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Jatropha Seed Shells as Energy Source

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Abstract

The seed shells of *Jatropha curcas* are a promising fuel for combustion technology. Thermal energy can be used for various purposes, e.g. for drying of *Jatropha* fruits or for transesterification of *Jatropha* oil to produce biodiesel. Gross energy of *Jatropha* shells is about 18–19 MJ kg⁻¹ and therefore comparable to rice husk and wood, which are still known as major energy source for dryers in rural areas of tropical and subtropical countries.

Shells from the de-shelling process are a bulky material which is comparable to rice husk. They consist of 50.9 % carbon, 39.5 % oxygen, 5.8 % hydrogen and 0.8 % nitrogen. Volatile matter and fixed carbon with values of 61 % and 29 % are comparable to rice husk. In general, combustion technologies for such fuels are readily available. However, for small scale combustion units, the technology and its operation have to be adapted accurately in order to reach a complete and clean combustion. In addition, the operation of the furnaces influences strongly efficiency and emission of toxic exhaust gas components. Furthermore, chemical composition of *Jatropha* shell and fusibility of fuel ash are influencing combustion behaviour. However, the fuel characteristics for *Jatropha curcas* seed shells are not yet available.

Therefore, the objective of this study is to investigate physical and chemical properties of *Jatropha* seed shells and to develop a combustion technology to be used by small scale farmers. Analysis of the combustion parameters of *Jatropha* seed shells and the analysis of combustion technologies is needed as a requisite for a systematic design process.

Keywords: Combustion, energy, *Jatropha curcas*, seed shell