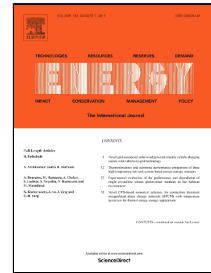


Accepted Manuscript

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

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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

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

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9

10 **Abstract**

11 Pre-treatment can enhance anaerobic digestion of seaweed; however, seasonal variation in
12 the biochemical composition of seaweed has a significant impact on the pre-treatment
13 effect. In this study, various pre-treatments were employed for the brown seaweed
14 *Laminaria digitata* harvested in March (with high ash content and low carbon to nitrogen
15 (C:N) ratio) and September (with low ash content and high C:N ratio). Washing of *L. digitata*
16 harvested in March with hot water (defined as 40 °C) removed 54% of the ash and improved
17 the volatile solids (VS) content by 31% leading to an improved biomethane yield of 282 L
18 CH₄ kg VS⁻¹. This pre-treatment affected a 16% increase in biodegradability, reduced salt
19 accumulation in the digestate by 54%, and increased specific methane yield per wet weight
20 by 25%. This level of effect was not noted for seaweed harvested in September, when the
21 biodegradability is higher.

22

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

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