Sugarcane Vinasse Treatment by Two-stage Anaerobic Membrane Bioreactor: Effect of Hydraulic Retention Time on Changes in Efficiency, Biogas Production and Membrane Fouling

Fábio S. Santos, Bárbara C. Ricci, Luzia S. França Neta, Míriam C.S. Amaral

PII: S0960-8524(17)31440-2
DOI: http://dx.doi.org/10.1016/j.biortech.2017.08.126
Reference: BITE 18735

To appear in: *Bioresource Technology*

Received Date: 30 June 2017
Revised Date: 18 August 2017
Accepted Date: 20 August 2017

Please cite this article as: Santos, F.S., Ricci, B.C., França Neta, L.S., Amaral, M.C.S., Sugarcane Vinasse Treatment by Two-stage Anaerobic Membrane Bioreactor: Effect of Hydraulic Retention Time on Changes in Efficiency, Biogas Production and Membrane Fouling, *Bioresource Technology* (2017), doi: http://dx.doi.org/10.1016/j.biortech.2017.08.126

Sugarcane Vinasse Treatment by Two-stage Anaerobic Membrane Bioreactor: Effect of Hydraulic Retention Time on Changes in Efficiency, Biogas Production and Membrane Fouling

Fábio S. Santos[a,*]; Bárbara C. Ricci[a]; Luzia S. França Neta[b]; Míriam C. S. Amaral[a]

[a]Department of Sanitary and Environmental Engineering, Universidade Federal de Minas Gerais, Avenida Antônio Carlos, 6627, Pampulha, CEP 31270-901, Belo Horizonte, Minas Gerais, Brazil

[b]Department of Chemistry, Centro Federal de Educação Tecnológica de Minas Gerais, Av. Amazonas, 5253, Nova Suíça, CEP 30421-169, Belo Horizonte, Minas Gerais, Brazil

Abstract

This research investigated the effect of hydraulic retention time (HRT) on two-stage anaerobic membrane bioreactor (2-SAnMBR) performance treating sugarcane vinasse. The experimental setup consisted of an upflow acidogenic reactor and a continuous stirred methanogenic reactor, fitted with submersed microfiltration hollow-fiber membranes. The results indicated excellent performance and robustness of 2-SAnMBR. The reduction in HRT of 5.3 to 3.1 days did not cause loss of its performance. The 2-SAnMBR showed high capacity of removing organic matter (97%), producing biogas (6.3 Nm^3 of CH_4 per m^3 of treated vinasse) and did not completely remove important nutrients to fertigation. Reducing the HRT, the average mass of soluble microbial products (SMP) and extracellular polymeric substances (EPS) per mass of mixed liquor volatile suspended solids (MLVSS) increased. Consequently, the transmembrane pressure (TPM) rate and fouling resistance rise. Despite the fouling effect, physical and chemical cleaning processes were able to recover operational permeability.

*Corresponding author. Address: Department of Sanitary and Environmental Engineering, Universidade Federal de Minas Gerais, Avenida Antônio Carlos, 6627, Pampulha, CEP 31270-901, Belo Horizonte, Minas Gerais, Brazil. E-mail address: fabiosoares04@gmail.com.