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Enhanced Biogas Production from Human and Agro-Waste: Waste to Wealth Initiative

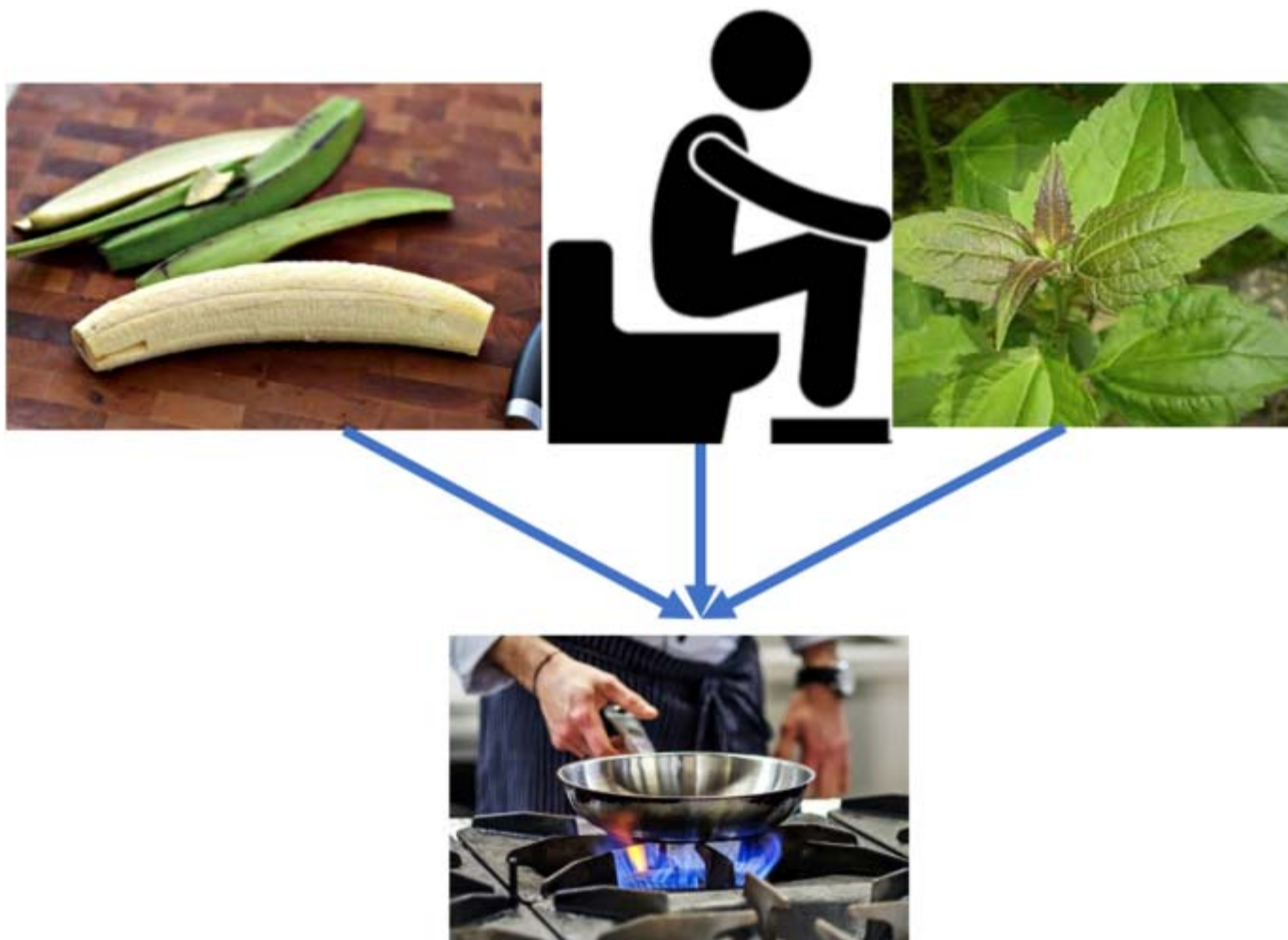
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Abstract

High population spikes have been projected for developing countries in the nearest future. This development is a source of concern as there are no visible futuristic economic agenda to douse

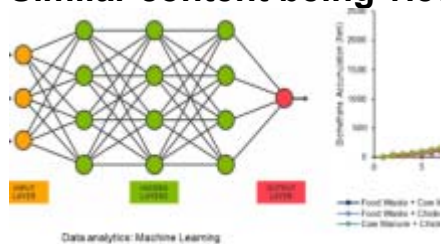
the menace of population growth in a dying economy. This paper is a blueprint for standalone energy users and the built industry to improve energy generation using sustainable materials, i.e., human and agro waste. This research examines two popular agro waste i.e., plantain peel and Siam leave. The concept of bio-digester septic tank design (BDSTD) was also discussed. Biogas from plantain-faecal (PF) had a higher cumulative production than biogas from Siam-faecal (SF) because plantain biomass aids initial bio-digestion of the faecal samples due to its inherent chemical components which are important to breaking undigested food component in the faecal mass. In this wise, the chemical component in Siam biomass cannot easily break undigested food components in the faecal mass. However, SF creates a better enabling environment for microbial growth that could lead to about 400% biogas generation over PF and 160% biogas generation over pure faecal (TF). Despite this feat, the caveat for improved daily gas production rate in SF is hinged on pre-processing of the faecal mass. With the aid of machine learning, it was revealed that higher retention time could be a natural way of pre-processing needed by the Siam biomass. This concept led to the design of the BDSTD which was technically hinged on cross-sectional partitions. Plantain biomass is recommended for four partitions BDSTD design as there would be shorter retention time in the overflow chamber while the Siam biomass is recommended for > 4 partitions BDSTD designs.

Graphical Abstract



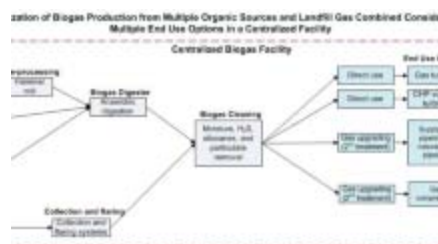
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Data Availability

Enquiries about data availability should be directed to the authors.

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Ethics declarations

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The authors declare no conflict of interest.

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