

# Analisis Biofiksasi CO<sub>2</sub> Pada Mikrolaga *Synechococcus* HS-9 dengan Variasi Konsentrasi CO<sub>2</sub> pada Rectangular Airlift Photobioreactor = Analysis of CO<sub>2</sub> Biofixation in *Synechococcus* HS-9 Microalgae with Variations in CO<sub>2</sub> Concentration in Rectangular Airlift Photobioreactor

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## Abstrak

Penelitian mengenai analisis biofiksasi CO<sub>2</sub> (cyanobacteria) *Synechococcus* HS-9 dengan variasi konsentrasi CO<sub>2</sub> pada rectangular airlift Photobioreactor telah dilakukan. *Synechococcus* HS-9 merupakan cyanobacteria hasil isolasi dari sumber air panas di wilayah Rawa Danau, Banten yang merupakan koleksi dari Laboratorium Taksonomi Tumbuhan Departemen Biologi FMIPA UI, Depok. Penelitian bertujuan untuk mengetahui pertumbuhan *Synechococcus* HS-9 setelah diberikan CO<sub>2</sub> dengan konsentrasi tertentu serta konsentrasi CO<sub>2</sub> optimal untuk pertumbuhan *Synechococcus* HS-9. *Synechococcus* HS-9 ditumbuhkan dalam sistem rectangular airlift photobioreactor pada kecepatan aerasi 2 LPM dengan variasi CO<sub>2</sub> sebesar 1,5%; 3%; 5%; serta tanpa tambahan CO<sub>2</sub>. Data yang diamati pada penelitian adalah biofiksasi CO<sub>2</sub>, pertumbuhan *Synechococcus* HS-9, serta kondisi lingkungan pertumbuhan *Synechococcus* HS-9. Hasil pengamatan biofiksasi CO<sub>2</sub> menunjukkan nilai -bio-fixation rate dari *Synechococcus* HS-9 adalah 4,48 g/L/d dan nilai CO<sub>2</sub> removal efficiency sebesar 83,4% pada tambahan CO<sub>2</sub> sebesar 5%. Hasil pengamatan pertumbuhan *Synechococcus* HS-9 menunjukkan variasi tambahan CO<sub>2</sub> sebesar 3% menghasilkan pertumbuhan paling optimal, hal tersebut dilihat dari jumlah produksi biomassa kering yang paling besar, yaitu 3,022 gram. Kondisi lingkungan pertumbuhan *Synechococcus* HS-9 juga mengalami perubahan, terutama pada nilai pH lingkungan. Penambahan CO<sub>2</sub> pada kultivasi *Synechococcus* HS-9 menyebabkan turunnya nilai pH dibandingkan dengan kultivasi *Synechococcus* HS-9 yang tidak diberikan tambahan CO<sub>2</sub>. Hasil penelitian menunjukkan penambahan CO<sub>2</sub> mempengaruhi pertumbuhan *Synechococcus* HS-9. Konsentrasi optimal CO<sub>2</sub> untuk pertumbuhan *Synechococcus* HS-9 adalah 3%, sedangkan untuk biofiksasi CO<sub>2</sub> adalah 5%.

.....Research on the analysis of biofixation *Synechococcus* HS-9 with variations in CO<sub>2</sub> concentration in a rectangular airlift photobioreactor has been carried out. *Synechococcus* HS-9 is cyanobacteria isolated from hot springs in the Rawa Danau area, Banten, which is a collection of the Plant Taxonomy Laboratory, Department of Biology, FMIPA UI, Depok. This study aims to determine the growth of *Synechococcus* HS-9 after being given CO<sub>2</sub> with a certain concentration and what is the optimal concentration of CO<sub>2</sub> for the growth of *Synechococcus* HS-9. *Synechococcus* HS-9 was grown in a rectangular airlift photobioreactor system at aeration speed of 2 LPM with CO<sub>2</sub> variations of 1,5%; 3,%; 5%; and without additional CO<sub>2</sub>. The data observed in this study were the biofixation of CO<sub>2</sub>, the growth of *Synechococcus* HS-9, and environmental conditions for the growth of *Synechococcus* HS-9. The results of CO<sub>2</sub> biofixation observations showed that the bio-fixation rate of *Synechococcus* HS-9 was 4.48 g/L/d and the value of CO<sub>2</sub> removal efficiency was 83.4% with the addition of 5% CO<sub>2</sub>. The results of the observation of the growth of *Synechococcus* HS-9 showed an additional variation of 3% CO<sub>2</sub> resulted in the most optimal growth, this was seen from the largest amount of dry biomass production, which was 3.022 grams. The environmental conditions for the growth of *Synechococcus* HS-9 also changed, especially in the pH value of the

environment. The addition of CO<sub>2</sub> to the cultivation of *Synechococcus* HS-9 caused a decrease in the pH value compared to the cultivation of *Synechococcus* HS-9 which was not given additional CO<sub>2</sub>. The results showed that the addition of CO<sub>2</sub> affected the growth of *Synechococcus* HS-9. The optimal CO<sub>2</sub> concentration for *Synechococcus* HS-9 growth was 3%, while for CO<sub>2</sub> biofixation was 5%.