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A STUDY ON THE FUNGI COMMUNITY IN THE SOIL OF WASTE DUMPS IN SOME REGIONS OF AL-KHALIS DISTRICT

Roqia Ahmed Abbas

Department of Biology, College of Education for Pure Science, University of Diyala, Iraq.
e-mail : roqiahmed55@yahoo.com

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ABSTRACT : For the sake of studying the fungi community of waste dumps in some regions of Al Khalis district and to identify the existence of human pathogenic fungi, soil samples were randomly collected from four different regions (Al Saadiya, Al Salam, Al Mansurya and Yethreb). The results revealed that the total number of fungi was between 6.66×10^{-3} in Al Salam territory to 10.66×10^{-3} in Yethrib territory, which also has recorded the highest number of fungi isolates of 32 isolations comparing to 30, 21 and 20 isolations for Al Saadiya, Al Mansurya and Al Salam territories, respectively. Moreover, it has been recognized that the isolated fungi belong to 8 fungal genus, which are *Aspergillus*, *Penicillium*, *Mucor*, *Rhizopus*, *Abisidia*, *Pacilomyces, Fusarium* and *Pythium*. Further, the study has recorded isolation of some fungi, such as *Aspergillus niger, Fusarum oxysporum, Rhizopus, Penicillium, Aspergillus flavus* and *Aspergillus nidulans*, that cause variety of human diseases including skin diseases.

Key words : Fungi, skin disease, *Aspergillus flavus*, *Aspergillus nidulans*.

INTRODUCTION

Fungi are found in all ecosystems from dry deserts to the oceans. The number of known fungus species in the world has reached about 1.5 million species which means that the number of fungi is up to five times the number of plant species. However, 95% of the fungi species are still unknown. Fungi play an essential role in the ecological balance, maintaining and sustainability. Furthermore, fungi have indispensable role in resistance environment pollution,due to the residual of chemical pesticides, is considerably reduced. Moreover, as disintegrating organisms able to produce different enzymes, fungal fungi possess good potentiality to decompose complex structure materials into simple materials which represent another vital role for the fungi in the environment (Mahmoud *et al*, 1997).

The ability of fungi to grow in all environments is attributed to their ability to analyze various organic compounds. They can analyze hydrocarbons and convert them into simpler materials through processes called biodegradation, mineralization or biotransformation.These processes break down materials' chemical chains through a series of chemical reactions. Once the break down process get complete, a process called mineralization commences, which end up with final products; air, water, CO_2 and inorganic materials (Alexander, 1981). Life therapy refers to the process of converting the most toxic substances intoless toxic materials, the process which also can be done by fungus and results in accumulation and increase of toxic substances concentration in the fungi body (Leahy and Colwell, 1990).

Waste is one of the most important contaminants of soil and the environment,it represents the results of human activities in daily life, such as paper, organic materials, minerals, glass, etc. The percentage of these wastes increases with the increase of population (Arnaout, 1993). Microorganisms in the soil, whether fungus or bacteria, grow directly on waste after being buried in the soil for feeding, analyzing it into simple compounds and materials (Stainer *et al*, 1989).

The study of Obire *et al* (2002), in Nigeria, considered 48 soil samples collected during different months of four landfill sites. The results of this study showed that the number of fungi ranged from 1.9×10^4 to 7.1×10^4 CUF/g soil. Further, the study reported variation in the percentage of the isolated fungi frequency, the percentage was *Aspergillus* (25.3%), *Fusarium* (5.4%), *Mucor* (11.5%), *Penicillium* (12.6%), *Rhizopus* (2.5%) and *Saccharomyces* (42.8%). On the other hand, in a study conducted by Osazee *et al* (2013), samples of waste dumps were collected in the Benin region of Nigeria. During this study, four fungal species were isolated;

Aspergillus, *Fusarium, Mucor* and *Saccharomyces* which gave the highest percentage of fungi compared to other fungi species. The study also pointed that the total fungus count was 7.0×10^3 compared to soil control treatment which was 3.3×10^3.

In another study conducted in one of the regions of India, keratine fungi was isolated from the waste dump soil. These fungi is characterized as one of the most important causes of fungal skin disease. 7-fungal species were isolated and the percentage of their occurrence was determined and found as *Penicillium chrysogenum* (15.62%), *Aspergillus niger* and *Rhizopus stolonifer* (14.06%), *Trichoderma harzianum* (12.50%), *Fusarium oxysporum* (10.94%), *Aspergillus* spp. (7.81%), *Aspergillus flavus*, *Curvularia lunata* (5.97%), *Penicillium* spp. (5.81%) and *Chrysosporium* spp. (4.69%) (Kumar *et al*, 2013). In Williams and Hakan (2016), five fungal species were isolated from different landfills in Nigeria.

The objective of present study is summarized as:

1. Isolation and diagnosis of endemic fungi in the soil of some waste dumps in the district of Khalis, Diyala.
2. Identification of fungi causing skin diseases.

MATERIALS AND METHODS

The current study was carried out in the mycology laboratory at the Department of Biology, College of Education for Pure Sciences, University of Diyala for the objective of study the bio-community in the soil of waste dumps of some regions of Al Khalis district. The study included the following steps:

Samples collection

Soil samples were collected from four different waste dumps regions distributed in different places in the district of Khalis. Table 1 shows the locations were samples have been collected. Soil samples weight 250g were taken from a depth of 5-10 cm below the soil surface, and the collection process was done using plastic bags. Samples were labeledand collection date was recordedon the site before the sample have been keptin the refrigerator until the process of isolation and diagnosis of fungi.

Preparation of Potato Dextrose Agar (PDA)

The preparation of Agar media was done according to instruction provided by the manufacturer where 39 grams of mediumwas dissolved in letter of distilled water. Later, medium was sterilizedfor 20 minutes in the autoclave equipment at 121°C and 1 joule pressure. Then the medium was left to cool down before it has been used as a medium for isolation and diagnosis of the fungi.

Isolation and diagnosis of fungi

To isolate the fungi, the dilationmethod was used where 1 gm of soil was weighted and put in a glass baker before 9 ml of sterilize distilled water was added to the sample. Then decimal dilutions was prepared for each sample, 1 ml of the third dilution was taken and place in a plastic dish where the PDA was poured. To ensure good sample-medium homogeneity, plastic dish was smoothly quivered in a circular motion. The process was repeated for three times for each sample before the dishes were incubated in the incubator at 25±2°C until the commence of the fungal growth.

For the sake of obtaining pure isolates for each fungi, purification process was implemented after the emergence of the fungal primates. The purification process was carried out by taking part of the fungal colony and transferring it to a new dish containing a PDA medium. This process was repeated for 3 times for each fungal isolation, then the dishes were put in the incubator at temperature of 25 ± 2°C for seven days (Michael and Peder, 1982). After seven days of implantation, the samples were examinedfor diagnosing the developing colonies on the plant medium. This was done by preparing glass slides whichwere examined under the light microscope at $10 \times 40 \times 40$ magnification to identify the phenotypic and microscopic characteristics of isolated fungi, the identifications wereimplemented based on taxonomic sources (Klich, 2002; Samson *et al*, 2004; Ellis *et al*, 2007).

Fungal community analysis

The average number of colony-constituting units (CFU) for each studied sample was calculated using the following equation:

Average CFU / gram soil = Number of colonies × Inverted dilution

RESULTS AND DISCUSSION

Total numbers of fungus

Fig. 1 illustrates the total number of fungi in waste dump soil collected from different regions ofKhalis district. The results presented in Fig. 1 report that the total number of fungi was 10.66×10^{-3} for Yethreb and Saadiya territories, while the number was $7 \times 10^{-3}$and 6.66 $\times 10^{-3}$ for Mansoriya and Salam territories respectively, which are given in Picture 1.

The outcomes of present study conform with the results reported by Obire *et al* (2002), who showed that the total fungus in the waste dumps soil was in range between 1.9×10^{-4} and 7.1×10^{-4} per one gram of soil. Concluded results conform also with Osazee *et al* (2013)

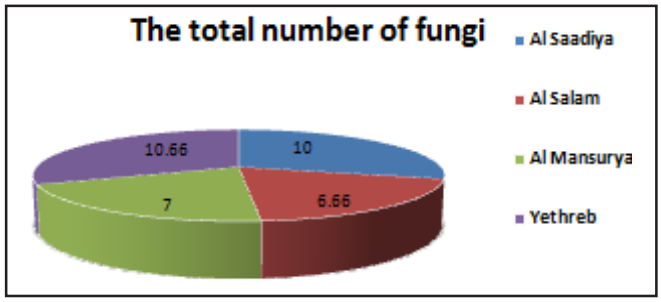
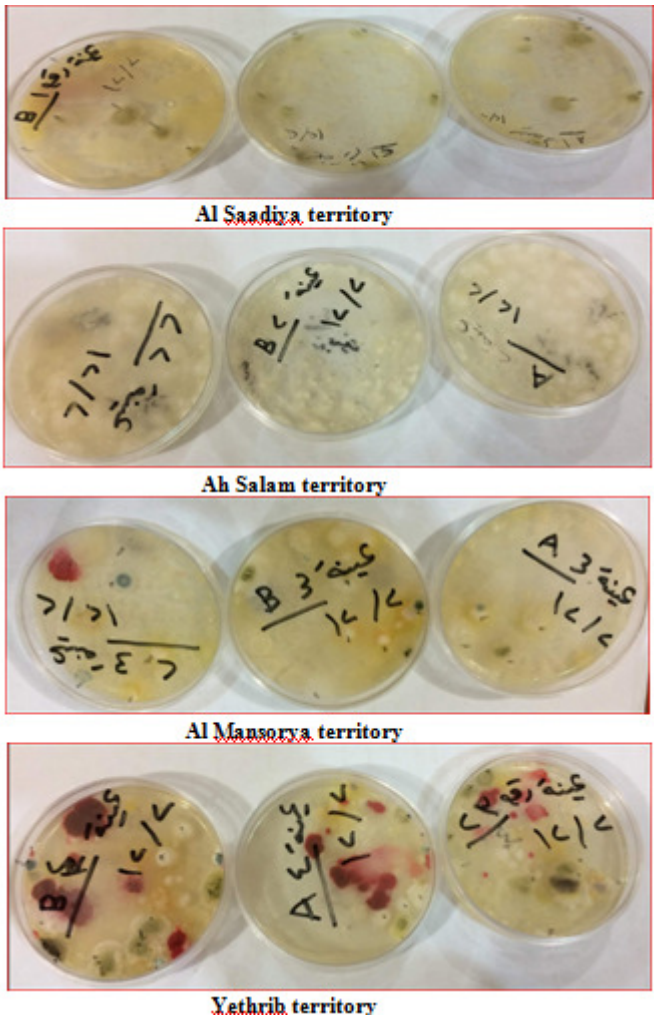


Fig. 1 : The total number of fungi in waste dumps soil in different territories belong to Khalis district.



Picture 1 : Number of fungal colonies in soil samples taken from landfills for some areas belonging to Khalis district.

who pointed that the total number of fungus in landfill soils was 7.0×10^{-3} while the numberin free of waste soil was 3.3×10^{-3}. It is observable that the total number of fungi increases with the increase of organic matter in the soil as it is the main food for the growth of fungi, and because the majority of fungus that settles the soil is the fungus fungi.

Isolation and diagnosis of fungi

Fig. 2 depicts the number of fungal isolates whichhave been isolated from the soil of the waste dumps. Results presented in the figure shows that thehighest density of the fungal isolates wasidentified as 32 fungal isolates in the soil of Yathrib area, moreover 30 fungi isolates were recognized at Al-Saadia area fungal, however for Al Mansouriya area and Al Salam area the density was 21 and 20 fungi isolate respectively.The isolated fungi belong to 8 fungal genus : *Aspergillus, Penicillium, Mucor, Rhizopus, Abisidia, Pacilomyces, Fusarium, Pythium*

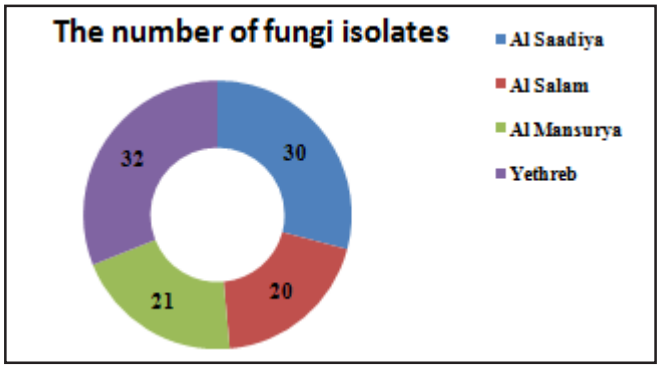


Fig. 2 : The number of fungal isolates in the soil of waste dumps in the areas belonging to the district of Khalis.

Table 1 : Samples collection locations.

Location	Location Number
Al Saadiya territory	1
Al Salam territory	2
Al Mansurya territory	3
Yethreb territory	4

Table 2 : Fungal species and genus that have been isolated from the soil of the waste dumps in the areas belonging to the district of Khalis.

Fungi species and genus	The number of fungal genus	Location
Aspergillus nidulans	1	**Al Saadia territory**
Aspergillus orazy *Mucor* spp. *Abisidia* spp.	3	**Al Salam territory**
Aspergillus nidulans *Aspergillus orazy* *Aspergillus fumaginatus* *Aspergillus niger* *Mucor* spp. *Pacilomyces* spp. *Penicillium* spp.	4	**Al Mansurya territory**
Fusarum oxysporum *Aspergillus nidulans* *Aspergillus orazy* *Aspergillus fumaginatus* *Aspergillus flavus* *Aspergillus niger* *Pythium* spp. *Penicillium* spp. *Rhizopus* spp	5	**Yethreb territory**

as shown in Table 2.

The spreading of fungi isolated from waste landfill soil is attributed to the ability of these fungi to produce wide range of enzymes. These enzymesgive the fungi required ability to analyze various organic matters. They also have good ability to withstand difficult environmental conditions in addition and their aptitude to produce large amounts of spores and cones which are easy to spread by air.

Interestingly, current study has also recorded the isolation of some fungi specieswhich are the cause of some human diseases including the skin diseases. The fungi which are responsible for these diseases are *Aspergillus niger*, *Fusarum oxysporum*, *Rhizopus*, *Penicillium*, *Aspergillus flavus*, *Aspergillus nidulans*. This group of fungi is called Creatinine fungi which has the ability to analyze creatine which is the most important component of the human skin. Accordingly, it is considered as a critically dangerous fungi on human health, and the promotion of their growth is highly linked to the existence of waste in the soil. The findings of the current studyis remarkably conform with the results reported by Kumar *et al* (2013).

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