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Presenting a new method for higher production of methane from agricultural residues in an anaerobic digestion process

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Agricultural wastes have large potential for energy production but this potential is not utilized. In pilot scale studies, the efficiency of a simple two-stage anaerobic digestion process was investigated for stabilization and biomethan production from potato wastes and sugar beet leaves, both separately and in co-digestion. A good phase separation between hydrolysis/acidification and methanogenesis was achieved, as indicated by the high carbon dioxide production, high volatile fatty acid concentration and low pH in the acidogenic reactors. Digestion of the individual substrates gave gross energy yields (2.1–3.4 kWh/kg VS) in the form of methane. Co-digestion, however, gave up to 60% higher methane yield, indicating that co-digestion resulted in improved methane production due to the positive synergism established in the digestion liquor. The integrity of the methane filters was maintained throughout the period of operation, producing biogas with 60–78% methane content. A stable effluent pH showed that the methanogenic reactors had good ability to withstand the variations in load and volatile fatty acid concentrations that occurred in the two-stage process. The results of this pilot-scale study show that the two-stage anaerobic digestion system is suitable for effective conversion of semi-solid agricultural residues like potato wastes and sugar beet leaves into biogas (methane).

Keywords: Agricultural residues; anaerobic digestion; methane; biogas; process

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