

Analisis Biofiksasi CO₂ Pada Mikrolaga Synechococcus HS-9 dengan Variasi Konsentrasi CO₂ pada Rectangular Airlift Photobioreactor = Analysis of CO₂ Biofixation in Synechococcus HS-9 Microalgae with Variations in CO₂ Concentration in Rectangular Airlift Photobioreactor

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Abstrak

Penelitian mengenai analisis biofiksasi CO₂ (cyanobacteria) Synechococcus HS-9 dengan variasi konsentrasi CO₂ 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 CO₂ dengan konsentrasi tertentu serta konsentrasi CO₂ optimal untuk pertumbuhan Synechococcus HS-9. Synechococcus HS-9 ditumbuhkan dalam sistem rectangular airlift photobioreactor pada kecepatan aerasi 2 LPM dengan variasi CO₂ sebesar 1,5%; 3%; 5%; serta tanpa tambahan CO₂. Data yang diamati pada penelitian adalah biofiksasi CO₂, pertumbuhan Synechococcus HS-9, serta kondisi lingkungan pertumbuhan Synechococcus HS-9. Hasil pengamatan biofiksasi CO₂ menunjukkan nilai -bio-fixation rate dari Synechococcus HS-9 adalah 4,48 g/L/d dan nilai CO₂ removal efficiency sebesar 83,4% pada tambahan CO₂ sebesar 5%. Hasil pengamatan pertumbuhan Synechococcus HS-9 menunjukkan variasi tambahan CO₂ 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 CO₂ pada kultivasi Synechococcus HS-9 menyebabkan turunnya nilai pH dibandingkan dengan kultivasi Synechococcus HS-9 yang tidak diberikan tambahan CO₂. Hasil penelitian menunjukkan penambahan CO₂ mempengaruhi pertumbuhan Synechococcus HS-9. Konsentrasi optimal CO₂ untuk pertumbuhan Synechococcus HS-9 adalah 3%, sedangkan untuk biofiksasi CO₂ adalah 5%.

.....Research on the analysis of biofixation Synechococcus HS-9 with variations in CO₂ 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 CO₂ with a certain concentration and what is the optimal concentration of CO₂ 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 CO₂ variations of 1,5%; 3%; 5%; and without additional CO₂. The data observed in this study were the biofixation of CO₂, the growth of Synechococcus HS-9, and environmental conditions for the growth of Synechococcus HS-9. The results of CO₂ biofixation observations showed that the bio-fixation rate of Synechococcus HS-9 was 4.48 g/L/d and the value of CO₂ removal efficiency was 83.4% with the addition of 5% CO₂. The results of the observation of the growth of Synechococcus HS-9 showed an additional variation of 3% CO₂ 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 CO₂ 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 CO₂. The results showed that the addition of CO₂ affected the growth of *Synechococcus* HS-9. The optimal CO₂ concentration for *Synechococcus* HS-9 growth was 3%, while for CO₂ biofixation was 5%.