Investigation of Alternative Sources of Inocula for Anaerobic Digestion

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Anaerobic digestion features among various conceivable solutions for addressing the global issues of waste remediation and soil and water sustainability. This technology offers an environmentally friendly way to handle human and organic wastes, control pollution, mitigate greenhouse gas emissions, and recover energy and elemental nutrients. Inoculation is the most critical step in startup of an anaerobic digester. This study was undertaken to investigate alternative sources of inocula in case digester effluents are not available or if manures are inappropriate. Sediment samples were collected from wetlands in Gainesville and Florida springs. These samples were subjected to microscopic examination and methanogenic activity tests in order to assess the presence of methanogenic bacteria. Results obtained confirmed the presence of methanogenic bacteria in different water-saturated environments. Soil samples from wetlands appear to be a better source of inoculum than spring sediments. Samples that demonstrated a higher methanogenic activity were selected as an inoculum source for the digestion of sugarcane bagasse. The total methane production ranged from 132.8 to 310.6 ml per gram of chemical oxygen demand (COD) added. Biochemical methane production of the bagasse using different inoculum sources reveals that wetland soils can be used for inoculating anaerobic digesters. The conclusion of this study is very promising for the future of the anaerobic digestion technology specifically in developing countries where this technology is at an emergent stage.