

6th World Congress on

BIOFUELS AND BIOENERGY

September 05-06, 2017 | London, UK

Growth of the algae *Chlorella vulgaris* at the photobioreactor and extraction of fatty acids for biodiesel production

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Microalga is known to have higher lipid contents and biodiesel efficiency than most plant oil sources e.g. palm oil. We conduct algae research at our laboratory in Konya, Turkey. We studied the growth of *Chlorella vulgaris* at the photobioreactor in our laboratory first. We aimed to use this photobioreactor of lab scale as feed stream to an open pond larger scale bioreactor for future work. Photobioreactor had three compartments which had separate controls for light and air circulation. Temperature was kept at 22°C - 26°C. The circulation rate was 180 L/hr. The light intensity was set at 16 hours on and 8 hrs off. The nutrient powder was dissolved in sterile water and the pH of the solution was 6.5-6.7. Inoculation of culture was performed aseptically. The algae culture was an original strain of *Chlorella vulgaris*, supplied from the USA. This specific culture was proposed for use as bioenergy and bio fertiliser due to high lipid content. The continuous growth was achieved at the bioreactor without contamination for more than 9 months. Slurry was dried and algae biomass was obtained. Extraction of lipids of the dried algae was performed by Bligh and Dyer method. Extracted lipid was subject to transesterification reaction for production of fatty acid methylesters (FAMES). The lipid contents of sample was analysed by GC. The results for the lipid contents were: palmitic acid: 33%, linoleic acid: 25%, oleic acid: 11%, palmitoleic acid: 8%, atearic acid, arachidic acid, myristic acid traces. The fatty acid profile was as expected from the literature except the lipid composition showed some changes due to photobioreactor configuration. We achieved successful growth of algae at the photobioreactor and extraction of lipids for biodiesel production. Future research for optimization of the conditions of the bioreactor should be performed.



Figure: A picture of the photobioreactor with the algae grown for nine weeks

Biography

Handan Erturk got her BS and MS degrees in Food Engineering of Middle East Technical University in Turkey. Later she went to USA for graduate study. She earned her PhD at Penn State University, Agricultural & Biological Engineering Department. Her expertise and publications were mainly on plant tissue culture, aseptic growth, modelling of biological systems, micropropagation. After she got back to Turkey, she has been researching and teaching on plant biotechnology, e.g. cell cultures. She has worked with the industry and now she is an Assistant Professor at the University in Konya, Turkey. She has been working on algae culture growth and long term maintenance at the laboratory. Her most recent research has been on production of biodiesel and biofertilizers from algae cultures grown at the laboratory.

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