

Anaerobic Digestion of Coffee Wastewater from a Fast Inoculum Adaptation Stage: Replacement of Complex Substrate

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Abstract : In this study, raw coffee wastewater (CWW) was used as a complex substrate for anaerobic digestion. The inoculum adaptation stage, microbial diversity analysis and biomethane potential (BMP) tests were performed. A fast inoculum adaptation stage was used by the replacement of vinasse to CWW in an anaerobic sequential batch reactor (AnSBR) operated at mesophilic conditions. Illumina MiSeq sequencing was used to analyze the microbial diversity. While, BMP tests using inoculum adapted to CWW were carried out at different inoculum to substrate (I/S) ratios (2:1, 3:1 and 4:1, on a VS basis). Results show that the adaptability percentage was increased gradually until it reaches the highest theoretical value in a short time of 10 d; with a methane yield of 359.10 NmL CH₄/g COD-removed; *Methanobacterium beijingense* was the most abundant microbial (75%) and the greatest specific methane production was achieved at I/S ratio 4:1, whereas the lowest was obtained at 2:1, with BMP values of 320 NmL CH₄/g VS and 151 NmL CH₄/g VS, respectively. In conclusion, gradual replacement of substrate was a feasible method to adapt the inoculum in a short time even using complex raw substrates, whereas in the BMP tests, the specific methane production was proportional to the initial amount of inoculum.

Keywords : anaerobic digestion, biomethane potential test, coffee wastewater, fast inoculum adaptation

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