Efisiensi Horizontal Sub-Surface Flow Constructed Wetlands dengan Tanaman Equisetum hyemale dalam Menurunkan COD dan BOD5 pada Limbah Cair Laundry = The Efficiency of Horizontal Sub-Surface Flow Constructed Wetlands with Equisetum hyemale in Reducing COD and BOD5 Laundry Wastewater

Martha Eventina Christi, author

Abstrak

Usaha Laundry di Indonesia memiliki peluang pengembangan ekonomi yang tinggi. Namun, limbah cair laundry di Indonesia belum memiliki peraturan lingkungan yang baik terhadap pengusaha jasa laundry. Constructed wetland dapat digunakan sebagai pengolahan biologis limbah cair yang sustainable, memanfaatkan energi yang rendah, dan tidak membutuhkan biaya yang tinggi untuk mengolah limbah cair laundry. Penelitian ini bertujuan untuk menganalisis dan mengevaluasi kemampuan dan korelasi organic loading rate (OLR) terhadap efisiensi penyisihan serta konstanta tingkat penyisihan (R); tingkat penyisihan areal (kA), dan tingkat penyisihan volumetrik (kV) dalam laju degradasi chemical oxygen demand (COD) dan biochemical oxygen demand (BOD) pada horizontal sub-surface flow constructed wetlands dengan tanaman bambu air (Equisetum hyemale) dalam mengolah limbah cair laundry. Penelitian ini menggunakan horizontal constructed wetlands dan tipe aliran sub-surface flow (SSF) dengan media tanah, pasir, dan kerikil dimana reaktor 1 menggunakan 120 tanaman dan reaktor 2 menggunakan 200 tanaman. Hasil penelitian ini menunjukkan bahwa reaktor 1 HSSF CW dengan tanaman E.hyemale menghasilkan rata-rata efisiensi penyisihan COD sebesar 86,04% dan BOD sebesar 88,10% sedangkan reaktor 2 menghasilkan rata-rata efisiensi penyisihan COD sebesar 88,22% dan BOD sebesar 90,30%. Organic loading rate yang diterima oleh reaktor 1 dan reaktor 2 HSSF CWs dengan tanaman E. hyemale tidak memiliki korelasi yang cukup signifikan terhadap efisiensi penyisihan COD dan BOD. Reaktor 1 HSSF CW dengan tanaman E.hyemale menghasilkan nilai rata-rata R 923,10 gr/ /hari; kA 3,77 m/hari; dan kV 1,00/hari sedangkan reaktor 2 HSSF CW dengan tanaman E. hyemale menghasilkan nilai rata-rata R 942,97 gr/ /hari; kA 4,20 m/hari; dan kV 1,12/hari dalam laju degradasi COD pada limbah cair laundry. Reaktor 1 HSSF CW dengan tanaman E. hyemale menghasilkan nilai rata-rata R 247,04 gr/ /hari; kA 4,15 m/hari; dan kV 1,10 kV sedangkan reaktor 2 HSSF CW dengan tanaman E. hyemale menghasilkan nilai rata-rata R 251,20 gr/ /hari; kA 4,81 m/hari; dan 1,29/hari dalam laju degradasi BOD pada limbah cair laundry.
.....Laundry businesses in Indonesia have high economic development opportunities. However, laundry effluents in Indonesia do not have good environmental regulations for laundry businesses. A constructed wetland can be used as a sustainable biological treatment of wastewater, utilizes low energy, and does not require high costs to treat laundry liquid waste. This study aims to analyze and evaluate the ability and correlation of organic loading rate (OLR) on the removal efficiency as well as the removal rate constant (R); areal removal rate (kA), and volumetric removal rate (kV) in the degradation rate of chemical oxygen demand (COD) and biochemical oxygen demand (BOD) in horizontal sub-surface flow constructed wetlands with water bamboo plants (Equisetum hyemale) in laundry wastewater treatment. This study used horizontal constructed wetlands and sub-surface flow (SSF) with soil, sand, and gravel as media where reactor 1 used 120 plants and reactor 2 used 200 plants. The results showed that reactor 1 HSSF CW with E.

hyemale plants produced an average COD removal efficiency of 86,04% and BOD of 88,10%. In comparison, reactor 2 produced an average COD removal efficiency of 88,22% and BOD of 90,30%. The organic loading rate (OLR) received by reactor 1 and reactor 2 HSSF CWs with E. hyemale plants do not significantly correlate with COD and BOD removal efficiency. Reactor 1 HSSF CW with E. hyemale plants produced an average value of R 923,10 gr/ /day; kA 3,77 m/day; and kV 1,00/day while reactor 2 HSSF CW with E. hyemale plants produced an average value of R 942,97 gr/ /day; kA 4,20 m/day; and kV 1,12/day in the rate of COD degradation in laundry wastewater. Reactor 1 HSSF CW with E. hyemale plants produced an average value of R 247,04 gr/ /day; kA 4,15 m/day; and kV 1,10 kV while reactor 2 HSSF CW with E. hyemale plants produced an average value of R 251,20 gr/day; kA 4,81 m/day; and 1,29/day in the rate of BOD degradation in laundry wastewater.