

Effects of Nitrogen Source and Cultivation Conditions on Growth Rate and Lipid Production in *Nannochloropsis gaditana*

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ABSTRACT

Microalgae are an ideal choice as a renewable and sustainable alternative oil source to traditional fossil fuel. It has the advantages of high oil content, short growth cycle, high yield and low maintenance cost. This work focuses on optimizing the growth and production of lipids in the marine algae strain *Nannochloropsis gaditana* (CCMP 527). Several factors are studied including: (1) composition of the gas phase (air vs. 5% CO₂ enriched air); (2) pH; (3) nitrogen source; (4) nitrate concentration, and (5) water source. Both the lipid content and the cell growth were monitored as a function of time. Experimental data shows that with 5% CO₂ enriched air and tris-HCl buffered medium the maximum growth rate of 0.02 hr⁻¹ and a lipid content of 40% are achieved. Use of urea or ammonia as nitrogen sources resulted in decreased amounts of total lipid. In addition, when glucose is added into the medium, microalgae grow faster by heterotrophic growth but with a low lipid yield. Maximum lipid content is obtained in late-exponential phase and is relatively constant from this point through stationary phase. Finally, lipid composition is analyzed by GC-FID, and for CCMP 527, the major compounds are palmitic acid (16:0) and palmitoleic acid (16:1).