

Standardization of process parameter for maximum oil recovery from jatropha seed

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SUMMARY : The experiment was carried out to standardize process parameter for maximum oil recovery from jatropha using solvent extraction and expelling at laboratory scale. The grit size of 2 mm having flake thickness of 0.5 mm at pressure of 1.5 kg/cm² for 10 minutes of steam treatment and drying of steam treated flakes for 20 minutes at 65 °C temperature gave the maximum oil recovery of 98.22 per cent by solvent extraction and 73.37 per cent for mechanical expression method. The solvent and expelling experiment of jatropha without steam treatment having flake thickness 1.5 mm and grit size 3 mm showed that the oil recovery was 94.83 for solvent and 71.63 per cent for mechanical expression in a single pass.

KEY WORDS : Oil recovery, Process parameter, Jatropha seed

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India, with a GDP of about USD 475 billion, is the fifth largest economy in the world (Anonymous 2011). Seventy two per cent of India's people live in rural areas and about 70 per cent earn their livelihood from agriculture. India's rate of economic development is affected, as it needs to import about 70 per cent of its petroleum demand. Wildly fluctuating world prices of oil have been a destabilizing element for the country's balance of payments situation, particularly in recent times. The current yearly consumption of diesel oil in India is approximately 40 million tonnes forming about 40 per cent of the total petroleum product consumption. As on today the total diesel fuel demand in India is 66.9 Million Metric Ton (Poonia and Jethoo, 2012). Therefore, attempts need to be made to reduce reliance on imports and achieve better alternative sources of energy which are suitable and sustainable for the better health of the environment (Punia, 2007). In India, it is estimated that cost of biodiesel produced

by trans-esterification of oil obtained from jatropha cultivation generates an income of Rs.2500/per ha in existing system of farming. Bio-diesel plant grown in 11 million ha of land can yield a revenue of approximately Rs.20000 crore a year and provide employment to cover 12 million people both for plantation and running of the extraction plant (Chandra *et al.*, 2006). Around 4-5 kg of jatropha seed is produced per plant and the fruiting starts in the second year onwards and continues unto 40-50 years (Anonymous, 2012).

Oil can be extracted mechanically with an oil press, an expeller, or even with a wooden mortar and pestle – a traditional method that originated models that an individual can build to power driven commercial presses. 72 per cent of oil is recovered by mechanically expelling. Higher percentage of oil can be extracted with solvents (up-to 99%), but solvent extraction is a complex operation. The solvent like ethane, propane, carbon dioxide, n-hexane etc. are mostly used for oil extraction, however, n-hexane is economical and convenient. The standardization of process for maximum oil recovery is not known. In this study the process and technology would be optimized for maximum oil recovery of jatropha using solvent extraction process at laboratory scale.

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