Effect of leachate recirculation on biogas production from waste organic fraction.

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Currently, there is an increase in waste generation due to the growth and clustering of the global population. The waste is normally disposed in landfills, where the organic fraction is naturally converted in biogas through an anaerobic digestion process. The biogas is a blend of gases (mainly CH_4, CO_2) that can be used as a renewable energy source and can replace conventional fuels. This process also produces the leachate, a liquid with high organic load, which can stimulate microbial activity, providing the necessary moisture to the process, when it is recirculated. In this context, this study aimed to determine the physical-chemical composition of the organic fraction of waste produced by the University Restaurant (UR) of Universidade Federal do ABC, located in Santo Andre, Brazil, and to study the effect of the presence and recirculation of the leachate on biogas production, at a pilot scale. For this, physical-chemical analysis were performed on organic fraction samples of solid waste produced by the UR and on leachate samples that supplied four anaerobic reactors with different concentrations of organic waste and leachate. These physical-chemical characterization analyses were carried according to Chemical Oxygen Demand (COD), Dissolved Oxygen, Total and Volatile Solids (TS and VS), Total Phosphorus, ash and moisture content. Furthermore, the kinetics of decomposition of the waste was followed by measures of COD, temperature, pH and volume of biogas produced. The low pH combined with the reduction of COD and with the temperature variation in the reactors lead to determine the stage the biogas production process. Furthermore, the rates of methane produced compared to the VS found in the decomposed residue sample indicates if the leachate recirculation favors the anaerobic process.

Keywords: biogas; solid waste; leachate; biochemical conversion.