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The protective effect of Pseudomonas in syntrophic fatty acids degradation under microaerophilic conditions.

103

Talk

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Abstract

Micro-aeration has been used in anaerobic digestion (AD) systems to improve some aspects of this multifunctional and flexible technology. The addition of vestigial amounts of oxygen is usually associated with an increase of the relative abundance of facultative anaerobic bacteria (FAB) in the microbial community. Besides being involved in fermentation/acidogenesis, FAB have been referred to act as a protective shield against the damaging effects of oxidative environments to the strict anaerobic organisms of these communities.

The microbial relationships between FAB, syntrophic bacteria and methanogens were investigated, during the degradation of short (C4), medium (C8) and long (C16) chain fatty acids by two syntrophic cultures (Syntrophomonas species and a methanogenic partner) in the presence of facultative bacteria (two Pseudomonas sp.). Pseudomonas were added to the pre-grown syntrophic pair, along with the substrate and a range of O2 concentrations (0-10% v/v). The grown cultures then were transferred a second time, with the same substrate and to all the O2 conditions previously tested. The cultures were followed through CH4, VFA, LCFA and pH measurements.

In the presence of O2 (up to 2%) an effective syntrophic relationship, as well as the maintenance of methanogenic activity, was only possible in the presence of FAB. Cultures exposed to O2 in the first incubation performed well when transferred back to anaerobic conditions. Moreover, at the second phase, Pseudomonas maintained its protective shield effect and most of the cultures previously developed under micro-aerobic conditions could also maintain its activity.

This work demonstrates that the presence of Pseudomonas contributes for a more resilient and functional syntrophic consortium degrading fatty acids under micro-aerobic conditions.

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