Efek pencahayaan terhadap produksi biomassa nannochloropsis sp. pada reaktor pelat datar = Lighting effects on biomass production of nannochloropsis sp. in plat-type reactor

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Abstrak

ABSTRAK
Nannochloropsis sp. merupakan salah satu jenis mikroalga yang banyak mengandung nutrisi. Dengan demikian Nannochloropsis sp. sebenarnya mempunyai potensi yang besar dan menjanjikan sebagai sumber nutrisi pangan dan bahan baku biomedis. Pada penelitian ini akan dilakukan teknik untuk meningkatkan produksi biomassa mikroalga Nannochloropsis sp. dengan pengaturan pencahayaan yaitu mencari Imax,opt dari beberapa inokulum dilanjutkan dengan perlakuan alterasi pencahayaan. Kultivasi Nannochloropsis sp. dilakukan dalam medium walne pada temperatur 29°C, tekanan operasi 1 atm, sumber pencahayaan lampu 20W/12V/50Hz, dan konsentrasi CO2 5 %. Hasilnya menunjukkan bahwa alterasi mampu meningkatkan kemampuan produksi biomassa sampai 1.22 kali lipat lebih tinggi dibandingkan pencahayaan pada intensitas tetap dengan jumlah inokulum yang sama serta masa kultivasi yang lebih singkat (204 jam) dan energi untuk produksi biomassa (Ex) yang lebih efisien (793,75 kJ/g). Selain itu, pada perlakuan alterasi juga didapatkan nilai ratarata qco2 lebih besar 1.08 kali lipat (37,69 g/gsel.jam), nilai CTR (Carbon Transfer Rate) lebih besar 2.03 kali lipat (25,55 g/L.jam) dan konsentrasi [HCO3-] lebih besar 1.11 kali lipat (0.0245 M) dibanding pencahayaan pada intensitas tetap. Mikroalga yang dikultivasi pada alterasi pencahayaan juga memiliki kadar lipid lebih tinggi yaitu (39.6%). Pencahayaan yang kuat secara tidak langsung memang dapat mempengaruhi akumulasi lemak jika dikombinasikan dengan tekanan lain atau keberadaan CO2 berlebih.
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ABSTRACT
<i>Nannochloropsis sp. has a great potential and promising as a nutritional source of food and biomedical materials in consideration of it contain many nutrients. On the other hand, environmental factors affecting growth rates and gains in the cultivation of cells also have an impact on levels of lipids and oils and its composition in Nannochloropsis sp. One of the influential factors is lighting. Based on these facts, then on this study will be conducted a techniques to increase biomass production of microalgae Nannochloropsis sp. by the lighting setting that are tailored to the growth. Lighting arrangement is done by finding Imax,opt from several inoculum followed by the alteration lighting treatment which is expected could reduce the self-shading effect that occurs in cultured microalgae in a

photobioreactor, in order to obtain optimal growth rate and increased the biomass production of Nannochloropsis sp. Alteration of lighting treatment on the cultivation of Nannochloropsis sp. in the walne medium on 29 °C temperature operating conditions, operating pressure of 1 atm, lighting sources 20W/12V/50Hz, and 5% CO2 concentration was successful in increasing biomass production capability up to 1:22-fold higher than in continuous illumination with the same amount of inoculum and a shorter cultivation period (204 hours) and for the production of biomass energy (Ex) is more efficient (793748.66 J/g). In addition, the alteration treatment is also found CO2 fixation and cell activity fold higher compared with continuous illumination at Imax,opt it with the same amount of inoculum. As shown by the average value of alterations qco2 and CTR on each lightingfold larger 1:08 and 2:03 times as well as the concentration of [HCO3-] 1:11-fold higher (0.0245 M). Microalgae are cultivated on the alteration of lighting also has a higher lipid content (39.6%) compared lipid levels in continuous light. Strong lighting is able to indirectly affect the accumulation of fat when combined with other pressures, or the presence of excess CO2.</i>