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COMPARATIVE BETWEEN THE EFFICIENCY OF THE FUNGUS *ASPERGILLUS NIGER*, AND *RHIZOPUS OLIGOSPORIUM* IN REDUCING THE CONCENTRATIONS OF SOME HEAVY METALS AND ENVIRONMENTAL FACTORS OF SEWAGE IN NASSIRYA CITY

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ABSTRACT

The present study deal with using two species of fungi, *Aspergillus Niger*, *Rhizopus oligosporium*, in treatment of wastewater to reduce heavy metals concentrations (Pb, Cd) and some physical and chemical properties from final discharge of Al nassiryacity .Tow group were used in this process ,with tow weight from the mention fungi (1 ,2)gm of each group of fungi with 2 liter of wastewater this group have clone in laboratory in (25◦) extended for 6 days .The result showed that high efficiency in reducing the concentration of(cd and pb) by fungi *Aspergillus Niger* the percent of removing was 100% more than *Rhizopus oligosporium* compare with reducing of some environmental parameters.

KEYWORDS: *Aspergillus Niger*, *Rhizopus oligosporium.*

INTRODUCTION

Direct discharge of wastewater is a major cause of contamination of the aquatic environment by many organic and inorganic pollutants, such as heavy metals, when applied to surface water without primary treatment. These pollutants change the properties of natural water. Heavy metals are dangerous pollutants to the environment.[1] The entry of heavy metals into the water bodies reduces the balance of the ecosystem and the poisoning of aquatic plants, fish and other organisms in the environment. These minerals are very toxic to humans when they enter the food chain.[2] Fungus plays an important role in reducing and removing the concentrations of many heavy metals in the soil and the aquatic environment for possessing a

variety of different mechanisms that make them efficient in the process of reducing concentrations of heavy metals, such as the process of adsorption on the walls of the external fungal adsorption or the formation of heavy complexes sedated and storing elements within their cells.[3,4] In their study,[5] noted that the fungal and dynamic fungi of the bioaccumulation of heavy metals and the ability of Mycelium to efficiently absorb cadmium, iron, mercury and zinc in the aquatic environment. The fungal yarn consists of a group of compounds such as polysaccharides and protein. The latter is composed of secondary groups such as carboxyl and hydroxyl, as well as contains phosphates and amino acids. All these groups of substances act on the binding of heavy element molecules[6,7]

The current study aims to compare the efficiency of the Mycelium fungus to the fungal biomass, *Aspergillus niger, Rhizopus oligosporium*, to reduce concentrations of heavy metals such as lead and cadmium and some physical and chemical properties of laboratory wastewater.

WORK MATERIAL AND MEHODS

Sampling Method

Samples of the final discharge water of the sewage treatment plant in nassirya were collected using 2liter polyethylene bottles, sealed and transferred to the laboratory, sterilized with autoclave, 121 bar, 1.5-bar and 1 liter for physical and chemical tests.

Isolation, purification and diagnosis of fungi

Two types of fungi were isolated, developed and diagnosed from the sewage treatment plant in nassirya city, *Aspergillus Niger*, *Rhizopus oligosporium*,[8] The fungal growth in malt extract agar (MEA) The chloromafnicol was prepared by dissolving 250 mg of the antibody in 250 ml of distilled water. 1 mL of the sewage sample was placed in 9 cm diameter sterilized glass dishes. Add the sterilized stainless steel medium to the well, and incubate the dishes at 25°C for 48 hours. The emergence of fungal colonies, worked slides for the purpose of diagnosis of fungal species and depending on the Classification.[9]

Heavy metal measurement

Heavy metals were measured by lead and cadmium before and after treatment with fungus using an atomic absorption spectrophotometer.˙ was used for laboratory measurement. The percentage of removal of metal concentrations was calculated as follows:

% = Initial Focus - Final Focus / Initial Focus × 100%

Chemical properties and physical properties

The APHA method (1998)

In determining chemical and physical properties include

Total solids (TS)

RESULTS

Results of the study were shown in the tables below:

Table (1): Concentration of heavy metals before and after treatment with (1)gm of bio mass of fungi, *Aspergillus niger, Rhizopus oligosporium*.

Concentration after 6 days Treatment (Mg / l)		Concentration after 4 days Treatment (Mg / l)		Concentration after 2 days Treatment (Mg / l)		Concentration before treatment (Mg / l)	Element
R. oligosporium	*As. niger*	*R. oligosporium*	*As. niger*	*R. oligosporium*	*As. niger*		
6.43*	0	10.01**	5.07**	12.11*	10.01 *	14.5	Lead
0.09**	0	0.16*	0.10**	0.21*	*0.17	0.25	Cadmium

** Significant differences (P <0.01) compared to the treatment

* Significant differences (P <0.05) compared to the treatment

Table (2): Concentration of heavy metals before and after treatment with (2 g) of live mass of fungi, *Aspergillus niger, Rhizopus oligosporium*.

Concentration after 6 days Treatment (Mg / l)		Concentration after 4 days Treatment (Mg / l)		Concentration after 2 days Treatment (Mg / l)		Concentration before treatment (Mg / l)	Element
R. oligosporium	***As. niger***	***R. oligosporium***	***As. niger***	***R. oligosporium***	***As. niger***		
5.07*	0	6.03*	0	9.8**	**5.77	**14.5**	Lead
0.09*	0	0.11**	0	0.15*	**0.09	**0.25**	Cadmium

** showed significant differences (P <0.01) compared to the treatment

* Significant differences (P <0.05) compared to the treatment

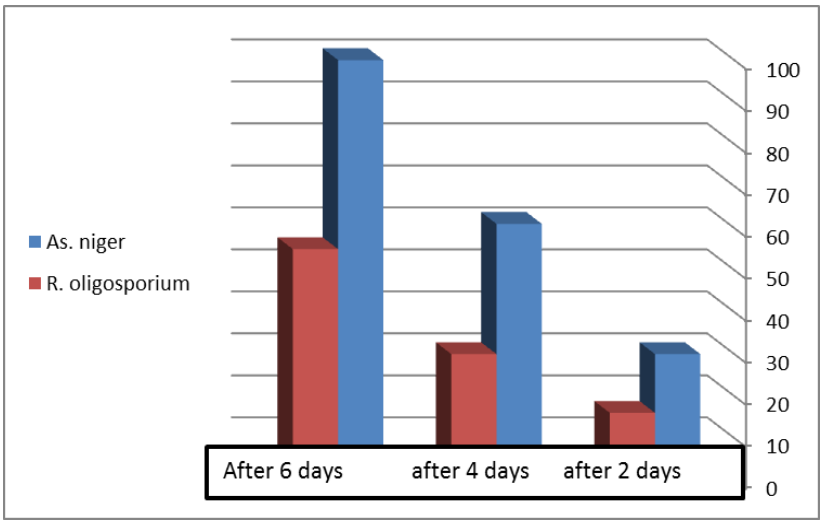

Figure (1): Removal ratio of the lead element when treated with (1) gm of the living fungal mass.

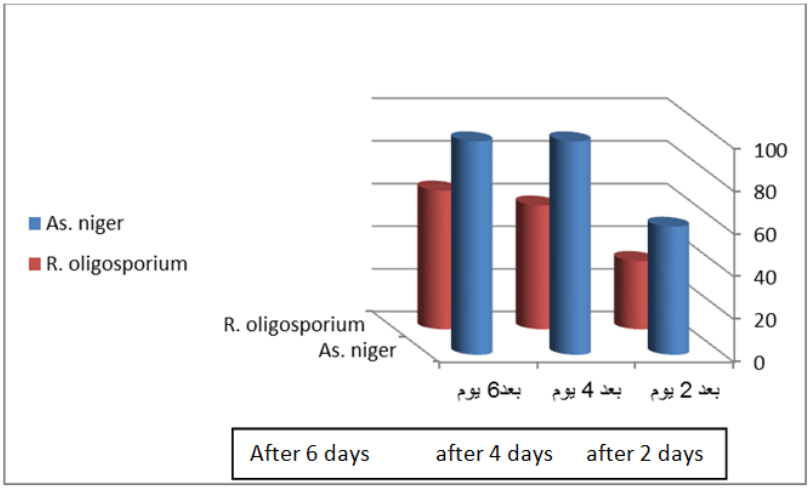

Figure (2): by removal of the lead element when treated with (2) gm of the living fungal.

Table (3): Values of some physical and chemical properties (mg / L) before and after treatment with (1 gram) of the biomass of the fungus, *Aspergillus niger*, *Rhizopus oligosporium*.

Value after 6 days of treatment		Value after 4 days of treatment		Value after 2 days of treatment		Value before the transaction	Characteristic
R. oligosporium	***As. Niger***	***R. oligosporium***	***As. Niger***	***R. oligosporium***	***As. Niger***		
102	88	145	125	167	150	171	T.S.
146	95	225	150	299	250	**319**	COD

Table (4) Values of some physical and chemical properties (mg / L) before and after treatment with (2 g) of the biomass of the fungus, *Aspergillus niger, Rhizopus oligosporium*.

Value after 6 days of treatment		Value after 4 days of treatment		Value after 2 days of treatment		Value before the transaction	Characteristic
R. oligosporium	***As. Niger***	***R. oligosporium***	***As. Niger***	***R. oligosporium***	***As. Niger***		
54	45	97	78	144	120	171	T.S.
110	76	167	133	221	199	**319**	COD

DISCUSSION

Table (1) shows the reduction of concentrations of some heavy metals lead and cadmium from the final discharge ponds of the wastewater treatment plant before and after treatment with one gram of live fungal mass. The results showed that the live mass of *Aspergillus Niger is* highly efficient in removing concentrations of some heavy elements from wastewater P <0.01 higher than the efficiency of *R. oligosporium* within six days of treatment, and the higher the weight of the living fungal mass to 2 g the greater the efficiency of removal.

The results were consistent with the study of the efficiency of the fungal masses of *Aspergillus niger*, *Pencillium austurianum*, *Saccharomyces cervisiae* and *Mucor arcindloiddes* in reducing the concentration of heavy elements from contaminated soils. They demonstrated the efficiency of these isolates in reducing iron concentrations by 60% The results were also consistent with[11] in their study of the removal of chromium and cadmium from industrial waste water Using the non-living masses of *Aspergillus* and *Rhizopus* as they proved ability These fungi on the removal of these heavy elements within 18 hours of liquid farm, as well as[12] in their study of the fungus *Rhizopus delemar* and the ability of its mass to reduce the concentrations of elements of liquid farm and efficiently. *Aspergillus niger* has been shown to reduce the concentrations of lead and cadmium elements by 100% during 6 days. This is due to the fact that its fungal yarn is cohesive and has a large mass of 973.4 mg, and direct contact with the wastewater sample has increased the surface area[13] in their study on *Rhizopus nigricans* in removing the element of chromium from the liquid plant and the fungal spinning ability of this fungus to propagate significantly during the model and increase the surface area of the adsorption process. In his study,[14] observed the ability of the living mass of the fungus, *Armillaria*, to reduce concentrations of zinc, lead and cobalt from contaminated soils at high rates and for long periods of time through bioaccumulation.[15]

also showed the ability of *Rhizopus* to reduce concentrations Zinc from the liquid farm is highly efficient. The results showed that the living mass of *Rhizopus* 543.2 mg was less efficient in reducing concentrations of lead, cadmium and copper due to the non-cohesion of the fungal yarn and the formation of a small thick mass, which led to weak contact with each sample of water as the fungus and its cohesion a large role and effective in the adsorption of heavy elements This was demonstrated by[16] in their study comparing the efficiency of non-living masses of fungi *Rhizopus arrhizus*, *Mucor miechei*, *Penicillium chrysogenum* in reducing concentrations of heavy elements from contaminated soils.

The treatment recorded a decrease in the presence of suspended substances and in the waste water column as shown in Tables 3 and 4 due to bio-adsorption as well as bio-clotting. The volume decreased when biomass was used and the COD values decreased because the fungal cell membranes Functional groups that are negatively charged have the potential to adsorbise the elements and the positively charged minerals, then deposition and disposal, as well as the dismantling of complex materials into simpler materials that facilitate their exploitation by other organisms such as bacteria, fungi, yeasts, algae and primates

CONCLUSIONS

1. The possibility of bio mass of fungus, *Aspergillus Niger*, *Rhizopus oligosporium*, in reducing the concentration of heavy elements lead and cadmium at a high rate of 65-100% of the sample of sewage water.
2. *Aspergillus Niger* showed the highest efficiency in reducing concentrations of heavy elements by 100% within 6 days treatment.
3. Showed the efficiency of *Rhizopus* less in the reduction of concentration of heavy elements lead and cadmium attributed to the fact that the mass is not coherent and thin

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