

June 2007 issue

Green Gold in a Shrub

Entrepreneurs target the *Jatropha* plant as the next big biofuel

By Rebecca Renner

A woody shrub with big oily seeds could be the ideal source for biofuel. For hundreds of years, Africans in places such as Tanzania and Mali have used *Jatropha curcas* (jatropha) as a living fence. Now biodiesel entrepreneurs in tropical zones in Africa and India are buying up land, starting plantations and looking forward to making fuel from the seeds, which, they argue, will be better for the global environment and economy than conventional biofuel crops grown in temperate climates.

Ethanol from corn or sugarcane and biodiesel from canola, soy or palm oil have become major players in renewable energy. In principle, biofuels do not increase the amount of carbon dioxide in the air, because as the plants grow they trap the CO₂ that is released when the biofuels are burned.

Still, biofuels face a great deal of criticism. Food commodities such as corn, canola and soy all yield oil, but they are expensive, require intensive agricultural practices and threaten food supplies. *Jatropha* seems to offer the benefits of biofuels without the pitfalls. The plants favor hot, dry conditions and hence are unlikely to threaten rain forests. There is no trade-off between food and fuel either, because the oil is poisonous. John Mathews, a professor of strategic management at Macquarie University in Australia, notes that many tropical developing countries have huge swaths of degraded and semiarid land that can be utilized for fuel crops. The cost of labor there is cheap, too. Biofuels made from plants such as *jatropha*, he argues, "represent the best bet for a last-ditch effort to industrialize the poor south and end poverty." He advocates large-scale plantings to aid energy independence in expanding economies such as China and India and to boost exports in the less developed countries of Africa.

Mathews's vision may be coming true. U.K. biodiesel company D1 Oils has planted 150,000 hectares of *jatropha* in Swaziland, Zambia and South Africa, as well as in India, where it is part of a joint venture. The firm plans to double its

crop sizes this year. Dutch biodiesel equipment manufacturer BioKing is developing plantings in Senegal, and the government of China has embarked on a massive project. "People aren't making much jatropha oil right now, because everyone wants seeds for planting," says Reinhard Henning, a German technology transfer consultant and expert in jatropha.

In addition to establishing plantations, jatropha boosters are starting to identify, select and propagate the best varieties for biodiesel production. Henning has found Brazilian jatropha seeds that contain 40 percent oil--about the same as canola and more than twice the 18 percent contained in soybeans. Indonesia has a dwarf variety that is especially easy to harvest.

Finding the variety best suited to particular growing conditions is crucial, explains D1 Oils agronomy director Henk Joos, because right now not much hard scientific information exists about jatropha--just lots of stories. "We know that this plant is environmentally elastic and drought-tolerant. But the aura that this is a wonder crop that you can plant in the desert and harvest gold" is a dangerous notion that threatens social and economic sustainability, Joos says, adding that jatropha needs to be managed like any other crop. He notes that at D1 Oils plantations, farmers plant in land that is as good as possible without replacing food crops, then apply first-rate farming practices: prune branches, apply manure and provide water.

But the realization that successful large-scale operations have to function like well-run farms raises the issue of competition with food crops for water and land, says agronomist Raymond Jongschaap of Wageningen University in the Netherlands. Jongschaap is spearheading one of the research projects looking for different types of jatropha with the goal of matching plants to growing conditions and maximizing oil yields. He has the most faith in small-scale efforts based on hedges or intercropping jatropha with other plants-- a method used in projects in Kenya and Madagascar, where jatropha is planted alongside vanilla.

Henning agrees that it is smart for jatropha growers to start small. Biodiesel cannot compete with current petroleum prices, which are relatively low, so jatropha would be better suited for local projects that improve rural livelihoods and basic energy services. These small projects have already started to build a framework of familiarity and expertise--in parts of Tanzania, kids learn about jatropha in school. Then, as fuel prices increase, jatropha cultivation can go to a larger scale. The wild shrub could then become a "sustainable cash crop," Joos believes, and a fuel for the future.