

EFFECTS OF ANAEROBIC CO-DIGESTION OF ORGANIC WASTES ON BIOGAS YIELD AND SOME PROXIMATE CHARACTERISTICS OF THEIR BY- PRODUCTS

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ABSTRACT

The effects of anaerobic co-digestion of five ratios of mixtures of cow dung and maize cobs as treatments A, B, C, D and E respectively assessed on biogas yield and some proximate properties of their by-products. Triplicate slurries of these wastes (1:3 w/v) separately fed into 13.6L locally made digesters, under strict anaerobic condition, were monitored for eight weeks retention period. Separate treatment fractions were also subjected to standard methods to determine their proximate compositions before and after anaerobic digestion (AD). The biogas yield was in the order of treatment C (75:25-cow dung: maize cob) > D(50:50- cow dung: maize cob)>A(100:0 cow dung: maize cob) > E(25:75- cow dung: maize cob) > B(0:100 cow dung: maize cob), with treatments C(2522.40ml) and B(1713.20ml) having the highest and lowest average cumulative yields. All treatments recorded % increase in ash, crude protein (CP) and moisture contents(MC), with treatments B(287.91%), E(529.44%) and B(763.60%) showing the highest %increases in CP, MC and ash respectively. All co-digested substrates had percentage bioconversion efficiencies (%BE) greater than the single substrates for total solids (TS) and volatile solids(VS). Treatments D and B recorded the highest (24.75% and 53.12%) and lowest (6.37% and 29.84%) %BE for TS and VS reductions respectively. Similarly, treatments E(56.60%) and B(17.52%), and C(11.43%) and A(9.29%) recorded the highest and lowest %BE for COD and ME reductions respectively. The %reduction in C/N ratio was in the order of treatment A(81.80%)>E(72.39%) >D(62.17%) > A(29.35%) and C(10.41%). The agricultural waste management initiative had provided an effective means of alternative energy generation, veritable industrial biochemical production, which would guarantee sustainable public health and environmental management.

Keywords: Anaerobic, Biogas, Co-Digestion, Cow dung, and Maize Cob.