

ABSTRACT

Vinasse is a byproduct of the distillation of ethanol production that having high organic content. It makes it the potential to be material for producing biogas under anaerobic condition by the microbial community. Anaerobic decomposition in this study was done under thermophilic conditions (55 °C) and mesophilic conditions (28 – 29 °C) with vinasse as a substrate and anaerobic digester cow dung as an inoculum. This study aims to compare the microorganism community structure of 16s rRNA that roles in the biogas producing optimally under thermophilic and mesophilic conditions. The identifying microbial community that was used in this study was using the amplicon sequencing 16S rDNA method. The samples that analyze were collected from the reactors under thermophilic and mesophilic conditions, then the DNA from all of them was isolated using ZymoResearch fecal/ soil miniprep kit. The DNA isolates were tested for quantity and quality using nanodrop, PCR amplification, and electrophoresis. The good quality and quantity were sequenced by 16s rRNA. The output from 16s rRNA sequencing was analyzed with OTU (Operational Taxonomic Units), alpha diversity, and beta diversity.

The result of this study has obtained that in both conditions, the sequences of Order Clostridiales and Methanosarcinales were found. In thermophilic conditions, the order of Haloplasmatales, Petrotogales, Thermoanaerobacterales, Synergistales, and Und_Atribacteria were showing the dominances, while in mesophilic conditions, Lactobacillales, Und_Cloacimonetes, and Bacteroidales were dominant. Other than that, thermophilic and mesophilic conditions obtained different methane production. The methane production under thermophilic condition tends to increase while mesophilic tends to steady. Based on that result, thermophilic and mesophilic conditions affect the microbial structure community that roles in methane production. In the thermophilic condition, the diversity of the genus in archaean is higher than in the mesophilic condition. In addition, in the thermophilic condition, there is the domination of Petrotogales.

Keywords: anaerobic digestion; digester anaerobic cow manure; mesophilic; microbial community; thermophilic; vinasse