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ANALYSIS OF SOIL PROPERTIES AND FUNGAL COMMUNITY IN AL-DIWANIYAH CITY

Taif Muthher Muslem* and Hiba Riyadh AL-Abodi
Department of Environment, collage of science, University of Qadisiyah, Iraq
Corresponding author: taif.muslim@qu.edu.iq

Abstract

Soil microbiology play a signigivcant part in the biochemical cycling of element in the biosphere, where critical element such as carbon, nitrogen and iron undergo chemical transformations. Several significant fungi may be found in soil. The presence and abundance of fungi in the soil are determined by the soil texture, nutrients, pH. We chose to investigate which region is high biodiversity are productive and diversified in terms of microbiology. Three site were inviestigate in the city of Al-Diwaniyah (S1) Norton city, (S2) the center city and (S3) the south city. The result shoewed three types of soil (sandy clay, clay and sandy lomia) Soil texture was determined by the hydrometer method. The pH value of the soils ranges between (7.6-8.3). The percentage of sodium, potassium, sulfate, nitrogen, bicarbonate, carbonate and total organic matter of the soil was measured. The highest rate of TOC was in S1(54.07 ± 5.74), the highest rate of Na was in theS3(5190.32 ± 431.76). The most rate potassium was in theS2 (2705.88 ± 260.63). the highest rate So4 was in the S1(5484.78± 1006.44), the maximum rate N was in the S1(1107.67± 21.55), while Hco3 was in the S2(748.33 ± 85.23). The analysis of physical, chemical and biological variables showed statistically significant differences between them, the study of the three regions, and the difference in the number of fungi according to the abundance or lack of nutrients. The highest level of fungi was found in sandy clay soils, and the lowest level of abundance of fungi was in loam sandy soils. The highest Presence of fungi of fungi was in the (S1),and the most abundant were *Alternair alternate* in three sites.

Keywords: soil fungi, *Alternair alternate*, yeast, Al- Diwaniyah city, *Candida albicans*

Introduction

Soil a complicated community, Soil quality is described as the balance of high activity and high microbial richness[1]. This ecosystem is home to a wide range of microorganisms, including bacteria, archaea, fungus and yeasts, as well as protozoa and microalgae[2]. The soil is a dynamic medium for microbial/biological activity[3], and the quantity and type of microorganisms present in a specific soil are determined by a variety of environmental parameters such as the amount and type of available nutrients, moisture and aeration, pH, temperature, and so on[4] .Iraq's soils range greatly from one another due to variances in soil-forming elements[5]. As evidenced by variations in morphological, physical, chemical, and mineralogical qualities, the degree of soil development decreases from northern to southern Iraq [6]. Fungi are important in many soil microbiological activities, including soil fertility, decomposition, mineral and organic matter cycling, plant health, and nutrition [7]. Fungi are critical to the functioning of soil ecosystems [8]. They play an important role in many vital activities, particularly organic matter decomposition and elemental release

through mineralization, especially in forest and agricultural soils [9]. Many environmental conditions, such as the amount and kind of nutrients, moisture, degree of aeration, pH, and temperature, influence the number and types of microorganisms found in soil[10]. The current study's goal is to extract mycoflora from various locations and measure parameters of soil quality.

study area

Al-Diwaniyah is one of the cities in southern Iraq and the middle Euphrates region. It is the administrative, economic and political center of Al-Diwaniyah Governorate(Figure1), where all the administrative and governmental institutions are located. A branch of the Euphrates River passes through it, known as the Shatt Al-Diwaniyah, about 180 km from Baghdad**.** The study samples were collected from three areas (Figure1)in the city of Al-Diwaniyah (north of the city S1 , the center of the city S2 and the south of the city S3) (Table 1).

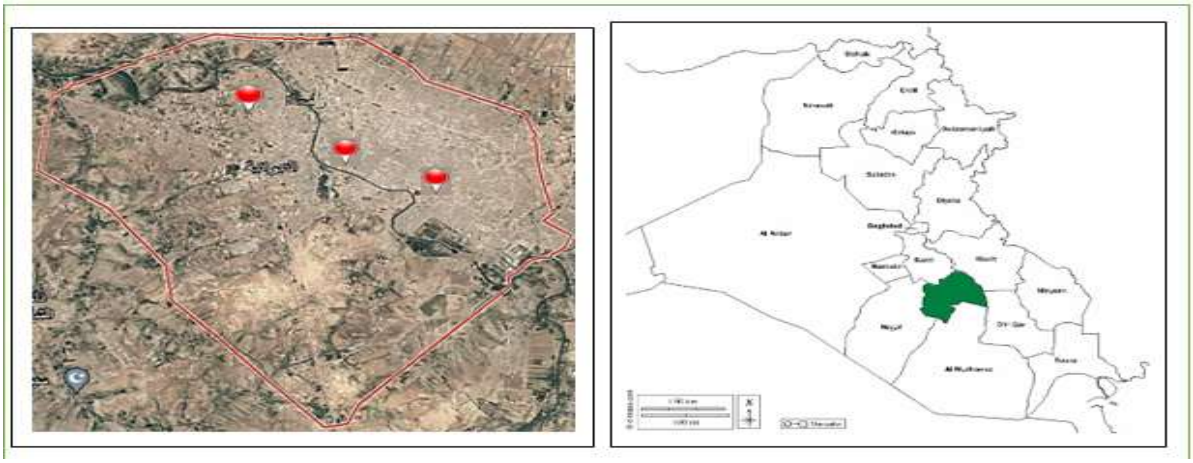


Figure1 .location of study area

Table 1. GPS of location soil sample

Region	The coordinates of the study areas
S1	N44.882301456357716 E32.00072879025644
S2	44.92143607410847N 31.984826481450735E
S3	44.934164135033605N 31.983368215283836E

Sample Collection

The study samples were collected for the period from June2022 to July 2022 from 0-25 cm depth, One kilo of soil samples was collected and sieved through 2mm sieved . Samples were collected from nurseries and gardens, with three replicates for each region.

Isolation and identification of fungi

Fungi were isolated by dilution method [11]. 1 gm of the soil sample was suspended in 10 ml of sterile distilled water to make a series of dilutions from 10^{-1} to 10^{-5}. 1 ml of the fifth dilution was

placed in a Petri dish containing PDA medium, the dishes were incubated in the incubator for one week at 28ºC. Fungi were diagnosed based on the fungal hyphae, Hyphae spores, condiphore and conidia [12].

Analysis of the physico-chemical properties of the soil

The percentage of soil components was estimated using the hydrometer method[13], The pH value was measured using a pHmeter. The TOC content of the soil was measured[14], also Na,k,N [15]. Sulfate was measured for soil [16], Soil carbonate and bicarbonate were measured[17].

Result and Discuss

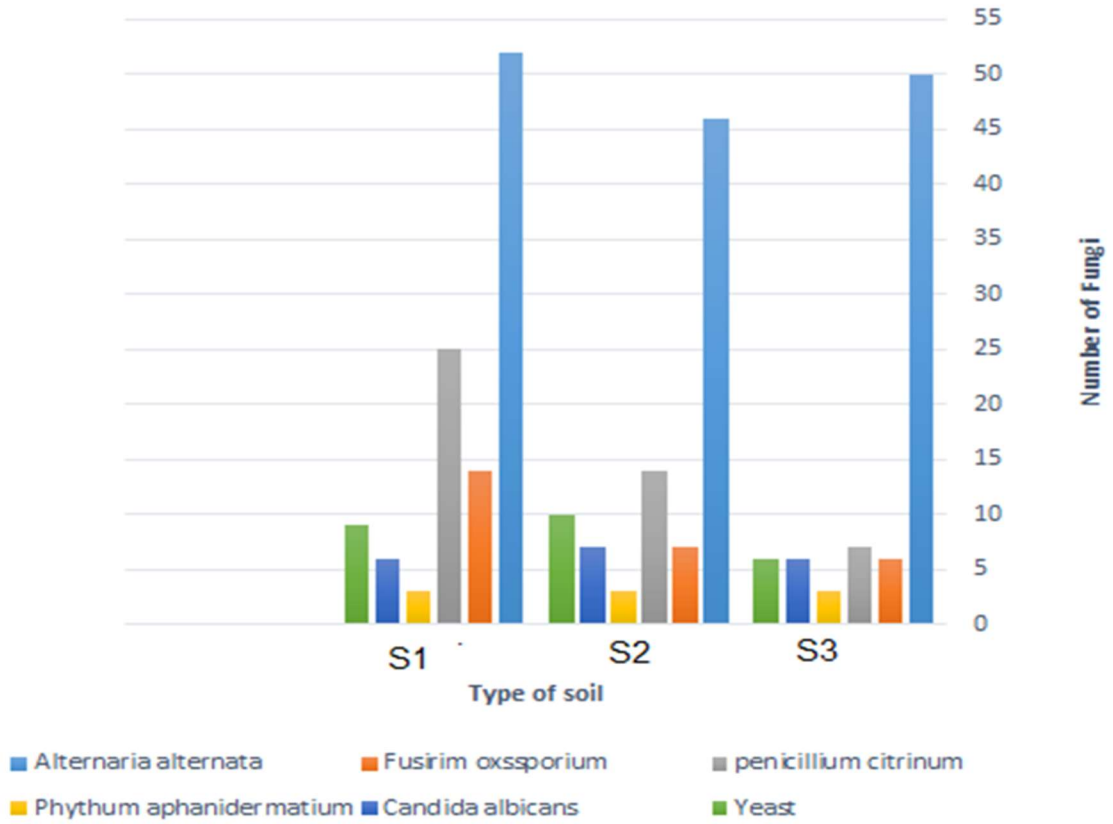
The soils were classed based on their granulometric composition basic asS1(sandy clay),S2(clay)and S3(sandy lomia) according the USDA triangle classification. Despite the convergence of the pH value in all study areas, there is a difference in soil texture(Table 2), and because of this difference there is a discrepancy in the number of fungi present in the study areas and this depends on the abundance of nutrients in the soil (Figure2)

Table 2. Some Physical and chemical qualities of the soil and some Nutrient contents in the soil

soil sample	Soil texture			Texture class	pH	Toc%	Na	k	SO_4	N	Hco_3
	salt	clay	sand								
S1	%20	%5	%75	sandy clay	7.4 ± 0.02	54.07 ±5.74	70.09 ± 248.33	432.89 ± 39.88	5484.78± 1006.44	1107.67 ± 21.55	282 ± 61.02
S2	6.66 %	%85	8.4 %	clay	8.3 ± 0.03	40.01 ± 1.21	1081.65 ± 46.97	2705.88 ± 260.63	718.78 ± 77.72	1044.33±5.51	748.33± 85.23
S3	%5.5	44.4 %	50.1 %	sandy lomia	7.6 ± 0.01	31.21 ± 3.89	5190.32 ± 431.76	66.33 ±6.51	685.53 ±49.46	147.33 ±44.61	284 ± 62.55
LSD					0.043	0.292	1138.283	409.109	6007.504	14.616	87.643
P.value					0.000	0.000	0.000	0.000	0.000	0.000	0.000

*There is a significant difference at a significant level 0.01

Figure2.Type & number of fungi according to the study sites



The majority of soil microbes and plants prefer pH range of 7 to 8 because of the availability of This pH range is ideal for most soil nutrients. The pH of an environment immediately impacts microbes and microbial enzymes, as well as the dissociation and solubility of numerous chemicals that directly influence fungi [18]. The highest value of total carbon was (54.07 ± 5.74) in the soil was in the (S1) and abundance of nitrogen in the same area(1107.67±21.55) and high sulfate content(5484.78± 1006.44), Low level of sodium in the soil (70.09±248.33) ,this make (S1)was the rich in nutrients .

S2 location characterize that TOC was(40.01 ± 1.21)its very important ,Organic matter decomposition is mostly a biological process that happens spontaneously. Three key elements influence its speed: soil organisms, the physical environment, and the quality of organic materials[19]. The level of sodium in the soil is high(1081.65±46.97).while the level of K was(2705.88 ± 260.63).So4 level was(2705.88 ± 260.63), Nitrogen level in soil is high(1044.33±5.51).

The feature of S3 was sandy lomia texture, pH was alkline (7.6). The total organic carbon rate is lower than the previous regions it was(31.21 ± 3.89), the amended of Na was high (5190.32 ± 431.76) rate compared to the S1. The rate of k was low (66.33 ± 6.51), rate of So4 was(685.53 ±

49.46),low rate of nitrogen (147.33±44.61),the rate of Hco3 was(284 ± 62.55).From the (Table2) there is a significant difference at a significant level0.01.

These factors and nutrients support the growth of fungi in the soil and plants, making it a suitable place for a community of microorganisms [20]. As the presence of some types of fungi depends on us, as is the case in the fungus Cadida albicans[21] .In the(Figure2) The species found in the three sites were *Alternair alternate*, *Fusirum oxssporium, Penicillium citrinum, Phythum aphanidermatium,Candida albicans, Yeast* [22]. From(Figure2) the highest rate of fungi was in S1, the lowest in S2, and the lowest abundance rate was in the S3. The most dominant type of fungi is *Alternair alternate* in three sites,while The lowest type of fungi is(*Phythum aphanidermatium)*.This diversity and the large number of fungi is the result of the presence of elements and plants that support microorganisms.The site that increase in the number of fungi is (S1)compared to the (S2 &S3). This increase is due to the abundance of nutrients such as sulfates and lack of sodium, as salty soil discourages the growth of fungi [23].Fungi help plants to withstand drought, as they work to moisturize the plant through the plant cells. Soil fungi contribute to supplying plants with nutrients such as potassium, iron, copper, calcium and phosphorous[24]. The quantity, variety, and composition of soil microbial communities influence nutrient cycling and litter decomposition rates in drylands across the world[25].

Conclusion

The results demonstrate significant difference between the sites studied, both regarding physico–chemical and biological parameters, and the abundance of fungi. The pH value controls the abundance of soil fungi and soil type. A larger diversity of microorganisms and their diverse metabolic capabilities is thought to be directly connected to soil fertility.

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