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Briquette Production from Baobab (*Adansonia digitata*) Fruit Shells

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Abstract

The major sources of traditional biomass in the Republic of Malawi are firewood, charcoal, and agricultural residues, which contribute approximately 87 %, 6.4 %, and 6.6 % to total energy supply. The intense utilisation of charcoal and firewood can contribute to forest degradation and deforestation, particularly around densely populated areas. With an annual deforestation rate of 2.4 percent, forest loss in Malawi is among the highest in Southern Africa. Forest conservation in the country is hampered by the interaction of high population density, poverty, and rural dependence on forests, as well as poor forest management institutions. Agricultural expansion and high demand for wood fuels are two major forest threats.

The use of organic waste material as an alternative fuel can help alleviate this problem. Considering the area-specific biomass availability, related transportation cost and lack of attractive alternative uses, baobab (*Adansonia digitata*) fruit shells are a suitable agricultural residue. These shells are abundant due to the baobabs' wide distribution in the southern region of Malawi, and along the lakeshore in the central and northern regions of the country.

The purpose of this study is to analyse the physical properties of baobab shells, to determine the technological feasibility and fuel efficiency of baobab shell briquettes and crushed shells, and to assess any health risk related to using baobab shell briquette as an alternative fuel.

A briquette screw press machine with a motor capacity of 15 kWh and a capacity of 109.5 kg/h was used in Malawi to produce the baobab shell briquettes. The samples were characterised with regard to major physical properties, i.e. energy content, bulk density, ash content, and inflammability; and an exhaust gas analysis was performed. The baobab shells briquette samples were compared with other fuels typically used in Malawi to identify their respective advantages and disadvantages. The technology will be evaluated and recommendations for practice will be presented.

Keywords: *Adansonia digitata*, baobab, biomass, briquettes, energy, fuel, malawi