



Tropentag, September 17-19, 2014, Prague, Czech Republic

“Bridging the gap between increasing knowledge and decreasing resources”

## Comparative Study of Energy Productions from Selected Crop Residues through Anaerobic Digestion at Mesophilic Temperature

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### Abstract

The conventional energy sources in the world are rapidly reducing due to industrial and urban development. In the same way, demand on the world's fossil fuels increases, their prices rise and their environmental effects are becoming more obvious. This has led to rising interest in the development of alternative energy sources. One of these alternative energy sources is biogas. This work evaluated and compared the biogas yields of maize stalk (MS), maize cobs (MC) and rice straw (RS) by batch experiment at mesophilic temperature (37°C). The study was carried out in a laboratory scale batch digester. The digestion bottles were fed with 9.95, 11.70 and 7.53 g, respectively, which were calculated. The digestion took place for a period of 34 days after which the gas production was noticed to be below 1% of the total gas produced till that time. The biogas yields from organic dry matter (ODM) of MS, MC and RS were found to be 357.10 IN kg<sup>-1</sup> ODM, 514.31 L kg<sup>-1</sup> ODM and 324.54 L kg<sup>-1</sup> ODM respectively after 34 days digestion time. Methane yields (ODM) of MS, MC and RS were also found to be 222.39 L CH<sub>4</sub> kg<sup>-1</sup> ODM, 298.39 L CH<sub>4</sub>kg<sup>-1</sup> ODM and 211.30 L CH<sub>4</sub>kg<sup>-1</sup> ODM respectively. The biogas/methane yields from fresh mass (FM) of MS, MC and RS were found to be 147.59 L kg<sup>-1</sup> FM / 91.91 L kg<sup>-1</sup> FM, 180.65 L kg<sup>-1</sup> FM / 104.81 L CH<sub>4</sub>kg<sup>-1</sup> FM and 177.29 L kg<sup>-1</sup> FM / 115.43 L CH<sub>4</sub>kg<sup>-1</sup> FM. MS, MC and RS maize stalk was found to have methane concentrations of 61.9, 58.0 and 65.1 %, respectively. This study has established that among MS, MC and RS, MC has the highest biogas and methane yields.

**Keywords:** Batch experiment, biogas potential, energy, maize cob, maize stalk, mesophilic, rice straw