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Effects of organic composition on the anaerobic biodegradability of food waste

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Abstract

This work investigated the influence of carbohydrates, proteins and lipids on the anaerobic digestion of food waste (FW) and the relationship between the parameters characterising digestion. Increasing the concentrations of proteins and lipids, and decreasing carbohydrate content in FW, led to high buffering capacity, reduction of proteins (52.7–65.0%) and lipids (57.4–88.2%), and methane production (385–627 mLCH₄/g volatile solid), while achieving a short retention time. There were no significant correlations between the reduction of organics, hydrolysis rate constant (0.25–0.66 d⁻¹) and composition of organics. Principal Component Analysis revealed that lipid, C, and N contents as well as the C/N ratio were the principal components for digestion. In addition, methane yield, the final concentrations of total ammonia nitrogen and free ammonia nitrogen, final pH values, and the reduction of proteins and lipids could be predicted by a second-order polynomial model, in terms of the protein and lipid weight fraction.

Keywords: Food waste; Anaerobic digestion; Organic composition; Methane;

Statistical analysis

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