



<http://www.kimminic.com/oil.htm>

Crude Jatropha Oil The oil from **Jatropha** seeds can be extracted by two different methods; mechanical extraction using a hydraulic or screw press machine (through heating), and solvent extraction.

Mechanical:

To prepare the seeds for mechanical extraction, the seeds are solar heated for several hours or roasted for 10 minutes, without overheating. The process breaks down the cells containing the oil and eases the oil flow. The heat also liquefies the oil, which improves the extraction process. A hydraulic press machine is then used to compress a measured amount of seeds and extract the oil.

Solvent:

Solvent extraction yields the maximum seed oil, that is 38% by weight of the seed, or 99% of the total available vegetable oil. The process involves the use of two solvents, Hexane and Isopropanol, applied in varying proportions to extract oil from crushed **Jatropha** seeds.

The oil extracted using the solvent process can be purified by:

Sedimentation:

This is the easiest way to get clear oil, but it takes about a week until the sediment is reduced to 20-25% of the raw oil volume.

Boiling with water:

The purification process can be accelerated significantly by boiling the oil with about 20% of water. The boiling should continue until the water has completely evaporated (no bubbles of water vapour anymore). After a few hours the oil then becomes clear, separated from the seed-cake and other residue.

Research shows that the seed-cake and other residue from the extracted oil have high mineral content of nitrogen (6%), phosphorous (2, 75%) and potassium (0.94%), which can be used as **organic fertilizer**. An application of one ton of press cake is equivalent to 200 kg of mineral fertilizer (NPK 12:24:12).

The residual substance obtained from the sedimentation of the oil during the purification

process in the tank has also industrial and commercial value. It can be mixed and boiled with caustic soda and water for "raw" **soap** production.

At 35 to 40 percent oil yield, Kimminic Corporation expects to extract and generate up to 70,000 tons of oil in 2009 growing to 227,500 tons of oil by 2013.



Jatropha Seed

Jatropha is a basic tropical tree cultivated primarily in Africa, Asia and Latin America. As far as its habitat is concerned this highly drought-resistant species is adapted to arid and semi-arid conditions. It is a small tree or shrub with smooth gray bark, which exudes a whitish colored, watery, latex when cut. Normally, it grows between three and five meters in height, but can attain a height of up to eight or ten meters under favourable conditions.

Jatropha plant handles dryness very well and it is possible to live almost entirely of humidity in the air. Differences in yield depends on available rainfall or water. The **Jatropha** plant lives and produces seeds for 50 years with minimal input.

The trees are deciduous, shedding the leaves in the dry season. Flowering occurs during the wet season and two flowering peaks are often seen. In permanently humid regions, flowering occurs throughout the year. The seeds mature about 30 days after flowering. Early growth is fast and with good rainfall conditions nursery plants may bear fruits after the first rainy season, direct sown plants after the second rainy season.

Research has determined that the yield is optimized with some nutrients. Furthermore, it has been determined that the use of good organic fertilizer, particularly **Jatropha**'s own organic fertilizer, is preferable for optimum yield.

Harvesting will begin 6 months after sowing or planting and it continues year round as branches sprout, flower and bear fruits. The new plant yields fruits at optimal level at the end of the 12th month.

Standard plant management practices required are timely weeding (4 times a year), proper fertilization, surface ploughing and pruning. With these management practices a yield around 15-20 kg of fruit per tree can be obtained even if the plants did not reach full maturity.

Kimminic Corporation expects to successfully plant and harvest 100,000 metric tons of **Jatropha** physic nut at the end of 2008 and growing its capacity to 650,000 metric tons of **Jatropha** physic nut by 2012.



Bio-Diesel

Bio-diesel is the most valuable form of renewable energy. It is environmentally friendly and ideal for heavily polluted cities and is as biodegradable as salt. Research has found that it produces 80% less carbon dioxide, 100% less sulfur dioxide emissions and has 90% reduction in cancer risks.

The process to transform Jatropha (vegetable) oils to **bio-diesel** is to transesterify. This involves a process of creating a chemical reaction by combining Jatropha oil with methanol (as methyl ester) in the presence of catalyst in the production process.

The required capacity of the transesterification plant is dependent on the amount of crude Jatropha oil that has to be transesterified into **bio-diesel**. We estimate to have a plant with a production capacity of 250,000 tons of Jatropha oil for the next five years. We will start our production of bio-diesel gradually with 50,000 tons a year expanding year by year to the demands of the local markets.



Organic Fertiliser



Soap

Jatropha By-Products:

Solvent extraction, as indicated, yields the maximum seed oil, that is 38% by weight of the seed, or 99% of the total available vegetable oil. The residual seed cake resulting from the extraction and the process of sedimentation yield other by-products from Jatropha.

Research shows that the press or seed-cake and other residue from the extracted oil have high mineral content of nitrogen (6%), phosphorous (2, 75%) and potassium

(0.94%), which can be used as **organic fertilizer**. An application of one ton of press cake is equivalent to 200 kg of mineral fertilizer (NPK 12:24:12).



Inter-row planting of other (food) crops is also possible.

The residual substance obtained from the sedimentation of the oil during the purification process in the tank has also industrial and commercial value. It can be mixed and boiled with caustic soda and water for “raw” **soap** production.

In addition to these by-products, the process of converting crude Jatropha oil to bio-diesel will result in the recovery of a high percentage of the inputs, especially the methanol used, and production of crude glycerine. The crude glycerine can be refined for industrial and commercial purposes.