Topic: Biomass and Lipid Production from Green Microalga *Ankistrodesmus* sp.

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ABSTRACT

Light intensity directly affects the growing and photosynthesis of microalgae, which requires optimal light intensity during the cultivation. Photoinhibition may occurred at high light intensity and low algal densities. In order to in dense algal culture, light penetration may be limited. The effect of light intensity and temperature on the cell growth and biochemical compositions of *Ankistrodesmus* sp. were investigated. The lipid content was strongly influenced by the temperature. Increasing temperature seemed to lower the lipid accumulation in this alga. The maximum biomass concentration occurred at 30 klux.

Carbon dioxide is a greenhouse gases and a main cause of global warming. Microalgae could uptake carbon dioxide as carbon source for growth. *Ankistrodesmus* sp. was cultivated for the production of microalgal lipid. pH in the range from 6 to 8 was not found to give significant effects on growth and lipid production where the culture seemed to grow best at pH 8. Although the algal growth remained unaltered, lipid production could be enhanced when the culture was aerated with additional CO_2. It was found that as much as 30% lipid could be achieved when 5% by vol. of CO_2 was mixed with the air supply, i.e. lipid productivity increased from 97.45 to 109.99 mg L^{-1} d^{-1}. Analysis indicates that CO_2 helped promote the accumulation of palmitic acid which is the dominant lipid species.

This work investigated the effect of the nutrient on lipid accumulation in *Ankistrodesmus* sp. culture. Batch cultures were carried out using fresh BG11 medium, and after the harvest, the medium was reused for the next culture, and this method was repeated two times. The maximum lipid productivity of 29.75 mg L^{-1} d^{-1} was obtained from the culture with the 2^{nd} reuse medium. In continuous cultures, *Ankistrodesmus* sp. was cultured in both fresh and modified BG11 mediums. The modified BG11 medium was adjusted to resemble the content of the 1^{st} reuse medium. As a comparison between batch and continuous cultures, it was proven that the productivity in the continuous culture was better than the batch where the achievable maximum biomass and lipid were 188.30 and 38.32

mg L^{-1} d^{-1}. The maximum lipid content of 34.22% was obtained from the continuous culture at the dilution rate of 0.08 d^{-1}, whereas the maximum saturated and unsaturated fatty acid productivities of 79.96 and 104.54 mg L^{-1} d^{-1} were obtained at the dilution rate of 0.16 d^{-1}.

Keywords: *Ankistrodesmus* sp., Photobioreactor, Lipid production, Carbon dioxide, Continuous culture, Modified nutrients