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THE USE OF OSCILLATORIA PSEUDOGEMINATA IN DOMESTIC WASTEWATER TREATMENT IN AL- DIWANIYA PROVINCE, IRAQ

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Abstract-The study included testing the susceptibility of algae (*Oscillatoria pseudogeminata*) in removing phytonutrients consisting of ammonia, nitrite, nitrates, active phosphorus, and total phosphorous. As well as the ability of these algae to reduce the chemical requirement of oxygen from the domestic wastewater, in addition to its effectiveness in removing some heavy metals (iron, copper, lead, nickel). This algae was used in the form of the Unialgal culture obtained from the algae plant in the fish department. The results indicated that the efficiency of *O. pseudogeminata* was better than the other two types. Where the removal was complete (100%) for both ammonia and active phosphorus during the seventh day of treatment. 79% of total phosphorous was removed after ten days. The ability of the algae was lower in removing nitrites (70%) and nitrates (80%), and the algae was able to reduce the chemical requirement of oxygen to 80% during the treatment period. The heavy metals were removed 100% for iron, copper, lead and nickel on the ninth day.

Key words : Water pollution, *Oscillatoria pseudogeminata*

I. INTRODUCTION

Water pollution is defined as the increase in chemical, biological or physical factors in a concentration or in a way that makes water harmful to humans, aquatic organisms, or properties. There are those who see that water is polluted when it is not of a quality with specifications that are compatible with the highest requirements that a person needs, namely drinking mainly, then all other personal uses and natural uses, including recreational purposes as well. Natural pollution means the appearance of natural ingredients in water, such as inorganic

salts of all kinds, silt, sulfur gases dissolved, heat, radiation, and others in more quantities than normal. As for human pollution, it is the changes that occur in water due to human activity, whether industrial or agricultural, or as a result of daily uses of this water by humans. Water in nature is exposed to the danger of the appearance of foreign compounds such as pesticides, or an increase in one or more other natural components such as salts from their natural limits. As is well known, water bodies have the ability to self-purify from foreign pollutants (Al-Omar,2000).

Due to the increased volumes and concentrations of the fluxes, it has become impossible for water bodies to perform this process (Rupert *et al.*, 1996). Domestic wastewater, which is produced by cities, is a major source of water pollution. Consequently, the ill-considered and unregulated use of untreated wastewater has negative consequences for the environment and public health. Most studies conducted on the use of wastewater for agricultural purposes indicate that there is a difference in the nature and contents of these substances according to their sources (Al-Khair, 2001), and there is an urgent need to identify their contents before using them, and may contain high concentrations of some toxic elements that exceed their natural limits, It may also contain pathogens that may directly or indirectly cause environmental risks to plants and their consuming neighborhoods, even though they contain some nutrients necessary for plant growth (Al-Hadithi *et al.*, 2001). Treatments that started with simple traditional methods have evolved into advanced treatment methods and sterilization, as some countries have reached the production of safe drinking water from wastewater according to the international standards for drinking water (Al-Khair, 2001). As a result of the rapid population development that increased wastewater and that was accompanied by partial treatment, it



led to an increase in nutrient load and caused the problem of nutritional enrichment (Eutrophication Diederik, 1999) and 2001 (Victor, et al.). One of these methods is the use of microalgae, as algae farms have been used to remove nutrients from wastewater rich in nitrogen and phosphorus (Tam et al., 1994) as a third stage of treatment (Lavoie and De la Noüe, 1985 and Noüe, 1993 Talbot and De la Canizares et al., 1994) These wastes were also used as a culture medium for algae growth Removal of nutrients and oxygen production, which improves the quality of Almtvdqat and this growth is accompanied by the production of live mass of algae as possible to take advantage of them for several purposes (De la Noüe, et al., 1992).

II. MATERIALS AND METHODS

Waste water from the final sedimentation ponds was used as culture media for the development of the mentioned algae by

culture algae in sterile wastewater once and not sterilized again in constant laboratory conditions at a temperature of 20 ± 20 and the intensity of illumination 260 microsinstein / m² / second and in a light system 8:16 hours of lighting: Dark using fixed farms.

III. RESULTS AND DISCUSSION

The study aims to identify the efficiency of the *Oscillatoria pseudogeminata* in Removing the nutrients (nitrogen and phosphorous) from domestic waste water and Removing heavy metals (nickel, lead, iron and copper) from this also determine the living mass of algae . Comparing the removal process with sterile and non-sterile wastewater,

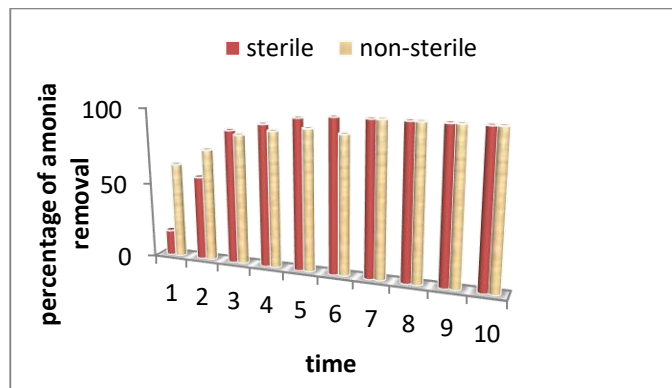


Figure (1): Percentage of removing ammonia from sterile and non-sterile wastewater Treatment with *Oscillatoria pseudogeminata*

The current study showed that removal ratio of ammonia from sterile and non sterile wastewater was perfect when this treatment with the algae *Oscillatoria pseudogeminata* and this means that we can use this algae in treatment of water , but Extensive studies must be done to find out

whether these algae affected human health or excrete harmful substances in order to make sure and thus use them to sterilize household wastewater and get rid of some harmful pollutants harmful to humans and living organisms.

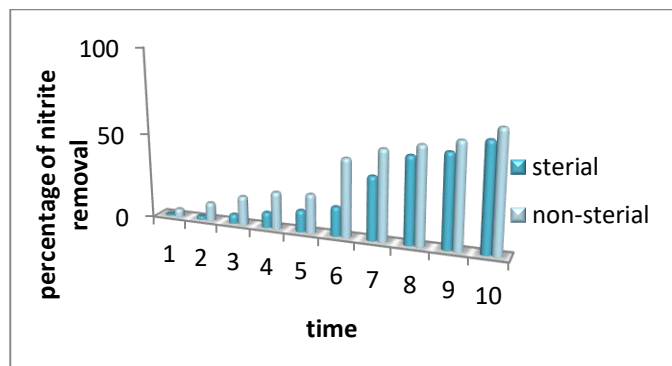


Figure (2): Percentage of nitrite removal from sterile and non-sterile wastewater Treatment with *Oscillatoria pseudogeminata*

Table (1): Biomass in terms of cell number, absorbance, dry weight, growth rate, and doubling time of the algae culture *Oscillatoria pseudogeminata* in sterile wastewater.

Time of multiplication (hour)	growth rate	Dry weight (Lt. Mg)	Absorbance nanometer	cell x ⁶ /10 mili	day(time)
0.00	0.01	0.044	0.033	0.4	0
72.20	0.01	0.045	0.044	0.36	1
38.21	0.180	0.063	0.055	0.5	2
48.9	0.99	0.077	0.090	0.4	3
60.12	0.100	0.085	0.111	0.9	4
45.11	0.91	0.089	0.120	1.3	5
58.12	0.100	0.110	0.150	1.7	6
59.22	0.130	0.120	0.166	1.9	7
60.32	0.150	0.133	0.169	2.5	8
63.13	0.115	0.145	0.170	3.1	9
66.12	0.130	0.152	0.180	4.1	10

Table (2): Biomass in terms of cell number, absorbance, dry weight, growth rate, and doubling time of the algae culture *Oscillatoria pseudogeminata* in non-sterile wastewater.

Time of multiplication hour	Growth rate	Dry weight (Lt. Mg)	Absorbance (nanometer)	cell x ⁶ /مليتر	Time) day(
0.00	0.00	0.056	0.08	0.13	0
55.2	0.132	0.016	0.09	0.35	1
48.5	0.142	0.07	0.133	0.15	2
41.2	0.173	0.091	0.172	1.0	3
42.3	0.165	0.11	0.196	1.12	4
49.2	0.141	0.13	0.230	1.26	5
53.7	0.132	0.149	0.250	1.19	6
57.9	0.124	0.150	0.271	3.3	7
64.3	0.111	0.153	0.291	4.3	8
69.2	0.107	0.152	0.280	4.7	9
81.05	0.115	0.141	0.271	4.8	10

IV. CONCLUSION

The study included the use of algae to purify water from heavy metals and filter domestic wastewater. Also, in future studies, other types of algae can be used in water purification.

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