Biovalorization of Banana Waste: Auditing and Improvement of Bio-Methane Production by Fungal Pre-Treatment

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Abstract
Bananas is an important staple food and cash crop in Tanzania, which generates huge waste quantities, currently underutilized and discarded causing detrimental impact to the environment. However, represents untapped bio-resource for bio-valorization into valuable bio-products. A waste audit case study was conducted for four common cultivars, Mshare-Kahuti, Mbwailuma (Matoke), Kisukari-Mshare and Kimalindi at Horticulture Research and Training Institute, Tengeru, Arusha, Tanzania. Wastes quantities generated annually from one hectare were estimated at 57, 99, 64 and 125 tons/year for Mshare-Kahuti, Mbwailuma (Matoke), Kisukari-Mshare and Kimalindi, respectively. Methane yield of various wastes fresh fractions of Mshare-Kahuti (for cooking) and Kisukari-Mshare (for desserts) were investigated in batch anaerobic bioreactors (BAB). The highest methane yields for Mshare-Kahuti and Kisukari-Mshare were 0.273 and 0.255 m3 CH4/kg of volatile solids (VS) added were recorded from corm and peels banana waste fractions, respectively. The effect of solid state-fermentation pretreatment of banana wastes with Pleurotus sapidus (P 969) at 10% (wet wt bases) for 7, 14 and 21 incubation days on the extent of methane yield was also investigated in BAB. Maximum methane yields for Mshare-Kahuti and Kisukari-Mshare were 0.96 and