

BACTERIAL COMMUNITY ADJUSTMENT METHODOLOGY FOR ANAEROBIC DIGESTION PERFORMANCE OF SCALE IN LABORATORY.

Authors: Sica, P.¹; Baptista, A. S.¹; Carvalho, R. S.¹; Tonoli, F.¹; Das, K. C.².

Institution: ¹ ESALQ/USP – College of Agriculture Luiz de Queiroz/ University of Sao Paulo (11, Pádua Dias Avenue – Agronomia, Piracicaba-SP), ² UGA- The University of Georgia (Athens-GA)

Abstract

In recent decades, the need to seek new clean energy alternatives is becoming increasingly in focus. Among these alternatives highlight the anaerobic digestion that produce methane in addition, which can be used as an energy source. However, despite being widely used in treatment of domestic sewage, anaerobic digestion is a relatively new technology in the treatment of other waste such as vinasse, a byproduct of the sugarcane industry. So there is a need for studies to implement this technology on an industrial scale. In the laboratory context, a major obstacle to conducting experiments is the availability of a sludge with bacterial community adapted to the substrate to be used. Therefore, the aim of this project was to develop a methodology to adapt the bacterial community vinasse, which was later used to carry out other experiments in UASB reactors. To this end, it used residual water sludge treatment process. The volume of 1 liter of this sludge was divided into four PET type bottles's 2L in anaerobic condition with 50% working volume. The adaptation process lasted 47 days, when PET bottles were fed with increasing COD concentration of vinasse, 5, 10, 15 and 20 g L⁻¹ to stabilize the production of biogas. The parameters analyzed were: total gas production; concentration of methane; pH of the effluent. Each day, the effluent from 2 treatments with higher methane production was inoculated in the other two treatments, aiming at homogenizing the bacterial community. During the first 7 days, when it was fed vinasse 5 g COD L⁻¹, biogas production medium was 6.2 ml per reactor per day. In the final stage, day 29-47 days, the reactors were fed with stillage 20 g L⁻¹, yielding an average of 243.95 ml per reactor per day. Analyzing the gas production for concentration of COD, you can see an increase in this proportion, leaving 1.24 of biogas mL x liter of vinasse/g of COD to 12.20 of biogas mL x liter of vinasse/g of COD, indicating growth of bacteria community. Therefore, the methodology proposed in this project was to adapt the bacterial community present in the water treatment sludge to the vinasse characteristics.