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Sustainable waste conversion to biogas through anaerobic digestion of cassava biomass in South Africa

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About 70% of the countries in Africa rely on imported energy and are faced with major challenges such as energy security for the future and better use of natural resources. This situation is aggravated by huge unemployment and low gross domestic product (GDP). A huge chunk of African countries national budget which could have gone into development is spent on energy import. This leads to in-fighting (wars), poor infrastructural development and spread of lethal diseases. The exploration of other natural sustainable sources of energy such as biogas is of great importance because of the excessive demand from both the rural and urban population on fossil energy. Conversion of biomass to energy will help reduce this dependence as well as mitigate the negative social and environmental impacts such as rural unemployment and global warming. Cassava biomass offers multiple benefits such as high yields of starch (80.6% dry weight) and total dry matter (38.6%). Using a locally fabricated laboratory batch fermenter (25 L), anaerobic digestion was carried out under mesophillic conditions. Pre- treatment of the cassava biomass with spoilage fungi, *Aspergillus niger* and *Penicillium* species yielded large amounts of fermentable sugars required for digestion. Fresh Zebra droppings (2:1 v/v) were used as inoculum. Theoretical biogas yields were between 0.71 and 0.75 Nm3 per kg VS while the total biogas yields of between 250 and 300 L/kg VS fed into the digester was obtained after 20 days retention time. Cassava is not yet a staple food in some BRICS countries like South Africa and the peels and other by-products of its processing are equally suitable for energy production. The use of cassava will be an alternative feedstock strategy for several rural biogas projects running with cow dung inside South Africa. In addition, opportunities exist for decentralized, cheaper and socially advantageous bioenergy production from cassava considering that fuel and electricity needs are not satisfied in many rural areas. Finally, the incorporation of cassava anaerobic digestion facility at different scales will deliver additional benefits like the incorporation of nutrients and residual carbon into the land as fertilizer.

Biography

Vincent Okudoh has completed his PhD from University of KwaZulu-Natal in 2011 and postdoctoral studies from the same University School of Engineering. He is a Biotechnology lecturer and researcher with BioERG at Cape Peninsula University of Technology Cape Town Campus, South Africa. He published many papers in reputed journals and serves as an Advisory Editorial Board Member with *Scholars Academic Journal of Pharmacy*.

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