ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Isolation Of Fungi From Surface Water Of Tigris, Euphrates Rivers And Some Water Sources.

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ABSTRACT

Samples were collected from Tigris river, Euphrates river and university of Baghdad channel besides another secondary water sources monthly and to six months' period. These water samples were cultured on PDA medium using three replicates per each water source. During research period, twenty-four fungal genera were isolated and diagnosed. The results showed that the highest number of fungal isolates in their different genera was at March month and it reached to 128 isolates while in December, there was decline in isolates numbers to 75 isolates. Larger isolates number appeared during the six months in University of Baghdad channel and it reached 236 isolates followed by Tigris river (190 isolates), then in Euphrates river (150 isolates). The Aspergillus, Pythium and Fusarium recorded the highest frequency percentage in the three rivers (more than 17%), while the Chaetomium, Allomyces and Beltrania genera recorded the lowest frequency percentage (0.193-0.687%). Also Aspergillus, Fusarium and Pythium recorded the highest appearance percentage (88.88-100%). As for the secondary sources, thirty-six fungal isolates belong to seven genera appeared. The Aspergillus recorded highest frequency percentage (5.144%) followed by Fusarium (1.668%), while the Rhizopus recorded highest appearance percentage.

Keywords: surface water, fungal isolation, frequency percentage, appearance percentage

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ISSN: 0975-8585

INTRODUCTION

Fungi live in different water sources including the high salinity water (18) and the frozen water environments (28). So it is not surprising to isolate fungus from surface water as ponds, rivers lakes and even from drinking water and taps water (4, 19, 21, 22, and 27).

The fungi are considered as one out of the biological contamination sources for water and their importance did not limit as pathogens of human, animal and plant (6&9), but they have an effect on the environment and on the changes occurring on it (12, 27). They also produce odors and pigments in the water that make it unacceptable (14 &23). The waters may be exposed to the fungal contamination by many effects or agents as mixing with waste water, factories and hospital disposals and fungi coming from soil, crops, plant residues, organic material decomposition and others of direct and indirect sources (13,25). Many studies were done on isolation and identification fungi from different water resources such as rivers, lakes, fountains, wells and different irrigation channels (1, 4, 16, 22, and 24).

With such studies and due to rareness of this kind of research in Iraq, so it was decided to carry out this study on isolation and identification of the pathogenic and non- pathogenic fungi in Tigris river, Euphrates river, Baghdad university channel and tap waters in some regions of Baghdad.

MATERIALS AND METHODS

Samples were collected monthly from Tigris river, Euphrates river and Baghdad university channel away from coast and the waters samples were put into 100ml capacity plastic bottles. The bottles were opened under water surface and they were closed before pulling out of water. Taps water samples were also taken monthly from four regions in Baghdad, they were Al-Dora, Al-Kazalia, Al-Gadria and Oor districts besides manufactured bottles waters for test and comparison, they were Al-Loaloa, Al-Wafi, and Hene waters. The samples were put in a refrigerator till time of test.

In the isolation method, one ml water from the water sample were taken and put into sterilized petri dish (9 cm diameter using three replicates for each sample), then 20 ml of sterilized PDA media having the antibiotic (chloramphenicole, 250 mg l^{-1} concentration) was added to each petri dish. The petri dishes were circle shaken for contents homogenization, then the petri dishes were incubated at 25± 2 C^{o} for (4-7) days. The fungal colonies were estimated and purified.

The frequency percentage of each fungus was estimated by using the following equation:

Frequency percentage = (Fungus colonies No. ⁄ Total No. of colonies) × 100

The appearance percentage of each fungus was estimated by using the following equation:

Appearance percentage = (No. of samples having fungus ⁄ total No. of samples) × 100 (26)

RESULTS AND DISCUSSION

During this study which was lasted for six months, 24 genera of fungi were isolated and diagnosed according to certified classification keys (1, 2, 5, 7, 8, 11, and 15). The result showed that the highest number of isolates at different genera was in February month and it reached 128 isolates, then in January (104 isolates) while the isolates numbers in March and April were approximate (86 and 83) respectively. In December, there was decline in isolates number to 75 isolates (Fig.1).

ISSN: 0975-8585

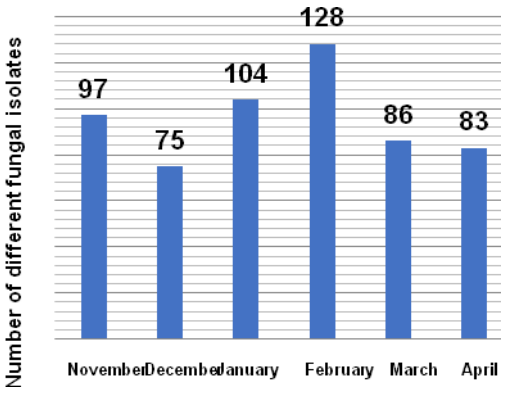

Fig 1: Number of fungal isolates taken from Tigris, Euphrates and Baghdad University channel during each month

The rise and decline in the number of fungal isolates may be due to moderate of temperature degrees during February month and it declined in December (12). The largest number of isolates during the six months was in Baghdad University channel (236 isolates) followed by Tigris river (190 isolates) and then in Euphrates river (150 isolates) (Fig 2)

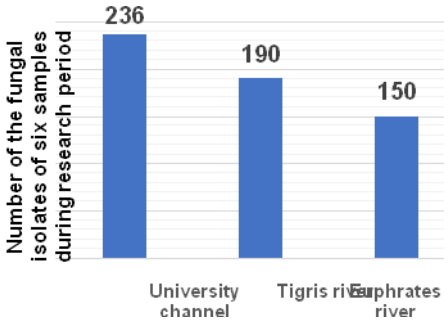

Fig 2: Fungal genera isolate number in Tigris,

Euphrates and university channel during research period.

Isolates number rise in university channel may be due to low water movement and stagnant in some times and mixing it with irrigation water. Fusarium, Pythium and Aspergillus registered highest fungal frequency percentage in Tigris, Euphrates and Baghdad university channel in which were 17.764%, 17.042% and 17.037% respectively (table 1)

Table 1: Fungal genera frequency percentage in Tigris river, Euphrates river and University channel.

Month / Fungi	Frequency %						
	Nov.	Dec.	Jan.	Feb.	March	April	Fungal frequency %
Allomyces	0.000	0.000	0.000	1.562	0.000	0.000	0.026%
Alternaria	1.030	2.564	2.884	7.031	2.325	4.819	3.442%
Aspergillus	16.494	19.230	24.038	7.031	19.767	15.662	17.037%
Beltrania	4.123	0.000	0.000	0.000	0.000	0.000	0.687%
Ceratocystis	0.000	0.000	0.000	0.000	3.488	3.614	1.183%
Chaetomium	0.000	0.000	0.000	0.000	1.162	0.000	0.193%

Cladosporium	3.092	6.410	4.807	4.687	11.627	1.204	5.304%
Curvularia	1.030	0.000	0.000	1.562	4.651	2.409	1.608%
Drechslera	2.061	2.564	3.846	0.781	0.000	1.204	1.746%
Epiccocum	3.092	5.128	0.000	0.000	3.488	0.000	1.951%
Fusarium	7.216	21.794	24.038	25.000	10.465	18.072	17.764%
Mucor	3.092	0.000	1.923	0.781	2.325	4.819	1.424%
Neoscytalidium	0.000	2.564	0.000	7.812	0.000	0.000	1.729%
Penicillium	2.061	5.128	3.846	1.562	6.976	19.277	6.475%
Phoma	0.000	0.000	0.961	3.906	1.162	3.614	1.607%
Pythium	46.391	8.974	12.500	20.312	10.465	3.614	17.042%
Phytophthora	0.000	5.128	1.923	0.781	1.162	0.000	1.499%
Rhizoctoznia	0.000	2.564	2.884	1.562	0.000	2.409	1.569%
Rhizopus	0.000	5.128	3.846	2.343	0.000	8.433	3.291%
Saprolegnia	0.000	0.000	0.000	0.781	1.162	1.204	0.524%
Stemphillium	1.030	0.000	3.846	0.781	0.000	2.400	1.342%
Thielaviopsis	0.000	0.000	5.769	1.562	0.000	1.204	1.422%
Trichoderma	6.185	12.820	0.000	10.156	4.651	1.204	5.836%
Ulocladium	1.030	0.000	1.923	0.781	11.627	4.819	3.363%

The rise of the frequency percentage of Fusarium and Pythium due to they are from soil fungi which they may be moved by rain and irrigation waters to the rivers (3, 20). The Aspergillus is saprophytic widespread fungus and it produces huge numbers of conidian spores (30). Chaetomium, Allomyces and Beltrania recorded lowest frequency percentage which were 0.193%, 0.260% and 0.687% respectively, while other fungi recorded an important ratio such as Penicillium (6.475%), Trichoderma (5.836%), Cladosporium (5.304%), Alternaria (3.442%), Ulocladium (3.363%) and Rhizopus (3.291%) (Table1).

As for the appearance of fungi in these three water sources during six months , the Aspergillus recorded 100% appearance percentage followed by Fusarium (94.44%) and Pythium (88.88%) , while Allomyces , Beltrania and Chaetomium recorded lowest appearance percentage and the following genera recorded a good appearance percentage and they were : Penicillium (66.66%) , Cladosporium (61.10%) (Alternaria, Rhizopus and Trichoderma 44.44% for each one, Stemphillium, Ulocladium, Rhizoctonia and Drechslera 38.88% for each one and phytophthora, 33.32%.

It is worthy mentioned that the Phoma, Saprolegnia, Ulocladium and Epiccocum did not appear in Euphrates river waters samples, while the Beltrania and Neoscytalidium did not appear in Tigris and Euphrates water samples while all the identificated genera, appeared in University channel waters samples (table 2)

Table 2: Fungal appearance percentages in Tigris, Euphrates and University channel.

Fungus	Tigris	Euphrates	University channel	% appearance
Allomyces	**0%**	**16.66%**	**0%**	**5.55**
Alternaria	**33.33%**	**50%**	**33.33%**	**44.44**
Aspergillus	**100%**	**100%**	**100%**	**100**
Beltrania	**0%**	**0%**	**16.66%**	**5.55**
Ceratocystis	**33.3%**	**0%**	**33.33%**	**22.22**
Chaetomium	**16.66%**	**0%**	**0%**	**5.55**
Cladosporium	**50%**	**50%**	**66.66%**	**61.1**
Curvularia	**50%**	**16.66%**	**33.33%**	**33.33**
Drechslera	**50%**	**16.66%**	**50%**	**38.86**
Epiccocum	**0%**	**16.66%**	**50%**	**22.22**
Fusarium	**100%**	**100%**	**83.33%**	**94.44**
Mucor	**50%**	**16.6%**	**16.6%**	**27.77**
Neoscytalidium	**0%**	**0%**	**33.3%**	**11.11**
Penicillium	**66.66%**	**66.66%**	**66.66%**	**66.66**
Phoma	**0%**	**33.3%**	**33.3%**	**22.22**
Pythium	**100%**	**66.6%**	**100%**	**88.88**
Phytophthora	**16.66%**	**16.66%**	**66.66%**	**33.32**

ISSN: 0975-8585

Rhizoctoznia	**16.66%**	**66.66%**	**33.33%**	**38.88**
Rhizopus	**16.66%**	**50%**	**16.66%**	**44.44**
Saprolegnia	**0%**	**33.33%**	**16.66%**	**16.66**
Stemphillium	**16.66%**	**66.66%**	**33.33%**	**38.88**
Thielaviopsis	**16.66%**	**33.33%**	**16.66%**	**22.21**
Thichoderma	**33.33 %**	**66.66%**	**33.33%**	**44.44**
Ulocladium	**0%**	**50%**	**66.66%**	**38.88**

The isolated fungi in this study were close with findings of other researchers (1, 10, 13, 17, 18, and 22). Aspergillus was the more frequency in water in (22, 25, 27, 29) studies. While the Pythium was the second frequency in Aswan lake (10).

Allomyces appeared low frequency ratio in this lake and the following genera (Cladosporium, Fusarium, Penicillium, Curvularia, Trichoderma, Alternaria and Epiccoum) appeared at important frequencies which were (10, 22, 25, 27, and 29). Other water sources which are considered secondary in this research reflected appearance of 36 fungal isolates belong to seven genera which were Aspergillus, Cladosporium, Fusarium, Penicillium, Phoma, Pythium and Rhizopus. There was no recorded appearance of any fungus in the six months samples in each of Al-Dora tap water,Al-Kazalia tap water, Oor tap water and all bottles water , as well as the control treatment (culture media only).

As the case in the main sources the Aspergillus recorded the highest frequency percentages (5.147%) in the six months' samples for these secondary sources, followed by the Fusarium (1.666) and Cladosporium (1.388%). The two fungus (Penicillium and Phoma) recorded lowest frequency percentage (0.277%) for each one (Table3). The percentage of fungi appearance was superior in Aspergillus (5%) while Penicillium, Phoma and Pythium recorded lowest appearance percentage (16.66%) for each one (Table 4).

Table 3: Fungal frequency percentages in another water sources during six months

Fungus	Al-Dora tap water	Al-Kazalia tap water	Al-Gadria tap water	Hay Oor tap water	Al-loaloa water	Al-wafi water	Hene water	Well water	Unpurified Water	control	Frequency %
Aspergillus	**0**	**0**	**5.555**	**0**	**0**	**0**	**0**	**30.44**	**15.38**	**0**	**5.147**
Cladosporium.	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11.111**	**2.777**	**0**	**1.388**
Fusarium	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11.111**	**5.555**	**0**	**1.666**
Penicilli.	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2.77**		**0**	**0.277**
Rhizopus	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11.111**		**0**	**1.111**
Phoma	**0**	**0**	**0**	**0**	**0**	**0**	**0**		**2.77**	**0**	**0.277**
Pythium	**0**	**0**	**0**	**0**	**0**	**0**	**0**		**5.55**	**0**	**0.577**
Bacteria	**20 Bacterial Colonies In March month**							**One bacterial Colony In Dec.**	**One Bacterial Colony In Dec. and five Bacterial Colonies In Feb.**		

ISSN: 0975-8585

Table 4: Fungus appearance percentages in another water sources during six months

Month / Fungus	Nov.	Dec.	Jan.	Feb.	March	April	Appearance percentage %
Asprgillus	2	1				14	50
Cladosporium		1				4	33.333
Fusarium		1				5	33.333
Penicillium						1	16.666
Phoma						1	16.666
Rhizopus					2	2	33.333
pythium				2			16.666

It is worthwhile to refer to appearance of 20 bacterial colonies in Al-Dora tap water during March, one bacterial colony in well water sample in December, six bacterial colonies in unpurified water in February and December.

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