

Abstract

A study was conducted at Egerton University, Njoro, Kenya to establish the potential of plastic digester to produce biogas under natural and greenhouse microenvironment. The specific objectives were to evaluate the effects of greenhouse and ground insulation on the rate and quality of biogas generation. A greenhouse measuring 6m long, 4m wide and 2m high was constructed. Inside the greenhouse and the outside environment, three replications of thirty (30)-litre plastic biogas digester filled to two third capacity with slurry were used. The digesters were partially exposed to the environment and when fully buried in the ground. Biogas yields averaged 90.3 and 63.0 litres per kilogramme (l/kg) of volatile solids added for partially buried digesters under greenhouse and natural conditions, respectively. The corresponding digester temperatures averaged 27.5 and 22.2oC. The respective biogas yields averaged 312.8 and 226 litres per kilogramme volatile solid added, while the temperatures averaged 27.9 and 24.1oC for fully buried digesters. The average methane content in the biogas was 61.5% and 56.4% under greenhouse and natural conditions, respectively. At the 0.05 significance level, greenhouse effect was found to enhance both the quantity and quality of biogas generation from dairy cattle dung. The effects of ground insulation had a far much effect on the quantity of biogas generation as compared to the effects of greenhouse conditions. Therefore ground insulation of plastic biogas digester under greenhouse conditions significantly enhances biogas generation.