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Sequential batch thermophilic solid-state anaerobic digestion of lignocellulosic biomass via recirculating digestate as inoculum -- Part I: Reactor performance

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Abstract

Sequential batch thermophilic (55°C) solid-state anaerobic digestion (SS-AD) of yard trimmings was evaluated at a total solids (TS) content of 22% via recirculating digestate as the inoculum. The substrate-to-inoculum (S/I) ratio of 1 (TS basis) was favored over 2 and 3 due to significantly higher methane yield and volumetric productivity. At an S/I ratio of 1, sequential batch SS-AD gradually reached steady state by 3 runs (30 days/run) with increases in both methane yields (up to 11.5%) and cellulose degradation (up to 55%), indicating that recirculated digestate could be a feasible inoculum to establish long term stable SS-AD of lignocellulosic biomass. The initial sharp increases of volatile fatty acids during runs 2–4 indicated faster hydrolysis of organic matter than during run 1, suggesting that microbes were probably more

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