

ABSTRAK

DEGRADASI POLUTAN LIMBAH CAIR TAHU DENGAN MIKROALGA *Nannochloropsis* sp. DAN *EFFECTIVE MICROORGANISMS 4 (EM4)*

Volume limbah cair tahu yang dihasilkan menjadi permasalahan serius dari industri tahu. Limbah cair tahu mengandung bahan organik, *Total Suspended Solid (TSS)* tinggi, pH rendah, kadar *Biological Oxygen Demand (BOD)* dan *Chemical Oxygen Demand (COD)* tinggi, yang jika dibuang langsung ke dalam badan air akan menurunkan kualitas lingkungan. Penggunaan mikroalga *Nannochloropsis* sp. dan *Effective Microorganism (EM4)* dalam pengolahan limbah cair tahu sangat ramah lingkungan dan tidak menghasilkan limbah sekunder juga mampu menghasilkan lipid yang dapat dikonversi menjadi biodiesel. Dalam penelitian ini, laju pertumbuhan jumlah sel, penurunan kadar organik COD dan BOD, pH dan total lipid diuji. Pengolahan dilakukan dalam 2 gelombang dengan masa kultivasi masing-masing selama 14 hari dalam fotobioreaktor *bubble column*. Gelombang pertama, dilakukan variasi 0, 20, 40, 60, 80, dan 100% limbah cair tahu terhadap mikroalga dengan kondisi optimum pada variasi 40% yang mengalami penurunan nilai COD sebesar 69,16% dan BOD sebesar 91,92%, kenaikan pH hingga 8,4, dan menghasilkan total lipid sebesar 10,7%. Gelombang kedua, dilakukan variasi 0, 20, 40, 60, 80, dan 100 mL penambahan EM4 ke dalam variasi optimum 40% limbah cair tahu terhadap mikroalga memberikan kondisi optimum pada variasi 20 mL yang mengalami penurunan nilai COD sebesar 94,25% dan BOD sebesar 96,76%, kenaikan pH hingga 8,3, dan menghasilkan total lipid sebesar 23,65%. Penambahan EM4 mampu memangkas waktu kultivasi menjadi 9 hari, menurunkan nilai COD dan BOD lebih tinggi, menaikkan pH dari asam hingga netral dengan cepat dan menghasilkan total lipid lebih banyak.

Kata kunci: limbah cair tahu; *Nannochloropsis* sp.; COD; BOD; biodiesel.

ABSTRACT

DEGRADATION OF TOFU LIQUID WASTE POLLUTANTS WITH MICROALGAS *Nannochloropsis* sp. AND EFFECTIVE MICROORGANISMS 4 EM4

*The volume of tofu liquid waste produced is a serious problem for the tofu industry. Tofu liquid waste contains organic matter, high Total Suspended Solid (TSS), low pH, high levels of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), which if discharged directly into water bodies will degrade environmental quality. The use of *Nannochloropsis* sp. microalgae and Effective Microorganisms (EM4) in the treatment of tofu liquid waste is very environmentally friendly and does not produce secondary waste and is also capable of producing lipids that can be converted into biodiesel. In this study, the growth rate of cell number, decrease in organic levels of COD and BOD, pH and total lipid were studied. Processing was carried out in 2 waves with a cultivation period of 14 days each in a photobioreactor bubble column. In the first wave, variations of 0, 20, 40, 60, 80, dan 100% of tofu liquid waste were carried out on microalgae with optimum conditions at 40% variation which decreased the COD value by 69.16% and BOD by 91.92 %, increasing the pH to 8.4, and yielding a total lipid of 10.7%. The second wave, variations of 0, 20, 40, 60, 80, dan 100 mL of EM4 were added to the optimum variation of 40% tofu liquid waste against microalgae giving optimum conditions at 20 mL variation which decreased the COD value by 94, 25% and BOD of 96.76%, increasing the pH to 8.3, and producing a total lipid of 23.65%. The addition of EM4 was able to reduce the cultivation time to 9 days, lower the COD and BOD values higher, raise the pH from acidic to neutral quickly and produce more total lipids.*

*Keywords: tofu liquid waste; *Nannochloropsis* sp.; COD; BOD; biodiesel*