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Mycoflora of Ground Water Associated with Al-Teeb well in Iraq

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Abstract

Al-Teeb well is an important groundwater source for drinking water used by marsh dwellers in southern area of Iraq. The mentioned water facility supply more than 250,000 marsh dwellers of Misan province in Iraq with drinking water by tanker trucks. 43 fungi were isolated from sediments of Al-Teeb well, the isolated fungi included one new first record species *Allysedium sp*., added to Iraqi fungi, mentioned new record fungus was described and illustrated, has been kept in Basrah herbarium under no. 20101.

Keywords

Groundwater; Fungi; Sediments; Iraq

Introduction

Bacteria and fungi are the most common microorganisms of soil; however molds outnumber bacteria, under conditions of poor aeration, low temperature, and acidity, because they tolerate these conditions more easily. Molds are types of fungi distinguish by their mycelia; threads grow in different environments specially soil and aquatic ecosystems [1].

In aquatic ecosystem fungi consider one of microorganisms that play an important role in biodegradation process of cellulose containing materials and decompose undesired organic materials submerged in water and contribute in food chain. The potential of using white-rot fungi for the degradation of pollutants has been extensively researched in-vitro and has mainly been attributed to their ability to degrade lignin [2].

Fungi in water distribution systems are well known and have gained importance; it is unsurprising that fungi are isolated from the surface or underground raw water in reservoirs and distribution systems, since they are found in almost every environmental niche [3].

Most studies involved in evaluating the potential of white-rot fungi in bio-remediation have been done under lab conditions. However, non-white rot fungi will not fully mineralize of PAH, whereas white rot fungi are capable of doing so by introducing oxygen into the rings, rendering the molecules more soluble and chemically reactive. This reaction is produced via extracellular enzymes produced by white-rot fungi. The fungus managed to survive in high concentrations of the organo pollutants and degraded 90% anthracene and 97% nitrobenzene [4].

Fungi are also capable of influencing metal transformation in several types of media such as industrial wastes, low-grade ores and metal bearing minerals Bioaccumulation of metals, such as cadmium, zinc, and cesium, by several fungi has been shown. Not only does the fungal mycelium take up metals they can also transport the metals to the fruiting bodies [1,5].

Although groundwater generally is less likely to be contaminated than surface water, it nonetheless may require contaminant removal. Possible groundwater contaminants include naturally occurring inorganic chemicals that have found their way into the aquifer. Groundwater near the land surface usually teems with microbial life. Bacteria are far more numerous than any other organism in the soil and groundwater.

Molds and other fungi also are common in groundwater near the land surface, where plenty of oxygen is present. Most fungi feed on dead or decaying material. Similar to the bacteria, the numbers of fungi decrease with depth.

The aim of the present study is to isolate fungal diversity associated with well bodies and groundwater.

Material and Methods

Sediment samples were collected from different depths of the well samples has been gathered from the well of marsh area after drying by oven under 50 C°.

The following culture media were used for growth of isolated fungi from sediments:

1. Potato carrot Agar- mixture of potato (20gm), Carrot (20gm) and Agar (20gm) in 1litter of distil water, sterilize by autoclave.
2. Malt Extract Agar-mixture of malt extract (15gm) and agar (20gm) in 1 litter of distil water, sterilize by autoclave.

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The present study used dilution technique method to isolate fungi from sediments ,which summarize by adding 1 gm of dry sediment to 99 ml of sterilized distil water in a conical flask with shaking for 10 min and drain 1 ml of the suspension by a sterilized pipette, follow by pouring culture medium on the sample in the Petri dish.

Isolates of fungi were identified by the author of present research according to fungal keys published in the following papers [6-17].

Results

43 fungal species were isolated from sediments of Al-Teeb well in marsh area of Iraq during 2017; the isolated species belongs to *Hyphomycetes* 33 species, *Ascomycetes* 6 species and *Zygomycetes* 4 species. As shown in Table 1.

New Record Fungus

One new record fungus belong to Hyphomycetes was isolated from sediments of we the well.

Table 1: Fungi isolated from sediments of Al-Teeb well.

No.	Fungi
1	*Absidia corymbifera* (Cohn) Sacc.& Trotter
2	*Aphanoascus fulvescens(Cooke)Apinis*
3	*Alternaria alternata* Keissler
4	*Alternaria raphani* Groves & Skolko
5	*Alternaria sp.*
6	*Allysedium sp.*
7	*Aspergills flavus* Link & Fries
8	*A.fumigatus* Fres
9	*A.nidulans* (Eidam) vuill
10	*A.niger* van Tieghem
11	*A.terreus Thom*
12	*Aspergillus sp.*
13	*Aureobasidium pullulans* (De Bary) Arnaud
14	*Bipolaris hawaiiensis (M.B.Ellis) Subram.&*Jain
15	*Bipolaris spicifera* (Bain)v.Arx
16	*Chaetomium globosum K*unze & Fries
17	*Chaetomium sp.*
18	*Chuppia sarcinifera* Deighton
19	*Cladosporium cladosporoides* (Fresen) de Vries
20	*Cladosporium spongiosum Berk.& Curt.*
21	*Cladosporium sp.*
23	*Curvularia penniseti (Metra)Boedijn*
24	*Emericella nidulans (Eidam) vuill .*
25	*Emericella sp.*
26	*Eurotium sp.*
27	*Fusarium oxysporum* Schlecht.
28	*Fusarium sp.*
29	*Graphium putredinis (Corda)Hughes*
30	*Monodictys glauca* (Cooke & Harken)Hughes
31	*Mucor sp.*
32	*Penicillium sp.*
33	*Phoma glomerata (Corda)Wollen.& Hochapfel*
34	*Phoma herbarum Westend.*
35	*Phoma sp.*
36	*Rhizopus stolonifer* (Ehrenb:Fr.)Vuill.
37	*Stachybotrys atra* Corda
38	*Stachybotrys atra Corda var. microspora* Mathur& Sankhla
39	*Stachybotrys sp.*
40	*Stemphylium sp.*
41	*Torula herbarum* (Pers.)Link ex S.F.Gray
42	*Trichocladium opacum* (Corda)Hughes
43	*Ulocladium botrytis* Preuss

Description of *Allysidium sp*. as a new record fungus

Colony black, mycelium partly superficial, partly immersed, hypha branched, septate, dark brown to blackish smooth,6-8 µ thick, conidiophores with 1-2 branched, semimacronematous, pale to dark colored, conidiogenous cell monoblastic, conidia in branched chains, spherical to oval, or limoniform, 6-9 µ in diameter, without septa fungus isolated from sediment was kept in Basrah university herbarium under the number BSRA 3001 (Figure 1).

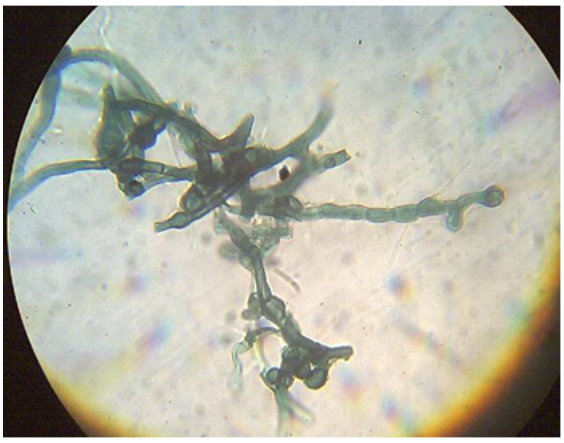

Figure 1: Picture of *Allysidium sp.*

Discussion

Aquatic fungi groups *Hyphomycetes*, *Ascomycetes* and *Zygomycetes* primarily originate in water by transferring of pathogenic fungi associated with terrestrial plants to aquatic habitats and bears reproductive units of fungi (spores) during a period of time to adapt with the new habitat. Sediments enriched with nutrients especially organic matter which encourage microorganisms growth [18].

Fungi can survive under sever conditions and has the ability to grow under limited conditions to produce a hypha and to sporulate again or produce fruit bodies as in *Ascomycetes* and *Basidiomycetes*. As shown in Table 1 many species of fungi were isolated from sediment of Al-Teeb well due to suitable conditions of fungal growth specially biodegradation role of fungi in decomposition process, which led to high water purification quality without using chlorination technique. Biological parameters of raw water of the well approached to international standard specification of E. coli per 100 ml water. As shown in table 1 many species of fungi were isolated from well sediment.

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