A Study and Investigation of Waste Water Treatment by Using Algae

Rohit P. Deshmukh[1] Dr. Arif Khan[2]
[2]Principal
[1,2]Department of Civil Engineering
[1,2]NCET, Nagpur, Maharashtra, India

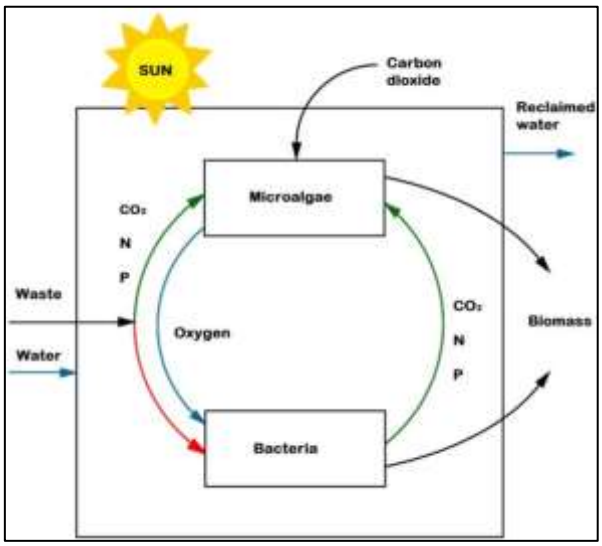
Abstract— In this research, we investigate the waste water treatment by using algae. As from our investigation, we know that the world is facing problems with a wide variety of pollutants and contaminates from various development activities. The population explosion in the world has resulted in an increase in the area of polluted water. The concern on the quantity and quality of waste generated and discharged into natural water bodies has recently indicated the need for different strategies address water quality challenges in the regions. So for that we have design a system is to grow freshwater algae in municipal waste water. In this the flexible plastic tubes that float in sea water and process of growing, the algae treat waste water and address environmental problems by consuming nutrients from wastewater and carbon dioxide. The nutrients, if left unconsumed, would otherwise be released into the costal waters contributing to undesired algae blooms. Depending upon the amount of sunlight, nutrients, water temperature and a few other environmental conditions algae can double their numbers every day and be ready to treat waste water in just three to five days.

Keywords: Waste water, Algae, Nutrients, sunlight, Temperature

I. INTRODUCTION

The system is designed to grow freshwater algae in municipal waste water using photo bioreactors, which are flexible plastic tubes that float in water. In the process of growing, the algae treat waste water and address environmental problems by consuming nutrients from waste water and carbon dioxide. The nutrients, if left unconsumed would otherwise be released into the coastal waters contributing to undesired algae blooms. Just like shrubs and trees, algae have an appetite for the greenhouse gas, carbon dioxide.

Depending on the amount of sunlight, nutrients, water temp. And a few other environmental conditions. Algae can double their numbers everyday and be ready to harvest in just three to five days. Some of algae make oil, which can be converted into environmentally friendly and sustainable bio fuels. In addition, the remaining of the algae can be produced other products such as fertilizer, natural gas and animal feed.



II. CONSTRUCTION

The system consists of large glass tank assuming as sea or water tank or river or pond or nallah. The system consists of large flexible glass tube called photo bioreactors which float on water. The tube made up of flexible clear plastic; contain algae growing in waste water. The 9 flexible plastic tubes are filled with algae and wastewater which circulates through the system.

In this system an inlet tank is provided which is in the form of plastic tank, this tank sufficiently contains the waste water as we need to treat. The tank has capacity of 5 liters also there is valve provided at the outlet of the tank for better control of flow. For inlet tank plastic transparent material is used for better appearance. This tank is cylindrical shape and proper mouth is provided for addition of wastewater to the inlet.

Inlet tank is further connected to the glass tank with the help of plastic pipes; glass tubes are provided which act as photo bioreactors are attached to the tank. The main purpose of providing transparent glass tube is to transmit the sunrays for the growth of algae. The length of glass tube which are provided in this system is 85cm long and diameter of tube is 18cm. the U-tube are provided for spiral movement at the bent. The no of tubes provided in this system are 09 no and 10 no of U-bent are also provided.

Borosil glass pipe are used to make the flow arrangement, at the turning point of the pipes there is U-tube is provided. This arrangement is placed in the glass tank having a size 92×46×30cm, the tank is sufficiently joint with the silicon to avoid the leakage as the glass tubes are heavy there are three intermediate support provided this glass tank have capacity of 127 liters.

As soon as the water get passed through the photo bioreactors water get collected in recirculation tank as the

contact period was not sufficient for proper treatment of waste water it needed to be recirculated.

III. ALGAE GROWTH PARAMETERS

Concentration of cells in phytoplankton cultures are generally higher than those found in nature. Algal cultures must therefore be enriched with nutrients to make up for the deficiencies in the water.

A generalized set of conditions for culturing micro algae (modified from anonymous, 1991)

Parameters	Range	Optimum
Temperature (˚ C)	16-27	18-24
Salinity	12-40	20-24
Light intensity	1,000-10,000	2,500-5,000
Photoperiod(light: dark, hours)	16:8(min)	24:0 (max)
pH	7-9	8.2-8.7

IV. TESTING OF SEWAGE

This chapter presents the results of research tasks performed according to the base line conditions and experiment design. All the tests conducted were in accordance with the methods described in below to determine purified water.

A. Testing

- BOD
- COD
- pH
- Total solids
- Dissolved oxygen
- Turbidity

V. RESULT

After 72 hrs…..

Characteristics	Untreated	Treated
PH	4.7	8.3
Nitrate	4.4	2.4
BOD	146	20
Sulphate	40	25
COD	206	42
Total solids	630	216

VI. CONCLUSION

- Depending on the amount of sunlight, nutrients, water temperature and a few other environmental conditions.
- Algae can double their numbers every day by absorbing more amounts of nutrients, metals.
- Makes water clean in just three to five days.
- Then algae can be converted into environmentally friendly and sustainable biofuels, can be used to produce other products such as fertilizer, natural gas and animal feed.

REFERENCES

[1] Amin S. (2009). "Review on biofuel oil and gas production processes from microalgae." Energy conversion and Management 50(7): 1834-1840
[2] Campbell M. N. (2008). "Biodiesel: Algae as a renewable source for liquid fuel." Guelph Engg Journal 1: 2-7
[3] S. K. Garg Environmental Engg (vol. II) "Sewage Disposal and Air Pollution Engineering". Khanna Publishers.
[4] Metcalf & Eddy (1991). "Waste Water Engineering Treatment, disposal and Reuse."
[5] McGarry M. G. and C. Tongkasame (1971). "Water reclamation and algae harvesting." Water pollution control federation 43(5): 824-835
[6] Burdick C. R. and D. R. Refling (1982). "Advanced biological treatment to achieve Nutrient Removal." Water pollution control federation 54(7): 1078-1086
[7] Oswald, W. J. and C. G. Golueke (1960). "Algae in Waste treatment."
[8] Metcalf, Eddy, et al. (2004). Wastewater engineering: treatment and reuse, McGraw Hill.
[9] CIA Country factbook, webpage, http://rs6.loc.gov/frd/cs/nptoc.html
[10] Colloidal Silver discovery center, webpage, http://www.colloidal-silver.com
[11] www.Encyclopedia.com
[12] www.Wikipedia.com

