Combined Thermo-Microbial Pre-Treatments Methods for Enhanced Biogas Production from Nile Perch Fish Solid Waste in Tanzania.

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Abstract

Anaerobic digestion (AD) of fish waste is difficult mainly due to high protein and lipid content which inhibit the process. Pre-treatments methods are option to improved AD of fish wastes for biogas production. Effects of heating, pasteurization separately and combined with CBR-11 bacteria strain culture (internal code) pre-treatment on biogas production from fish solid waste (FSW) was investigated in batch anaerobic bioreactors (BAB). The two thermo pre-treatment methods had a positive effect with best results 311 and 361 CH 4 ml/g volatile solids (VS) added obtained from heated FSW for 90 seconds at 130 o C and pasteurised FSW for 60 minutes at 70 o C, respectively. The highest methane yield were two fold compared with non-pre-treated FSW (163 CH 4 ml/gVS added). Heated and pasteurised FSW each separately combined with CBR 11 bacterial culture pre-treatment prior to AD had a maximum methane yield of 697 and 491 CH 4 ml/gVS added , respectively. Resulting in three to four fold increases in methane yield compared with non-pre-treated FSW (163 CH 4 ml/gVS added). The methane content of the biogas ranged between 70-81% regardless of pre-treatment methods employed. In conclusion combined thermo-microbial pre-treatment is a novel method for enhanced biogas production of FSW. However, remain to be tested in continuous anaerobic digester with or without co-digestion.