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Anaerobic Co-Digestion of Sewage Sludge and Bagasse for Biogas Recovery

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Abstract : In Egypt, the excess sewage sludge from wastewater Treatment Plants (WWTPs) is rapidly increasing due to the continuous increase of population, urban planning and industrial developments. Also, cane bagasses constitute an important component of Urban Solid Waste (USW), especially at the south of Egypt, which are difficult to degrade under normal composting conditions. These wastes need to be environmentally managed to reduce the negative impacts of its application or disposal. In term of biogas recovery, the anaerobic digestion of sewage sludge or bagasse separately is inefficient, due to the presence of nutrients and minerals. Also, the Carbone-Nitrogen Ratio (C/N) play an important role, sewage sludge has a ratio varies from 6-16, where cane bagasse has a ratio around 150, whereas the suggested optimum C/N ratio for anaerobic digestion is in the range of 20 to 30. The anaerobic co-digestion is presented as a successful methodology that combines several biodegradable organic substrates able to decrease the amount of output wastes by biodegradation, sharing processing facilities, reducing operating costs, while enabling recovery of biogas. This paper presents the study of co-digestion of sewage sludge from wastewater treatment plants as a type of organic wastes and bagasse as agriculture wastes. Laboratory-scale mesophilic and thermophilic digesters were operated with varied hydraulic retention times. Different percentage of sludge and bagasse are investigated based on the total solids (TS). Before digestion, the bagasse was subjected to grinding pretreatment and soaked in distilled water (water pretreatment). The effect of operating parameters (mixing, temperature) is investigated in order to optimize the process in the biogas production. The yield and the composition of biogas from the different experiments were evaluated and the cumulative curves were estimated. The conducted tests did show that there is a good potential to using the co-digestion of wastewater sludge and bagasse for biogas production.

Keywords : co-digestion, sewage sludge, bagasse, mixing, mesophilic, thermophilic
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