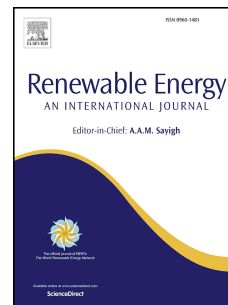


# Accepted Manuscript

Bio-hydrogen and bio-methane production from food waste in a two-stage anaerobic digestion process with digestate recirculation

Dalal E. Algapani, Wei Qiao, Marina Ricci, Davide Bianchi, Simon M. Wandera, Fabrizio Adani, Renjie Dong



PII: S0960-1481(18)31029-2

DOI: [10.1016/j.renene.2018.08.079](https://doi.org/10.1016/j.renene.2018.08.079)

Reference: RENE 10506

To appear in: *Renewable Energy*

Received Date: 23 February 2018

Revised Date: 4 July 2018

Accepted Date: 23 August 2018

Please cite this article as: Algapani DE, Qiao W, Ricci M, Bianchi D, M. Wandera S, Adani F, Dong R, Bio-hydrogen and bio-methane production from food waste in a two-stage anaerobic digestion process with digestate recirculation, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.08.079.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 **Bio-hydrogen and bio-methane production from food waste in a**  
2 **two-stage anaerobic digestion process with digestate recirculation**

3 Dalal E. Algapani <sup>a,b</sup>, Wei Qiao <sup>a,c,\*</sup>, Marina Ricci <sup>d</sup>, Davide Bianchi <sup>d</sup>, Simon M.  
4 Wandera <sup>a</sup>, Fabrizio Adani <sup>d</sup>, Renjie Dong <sup>a,c</sup>

5 <sup>a</sup> College of Engineering, China Agricultural University, Beijing 100083, China

6 <sup>b</sup> College of Agricultural Technology and Fish Science, Al-Neelain University, Khartoum, Sudan

7 <sup>c</sup> State R&D Center for Efficient Production and Comprehensive Utilization of Biobased Gaseous Fuels, Energy  
8 Authority, National Development, and Reform Committee (BGFuels), Beijing 100083, China

9 <sup>d</sup> Gruppo Ricicla – DiSAA – University of Milan, Via Celoria 2, 20133 Milano, Italy

10 **Abstract**

11 Bio-H<sub>2</sub> and bio-CH<sub>4</sub> production from food waste in a two-stage temperature phased system were  
12 investigated to determine the effects of digestate recirculation on energy efficiency and process  
13 stability. Different recirculation ratios (RR), i.e. 0.3, 0.5, and 1.0, were tested. Maximum H<sub>2</sub>  
14 production of 3 L-H<sub>2</sub> L<sup>-1</sup>d<sup>-1</sup> and yield of 135 L-H<sub>2</sub> kg<sup>-1</sup>VS<sub>in</sub> were achieved for an RR of 0.3 at  
15 HRT 5 d and OLR of 18 kg-VS m<sup>-3</sup>d<sup>-1</sup>. The RR of 0.3 was also the best for producing CH<sub>4</sub> and  
16 gave results of 2.9 L-CH<sub>4</sub> L<sup>-1</sup> d<sup>-1</sup>, i.e. 510 L-CH<sub>4</sub> kg<sup>-1</sup>VS<sub>in</sub> at HRT 9 d and OLR of 5.7 kg-VS m<sup>-3</sup>  
17 d<sup>-1</sup>. The energy recovered from the recirculation process increased the H<sub>2</sub> production by 8% and  
18 decreased the CH<sub>4</sub> production by 3%; the total energy production did not change. Digestate  
19 recirculation in comparison with a no-recirculation system reduced the need for alkali addition to  
20 maintain pH in the H<sub>2</sub>-reactor by 54%.

21 **Keywords:**

22 Anaerobic digestion; Bio-hydrogen and bio-methane; Digestate recirculation; Food waste; Two  
23 stage

Download English Version:

<https://daneshyari.com/en/article/11001231>

Download Persian Version:

<https://daneshyari.com/article/11001231>

[Daneshyari.com](https://daneshyari.com)