

No. TA 981/S1-TL/1122-P

**PENYISIHAN AMONIUM DENGAN PROSES ANAMMOX  
DAN NITRIFIKASI-DENITRIFIKASI PADA *TIDAL FLOW*  
*CONSTRUCTED WETLANDS***

**TUGAS AKHIR**



**DEPARTEMEN TEKNIK LINGKUNGAN  
FAKULTAS TEKNIK – UNIVERSITAS ANDALAS  
PADANG  
2022**

## ABSTRAK

Penelitian ini bertujuan untuk menganalisis kinerja *tidal flow constructed wetlands* dalam penyisihan amonium melalui proses anammox dan nitrifikasi-denitrifikasi dengan tanaman *Equisetum hyemale* selama 70 hari. *Tidal flow constructed wetlands* skala laboratorium berbasis batu apung dan zeolit dioperasikan dengan siklus 10 jam tergenang dan 2 jam kering. Percobaan dilakukan menggunakan limbah artifisial dengan konsentrasi amonium 70 mg-N/L dan tiga variasi reaktor. Reaktor 1 ditambahkan spesies anammox *Candidatus Brocadia fulgida*, dan sedimen Muaro Panjalinan sebagai sumber *Ammonium Oxidizing Bacteria* (AOB). Reaktor 2 hanya sedimen Muaro Panjalinan sebagai sumber bakteri nitrifikasi-denitrifikasi, sedangkan Reaktor 3 sebagai kontrol tanpa penambahan inokulum bakteri. Konsentrasi amonium dianalisis menggunakan Spektrofotometer UV-Vis dengan efisiensi penyisihan dilihat dari parameter *Nitrogen Removal Efficiency* (NRE) dan *Amonium Conversion Efficiency* (ACE). Nilai NRE dan ACE pada Reaktor 1, Reaktor 2, Reaktor 3 berturut-turut 74,04% dan 98,19%, 63,48% dan 90,44%, 48,62% dan 74,42%. Reaktor *tidal flow constructed wetlands* dengan tanaman *Equisetum hyemale* menggunakan proses anammox dan nitrifikasi-denitrifikasi, memiliki efisiensi penyisihan amonium yang lebih tinggi dibandingkan dengan reaktor kontrol.

**Kata kunci:** Anammox, nitrifikasi-denitrifikasi, penyisihan amonium, *Equisetum hyemale*, *tidal flow constructed wetlands*.



## ABSTRACT

*This research aims to analyze the performance of tidal flow constructed wetlands in ammonium removal through anammox and nitrification-denitrification processes using Equisetum hyemale plants for 70 days. Laboratory scale of Tidal flow constructed wetlands based on pumice and zeolite were operated with a cycle of 10 hours inundated and 2 hours dry. The experiment was carried out using artificial waste with an ammonium concentration of 70 mg-N/L and three reactor variations. Reactor 1 contains the species anammox Candidatus Brocadia fulgida and Muaro Panjalinan sediment as a source of Ammonium Oxidizing Bacteria (AOB). Reactor 2 was only sediment from Muaro Panjalinan as a source of nitrifying-denitrifying bacteria, while Reactor 3 served as a control without the addition of bacteria inoculum. The concentration of ammonium was analyzed using UV-Vis spectrophotometer with removal efficiency seen from Nitrogen Removal Efficiency (NRE) and Ammonium Conversion Efficiency (ACE) parameters. The value of NRE and ACE in Reactor 1, Reactor 2, and Reactor 3 respectively were 74.04% and 98.19%, 63.48% and 90.44%, 48.62% and 74.42%. The tidal flow constructed wetlands reactor with Equisetum hyemale plants using anammox and nitrification-denitrification processes had a higher ammonium removal efficiency than control reactor.*

**Keywords:** Anammox, nitrification-denitrification, ammonium removal, Equisetum hyemale, tidal flow constructed wetlands.

