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Gabriel Capson-Tojo, Roman Moscoviz, Diane Ruiz, Gaëlle Santa-Catalina, Eric Trably, Maxime Rouez, Marion Crest, Jean-Philippe Steyer, Nicolas Bernet, Jean-Philippe Delgenès, Renaud Escudié

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Addition of granular activated carbon and trace elements to favor volatile fatty acid consumption during anaerobic digestion of food waste

Gabriel Capson-Tojo ^{a,b}, Roman Moscoviz ^a, Diane Ruiz ^a, Gaëlle Santa-Catalina ^a, Eric Trably ^a, Maxime Rouez ^b, Marion Crest ^b, Jean-Philippe Steyer ^a, Nicolas Bernet ^a, Jean-Philippe Delgenès ^a, Renaud Escudie ^{a,*}

^a LBE, INRA, Univ. Montpellier, 102 avenue des Etangs, 11100, Narbonne, France

^b Suez, CIRSEE, 38 rue du Président Wilson, 78230, Le Pecq, France

* Corresponding author: tel. +33 (0) 468.425.173, e-mail: renaud.escudie@inra.fr

Abstract

The effect of supplementing granular activated carbon and trace elements on the anaerobic digestion performance of consecutive batch reactors treating food waste was investigated. The results from the first batch suggest that addition of activated carbon favored biomass acclimation, improving acetic acid consumption and enhancing methane production. Adding trace elements allowed a faster consumption of propionic acid. A second batch proved that a synergy existed when activated carbon and trace elements were supplemented simultaneously. The degradation kinetics of propionate oxidation were particularly improved, reducing significantly the batch duration and improving the average methane productivities. Addition of activated carbon favored the growth of archaea and syntrophic bacteria, suggesting that interactions between these microorganisms were enhanced. Interestingly, microbial analyses showed that hydrogenotrophic methanogens were predominant. This study shows for the first time that addition of granular activated carbon and trace elements may be a feasible solution to stabilize food waste anaerobic digestion.

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