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Effects of hydrothermal pre-treatments on Giant reed (*Arundo donax*) methane yield

Giuseppe Di Girolamo, Marco Grigatti, Lorenzo Barbanti, Irini Angelidaki

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1 **Effects of hydrothermal pre-treatments on Giant reed (*Arundo donax*) methane**
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3 **yield**
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8 Giuseppe Di Girolamo^{a;b:1}, Marco Grigatti^b, Lorenzo Barbanti^b, Irini Angelidaki^a
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10 ^aDepartment of Environmental Engineering, Technical University of Denmark, Building
11
12 113, Dk-2800 Kgs. Lyngby, Denmark
13

14
15 ^bDepartment of Agricultural Sciences (DipSA), University of Bologna, Viale Fanin 44,
16
17 40127 Bologna, Italy
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22
23 **Abstract**
24

25 Twelve hydrothermal pre-treatment combinations of temperature (150 and 180 °C),
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27 time (10 and 20 min) and acid catalyst (no catalyst; H₂SO₄ at 2% w/w immediately
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29 before steam cooking or in 24-hour pre-soaking) were tested to assess their effects on
30
31 methane yield of Giant reed biomass vs. untreated control. A batch anaerobic digestion
32
33 was conducted with 4 g VS l⁻¹ at 53 °C for 39 days. Untreated biomass exhibited a
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35 potential CH₄ yield of 273 ml g⁻¹ VS; the four pre-treatments without acid catalyst
36
37 achieved a 10%, 7%, 23% and 4% yield gain in the respective temperature/time
38
39 combinations 150 °C/10 min, 150 °C/20 min, 180 °C/10 min and 180 °C/20 min.
40
41 Conversely, the eight pre-treatments with H₂SO₄ catalyst incurred a methanogenic
42
43 inhibition in association with high SO₄²⁻ concentration in the hydrolysate, known to
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45 enhance sulphate reducing bacteria. Furfurals were also detected in the hydrolysate of
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47 five strong pre-treatments with H₂SO₄ catalyst.
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57 ¹ Corresponding author. Tel.: +39 051 2096643; fax: +39 051 2096241. E-mail:
58 giuseppe.digirolamo5@unibo.it
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