

Pineapple Waste Valorization through Biogas Production: Effect of Substrate Concentration and Microwave Pretreatment

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Abstract : Indonesia has produced more than 1.8 million ton pineapple fruit in 2013 of which turned into waste due to industrial processing, deterioration and low qualities. It was estimated that this waste accounted for more than 40 percent of harvested fruits. In addition, pineapple leaves were one of biomass waste from pineapple farming land, which contributed even higher percentages. Most of the waste was only dumped into landfill area without proper pretreatment causing severe environmental problem. This research was meant to valorize the pineapple waste for producing renewable energy source of biogas through mesophilic (30°C) anaerobic digestion process. Especially, it was aimed to investigate effect of substrate concentration of pineapple fruit waste i.e. peel, core as well as effect of microwave pretreatment of pineapple leaves waste. The concentration of substrate was set at value 12, 24 and 36 g VS/liter culture whereas 800-Watt microwave pretreatment conducted at 2 and 5 minutes. It was noticed that optimum biogas production obtained at concentration 24 g VS/l with biogas yield 0.649 liter/g VS (45%v CH₄) whereas microwave pretreatment at 2 minutes duration performed better compare to 5 minutes due to shorter exposure of microwave heat. This results suggested that valorization of pineapple waste could be carried out through biogas production at the aforementioned process condition. Application of this method is able to both reduce the environmental problem of the waste and produce renewable energy source of biogas to fulfill local energy demand of pineapple farming areas.

Keywords : pineapple waste, substrate concentration, microwave pretreatment, biogas, anaerobic digestion

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