Abstract

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Enhancing biogas production by co-digestion of food waste and carbon rich co-substrate

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Abstract:

Food waste management by anaerobic digestion is proved to be a potential alternative than composting, landfilling or incineration. It can lead to renewable energy production coupled with the minimization ofwaste volume and greenhouse gas emissions. Low C/N ratio of food waste inhibit the process stability and decreases the methanogenesis rate, so enhancement of biogas yield and degradability is often required to optimize by co-digesting it with another substrate. Co-digestion balances the carbon and nitrogen and increases digester performance and operations more efficiently. The addition of rice straw as co-substrate avoided the ammonia inhibition and volatile acid accumulation during the process and increases the process stability. Mixing food waste and rice straw balances the C/N ratio to 25, which is required for the maximum biogas production, whereas in case of food waste C/N ratio was 14.5. The study was performed in batch reactor under mesophilic (35+2oC) condition. The result showed that balancing C/N ratio increases the biomethane yield and 75 % of the methane was produced during initial 15 days. Methane yield and VS removal efficiency were higher significantly in comparison to mono-digestion of food waste. The biochemical methane potentials (BMP) of food waste and rice straw was calculated in a 1 L anaerobic reactor inmesophilic condition. The optimum methane yield of 0.295 m3/kg- VS was obtained which was 41.7% higher compared to the individual digestion food waste. The methane content and biogas production was obtained to be 62.37 % and 0.438 m3/kg- VS which was much higher

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