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Conditions for growth and oil production of marine microalga *Nannochloropsis* sp.

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***Abstract*—The purpose of this study was to explore the ways that could enhance the productivity of oil by a marine microalga *Nannochloropsis* sp. Microalgae have the characteristics of rapid growth with ample accumulation of oil in their cells. Algae are photoautotrophs that grow on carbon dioxide. With the yield of oil rich biomass, cultivation of microalgae suits the noble purposes of pollutant reduction and renewable energy production. In this study, *Nannochloropsis* sp., which is known for its large biomass yield with high cell oil content, was cultured in batch reactors in the Walne medium. Light intensity was controlled at 11000 Lux and culture temperature was set at 32 ± 2°C. Sodium bicarbonate was the carbon source and sodium nitrate was the nitrogen source, both of which were variables for the determination of maximal oil productivity. pH was held at controlled and un-controlled states. Test results showed that with sodium bicarbonate and sodium nitrate concentration of 12 g-HCO_3^- L^{-1} and 0.5 g NO_3-N L^{-1}, respectively, the highest quantity of biomass was obtained after seven days of culture. However, the highest cell oil content was found with 12 g-HCO_3^- L^{-1} and 0.1 g NO_3-N L^{-1} of bicarbonate and nitrate, respectively. The outputs of cell mass concentration and oil content were 0.8 g-dry-wt L^{-1} and 17% for the high nitrate culture, while cell mass and oil content for the low nitrate case were 0.5 g-dry-wt L^{-1} and 38%. Comparing oil production with the high nitrate feed, the low nitrate feed had an advantage in oil production by approximately 0.05 g-oil L^{-1} (+ 40%). Higher nitrogen supply is diverted to synthesizing proteinaceous cell mass instead of lipid. Increase in pH approaching 9.5 when bicarbonate was consumed did not hinder *Nannochloropsis* growth; control of medium pH below the ceiling of 9.0 resulted in lower performances in both biomass production and oil content therein. Bicarbonate and nitrate were found to be the controlling factors of oil production from the cultivation of microalga *Nannochloropsis* sp.**

***Keywords*—biomass oil, renewable energy, microalgae, carbondioxide mitigation, optimization**

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