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ANALYSIS OF MICROBIAL DIVERSITY AND STRUCTURE OF RURAL COMMUNITY HOUSEHOLD BIOGAS DIGESTERS FROM DIFFERENT AREAS OF QINGHAI PLATEAU

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Abstract

The present study aims to investigate the microbial community structure and to explore the change characteristics in the slurry samples of digesters. A number of 16 sludge samples collected from rural household biogas digesters (RHBDs) across four regions in Qinghai Plateau were analyzed by using 16S rRNA high-throughput sequencing. The results showed that the most predominant phyla included *Firmicutes*, *Bacteroidetes*, and *Proteobacteria* (76.4% in total). *Clostridium_sensu_stricto_1* exhibited the highest abundance in samples from Huangyuan County (HY) (10.05%–18.19%), and the lowest in samples were from Ledu County (LD) (0.25%–7.79%). The samples with high gas production exhibited higher abundance of *Synergistaceae_uncultured*. *Pseudomonas* and *Terrisporobacter* showed the highest abundance in the samples from LD (4.01%–19.39%) and HY (8.06%–16.09%), respectively. As for archaeal community, *Methanomicrobiales* constituted the most dominant taxon, and *Methanogenium* was the most predominant genus in all the samples contributing to biogas production. The abundance of *Methanocorpusculum* in the samples from Guide County (GD) (9.30%–25.02%) and HY (2.61%–11.72%) were higher than that from that of Datong County (DT) (0.11%–0.45%) and LD (0.26%–2.56%). The abundance of *Methanosaeta* in the samples from DT (10.21%–26.21%) was the highest, but was not detected in samples from LD. Methane production heavily relies on the H₂-oxidation/CO₂-reduction pathway in the biogas fermentation system. Moreover, temperature was the most important environmental factor leading to difference in microbial communities of RHBDs, and is positively correlated with the abundances of *Synergistaceae_uncultured*, *Methanogenium*, *Methanosaeta*, and *Thermogymnomonas*.

Key words: 16S rRNA high-throughput sequencing, different areas, microbial community structure, rural household biogas digesters, Qinghai Plateau

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