Anaerobic co-digestion of pineapple wastes with cow dung: effect of different total solid content on bio-methane yield

ABSTRACT

The abundance of agricultural wastes produced from pineapple processing and livestock industries has resulted in the difficulties of disposing of a large amount of waste. Anaerobic digestion is a way to reduce waste and generate renewable energy sources including biogas. In this study, pineapple waste is co-digested with cow dung in batch experiments under mesophilic temperature at 38±1°C at a working volume of 100 ml in 125 ml serum bottle. The effects of the total solid on methane yields are investigated at a different substrate ratio. The batch study is conducted at 3 different total solid which are 12%, 20% and 28% and at three different substrate ratio cow dung to pineapple waste (CD: PW) (1:1, 1:2 and 1:3). Daily biogas collection for 28% total solid at 1:1 ratio results in the highest cumulative biogas production of 313 ml, followed by 28% total solid at 1:3 ratio with 246 ml biogas yield. The highest methane yield is achieved at 12% total solid with a 1:2 ratio (17.19 CH4/g VS). Results show that at 12% total solid produces the highest methane yield at all ratios compared to other total solid percentages. Moreover, methane yield decreases as the total solid percentage increases from 12% to 28%. Overall, the production of methane from pineapple wastes co-digested with cow dung is proven to be a good strategy to minimise solid wastes.

Keyword: Biogas; Co-digestion; Cow dung; Methane; Pineapple; Total solid