

Bioaugmentation of Anaerobic Digesters with Anaerobic Hydrogen-Utilizing Cultures for Increased Biomethane Production and Process Stability

Methane is a commercially valuable fuel, as well as synthetic precursor, and can be obtained via microbial fermentation processes. In addition, proper methane production is required for stabilization of municipal, industrial and agricultural wastes via anaerobic digestion. Anaerobic digesters are used to treat wastes and produce renewable energy. In the process, select microorganisms are contacted with the waste and convert it to biogas that contains methane. The methane can be used as a renewable fuel. Currently, very little attention is paid to the exact microorganisms used, the digester microbial community structure, and the relationship between community structure and digester performance. When a digester is started, it is common practice to obtain starter culture from the most near-by operating digester and the exact microbes present are not determined. Regarding performance, some digesters may not produce as much biogas as possible, and other digesters may lose biogas production due to changes in feed waste composition, temperature, or other factors. This invention involves a method and materials (microbial cultures) to increase methane production and process stability. The method employs a process called "bioaugmentation" using microbial cultures enriched to use hydrogen to produce methane. In bioaugmentation, one augments an existing microbial community with a beneficial, exogenous microbe or group of microbes.