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CO2 and Nutrient Uptake in Two Brackish Water Strains of *Chlorella vulgaris*

Faqih Ahmad Shuhaili[1] & Seetharaman Vaidyanathan[1]
[1]*University of Sheffield, United Kingdom*
**Corresponding author: faahmadshuhaili1@sheffield.ac.uk*

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Microalgae have the potential for carbon dioxide (CO_2) sequestration as it has higher photosynthetic efficiency compared to terrestrial plants, produces more biomass yield and needs smaller land area for cultivation[1]. It utilizes the nutrient resources such as carbon to produce chemicals with value-addition, such as biofuels, bioplastics and pharmaceuticals.

Algae utilize the carbon supplied to them differently according to many variable factors such as strain type[2], carbon source, nutrient supply (e.g. nitrate and phosphate) as well as the condition that they live in (e.g. pH, salinity, temperature and light condition). This will result in different growth characteristics and biochemical composition of the algae.

In this work, we evaluated carbon dioxide uptake by two brackish water strains of *Chlorella vulgaris*, originating from different culture collections (CCAP, UK and BDU, India) and studied it with respect to different culture conditions. Our objective was to understand CO_2 uptake with respect to the conditions the algae are exposed to. Both replete and deplete conditions for each nutrient were studied.

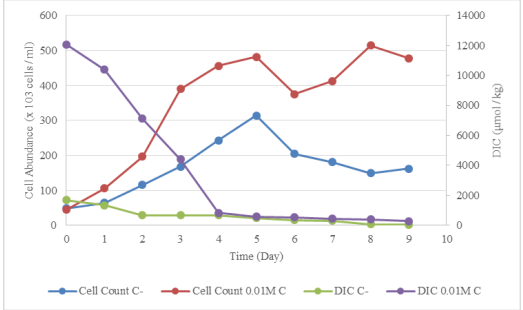

Fig 1. Cell Abundance (x 10^3 cells/ml) and Dissolved Inorganic Carbon (DIC) (µmol/kg) in *Chlorella vulgaris* (CCAP)

Carbon uptake differed for the two strains, but both cultures become carbon limited at a time that coincided with cessation in growth (Fig. 1). Although in general all major nutrients are taken highly during the beginning of experiments, their characteristics were different (Table 1). These variations later manifested in different biochemical composition of the algae.

Table 1. Log Uptake Rate of Carbon, Phosphate and Nitrate Nutrient Replete Condition in Beginning Day of Experiment

Strain	Carbon	Phosphate	Nitrate
CCAP	0.43	0.69	0.033
BDU	0.61	0.50	0.011

The uptake rate was also studied with respect to the source and supply of CO_2. These results will be discussed with respect to implications to microalgal CO_2 sequestration.

The results of the investigation will enable us to develop a better understanding of carbon uptake towards development of strategies for effective utilization of CO_2 by microalgae and its conversion to products of value.

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