ISSN 2250-3153

A Project to Promote Awareness of Jatropha Plantation

Khyati K. Choksi, Devansh D. Patel, Vidhi M. Joshi, Shrenik k. shah

Department Of Civil Engineering,Shree Swami Atmanand Saraswati Insti. Of Technology-Surat.

Abstract- Since the surge of interest in renewable-energy alternatives to liquid fossil fuels hit in 2004/5, the possibility of growing Jatropha curcas for the purpose of producing biofuel has attracted the attention of investors and policy-makers worldwide. The seeds of jatropha contain non-edible oil with properties that are well suited for the production of biodiesel. Today, rural communities continue to use it for its medicinal value and for local soap production. India and many countries in Africa use the jatropha plant as a living hedge to keep out grazing livestock.

Index Terms- Jatropha Curcas; Renewable-Energy; Bio-Diesel; Liquid Fossil Fuels; rural communities

I. INTRODUCTION

In 1991, the European Community, (EC) Proposed a 90% tax reduction for the use of biofuels, including biodiesel. Today, 21 countries worldwide, produces Biodiesel. Jatropha: A Smallholder Bioenergy Crop has Potential for Pro-Poor Development. This paper provides a brief overview of biofuels, their growth drivers and their potential impacts on poor societies. It looks at how jatrophawhich originated in Central America and then spread across Africa and Asia, has become widespread throughout the tropics and subtropics. It also builds upon technical and scientific information on key issues affecting jatropha for pro-poor development that was presented during the Consultation by specialists from around the world. The review also summarizes the most recent data on the cultivation, seed harvesting and processing, uses and genetic improvement of jatropha and our visit at navsari Agriculture University.

II. ORIGIN AND SPREAD

Jatropha is believed to have been spread by Portuguese seafarers from its centre of origin in Central America and Mexico via Cape Verde and Guinea Bissau to other countries in Africa and Asia. It is now widespread throughout the tropics and sub-tropics. Until recently, jatropha had economic importance in Cape Verde. Since the first half of the nineteenth century, with its ability to grow on poor soils with low rainfall, it could be exploited for oilseed production. Cape Verde exported about 35000 tonnes of jatropha seeds per year to Lisbon. Along with Madagascar, Benin and Guinea, it also exported jatropha seeds to Marseille where oil was extracted for soap production.

III. CULTIVATION OF JATROPHA PLANT

Cultivation is uncomplicated. Jatropha curcas grows in tropical and subtropical regions. The plant can grow in wastelands and grows on almost any terrain, even on gravelly, sandy and saline soils. It can thrive in poor and stony soils, although new research suggests that the plant's ability to adapt to these poor soils is not as extensive as had been previously stated. Complete germination is achieved within 9 days. Adding manure during the germination has negative effects during that phase, but is favourable if applied after germination is achieved. It can be propagated by cuttings, which yields faster results than multiplication by seeds. The flowers only develop terminally (at the end of a stem), so a good ramification (plants presenting many branches) produces the greatest amount of fruits. The plants are self-compatible. Another productivity factor is the ratio between female and male flowers within an inflorescence; more female flowers mean more fruits. Jatropha curcas thrives on a mere 250 mm (10 in) of rain a year, and only during its first two years does it need to be watered in the closing days of the dry season. Ploughing and planting are not needed regularly, as this shrub has a life expectancy of approximately forty years.

IV. PROPAGATION AND CROP ESTABLISHMENT

Seed from high-yielding jatropha plants is not generally available, due to the fact that the out-crossing seed selected from productive plants may or may not result in high-yielding and high-quality plants. Trees capable of producing more than 2 tonnes of dry seed per ha with 30% seed oil content should be selected as source material. Cuttings of at least 30 mm diameter gave earlier and higher initial yields than plants raised from seed, although little or no yield difference was seen for later harvests. Plants are ploughing by 2 m * 2 m and 1.5 m * 1.5 m.

Fig 1 Live propagation at Navsari(Surat) Agriculture University

V. OIL EXTRACTION

Traditional oil extraction methods are highly labour intensive, requiring some 12 hours to produce one litre of oil.

The process requires roasting the seed kernels, pounding them to a paste, adding water and boiling, and then separating the oil by skimming and filtering The Bielenberg ram press (shown in Plate 15) is a hand-operated expeller designed for construction and repair by small and simply equipped workshops. It has a low work rate – one litre of oil produced per hour – and therefore is only suited to small-scale or demonstration use. A hand-operated screw press is more efficient, but maintenance and repairs become more problematic. Engine-driven expellers can have work rates of 55 litres per hour (Henning, 2008b), with about 10% of the oil produced required to fuel the diesel engine that powers the press (see Plate 16). The Sayari expeller, manufactured in Tanzania, has a work rate of 15–33 litres per hour with a 4–5 kW engine and is capable of extracting 15 litres of oil from 75 kg of seed.

VI. PROPERTIES OF JATROPHA OIL

Oil quality and consistency are important for producing biodiesel. The Physical and chemical content of jatropha oil can be extremely variable. Oil characteristics appear to be influenced by environment and genetic interaction, as are seed size, weight and oil content. The maturity of the fruits also can affect the fatty acid composition of the oil, and processing and storage further affect oil quality.

VII. CLIMATE

Jatropha grows in tropical and sub-tropical regions, with cultivation limits at 30ºN and 35ºS. It also grows in lower altitudes of 0-500 metres above sea level. Jatropha is not sensitive to day length (flowering is independent of latitude) and may flower at any time of the year While jatropha can survive with as little as 250 to 300 mm of annual rainfall, at least 600 mm are needed to flower and set fruit. The optimum rainfalls for seed production is considered between 1000 and 1500 mm. Optimum temperatures are between 20˚C and 28˚C. Very high temperatures can depress yields.

VIII. PROCESS

The process of converting vegetable oil into biodiesel fuel is called Transesterification and is luckily less complex then it sounds. Chemically, Transesterification means taking a triglyceride molecule or a complex fatty acid, neutralizing the free fatty acids, removing the glycerine, and creating an alcohol ester. This is accomplished by mixing methanol with sodium hydroxide to make sodium methoxide. This liquid is then mixed into the vegetable oil. After the mixture has settled, Glycerine is left on the bottom and methyl esters, or biodiesel is left on top and is washed and filtered. The final product Bio Diesel fuel, when used directly in a Diesel Engine will burn up to 75% cleaner then mineral oil Diesel fuel.

IX. INTERNATIONAL LAWS AND REGULATION

Several countries have active Biodiesel programmes. Such countries also have given legislative support and have drawn up national polices on biodiesel development. Wide variety of motives for action taken can observe like Increase of energy supply security Energy forms Reduction of harmful locally acting emissions. Protection of soil by biodegradable products Reduction of health hazard by using non-toxic products.

X. BIODIESEL SCENARIO IN INDIA

As India is deficient in edible oils, non-edible oil is the main choice for producing biodiesel. According to Indian government policy and Indian technology effects. Some development works have been carried out with regards to the production of tranesterified non edible oil and its use in biodiesel by units such as Indian Institute of Science, Bangalore, Tamilnadu Agriculture University Coimbatore and Kumaraguru College of Technology in association with Pan Horti consultants. Coimbatore. Generally a Blend of 5% to 20% is used in India (B5 to B20). Indian Oil Corporation has taken up Research and development work to establish the parameters of the production of tranesterified Jatropha Vegetable oil and use of bio diesel in its R&D centre at Faridabad. Research is carried out in Kumaraguru College of Technology for marginally altering the engine parameters to suit the Indian Jatropha seeds and to minimize the cost of transesterification.

XI. ADVANTAGES

- **Energy Independence:**

Considering that oil priced at $60 per barrel has had a disproportionate impact on the poorest countries, 38 of which are net importers and 25 of Which import all of their oil; the question of trying to achieve greater energy independence one day through the development of biofuels has become one of ‘when’ rather than ‘if,’ and, now on a near daily basis, a biofuels programme is being launched somewhere in the developing world.

- **Smaller Trade Deficit:**

Rather than importing other countries’ ancient natural resources, we could be using our own living resources to power our development and enhance our economies. Instead of looking to the Mideast for oil, the world could look to the tropics for biofuels. producing more biofuels will save foreign exchange and reduce energy expenditures and allow developing countries to put more of their resources into health, education and other services for their neediest citizens.

- **Economic Growth**:

Jatropha bio-diesel creates new markets for agricultural products and stimulate rural development because biofuels are generated from crops; they hold enormous potential for farmers. In the near future—especially for the two-thirds of the people in the developing world who derive their incomes from agriculture.

- **Cleaner Air:**

Biofuels burn more cleanly than gasoline and diesel. Using biofuels means producing fewer emissions of carbon monoxide, particulates, and toxic chemicals that cause

smog, aggravate respiratory and heart disease, and contribute to thousands of premature deaths each year.

- **Less Global Warming:**

Biofuels contain carbon that was taken out of the atmosphere by plants and trees as they grew. The Fossil fuels are adding huge amounts of stored carbon dioxide (CO2) to the atmosphere, where it traps the Earth's heat like a heavy blanket and causes the world to warm. Studies show that biodiesel reduces CO2 emissions to a considerable extent and in some cases all most nearly to zero.

Table 1. comparison of common diesel oil
And jatropha oil

	Diesel oil	**Jatropha oil**
density(kg/l) (15/40 °c)	0.84-0.85	0.95-0.98
Cold solidifying point (°C)	-14	2.0
Flesh pt. (°C)	80	150-240
Cetane number	47.8	51.0
Sulphur (%)	1.0-1.3	0.13

We also do the site visit of farm of jatropha plants at navsari vishwa Krushi University, navsari (Gujarat).

Fig 2. Jetropha seeds at Navsari(surat) krushi university

XII. OUR SMALL PROCESS OF EXTRACTING OIL IN LAB

Pressure needed 68 bars with piston arrangement and around 550 Gms of jatropha seeds. Extract around 0.218 litre oil!

Fig. 3 Our handmade poster for clear understanding of mechanical process of extracting oil

XIII. CHEMICAL PROCESS

Triglycerides + methanol ⟹ methyl Ester + glycerine NaOH

XIV. CONCLUSION

At the global level, there is a need for coordination of biofuel development and an international food reserve system to protect the vulnerable poor. To meet pro-poor objectives, international support for research into jatropha agronomy and genetic improvement is needed. The development of nontoxic

Varieties should be a priority. CDM methodologies and certification to support sustainable jatropha production systems need to be accessible by the rural poor. Taking advantage of the opportunity jatropha presents for rural development will require developing countries to address the policy, regulatory and public investment constraints that generally affect their agricultural development. Biofuels need to be integrated within a broader framework of investment in rural infrastructure and human capital. Here some comparison of common usage diesel and jatropha diesel (table 1). This data is makeable in our research paper.

Fig 4: oil extraction at the surface of the knife while doing experiment at home

REFERENCES

[1] Integrated Crop Management Vol. 8–2010
[2] Dr. Jadeja,Db, professor and head-aspee collage of horticulture & foresty, navsari agriculture university, navsari (gujarat)
[3] www.jatrophadiesel.org
[4] WWW.NAVOADBOARD.COM

AUTHORS

First Author – Khyati K. Choksi, B.E. civil,Shree swami atmnanad saraswati insti.of tech-surat, khyatichoksi23@gmail.com

Second Author- Denash D. Patel,B.E. civil,Shree swami atmnanad saraswati insti.of tech-surat, pdevansh32@yahoo.com
Third Author- Vidhi M. Joshi,B.E. civil,Shree swami atmnanad saraswati insti.of tech-surat, vidhi.323@gmail.com
Fourth Author- Shrenik K. Shah,B.E. civil,Shree swami atmnanad saraswati insti.of tech-surat,shahshrenik41@yahoo.co.in

Correspondence Author- Shrenik K. Shah,B.E. civil,Shree swami atmnanad saraswati insti.of tech-surat,shahshrenik41@yahoo.co.in,08690129692