

## Enhanced Methane Production from Waste Paper through Anaerobic Co-Digestion with Macroalgae

**Authors :** Cristina Rodriguez, Abed Alaswad, Zaki El-Hassan, Abdul G. Olabi

**Abstract :** This study investigates the effect on methane production from the waste paper when co-digested with macroalgal biomass as a source of nitrogen. Both feedstocks were previously mechanically pretreated in order to reduce their particle size. Methane potential assays were carried out at laboratory scale in batch mode for 28 days. The study was planned according to two factors: the feedstock to inoculum (F/I) ratio and the waste paper to macroalgae (WP/MA) ratio. The F/I ratios checked were 0.2, 0.3 and 0.4 and the WP/MA ratios were 0:100, 25:75, 50:50, 75:25 and 100:0. The highest methane yield (608 ml/g of volatile solids (VS)) was achieved at an F/I ratio of 0.2 and a WP/MA ratio of 50:50. The methane yield at a ratio WP/MA of 50:50 is higher than for single compound, while for ratios WP/MA of 25:75 and 75:25 the methane yield decreases compared to biomass mono-digestion. This behavior is observed for the three levels of F/I ratio being more noticeable at F/I ratio of 0.3. A synergistic effect was found for the WP/MA ratio of 50:50 and all F/I ratios and for WP/MA=50:50 and F/I=0.2. A maximum increase of methane yield of 49.58% was found for a co-digestion ratio of 50:50 and an F/I ratio of 0.4. It was concluded that methane production from waste paper improves significantly when co-digested with macroalgae biomass. The methane yields from co-digestion were also found higher than from macroalgae mono-digestion.

**Keywords :** anaerobic co-digestion, biogas, macroalgae, waste paper

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