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Environmental Drivers That Influenced Microalgae in Sewage Water Treatment

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***Abstract*- Organic and inorganic substance which were released into the environmental as a result of domestic,agriculture, and industrial water activities lead to organic and inorganic pollution. Treatment of waste water with Microalgae based system have the abilty to remove(Nitrogen, Phosphate and other nutrients),BOD,COD and other impurities present in the waste water by using sunlight,co_2 and impurities like nutrients present in the waste water. The normal Primary and Secondary treatment processes of these wastewater have been introduced in a growing number of place , in order to eliminate the easily settled materials and to oxidize the organic material present in waste water. the microalgae treatment system is economical,green,and environmental friendly option of wastewater treatment.**

***Keywords:* - Microalgae, Nutrient removal, Wastewater, Sunlight, Co_2.**

I. INTRODUCTION

In earth and its ecosystem have been changed dramatically after the entrance of the human species into the cycle. One of the problems, which has been accelerated especially after the industrial revolution is environmental pollution, among them water pollution.

Water as one of the major resources for the development of human societies, has being used and then polluted by human bodies. The environment is currently facing many problems. One of the major problems is the accumulation of large amount of waste, especially waste water, generated by intensive production.

The accumulation of these wastes may pose disposal and pollution problem unless environmentally and economically sustainable management technologies are evolve .Microalgae have the ability to remove the nutrients, heavy metals, organic and inorganic toxic substances and other impurities present in waste water by using sunlight, co_2,and various nutrient.

The main advantage of using algal system is that it absorb solar radiation in the form of in its chloroplast cell and take co_2 along with nutrients from the waste water to synthesis their biomass and produce oxygen. The release oxygen from the microalgae is enough to meet the most aerobic bacterial requirements while met abolishing the residual organics in the treated wastewater. The bacteria, indetermination of the algae growth potential is the based on the relation of a maximum biomass yield concerning the biologically used nutrients for the microalgae growth. In water bodies, nutrients for the micro algae In a water body, nutrient could be consumed, partially, or totally, depending on the nutritional present in water. Furthermore, a nutrient-rich discharge like, effulent from the anaerobic digestion process is generally recycled to the head of the wastewater treatment plant and can increase the cost and destabilize the overall treatment process due to the accumution of phosphorus.

Algae are known to grown in the waste water, a possible solution is to collocate and integrate production of algae with treatment of nutrient-rich wastewater and utilize $co_2$from the power plant flue gas. Reduce the nutrient (Nitrogen, phosphate, and other minerals) from the wastewater, Removal of the Nutrient is an important part of the wastewater treatment because rich nutrient effulent discharged into the water bodies can result in the eutrophication in the water bodies.

The objective of this study where to test the role of microalgae pinnate in wastewater treatment. The Environment is currently facing a number of pollution problems. One the major problem is the accumulation of large amount of wastes, especially waste water, generated by intensive production.

Pollution problems unless environmentally and economically sustainable management technologies are evolved.

Microalgae treatment has number of unique benefits. As an aquatic species, they do not require arable land for cultivation .It means the cultivation of microalgae does the

not need to complete with agricultural commodities facilities can built on minimal land that has few other uses.

Fig.1. Microalgae in waste water.

The used algae cultivation can be fresh water or saline, wastewater, and salt concentration up to twice that of seawater can be used effectively.

II. FACTOR AFFECTING FOR THE GROWTH OF MICROALGAE

1. Sunlight

Microalgae are the unicellular, photosynthetic microorganism and they use sunlight in photosynthesis process. Photosynthesis is the process of converting light energy into organic molecules, which are mainly composed of carbohydrates, CH_2O. Sunlight is the important to the growth of microalgae and without sunlight microalgae growth has been reduces.

2. Carbon dioxide (CO_2)

The increased atmosphericCO_2 level is now worldwide accepted to be major contributor to global warming. The reaction between sunlight and CO_2 shown.

$$6H_2O + 6\,CO_2 = C_6H_{12}O_6 + 6O_2$$

3. Nutrients (Nitrogen, phosphorus, and other minerals)

The use of municipal and industrial wastewater effulent as a nutrient feedstock for the production of the algal has environmental and economic benefits. Wastewater nutrient are fed microalgae by different nutrient like nitrogen, phosphorus, ammonia, sulphur, iron, toxins and all the metal in wastewater to the production of microalgae biomass. The phosphorus and nitrogen are the most important nutrient to microalgae.

4. PH

Microalgae growth rate and treatment of wastewater may also be affected by pH of wastewater. Availability of inorganic carbon also affected by Ph., even if pH is high for other reasons than photosynthetic CO_2-exhauation, the Ph regulates what the species of inorganic carbon that is available. Increasing the dissolved oxygen concentration and pH cause for phosphorous sedimentation and also ammonia and sculpture removal. At pH 8.2 to 8.4, being slightly lower at 7.4 to 7.8, decreasing significantly above pH 9 and pH 9.7to 9.9 the cell were unable to grow well.

Table: 1 Summary of major nutrient removal efficiency by algal cultivation.

Algea species	Waste water characteristics	N(%)	P(%)	carbon	Retention time
Algal-bacterial symbiosis (chlorella +Nizchia)	Settled domestic sewage.	92	74	97% BOD, 87%COD.	10 h
Chlorella pyrenoidosa	Settled domestic sewage .	93.9	80	NA	13 days
Cyno bacteria	Secondary treated domestic effulent + settled swine waste water.	95	62	NA	1 days
Chlorella vulgaris	Diluted pig slurry (suspended solids content to 0.2%)	54-98	42-89	$BOD_5$9 8%	4.5 days
Chlorella pyrenoidosa	Domestic sewage and industrial waste water from a pig farm and a palm oil mill.	60-70	50-60	80-88% of BOD, 70-82% COD.	15 days
Mixed culture of chlorella anad diatom species.	Wood – based pulp and paper industries waste water.	-	-	-	42 days

5. Temperature

Temperature is proportional to the availability of sunlight and has little effect when sunlight is limiting. When light availability is not limiting, increase in the temperature can increase the rate of photo synthesis, growth/doubling rates are consequently. However, even though light is most often limiting the growth rate consequently.

Hovered, even though light is most often limiting the growth of microalgae, too much light may also cause lowered photosynthesis effectively, which is known as photo inhibition. Increased temperature enhances algal growth until an optimum temperature is reached.furder increase in temperature leads to a rapid reduction in algal growth rate. The temperature range generally within 20 to 30 0c for the maximum growth of microalgae.

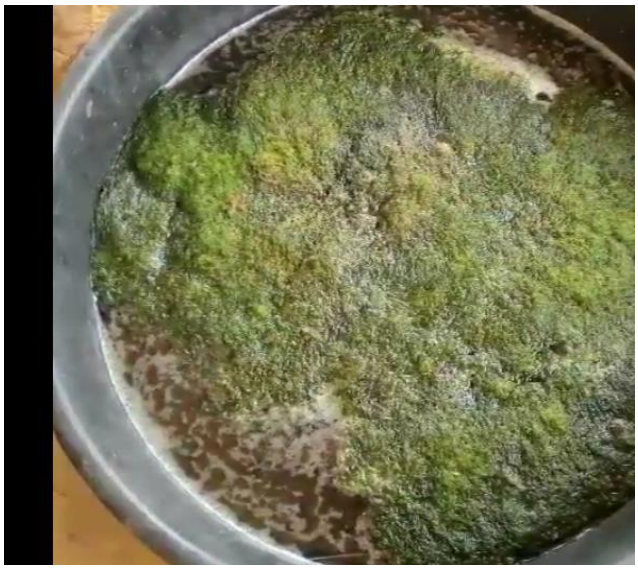

Fig.2. Microalgae purify the sewage water

IV.CONCLUTION

The study shows the ability of microalgae to uptake the carbon, nitrogen, phosphorous and heavy metals and microalgae have the potential for the treatment of the wastewater for the various type of effulent. Sewage and industrial wastewater is naturally enriched in nutrient that can be used for algal growth. It observed that the major factor that effecting algal growth and treatment efficient are carbon dioxide and light from all other factor .The various studies conducted to treat the wastewater using microalgae shown that the microalgae reactor has significant reduction in nutrients.BOD, COD, and other toxic elements. The system has a removal efficiency of 78-99% of nitrogen and phosphorous. The treatment system also succeeds to remove 40-65% of COD, BOD and other impurities present in wastewater.

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