

Biochemical Methane Potential (BMP) of Quince Waste

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Abstract

Anaerobic digestion is a well-established technology combining the treatment of several wastes with the production of biogas. However, the finding of the most suitable co-substrates is still a major challenge in anaerobic digesters. Quince is a fruit which has a long history of cultivation in Mediterranean region and Western Asia. According to FAO, world production was almost 700,000 tones in 2017. In addition, quince market is expected to grow on a higher scale in the period 2020-2025. Due to astringent taste, it is used mainly cooked for the production of jams, marmalade or jellies. During this process, peel, seed and stem are separated and discarded as waste. From this point of view, the industrially produced quince wastes could be a very interest substrate for biogas production. In this work, we estimate for the first time the biochemical methane potential (BMP) of quince wastes. In addition, the BMP of banana peels was determined and compared with quince waste. The experiment was conducted at mesophilic conditions (37 °C) in 120-ml serum bottle reactors using an inoculum to substrate ratio of 1:2. Maximum biogas production, biogas production rate and lag phase were estimated using a modified Gompertz equation. Results shown that quince waste could produce almost double biogas volume (per volatile solids) in comparison with banana peels. Specifically, maximum biogas production was found 930 ± 4 ml/g VS and 1584 ± 8 ml/g VS for banana peels and quince wastes, respectively. In addition, biogas production rate was found to be 105.6 ± 2.6 mL/gVS/d for banana peels and 132.1 ± 2.7 mL/gVS/d for quince waste. These preliminary findings indicate that exploitation of quince wastes in anaerobic digesters could be a very attractive option.

Keywords: methane, biogas, fruit waste, anaerobic digestion