

FINAL RESEARCH REPORT

**PROCESS DEVELOPMENT OF MARINE MICROALGA
CHLORELLA SP. CULTIVATION FOR PRODUCTION OF OIL
AND BIOPOLYMER**

BY

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ABSTRACT

This study aimed to evaluate a potential use of marine *Chlorella* sp. as a source of lipid, exopolysaccharides (EPS) and pigments in various culture conditions. Mixotrophic culture of marine *Chlorella* sp. produced much higher yields of biomass, lipid and EPS than photoautotrophic and heterotrophic cultures. Several factors affecting mixotrophic culture including light intensity, carbon dioxide and glucose concentration were optimized. An increased light intensity and carbon dioxide up to 4,000 lux and 10% (v/v), respectively, enhanced both biomass and product formation. With increasing glucose concentration up to 10 g L⁻¹, the biomass and EPS yields were most enhanced up to 3.76 g L⁻¹ and 1.86 g L⁻¹, respectively but the lipid and chlorophylls content decreased. The semi-continuous cultivation with intermittent medium replacement and glucose addition was proved to be an effective method to produce and harvest the biomass with high lipid content up to 44.9% and other valuable products including EPS and chlorophylls. The marine *Chlorella* sp. lipid has high potential to be used as biodiesel feedstock due to its similar composition with those of plant oils and the EPS could also be applied as a bioflocculant. This study has shown the concomitant production of the valuable biochemical products together with the lipid and this may contribute greatly to developing industrialized production of microalgal biomass.