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RESEARCH ARTICLE

Desalination of Stream water using some Fungal Species loaded with Agricultural and Industrial waste

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ABSTRACT:
The research included finding a scientific method to reduce the salinity in the stream water through the use of one of the microorganisms, the organism *Trichodermaharzianum*, and loaded on the husks of corn added to the molasses with specific concentrations within the laboratory experiment, which proved its ability to analyze the cellulose in the crusts by germination it, The efficiency of this process increased through the use of magnetized water.The results also showed the efficiency of magnetic water technology in dissolving of salts by measuring the salinity ratio before and after the use of this technique, proved its efficiency with the existence of corn shells loaded with fungus in reducing Salinity as a result of breakingbonds between the saline compounds and the next, the crusts act as a substance on which the ions Adsorbs on this side , on the other side, the used fungusadd it's strong enzymes that break the bonds between salts.

KEYWORDS: fungus, stream water, magnetic water , salinity, Irrigation.

INTRODUCTION:
The stream water is of utmost importance that can be used for irrigation purposes for the plants in addition to its importance for the environment. However, the contamination of the of stream water with many chemical elements as a result of the conversion of the of the factories and sewage water and high temperature and increased in the evaporation, led to increase in Salinity rates, whether it was the stream water from the rivers or the basins, which were developed in recent years for the purpose of disposal of polluted industrial water and thus the salinity rates increase with the increase of chemicals that pour in the stream-water as well as the decrease in water levels in Recent years, which negatively affected the cultivated as wheat and barley, economic crops, this problem has received considerable attention by researchers since the fifties of the last century.

Although the many attempts to study and address this problem since then, but it remained intractable due to lack of keeping pace with the scientific development and modern technologies of irrigation and drainage and thus increase the percentage of salinity in the stream water has affected the adjacent lands and thus increased interest in this subject in recent Therefore, this study suggested that:

1. Find a scientific and practical way to desalinate the stream water using one of the most effective microorganisms in this field, such as *Trichodermaharizainum*, which has the ability to break down the bonds between saline compounds due to the containment of a group of enzymes and make use of in their vital processes without being affected by this process or salinity .
2. The use of magnetic technology in the desalination of the water of the separator with the selected object in this process, as this technique of modern technologies used for desalination and have the ability to melt salts in water. In this experiment (magnetic cylinders)

MATERIALS AND METHODS OF WORK:

1-**Preparation of PDA medium** (**Potato dextrose agar):**

In order to obtain the pure colonies from the fungi used in research and conservation, preparation of the PDA prepared by Hi Media. According to the instructions of the company, 39.0 g per liter of distilled water was dissolved and sterilized by autoclave under pressure (1)**atm** in a (121) Celsius for 15 minutes. Cool the medium before pouring in the occlusion. Chloramphenicol was added by 0.25 mg / L.

2-**Preparation of the watery agar Medium and different concentrations of molass:**

The following medium have been prepared

1. The molasswere added to the first medium by 2% for the water agar (WA) medium. The contents were well prepared in a 250 mL glass flask for the purpose of homogenizing the contents.

2 - The second medium where the molasses were added by (1%) to the (WA) mediums.

3 - The third medium where it was prepared by adding molass by (0.5%) to (WA) medium The molasses were added on the basis of the dry weight of the medium mentioned before paragraph (1, 2, 3).

4 - The fourth medium was (WA) medium does not contain molasse The (1,2,3,4) medium sterilized with the autoclave under (1 atm) and at a temperature of (121 Celsius) for 15 min. Chloramphenicol was added by 0.25 mg / L to the previous media. Media were pouredin 9 diameter petry dishes after sterilization by 4 replicates for each medium (1, 2, 3, 4 and PDA) under good sterilization conditions and then left to harden.

3-**Preparation of isolation of *Trichodermaharzianum:***

A package of the pesticide produced in 2003 was obtained from the Atomic Energy Laboratories. The biological resistance fungi was isolated and purified in a method of shaking and isolation from the packaging model by using the PDA medium.

4 - **Study the effect of molasses concentrations on the growth and growth of fungi** T. harzianum

A: Radiation growth:

Tablets of T. rhizianumwere extracted with a diameter of 5 mm from a pure 7-day-old colony. They were transferred to petry dishes containing (1, 2, 3, 4 and PDA) media, to be grown in the center of the dish and inverted so that the fungal strains were in direct contact with the plant medium. The study occurred By 4 replicates per treatment and incubated in the incubator at (25 ± 2) Celsius. After three days, the rate of two orthogonal diameter was measured to the growth of the radiation fungus

B: Vaccine density of fungi: T. harzianum the fungal vaccine density of the fungus is measured by calculating the conidic spores

-Conidiospores:

A petrydishwas taken from each concentration of the concentrations of molasses in which the one week old fungus T. harzianum grew and put in each dish 5 ml of distilled water sterilized and the dish was shake vibratory for two minutes to wash the conidian spores for the fungus then poured this amount of water in a sterilized Erlenmeyer flask contain 95 ml of distilled water to obtain dilution (10^{-2}) ml .1 mL of this suspension was taken to the test tube containing 9 mL distilled water to obtain dilution (10^{-3}) and so on until dilution (10^{-5}). 1 ml of(10^{-2}) and (10^{-4}) dilution was taken and pour in a sterile dish and PDA medium poured over it then the dishes were moved Transiently to blend the suspension with the media culture homogeneously. after the hardening the dishes has been incubated for two days to a degree (**25±2) Celsius** after that the number of fungal colonies that were grown calculated, Which were multiplied in the inverted dilution to obtain the number of condic reproduction units in 1 mL of suspense for various treatments.

5 - Determination of the best fermentationmedium for the growth and loading of life-resistance fungal vaccine from the byproducts of some industrial plants:

For the purpose of determining the best growing medium for the growth and germintation of the fungus resistance, several media have tested the residues of the starch plant, namely corn husks and the substance of the keleotin, as well as the sugar factory with its occasional products,As well as rice husks produced by silos in the province of Diwaniyah. Plankton has been eliminated with these By-products by running water then dried obediently(under the sun) for 48 hours and then these substances soften by electric mixer and then 100 g was taken by 4 replicates of each substance. And add 2 g of molasses after the stability of their preference over other ratios in previous experiments and these flasks tagged by reference to the contents of the material and then add 20 ml of distilled water To moisten them and then flipped and sterilized by the autoclaveat (121) Celsius then it cooled down and mixed well then add 5 tablets with 5 millimeter In diameter from a pure colony of the vital resistance fungus ***T.harzianum.***Then it autoclaved at (25±2) for 10 day, usually the flasks are shake every 3 days. After thatthe conidic spores formed of 1 g of all the mentioned mixtures was calculated on the basis of dry weight. Thus, the best mix for making the biocides was tested according to the method 9.

4-obtaining magnetic water:

by using bio. magnets technique or Magneto Ron at (2000 Gauss) which manufactured locally by the researcher (Hayawiwewaattia) teaching at (college of agriculture / University of Qadisiyah) measured by the ministry of science and the technology. The water treatment technology department as The hollow magnetic cylinders were used , which were arranged on a plastic tube, as the stream water passed several times in this devicethrough this device and the passes was from the north pole and the water run to the south pole and for several times And vice versa mean by reverse polarity and for 6 hours[1,2] .

5-Measuring conductivity EC:

The salinity of the stream water were measured before and after the magnetic process and adding substances carried by the Fungus then the variation was recorded in three different stations from the stream water, as it occurred by process of the magnetization for several times for the stream water then the carried substances were added for the water, as stand in [3, 10]

RESULTS AND DISCUSSION:

1. **Effect of molasses concentrations on the growth of the *T .harzianum* traits:**

The rates of *T.harzianum* radial growth rates on different levels of molasses (0, 0.5, 1, 2) showed that the highest growth was achieved at 2% of molasses where the radial growth rate was 8.95 cm and the lowest growth rate was at (0%) molass. the figure 4 showed a positive correlation between the rate of radial growth diameter and the increase in molasses ratio. And there are significant differences between the media containing different levels of molasses and between the standard medium (PDA) table (1).

While the germination processes occurred in all prepared media but varied in the number of spores produced, with the highest number of spores in the medium containing (2%) molasses at a rate of 7.53 × 410 conidic spore/g)and the lowest rate was (**1.4** x **^{4}10**conidic spore/g) due to the absence of molass, the figure (5) shows that there is positive correlation between the number of conidic spores and the ratio of molasses in the medium.as by comparing the medium (PDA) with the (WA) medium on different levels of molasses we find it's the closest to the medium containing (2%) molasses with the surpasses of the later upon it. the addition of molasses with the different sugar it contained has given a good nutritional base. This is consistent with what they found [5,11] when they added syrup and molasses to the medium, which is reflected in the growth of T. rhizianum mushrooms, especially with an increase of its rate in 2%. It has been reported[4] that fungus enhances the increase of enzymatic activity to transform the contents of the mediumfor its growth

Table (1): Effect of molasses concentrations on the growth of the *T .harzianum* traits

Treatment	Rates of radial growth diameter (cm)	Rates of the number of the conidic spore x^{4}10 /g
(1) a medium not containing any percentage of molasses only (WA)	2.5 a	14 a
(2) a medium contain (0.5%) of molasses + (WA)	5.42 b	38.0 b
(3) a medium contain 1% of molasses+ (WA)	7 bc	36.75 b
(4) a medium contain 2% of molasses + (WA)	8.95 c	75.25 d
(PDA) standard medium doesn't contain any molasses	6 bc	63.5 c

•Rates with the same number vertically are not significantly different at the level p=0.05

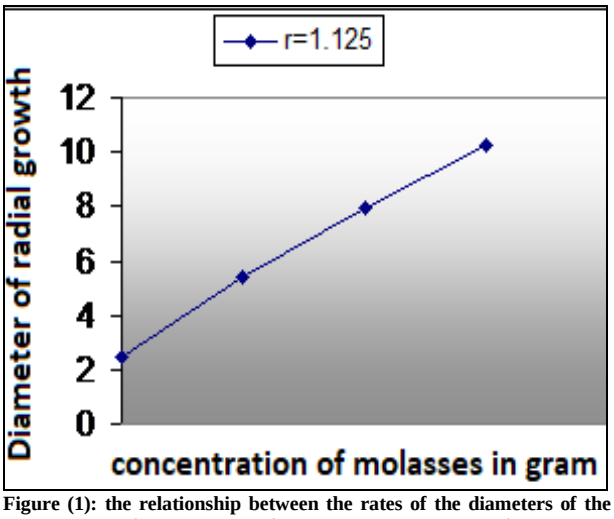

Figure (1): the relationship between the rates of the diameters of the radial growth for*T .harzianum*fungusand the percentage of molasses

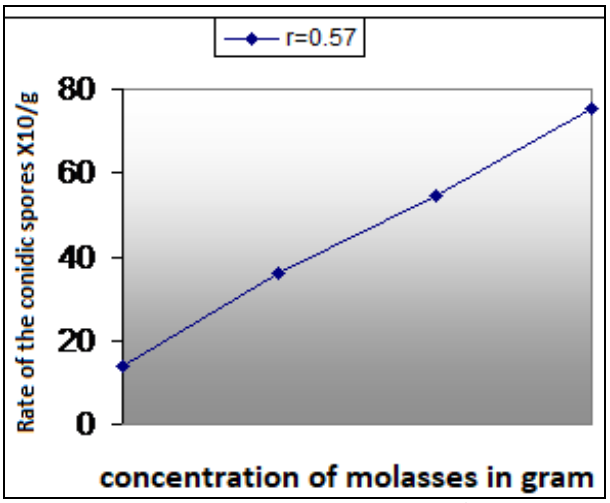

Figure (2): the relationship between the rates of conidic spores for*T. harzianum*and the molasses percentage

2-Determination of the best fermentation medium for the vital resistance fungus From the wastes of sugar and starch Maysan factory and the rise husk

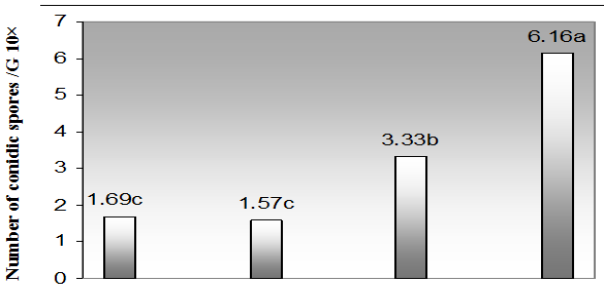

Figure (3): the number of conidic spores for the *Trichodermaharzianum* fungus formed on the Different materials with the added of 2% of molasses

The figure (3) shows the supremacy of the treatment of corn shells in the number of conidic spores formed which was **6.16x^{4}10spore / g,** while the lowest rate was with the cane 1.573 **^{4}10conidic spore /g** while the rice husks, which were not significantly different, were **1,693 ^{4}1conidic spore/g** and The nature of the components of these substances may play a role in these differences.

One study reported in[12,6,7]. The substrate of starch production of maize contains between 7-8% nitrogen, one-third of the amino acids (11 amino acids) such as Alanine,leucine, proline, valine, cysteine etc., as well as vitamins, nucleotides and mineral elements (12 metallic elements) potassium, Sodium, Phosphorus, aluminum, iron, calcium, zinc and others.

3- measuring the conductivity of stream water:
According to the World Health Organization (WHO) classification, the following table is shown

Table (2) Permissible limits of salinity and water quality

Electrical conductivity (EC) MS/CM	Water quality
From (50-400)	Excellent water
From (400-750)	Good water
From (750-1500)	Normal water
Larger than (1500)	High mineral water

Table (3) The variation of salinity ppm in the stream waters of Al Hamad district in three selected sites before the experiment and for six months of the summer of 2009

Months Selected Sites	**April**	**May**	**June**	**July**	**August**	**September**
North of the stream water	470	**660**	**1230**	**1180**	**770**	**560**
At the middle	**470**	**1260**	**3200**	**3100**	**1660**	**780**
At the south of the stream water	560	**1950**	**4950**	**4880**	**2870**	**1020**

From the above table we observe an increase in salinity during the months of the study, which was higher than the permissible limits for use. We note the high salinity rate in June and in the three sites selected in the experiment (1130, 3200, 4950) MS / CM.This may be due to increased evaporation of water and lower water levels of the river and this is what[13, 14, 15] proved.

Table (4) the variation of salinity ppm in the stream waters of Al Hamad district in three selected sites after the experiment and for six months of the summer of 2009

Months Selected Sites	**April**	**May**	**June**	**July**	**August**	**September**
North of the stream water	470	**660**	950	1000	580	400
At the middle	**470**	650	1100	2900	1550	620
At the south of the stream water	410	780	4500	2860	1750	980

The results showed in Table (4) with the use of magnetized water technology and corn husk, which was one of the best materials in the carrying of fungus *Trichodermaharzianum* with molasses and added to the stream water , a significant decrease in the values of electrical conductivity during the months of study.

These results explain that magnetized water solves salts, reduces surface tension and reduces water viscosity, leading to the separation of bonds between sodium salts, as well as increasing the efficiency of magnetized water by removing many other saline compounds and that what [3] proved. Also, the sugars found in the molasses are of great importance in the disconnection of saline compounds such as sodium chloride due to the presence of a group of sugars such as sucrose and lactose, and by (16 - 55)%, and this is what [11] proved. Sugar dissolves in the water by interfering with water molecules inside the sugar molecules, isolating them physically, and keeping them within the spaces between the water molecules, thus dissolving the sugar by spreading its molecules between the water molecules without interacting with it. This solubility is the opposite of melting table salt (sodium chloride) in water, where it is dissolved by ionization of sodium chloride, to negative chloride ions and positive sodium ions. For this reason, sugar solution in magnetized water is non-conductive as a result of free ions from the physical solubility of sugar;

these free ions act to disengage the dissolved salt (sodium chloride) in magnetized water, as the molecules of these sugars fill the voids formed by the soluble saline process. As for the use of *Trichodermaharzianum* fung us on corn husks, this fungus has the ability to produce chemical compounds and release them to the outer environment such as antibiotics and some external enzymes that affect some of the chemical compounds and analyze them and that what [8,16] proved.

CONCLUSIONS:

1-the germination of the fungus ***Trichodermaharzianum*** has increased on the corn shells through its ability to analyze the on these shells As it contains a group of enzymes that have the ability to dismantle the bonds.

2- The fungus called vital resistance funguswhich some call it environmental-friendly organisms the ability to dissolve salts in water by breaking the bonds between saline compounds and converting them into ions that can be exploited to make them more effective.

3-This fungus works on two pathways, reducing the salinity of the water of the stream water and the other can be used as a growth promoter after the irrigation process of field crops.

4- Magnetized water technology is one of the most modern techniques to be followed in the desalination of salt water through the use of hollow magnetic cylinders of the North and South poles, which can be used around plastic pipes, which result from the passage of water through the magnetic field dissolves the salts as a result of disintegration of the bonds and turns water into So called soft.

5-It was observed through the work of a mechanism of integration between the fungus *Trichodermaharzianum*loaded on the shells of the corns and the technique of magnetized water, salt dissolving as the use of technology alone, the water remains for a period magnetically, but this case continues with the integration of mushrooms on the crusts

6- This process require a period of time to observe the results.

RECOMMENDATIONS:

1- This project should be considered one of the national pioneer projects through which good results can be obtained if work is completed in this process.

2- Research on microorganisms that can have a wide resonance and may be absent from sight or which we consider to be negative only. They may have an economic impact and may work purely on the environmental side as some species of bacteria and fungi.

3- The use of magnetic technology in the treatment of water used for irrigation, which is expected to show significant differences in the increase of the growth characteristics of plants such as plant height and diameter and the number of branches of any study of the impact of magnetic technology on the germination and productivity of crops.

4- Attention to magnetic water technology because the directions of countries and scientific research have become in this direction because of the utmost importance in various areas of life not only in the field of desalination, but became involved in the fields of medicine, engineering, life sciences and other sciences with the use of qualified scientific specialists .

5- This experiment was carried out in the laboratory. If it performed in the stream water, the following steps should be taken

A-The transfer of water through the magnetic field (magnetic technology), which should be placed at the beginning of the stream water at the meeting of the river and the stream water by using Magnetizer technology, which improves many physical qualities of water, including reducing the surface tension by 3 - 1 Newton.M^{-1}This technique can dissolve salt.

B-During the entry of magnetized water into the stream water, masses of fungi loaded on corn shellsare propagated randomly or placed in the stream water as these water increases the permeability of the living membranes. In contrast, the fungal enzymes break down the bonds of the saline compounds. Therefore the ions adsorbed onto the surfaces of the shells used for carrying.

C-The same device should be placed at the end of the stream water to keep the water flowing to the river or the land free of salt.

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