Effect of Glucose Loading on the Growth Behaviour of Chlorella Vulgaris and Heterotrophic Bacteria in Mixed Culture

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Abstract

The effect of glucose concentration on the growth of *Chlorella vulgaris* and heterotrophic bacteria in mixed culture was studied. Granular glucose was fed daily as a source of organic carbon to provide an input concentration ranging from 25–700 mg/l. Growth rates of heterotrophic bacteria and algae increased with glucose loading rate but excessive loading rates were detrimental to the survival of the algae and bacteria. The maximum specific growth rates for the algae and bacteria were 1.58 and 1.70 d^{-1}, respectively. However, the saturation constants were significantly different with values of 27 and 174 mg/l for bacteria and algae, respectively. Under anaerobic conditions, bacterial density and algae growth were significantly affected by accumulation of volatile fatty acids (VFA). Although in low glucose loaded reactors, pH reached as high as 10.6, no significant effect of pH was observed on the survival of *Chlorella vulgaris* and heterotrophic bacteria. Inorganic carbon production increased with increasing glucose loading rate. When volatile fatty acids accumulated in anaerobic reactors, pH dropped resulting in a shift of equilibrium between H_2CO_3, HCO_3^- and CO_3^{2-} in favor of H_2CO_3production, most of which was released as CO_2(g) to the atmosphere.

Keywords

Heterotrophic bacteria;

Chlorella vulgaris;

Glucose loading rate;

Growth rate;

Oxidation ponds