Thermophilic anaerobic co-digestion of oil palm empty fruit bunches with palm oil mill effluent for efficient biogas production - DTU Orbit (22/04/2018)

Thermophilic anaerobic co-digestion of oil palm empty fruit bunches with palm oil mill effluent (POME) was investigated. The maximum methane potential of POME was 502 mL CH4/gVS-added corresponding to 33.2 m3 CH4/ton POME and 98% biodegradability. Meanwhile, the maximum methane potential of EFB was 202 mL CH4/gVS-added corresponding to 79.1 m3 CH4/ton EFB with 38% biodegradability. Co-digestion of EFB with POME enhanced microbial biodegradability and resulted in 25–32% higher methane production at mixing ratios of 0.4:1, 0.8:1 and 2.3:1 on VS basis than digesting EFB alone. The methane yield was 276–340 mL CH4/gVS-added for co-digestion of EFB with POME at mixing ratios of 0.4:1–2.3:1, while minor improvement was observed at mixing ratios of 6.8:1 and 11:1 (175–197 mL CH4/gVS-added). The best improved was achieved from co-digestion of treated EFB by NaOH presoaking and hydrothermal treatment with POME, which resulted in 98% improvement in methane yield comparing with co-digesting untreated EFB. The maximum methane production of co-digestion treated EFB with POME was 82.7 m3 CH4/ton of mixed treated EFB and POME (6.8:1), corresponding to methane yield of 392 mL CH4/gVS-added. The electricity production of 1 ton mixture of treated EFB and POME would be 1190 MJ or 330 kWh of electricity. The study shows that there is a great potential to co-digestion treated EFB with POME for bioenergy production.

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