

## ABSTRACT

*The population growth in Indonesia is accompanied by an increase in electricity consumption. In addition, organic food industry waste, especially banana peel waste also increased. This is due to Indonesia is one of the seven largest banana producers in the world. Therefore, this study aims to convert banana peel waste into electrical energy through the Microbial Fuel Cell (MFC) system. In MFC there are many factors that can affect the production of electrical energy, including the composition of the volume of the substrate and the incubation time of the substrate. Therefore this study is aimed at analyzing the effect of variations in the composition of the volume of the waste of banana peels and rice mud as a substrate on the production of electrical energy produced by the MFC system. The system that used in this study is a dual-chamber reactor consisting of anode and cathode compartments that can hold up to 500 mL, where the anode compartment is filled with banana peel waste and rice field mud substrate while the cathode compartment is filled with aquades. The two compartments are separated by a salt bridge made of twisted wickers stove in a solution of NaCl (1M) and the electrodes used in this study are zinc and copper with a surface area of 10 cm<sup>2</sup>. In this research, ten variations were prepared that will be filled with various volume composition between banana peel waste and rice field mud and also variations in the incubation time of banana peel waste. Observations will be held every four hours in 336 hours. The results of this study show that the maximum power that can be produced by this MFC system is 0,13 mW and the maximum energy is 1909,40 mJ in the reactor with a volume ratio of 300 mL rice field mud and 100 mL banana peels waste with an incubation period of 168 hours. Based on the results of the study, it can be concluded that the MFC system will produce optimal power and energy if the banana peel waste used has been incubated with the longest time and also the amount of rice mud used as a source of bacteria is more than the amount of banana peels in the anode chamber.*

**Keywords :** *banana peel waste, Microbial Fuel Cell, rice field mud.*