



44 • *Jatropha* for Fences and Oil

Jatropha



Jatrophas can form a closed fence within 2 years

tivated in the tropics as a hedge to protect fields and gardens, since animals do not eat it. The leaves and seeds are toxic to humans and many animals.

Propagation from seeds



Jatropha fruits. Seeds contain up to 35% oil

faster if the part from where the roots will emerge (indicated by small spots on the seed) faces downwards. After 2 years, or 3 rainy seasons, the *jatropha* plant will start to produce seeds.

Jatropha curcas is a small tree or large shrub which can grow to a height of up to 5 metres and live for more than 50 years. It is a drought-resistant species widely cul-

The best time for direct seeding is the beginning of the rainy season. After the first rains, when the soil is wet, the seeds are sown to a depth of 2-3 cm. The seeds sprout

Propagation by cuttings

Jatropha is easily propagated from cuttings. These should be more than one year old, "lignified" (this means the cuttings should be woody, not green branches) and about 60-120 cm long. The best planting time is 1-2 months before the beginning of the rainy season. For hedging, the cuttings can be planted alongside one another, like a regular wooden fence. The cuttings should be placed 20 cm into the soil, and held in place with horizontal branches on top. They will thus function as fencing immediately. Within a few weeks, the cuttings will start to grow. Cuttings can easily be kept in a shaded place for a few weeks, without drying out.

To get an efficient live fence that protects gardens against animals, the distance between the plants should be 5 cm. Dead plants should be replaced by new cuttings or seeds.

It is also possible to make a double row, with 20 cm distance between the two rows. The distance between each plant in the row should be 10-15 cm. Since the young plants have not developed their repellent odour, they are at risk of being eaten by animals. Therefore, they must be protected with some tree branches during the first year. After the rainy season, the plants will be large enough to function as a protective fence. If well maintained, this kind of hedge can even keep chickens out of gardens.

Possible uses of *jatropha*

- The plant is often used, in small quantities, as a plant medicine.
- It is used to mark boundaries and as live fencing.
- The fences are useful against erosion - especially if combined with vetiver contours or stone "bunds" - lines of stones running along contours.



- Oil which can be used for making soap or lamp fuel can be pressed from the seeds, or the seeds can be sold directly for industrial uses.

Jatropha for oil production

The suitability of jatropha for oil production varies according to the variety of jatropha being used, and ranges from 300 g to 9 kg per tree per year. This corresponds to ½ - 2 tons of oil per hectare.

The seeds contain about one-third oil. With a manual press, around two-thirds of this oil can be extracted (5 kg of seeds give about one litre of oil).

Jatropha press cake (the material that is left after pressing the oil) is valuable as an organic manure. It is comparable to chicken manure in terms of its effectiveness. One ton of jatropha press cake corresponds to 200 kg of chemical fertiliser.

Because the press cake still contains some oil, it also has pesticidal properties, and may reduce the amount of nematodes (a common pest) in the soil.

The most interesting and economically viable use of the jatropha oil is for soap production.

Jatropha gives a good quality, glycerine-rich soap which has positive effects on the skin.

Jatropha oil can be used as lamp oil, although a kerosene lamp requires conversion to burn jatropha, because jatropha oil is heavier than kerosene). A floating wick in a glass with oil can also be used, as developed by Binga Trees Trust. The use of jatropha oil as a lamp oil is explained further below.

Oil extraction

Seed preparation

Seeds for oil extraction should be dried in sunlight on top of a black plastic sheet

for several hours, or in a roasting pan for 10 minutes. It is important that the seeds are heated, but not burnt. This process breaks down the cells that contain the oil, allowing the oil to flow out more easily. Heat also thins the oil, which improves the extraction process.

The manual press

Many villages have manual presses for the production of sunflower or sesame oil. These can also be used to press jatropha seeds. In such presses, a piston creates pressure to force the oil out of the press cake. Sometimes the piston gets stuck and is difficult to move. Then the press has to be taken apart and the piston and its cylinder need to be cleaned thoroughly. It is possible to regulate the outlet of the manual press. The more closed it is, the more difficult it becomes to press the cake through the gap. Thus, more oil is extracted (a higher extraction rate). The outlet should be regulated in such a way that one person can push down the lever without forcing too much (no “hanging” on the lever).

Oil purification

• Sedimentation

Letting the sediments settle at the bottom is the easiest way to obtain a clear oil. It is best to use several containers, so that the clear oil is siphoned from one container to the next. After 24 hours this process is repeated at least one more time to get a batch of clear oil.



Manual press to produce oil from seeds



The oil left in the containers with the sediments (remains of seed shells, etc.) will eventually also separate.

- **Boiling with water**

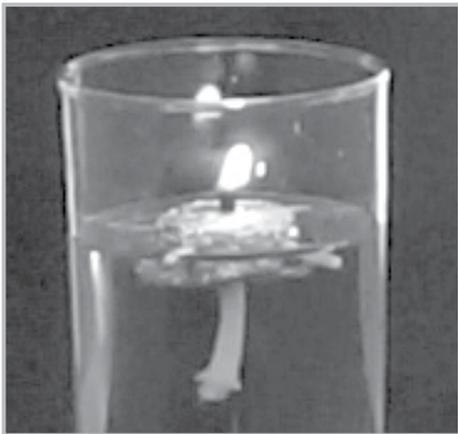
The purification process can be greatly accelerated by boiling oil and water together in a ratio of four parts oil to one part water. The boiling should continue until the water has evaporated (there are no bubbles of water vapour anymore). After a few hours, the oil becomes clear.

- **Filtering**

Passing the raw oil through a filter is a very slow process and has no advantage in terms of sedimentation. Therefore, it is not recommended.

Cleaning the press

Because jatropha oil is not suitable for consumption, the manual press must be cleaned thoroughly after being used to press jatropha and before it is used to extract cooking oil. At least one kg of edible seeds must be pressed, and the oil thrown away or used as biofuel. before the press can be used for edible oils again.



The Binga Lamp

Two lamp designs using jatropha oil have been developed.

Adapted kerosene lamp

To use a kerosene lamp for burning jatropha oil, the body the lamp is modified so that the mechanism for moving the wick is turned around to reduce the height between the surface of the oil and the flame. This is necessary because jatropha oil is heavier than kerosene. This design is promoted by Africare in Lusaka.

Binga Oil Lamp

A very simple and suitable design for a jatropha oil lamp was developed by the Binga Trees Trust, at Kariba Lake in Zimbabwe. This model works very well and can easily be assembled.

It uses a small glass filled with oil up to 3 - 5 cm below the rim. A small cork disc (or a disc of a maize cob) floats on top of the oil, wrapped in aluminium foil to prevent it from burning. A hole in the centre of the disc contains a cotton wick. The floating wick holder is centred using match sticks. Thus, the flame of the oil lamp is only some 1 or 2 mm above the surface of the oil and gives a quiet and steady light. There is some evidence that the smell of this light also repels mosquitoes.

An even simpler system consists of taking some cotton and twisting it into a form like an inverted mushroom. This is then placed head down in a plate or glass with a little oil and the end of the cotton is lighted as a wick.

Information from the manual "The Jatropha System" published by GTZ. More information at: www.jatropha.de

Lamp oil

Lighting is a basic need and kerosene is not always available in rural areas. Many people then use diesel instead. This creates much smoke, has a disagreeable smell and is unhealthy.