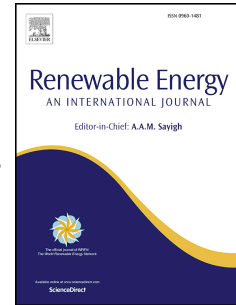


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Searching for possibilities to improve the performance of full scale agricultural biogas plants

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1 Searching for possibilities to improve the performance of full scale agricultural biogas
2 plants

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9

10 Abstract

11 Biogas plants have been widely used to both reclaim bio-energy from agricultural waste and to treat
12 waste; however, the efficiency of these biogas plants has yet to be determined. In this study, the
13 performance of five full scale biogas plants treating chicken manure (CM), pig manure (PM), a mixture
14 of chicken and pig manure (MM), dairy manure (DM), and maize straw (MS) were investigated. The
15 results showed that CM had the highest total energy (16.4 KJ/g-TS) and the MM had the highest bio-
16 available energy (10.2 g-COD/g-TS). The CM plant adopted a suitable hydraulic retention time (HRT)
17 but the other plants used a much longer HRT than necessary. The methane production from CM, PM,
18 MM, and DM was improved by 12%, 22%, 32% and 25% with the addition of trace metals, and this also
19 resulted in an increment in the methanogenic activity for CM, PG, MM and MS. The pH stability of all
20 the biogas plants was maintained at an acceptable level; nevertheless, the high pH and ammonium in the
21 CM digester negatively affected the methanogenic activity. The results, therefore, conclusively indicated
22 that the operation of the biogas plants could be more effective.

23 Key words: Full scale biogas plants; performance evaluation; animal manure; maize straw

24 Notation List:

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