ABSTRACT

Anita Andini, 24020220120006. Optimization of CO_2 Fixation by Microalgae *Choricystis* sp. to Increase Lipid Productivity. Under the guidance of **Endang Kusdiyantini as a Diponegoro University lecturer and Swastika Praharyawan as a BRIN researcher.**

Depletion of fossil fuel reserves and the increase in carbon dioxide (CO_2) emissions due to the overuse of fossil fuels have become a worldwide concern. Carbon dioxide (CO_2) biofixation by microalgae is considered as one method to reduce the greenhouse effect and produce biomass. Microalgae biomass containing lipids can be extracted into environmentally friendly biodiesel. This study aims to improve the ability of CO_2 absorption capacity through optimization of microalgae *Choricystis* sp. cultivation to produce high biomass and lipids as biodiesel feedstock. The optimized parameters were variation of CO_2 volume, noni leaf extract, and initial cell number of cultivation. Microalgae growth was measured by gravimetric dry biomass which was then used as a reference response in optimization. The optimization approach uses Response Surface Methodology (RSM) with Central Composite Design (CCD) based on the design and validation of the RSM model. The optimization model obtained was applied to the cultivation of microalgae *Choricystis* sp., then gravimetric measurement of biomass, lipid extraction using the bligh-dyer method, and measurement of fixation rate using the walkey-black method. The results showed that the optimum conditions of microalgae cultivation of *Choricystis* sp. at a CO_2 volume of 18,78 ml, the addition of noni leaf extract as much as 0,67 mL, and the initial cell number of $1{,}0775 \times 10^8$ cells/mL. Cultivation of *Choricystis* sp. at optimum conditions can increase the CO_2 fixation rate of 489,57 $mgL^{-1}day^{-1}$ with biomass productivity reaching 198.66 $mgL^{-1}day^{-1}$ and lipid productivity reaching 101,40 $mgL^{-1}day^{-1}$. The model prediction results are in accordance with the experimental results, namely biomass production of 1,39 g/L.

Keywords: *Biomass, Choricystis sp., CO_2 fixation, lipid productivity, Response Surface Methodology*