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ABSTRACT

The algal species were collected from the siren river Hazara division and were isolated and identified. Various species were selected to optimize the production of different biofuels. In order to efficiently produce biodiesel from algae, strains have to be selected with a high growth rate and oil content. If an open culture system was used, then the selected strain must have the ability to remain dominant under the applied conditions. The main species identified were *Tribonema*, *Ulothrix*, *Hydrodictyon reticulum*, *Bubble*, *Euglena*, *Oedogonium*, and *Spirogyra*. Amongst these species *Tribonema* specie showed the highest oil content which could be used for bio-fuel in future. It was concluded from the experiment that the siren valley had various algal species and *Tribonema sp.* was best for its oil content, which could be used for future bio-fuel purposes.

Keywords: Bio fuel production, Algae specie, Oil contents, *Oedogonium, Spirogyra*,

Introduction

An alga offers a diverse spectrum of valuable products and pollution solutions [1]. Because of environmental conditions such as temperature, the locally occurring strains preferred in most cases [2]. Microalgae are generally sunlight-driven cell factories of which convert fractional Carbon dioxide to prospective bio-fuels, food items, feeds and high value bioactive. Animals, plants were mostly used for production of oil but now a days micro algae are mostly preferred. In United States soybean is use for the production of biodiesel. "Bio-fuels done right" must be derived from feed stocks with low greenhouse gas emissions and little or no competition with food production. Algae are likely to win on both counts [3]. Microalgae can produce valuable co-products such as proteins and residual biomass after oil extraction, which may be used as feed or fertilizer, or fermented to produce ethanol or methane [4]. Biochemical composition of the algal biomass can be modulated by varying growth conditions, therefore, the oil yield may be significantly enhanced, and microalgae are capable of photobiological production of 'bio hydrogen' [5][6]. In the past 2–3 years the production of biodiesel from algae has been an area of considerable interest [7]. This is due to algae include higher productivities compared to land plants, with many species obtaining doubling times of some hours while many species could accumulate very large amounts connected with triacylglycerides (TAGs), the major feedstock regarding biodiesel production and also high good quality agricultural land is just not required growing the biomass. On the other hand, several challenges have to be tackled permitting commercial production of diesel powered from algae for a scale sufficient to manufacture a significant contribution to our transport and energy needs.

RESULT & DISCUSSION

Extracted oil was higher in *Tribonema* (24%) than in other species which was outstanding. However, biomass (after oil extraction) was lowest (1.50g) in *Tribonema* than in other species. After *Tribonema* the specie that manifested higher oil content was *Ulothrix* (1.89%). however the biomass of *Ulothrix* was higher (1.92g) than that of *Tribonema. Hydro dictyon reticulum* was ranked third in oil content (1.53%) with a higher biomass (1.93g) than *Tribonema* and *Ulothrix.* A bubble alga was followed by *Hydro dictyon reticulum* in oil content (1.11%) and with higher value (1.95g) of biomass than above three species. *Euglena* spp. was ranked fifth in oil content (0.82%) with greater biomass (1.96g). *Oedogonium* and s*pirogyra* contained lowest values of oil content (0.53% and 0.45%) with the highest values of biomass (1.97g and 1.98g) respectively as shown in Table 1.

Table 1: Measurement of fresh and dry weight, extracted oil and biomass of algae

Specie	Total weight	Residual biomass weight	% oil content
Tribonema spp	2 g	1.50036g	24%
Ulothrix spp	2 g	1.92g	1.895%
Hydro dictyon reticulum spp	2 g	1.93g	1.535%
Bubble spp	2 g	1.95g	1.115%
Euglena spp	2 g	1.96g	0.825%
Oedogonium spp	2 g	1.97g	0.53%
Spirogyra spp	2 g	1.98g	0.45%

GRAPHICAL REPRESENTATION OF OIL CONTENT

The given bar graph shows that highest amount of oil content was present in *Tribonema spp* while lesser in *Spirogyra spp* i-e 24% and 0.49% respectively. While in *Ulothrix spp*, *Hydro dictyon reticulum spp* and *Bubble spp* contains less amount of oil than *Tribonema spp* while *Euglena spp* and *Oedogonium spp* contains more oil contents than *Spirogyra spp.*

CONCLUSION

The valley possesses valuable algal species.

They had high growth rate at common growing conditions.

The oil content of *Tribonema* sp. was very high.

Tribonema could be used for bio-fuel production in future

MATERIAL AND METHODS

The experiment was completed in the Pakistan Council of Scientific and Industrial Research (PCSIR) Laboratory Peshawar Pakistan.

Sample Collection and Identification

Different indigenous algal species were collected from fresh water of beautiful valley of Siran river located in district Mansehra of Hazara division. Samples were identified and then analyzed.

Oil Extraction

Two gram of algae specie was taken and thoroughly washed by De-ionized water. Algae were grounded with mortar and pestle as much as possible. Empty Petri dish was taken and weighed. 2 grams of grounded sample was placed in Petri dish and dried in an oven, for about 30 minutes at the temperature of 100˚C. Then sample was placed in an empty test tube. 10 ml solution of isopropanol and acetone (1:1) was mixed with sample. Test tubes were shaked at vertex machine for 20 minutes. After shaking the solution was kept for settling down for 24 hours. Empty beakers were weighed and the shaked sample was filtered into beakers. Then beakers with filtrate were placed in an oven at 100˚C and transferred to desiccators for drying. When solvent solution was fully dried, beakers were taken out of the oven and placed outside for cooling at room temperature. After half an hour beakers were again weighed and oil percentage was calculated using the following formula:

$$\% \text{ Oil contents} = \frac{(\text{wt. of beaker before drying}) - (\text{wt. of beaker after drying})}{\text{Amount of sample}} \times 100.$$

Biomass Estimation

The residual biomass was collected after filtration and weighted.

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