

Jatropha Curcas Linn. as a Renewable Energy Source

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Abstract

Physic nut, *Jatropha Curcas* Linn., is the South America local plant. This plant is classified as one of the plant oil similar to palm oil. Oil extracted from *Jatropha* can be used directly with agricultural diesel engine, i.e., lister engine in rice mill, water pump, and small electrical generator, without further modification. Parts of *Jatropha* plant can be used as herbal and medicines, soap production, and perimeter fencing plant. However, *Jatropha* seeds contain some toxin, i.e., curcin and phorbol ester and the extracted oil is unsuitable for human consumption. *Jatropha* oil extraction starts from shelling of fresh *Jatropha* fruits. One kilogram of fresh *Jatropha* fruit would yield approximately 286-297 grams of seeds. The oil extraction may be accomplished by mechanical mean or by solvent extraction. In general, the mechanical crusher is 2.5 times less efficient than solvent extraction. It was found that 4 kg of *Jatropha* seeds will yield one-liter of oil using mechanical crusher while solvent extraction by hexane would yield 41% more oil. The extracted oil can be used with low speed diesel engine after filtration. **Transesterification** process may be performed to upgrade the oil characteristics before admix to biodiesel. The available data for cost evaluation of oil extraction is inconclusive. This is due to the vast different in production rate, oil extraction method as well as the labor cost in different areas or countries. **Transesterification** of *Jatropha* oil occurs by a reaction with alcohol and catalyst at 60°C. The product steam composed of biodiesel (methyl ester of fatty acid) and glycerol. The obtained biodiesel must pass through a conditioning process to separate catalyst and methanol. When compare with other energy crops such as palm, *Jatropha* plant has lower plantation cost and faster harvesting period. The investment and technical difficulty of extraction process are less than palm oil extraction. The raw oil from *Jatropha* can be used directly in particular applications while raw palm oil must go through costly and energy intensive **Transesterification** process. In this study, the authors combine and evaluate data from several published papers and reports. The major limitation of this work is that all the data analyzed is secondary data. Several parts of the information were obtained from overseas. Moreover, the comparison between *Jatropha* and palm was made base on the energy perspective only, exclude the utilization of palm as consumable plant. This comparison suggested that *Jatropha* plant has potential as a renewable energy crop. Finally, the authors consider that the utilization of *Jatropha* as a renewable energy source may be a viable option in the future. Additional study should be conducted on the life cycle analysis of the product within the domestic constraint and toxicity before the decision on supporting this route in industrial level can be made.