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GENERATION OF ALGAE BY USING DIFFERENT FERTILIZERS

Suraj Suroshe[1], Sneha Kankamwar[2], Prashansa Bagde[3], P. Chavan[4]

[1] *Student of Chemical Department of Jawaharlal Darda Institute and Technology, Yavatmal, Maharashtra, India.*
suroshes@gmail.com

[2] *Student of Chemical Department of Jawaharlal Darda Institute and Technology, Yavatmal, Maharashtra, India.*
snehask624@gmail.com

[3] *Student of Chemical Department of Jawaharlal Darda Institute and Technology, Yavatmal, Maharashtra, India,*
roji.silent@gmail.com

[4] *Professor of Chemical Department of Jawaharlal Darda Institute and Technology, Yavatmal, Maharashtra, India,*
chavanprakash23@yahoo.in

Abstract

Microalgae are the one of the oldest species on earth. Which grows by using light and CO_2 and release oxygen. Also dry algae contains 50-60% of protein and other lipids and other content. Algae grows by 25% by its own weight every day. It used as a food and medical purpose and Oil yield from algae is much more than soybean, jatropha, and other food crops. Petroleum products like petrol diesel are limited and getting costlier continuously. So it is necessary to search another source of fuel like biodiesel. Microalgae also grows in non fertile land and can be grow without land in close pond system or tube system. Microalgae absorbs gases like Carbon Dioxide, Nitrogen, Phosphate, etc which helps in the growth of algae. Also microalgae releases about 40-50% of oxygen in atmosphere which helps to reduce the pollution. So if we can increase the growth of microalgae by adding nutrients or different fertilizer. It is helpful to algae growing farmers and oil extractors from algae also the environment. The plants like Jatropha, Pongamia, Neem, Sal etc. are the important sources for production of biodiesel but having low yield of oil which is not satisfy the demand of energy. As a result, microalgae is in focus as a future source of biodiesel due to the advantages of yielding 30 times more oil compared to other oil seed crops. Delivering lipids for fuel production, microalgae are capable of actively improving the health of the environment through the sequestration of carbon-dioxide (CO_2) and production oxygen ($_{O2)}$ while recycling nutrients and potentially cleaning waste water in this process. These multiple benefits are actually the strength of algae production.

***Keywords**: Bio-diesel, Microbes, Oil Crops, Micro-algae, land required,etc*

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1. INTRODUCTION

Energy is essential for survival, development and for better living standard. Fossil fuels are required for industrial growth in India. Iran, Iraq, Saudi Arabia etc are the main countries from India import petroleum product. India depends on these countries for petroleum product. Petrol, Diesel, etc these are the nonrenewable sources of energy and creates pollution which is dangerous to the environment. Also the prices of the petroleum product increases continually due to decreases the fossil fuel resources has made it to search an alternative source of fuel as substitute of diesel. Biodiesel and Diesel have similar fuel properties. Due to this biodiesel consider as substitute of diesel.

Microalgae release about 40-50% of oxygen in the atmosphere and absorb gases like carbon dioxide, nitrogen, phosphate for growth which helps to reduce the pollution. Microalgae promises a new era of sustainable energy production as the next biofuel source. This narrow focus on only one purpose – biofuel production – neglects the multiple environmental benefits that algae cultivation itself provides. The autotrophic process of sunlight-driven photosynthesis in algae production reaches beyond renewable energy production; it sets up a co-dependency between energy transformation and ecological recycling .[1]

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In this paper we study the various effect of fertilizers on growth of algae. The algae which form on the flour of concrete is produce large amount of biodiesel than compare to others type.

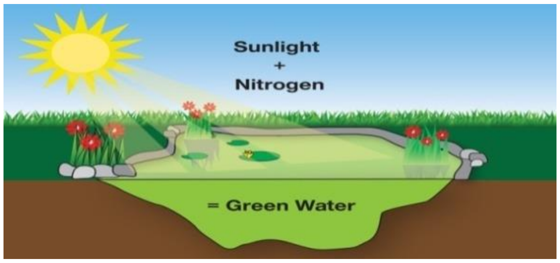

Fig.1 Natural process algae growth

2. MATERIALS AND METHODS

2.1 Materials That We Use

6 Plastic bottles. Algae, fish pond water, drilled aquarium airline tubing.

Photosynthesis reaction:
$6CO_2 + 6H_2O + \text{light} \rightarrow C_6H_{12}O_6 + 6O_2$

2.2 Methods Of Cultivation

Algae produce much more oil than food crop, About hundred time more than food crops per acre such as soyabean, jatropha, palm, sunflowers ,etc. Algae have 1-10 days of harvesting cycle, their cultivation permits several harvests in a very short time frame grow. Most research on algae cultivation has focused on close pond system which is expensive, or in natural method, which are cheap but risk of contamination.

Two types of cultivation methods of algae, Natural method and laboratory method, natural method also known as open pond method and laboratory method is also known as close pond method

2.3 Closed Pond System

Close pond system is much better than open pond system because requirement of water is much lower than open pond and also density of algae cells are more than open pond system having low contamination than open pond system. In close pond system the main problem is to find the low cost sterile source of CO_2 .Some experiment founds that CO_2 is important for the growth of microalgae. Some experts think than algae farming for biofuel is also helpfull to the farmer. Photo bioreactor are used as closed systems, which are the most comman form of tubes. Their diameter is about 10 inches in order to enter into more light. [5,3]

Table 1. Fertilizer that we use

SR. No.	NAME OF COMPOUND	WEIGHT (Gram)
1	Urea	1
2	DPA (Phosphate)	1
3	NPK	1
4	Organic compound	1

Fig. 2. Close loop system

2.4 Open Pond Systems

These systems are based on open, shallow pools up to depths of 30 cm, in which it is necessary to bring waste CO2, which algae use as food. Pools are made of concrete or pools are dug and coated with plastic wrap that would not have soaked the ground water. Pools are made in the shape of paths in which the algae, water and nutrients circulate. The driven rotor ensures adequate flow and ensures retention the algae in the water.The pools are shallow because the algae must be exposed to sufficient amounts of sunlight (the amount of light decreases with depth). Pools are constantly working, which means that water and food are constantly brought into the pool in front of the rotor, while water containing algae collects behind the wheel after they pass through the whole path. It is required a system of collection of algae that contain the proper amount of oil. Productivity is measured in biomass produced per day and per unit of available surface. To meet optimum productivity, is required a very large area. Considering large areas being necessary for production, these systems are called farms.[8,5]

Fig.3 Open pond system

4. EXPERIMENT SETUP

The goal is to conduct a controlled experiment to check the growth rate of algae

1) Which materials are included?
   6 liters bottle of water, algae, fish pond water, drill aquarium airline tubing.
2) First of all collect some algae from a pond or from the concrete tank. The special type of algae which is formed on the outer surface of the concrete tank is chlorella.(Chlorella is a genus of single-cell green algae. Chlorella contains the green photosynthetic pigments chlorophyll-a and -b in its chloroplast. Through photosynthesis, it multiplies rapidly,

requiring only carbon dioxide, water, sunlight, and a small amount of minerals to reproduce).[1]

3) Add equivalent amount of algae to the bottle A,B,C,D,E of tap water and fish pond water .Add 1gm algae in each bottle.

4) Add NPK in each of the bottles (Nitrogen, potash, potassium) 1gm.
   - The first bottle 'A' add urea of equivalent amount of 1 gm.
   - In second bottle 'B' add MOP (potash) of equivalent amount of 1gm.
   - In third bottle 'C' add DAP (diammonium phosphate) of equivalent amount of 1gm.
   - In fourth bottle 'D' keep it open in the indirect sunlight.
   - In fifth bottle 'E' add manure (organic fertilizer).

A) Make a hole in the bottle cap of the bottle that is just large enough to allow an aquarium airline to pass through it, then run the airline through the free air space cap ,seal the airline to the top of the bottle cap with closing it tightly.

B) Extend the aquarium airline from the bottle to one of the all the bottle except the bottle D in which bottle 'D' has to be kept open ..

C) Place all the 'E' bottle in the outdoor where ,they will get indirect sunlight .

D) Direct sunlight may inhibit growth the optimum temperature for algae growth is between 20-25^{o}C temperature 35^{o}C also is lethal to algae.

E) Monitor the growth of the algae in the all six bottle for about 12 days.

F) At the end of the 12 days compare the amounts of algae in the six sample bottle

Table 2. Observation Table

DAY	**A** ALGAE +UREA+NPK	**B** ALGAE+DAP +NPK	**C** ALGAE+MOP +NPK	**D** ALGAE +NPK +ORGANIC COMPOUND	**E** ALGAE +NPK
1	No change	No change	No change	No change	No change
2	No change	No change	No change	No change	No change
3	No change	No change	No change	No change	No change
4	No change	No change	No change	No change	No change
5	No change	No change	No change	No change	No change
6	No change	No change	No change	Slightly green	Slightly green
7	No change	No change	Slightly green	Slightly green	Slightly green
8	No change	No change	Slightly green	Green	Slightly green
9	No change	No change	Green	Green	Green
10	No change	Slightly green	Green	More green	Green
11	No change	Green	More green	Dark greenish	Dark greenish
12	No change	Green	Dark green	More dark green	More dark green

5. RESULT AND DISCUSSION

1) From first to six days of observation we have seen that the color of water did not changed .

Fig-4: Within 1-6 days

2) From 7 th to 9th day we have observed that the colour of bottle (B),(C),(D),(E)was slightly changed to green colour. The colour of bottle (A) remained unchanged.

Fig- 5: Within 7-9 days growth of algae

3) From 10th day to 12th day we have observed the dark green shade in bottle (B),(C),& more darker shade of green in

bottle (C),(D) and colour of bottle (A) remained unchanged.

Fig. 6 Within 10-12 days more greenish colour found

4) From 9th to 15th day we have observed that the colour of bottles (B),(C),(D),(E) have turned to dark green shade and the algae formed was settled at the bottom of the bottle and colour of Bottle (A) remained unchanged.

Fig. 7 After 12 days algae will be deposited in bottle

Now, we took algae from each bottle and took it on filter paper and dried it and weighted we got result :-

1) In bottle A the algae was dead therefore no colour change and dried algae obtain is zero
2) In bottle B the algae from one gram changed to 8 grams.
3) In bottle C the algae from one gram changed to 7.5 grams.
4) In bottle D the algae from one gram changed to 13 grams.
5) In bottle E the algae from one gram changed to 9 grams with contamination because bottle was open.

6. CONCLUSION

Our model clearly shows that closed system method of production of algae, despite its immunity to contamination, is prohibitively expensive. Algae technology is unique in its ability to produce a useful product from waste CO2. Algae extend usable energy we get from coal combustion and reduce carbon emissions by recycling waste CO2 from power plants. Algae reduce NOx day and night regardless of the situation with the light .Further research must be conducted on contamination prevention into open air production configurations.

- In open pond, more water evaporation is done so that close pond more beneficial than open pond.
- In organic fertilizer, rapid growth in few days and production more.
- In other fertilizer, no more change in algae than that like organic fertilizer.

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