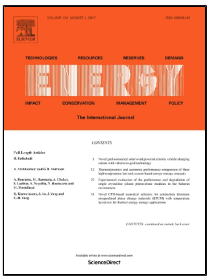
Accepted Manuscript



Comparison of pre-treatments to reduce salinity and enhance biomethane yields of *Laminaria digitata* harvested in different seasons

Muhammad Rizwan Tabassum, Ao Xia, Jerry D. Murphy

PII:	S0360-5442(17)31446-9
DOI:	10.1016/j.energy.2017.08.070
Reference:	EGY 11439
To appear in:	*Energy*
Received Date:	25 July 2016
Revised Date:	29 June 2017
Accepted Date:	15 August 2017

Please cite this article as: Muhammad Rizwan Tabassum, Ao Xia, Jerry D. Murphy, Comparison of pre-treatments to reduce salinity and enhance biomethane yields of *Laminaria digitata* harvested in different seasons, *Energy* (2017), doi: 10.1016/j.energy.2017.08.070

Comparison of pre-treatments to reduce salinity and enhance biomethane yields of *Laminaria digitata* harvested in different seasons

Muhammad Rizwan Tabassum [a], Ao Xia [b*], and Jerry D. Murphy [a, c]

a. MaREI Centre, Environmental Research Institute, University College Cork, Cork, Ireland
b. Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing 400044, China
c. School of Engineering, University College Cork, Cork, Ireland

Abstract

Pre-treatment can enhance anaerobic digestion of seaweed; however, seasonal variation in the biochemical composition of seaweed has a significant impact on the pre-treatment effect. In this study, various pre-treatments were employed for the brown seaweed *Laminaria digitata* harvested in March (with high ash content and low carbon to nitrogen (C:N) ratio) and September (with low ash content and high C:N ratio). Washing of *L. digitata* harvested in March with hot water (defined as 40 °C) removed 54% of the ash and improved the volatile solids (VS) content by 31% leading to an improved biomethane yield of 282 L CH_4 kg VS^{-1}. This pre-treatment affected a 16% increase in biodegradability, reduced salt accumulation in the digestate by 54%, and increased specific methane yield per wet weight by 25%. This level of effect was not noted for seaweed harvested in September, when the biodegradability is higher.

Keywords: *Laminaria digitata*; Seaweed; Pre-treatment; Anaerobic digestion; Biomethane

* Corresponding author at: Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing 400044, China. E-mail address: aoxia@cqu.edu.cn (Ao Xia).