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Short communication

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**Energy conversion analysis of microalgal lipid production under different culture modes**

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**Abstract**

Growth and lipid production performance of *Scenedesmus* sp. under different culture modes were investigated. Under heterotrophic aerobic mode, algal biomass concentration and total lipid content reached  $3.42 \text{ g L}^{-1}$  and 43.0 wt.%, which were much higher than those in autotrophic aerobic mode ( $0.55 \text{ g L}^{-1}/20.2 \text{ wt.}\%$ ). The applied light exposure of  $7.0 \text{ W m}^{-2}$  was beneficial to biomass and lipid accumulation.

Mixotrophic aerobic mode produced the highest biomass concentration of  $3.84 \text{ g L}^{-1}$ .

The biomass was rich in lipids (51.3 wt.%) and low in proteins (17.9 wt.%) and carbohydrates (10.3 wt.%). However, lower algal biomass concentration ( $2.93 \text{ g L}^{-1}$ ) and total lipid content (36.1 wt.%) were obtained in mixotrophic anaerobic mode.

Mixotrophic aerobic mode gave the maximum heat value conversion efficiency of 45.7%. These results indicate that mixotrophic aerobic cultivation was a promising culture mode for lipid production by *Scenedesmus* sp..

**Keywords:** Microalgal cultivation; Energy conversion; Lipid accumulation; Light

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