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Energy Potentials of Some Selected Agricultural Wastes as Local Fuel Materials in Nigeria

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Abstract

Agricultural wastes are potentially huge source of energy-giving materials. They are as of plant-derived materials that can be used for energy. These include wood, herbaceous plants, crop and forest residues, animal wastes, etc. In Nigeria, large quantities of these wastes are produced annually and vastly under-utilised. The practice is usually to burn these residues or leave them to decompose. However studies have shown that these residues could be processed into liquid fuels or combusted/gasified to produce electricity and heat. The main benefits of the use of biomass as energy source are rural development, increase in farm income, market diversification, reduction of agricultural commodity surpluses and derived support payments, enhancement of international competitiveness, revitalisation of retarded rural economies, reduction of negative environmental impacts. Ten agricultural wastes in Nigeria were subjected to ultimate and proximate analyses to determine their energy contents using the method of association of official analytical chemists. The samples are: groundnut shell, yam peels, coconut shell, mango peels, palm oil mill effluents, corn cob, cherry, orange peels, melon shell and black walnut hull. Results of analyses showed that the mean higher heating values of the waste samples are 16 505 kJ kg⁻¹, 19 597 kJ kg⁻¹, 20 647 kJ kg⁻¹, 15 891 kJ kg⁻¹, 17 303 kJ kg⁻¹, 19 458 kJ kg⁻¹, 28 203 kJ kg⁻¹, 28 203 kJ kg⁻¹, 19 299 kJ kg⁻¹, 21 392 kJ kg⁻¹, and 21 143 kJ kg⁻¹ for groundnut, shell, yam peels, coconut shell, mango peels, palm oil mill effluent, corn cob, cherry, orange peels, melon shell and black walnut hull respectively. All the waste samples considered have heat values greater than some well known biomass-fuels and fall within the limit for the production of steam in electricity generation. As a result of this, it is envisaged that industries that use their waste biomass for energy would simultaneously solve a waste disposal problem and save money on their energy needs.

Keywords: Agricultural wastes, heating value, Nigeria, ultimate analysis