Enhanced biogas production from municipal solid waste via co-digestion with sewage sludge and metabolic pathway analysis

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ABSTRACT

The present study intends to evaluate the potential of co-digestion for utilizing Organic fraction of Municipal Solid Waste (OFMSW) and sewage sludge (SS) for enhanced biogas production. Metagenomic analysis was performed to identify the dominant bacteria, archaea and fungi, changes in their communities with time and their functional roles during the course of anaerobic digestion (AD). The cumulative biogas yield of 586.2 mL biogas/gVS with the highest methane concentration of 69.5% was observed under an optimum ratio of OFMSW:SS (40:60 w/w). Bacteria and fungi were found to be majorly involved in hydrolysis and initial stages of AD. Probably, the most common archaea *Methanosarsina* sp. primarily followed the acetoclastic pathway. The hydrogenotrophic pathway was less followed as indicated by the reduction in abundance of syntrophic acetate oxidizers. An adequate understanding of microbial communities is important to manipulate and inoculate the specific microbial consortia to maximize CH_4 production through AD.

KEYWORDS

Municipal solid waste; Anaerobic digestion; Metagenomics; Bacteria; Archaea; Fungi

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