue inside the host's body and are internal spores that take the bacteria of this genus in the form of bacilli. It hasa role in biological transformations under anaerobic conditions that rely on chemical compounds containing nitrates and sulfates as the final receiver of electrons. This type of bacteria naturally exists in the soil and air causing diseases for both humans and animals. The most important disease caused by these bacteria in animals is intestinal poisoning, which affects large numbers of sheep. There are several types of toxins of a protein nature produced by these bacteria, some of which are highly toxic , but less toxic than tetanus and tetanus (2).These bacteria are spread in the soil of the river shoulders in the north of the study area from the sample taken from the village of Al-Bu Mujawirand the rice research area.In the eastern parts of the district, specifically Tabar Al-Brahim, there is flooded soil, myxobacteria, which are air bacilli.

Table (1) Spatial distribution of pathological bacteria in the soil of Mishkab District Center

Sample	Location of the Study Area	Soil Type	Bacteria
1	Northern Rice Research Al-Bu Mujawir Village	fall in, collapse, cave, slump, crock, fall, run down, crumple, tumble, ruin, tumble-down, break down, plummet, sink, founder, crack, come down, slough, perish, crash, go under	Bacillus/Clostridium
2	East of Tabar district (Ibrahim)	Faydia Tammouia	Myxobacteria
3	Middle of the study area (unknown)	fall in, collapse, cave, slump, crock, fall, run down, crumple, tumble, ruin, tumble-down, break down, plummet, sink, founder, crack, come down, slough, perish, crash, go under	pseudomonas/Clostridium tetani
4	North East (Dalka)	Salt	Salmonella
5	Southwest (Ghazalat)	=	Due to soil conditions bacteria decrease
6	West of Mishkab District Center	Desert	Salmonella
7	South of Mishkab District Center	=	Bacteria rates are dropping

Negative stiffness has a sliding pattern movement and has a distinct evolutionary cycle within prokaryotes. It is a mucous bacterium that lives mostly in the soil and feeds on insoluble organic matter. They are abundant in soil, solid animal waste, and vegetative cells, and they are flexible and move as they crawl, most of which

enter the dormant phase. The formation of dormant cells over specialized exercise bodies and their life cycle is carried out by the exit of rod cells from the exercise bodies and begins the process of active dietary transformation.

(1) Ali Salem Al-Shawawra, Biology and Soil, Dar Al-Safa for Publishing and Distribution, Amman, 255,2012p.
(2) Chehab Al-Shabib Embassy, Introduction to the Classification of Pathological Bacteria, Mustansiriya University, Edition

The biofilm helps the bacteria survive in extreme conditions. Mucosal bacteria are bacteria that are colonies covered with mucous shells. It represents about 2%of the total bacteria in the soil (3). In the center of the study area is the soil of the shoulder of the rivers (Megheila), which is spread by pseudomons bacteria (Monas' bacilli include more than 200 species of living throw and are widely found in the soil and water, and there are a few types of them that are satisfactory to humans and plants. This type of bacteria cannot live in the presence of oxygen. They can also reduce it to nitrates and grow only to live with oxygen. When the partial is low, most of this group is affiliated with the pathogenic bacteriophage (blackboard-forming).It is one of the important bacteria that dissolves rocks, minerals, phosphates and potassium, which makes the elements phosphorus and potassium available to the plant. It has a high ability to decompose high molecular weights compounds such as humic acid because it secretes large amounts of enzymes capable of decomposing sugar and organic acids. (4) The second type of bacteria in this sample is CLostridium tetani (Clostridium tetani, fusiform, organotetanic or Clostridium tetani), which are anaerobic gram-positive bacteria that may become gram-negative in older farms during vegetative growth. These bacteria appear in the form of a tennis racket under a microscope found in the soil in the form of spores or in the form of parasites within the digestive system of animals. One of the bacteria that causes tetanus is the production of a toxic substance that affects nerves and the brain. It can enter the microbial germs through torn wounds and damaged tissues. These bacteria are spread in the fertilizer with which the soil is treated (5).

(3) Wafaa Jassim Al-Rajab, Hassan Muhammad Ali Al-Qazzaz, Microbiology, Part I, Mosul, University of Mosul, 361p.

(4) Mahdi Al-Sammak, Medical Microbiology, Baghdad,109,1983p.

(5) Rehab Rashid Al-Azzawi, Bacterial Toxicology, Dar Al-Najeh Publishing and Distribution, Amman, Jordan

In the northeastern sections of the Mishkab district center in the Dalka area, there is saline soil spread by salmonella bacteria (its range is prokaryotes from the kingdom of eukaryotes (6-11). Gram-negative enterobacilli do not form spores and are produced by hydrogen sulfide. It is between 1 and 7 microns long and 3.0 to 7.0 microns thick. Among its types are the causes of typhoid and paratyphoid, food poisoning, or salmonellosis in humans and animals (12-15). About 2500 different serotypes have been identified so far within two types of salmonella, namely salmonella euphorica and salmonella intestinalis (16, 17). The bacterium is strong in all types of soil and can survive for several weeks in a dry environment and several months in water. Salmonella spores are widespread in domestic and wild animals (18).

It infects humans by consuming contaminated animal foods mainly from eggs, meat and poultry. Although other foods, including manure-contaminated vegetables, have contributed to the transmission salmonella spores (19, 20)

In the southwest (Al-Ghazalat) of the Mishkab district center, saline soil and sabbakh are absent and bacteria species are reduced due to the nature of the soil, which does not provide appropriate conditions for the activity of bacteria species in Table (1).

As for the western parts where the type of desert soil is found, the types of salmonella bacteria are widespread. The higher the salinity of the soil, the negative impact it has on microorganisms. In general, it can be said that bacteria can withstand high concentrations of salinity. The low-moisture desert soil gives few opportunities for the life of bacteria because it is a soil in which there are saline minerals that are an obstacle to the growth of some bacterial species in the southern parts of the Mishkab District Center (Table (1)).

(6) Asfar Shihab Al-Shabib, Intestinal Pathological Bacteria, Higher Education Press, Baghdad,16,1989p.

Results

1- The study proved through analyzes that the soil of Al-Mashhab district is contaminated with pathological bacteria.
2- The analysis proved that there is a difference in the environmental distribution of pathological bacteria in the soil types of the Mishkab District Center.
3- Natural geographical factors affect the environmental distribution of pathological bacteria in the Mishkab district center.
4- The study concluded that the presence of bacteria in the soil of the shoulder of rivers and flooded alluvial soil and their lack and absence in saline and desert soils due to conditions of soil formation that weaken the growth of bacteria in them.
5-Sample analyses showed a different distribution of bacteria types in soil types in the study area.

Conclusions

The study proved that the soil of the Mishab district is contaminated with pathological bacteria.
There is a variation in the environmental distribution of pathogenic bacteria in the soil types of the Mishkab District Center.
Natural geographical factors clearly affect the distribution of pathological bacteria.
The presence of bacteria was noticeable in river shoulder soils and alluvial soils, while the numbers decreased in saline and desert soils.
Sample analyses showed a different distribution of bacterial species by soil type in the study area.

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