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Microbiology, biochemical changes and biogas production during composition of oil palm empty fruit bunch

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The microbiological, biochemical changes and biogas production during composition of Oil Palm Empty Fruit Bunch (OPEFB) for 42 weeks were studied using standard analytical procedures. The nitrogen, phosphorus, potassium, carbon-nitrogen ratio, heavy metals and proximate composition were also assayed. The results revealed abundance and heterogeneity in genera and species of heterotrophic bacteria and fungi which included *Micrococcus luteus*, *Klebsiella aerogenes*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus megaterium*, *Absidia repes*, *Aspergillus niger*, *Aspergillus glaucus*, *Fusarium oxysporium*, *Mucor haemalis*, *Helminthosporium sativum*, *Saccharomyces uvarum* and *Candida pseudotropicalis*. Mean aerobic and anaerobic bacterial densities ranged from 2.9×10^5 to 5.0×10^5 cfu/g and 2.7×10^5 to 4.7×10^5 cfu/g respectively while fungal densities ranged from 3.3×10^5 to 7.4×10^5 cfu/g. Successional studies revealed primary colonizers of the compost comprised both bacteria (29.6%) and fungi (66.7%) with a pH range of 7.8 to 8.5. The results also revealed high levels of heavy metals ranging from 8.78 to 0.19 mg/I for iron, 4.80 to 0.48 mg/I for sodium, 2.79 to 0.08 mg/I for calcium, 2.53 to 0.40 mg/I for zinc, 2.41 to 0.07 mg/I for cadmium, 2.23 to 0.20 mg/I for lead and 1.89 to 0.22 mg/I for copper. The high level of Nitrogen, Phosphorous and Potassium (NPK) ranged from 1.62 to 0.10 mg/I, 11.33 to 0.17 mg/I and 8.66 to 0.11 mg/l respectively while proximate compositional studies showed varying levels of carbohydrate (76.53% to 23.94%), protein (10.15% to 0.68%), lipids (0.54% to 0.48%), ash (8.00% to 90%), fiber (4.78% to 31.00%), moisture (63.00% to 63.55%) and organic matter (92.00% to 56.10%) respectively, with a positive correlation ($p < 0.05$) in ash and fiber content over time. Anaerobic digestion of 2,750g of the OPEFB yielded biogas in the range of 0.035 m³ to 0.035 m³. The results underscore the use of OPEFB as organic fertilizer and suggest additional value as a good source of renewable energy rather than waste in developing countries.

Biography

Alfred Y Itah did his BSc (Hons.) in Microbiology (1983), Calabar, Nigeria and PhD (1987) at Graduate School Board and Senate of the University of Calabar following his excellent performance in MSc course work examinations. He worked as a Professor of Environmental and Public Health Microbiology (2004); Head, Department of Microbiology (2001-2006). He was elected as Dean, Faculty of Science (2008-2010) and re-elected as Dean (UNOPPOSED, 2010-2012). He is a member of 10 learned societies including the Nigerian Society for Microbiology and American Board of Research Advisors. He has more than 51 scientific publications in reputable national and international journals with high impact factor. He is a Consultant Environmental and Public Health Microbiologist (Since 1998) and Litigation Expert Witness on crude oil pollution matters (Since 2000). He has attended more than 22 scientific conferences and is the Editorial Board Member and Editor-in-Chief to some reputable journals in Nigeria.

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