

RESEARCH ARTICLE

Jatropha cultivation: A strategy for biodiesel production in India

■ SUKANTA SARKAR

SUMMARY

Jatropha grows in tropical and sub tropical regions. Jatropha oil is a possible feedstock for biodiesel production. Oil extraction can be done either mechanically or chemically. The oil can be used for lighting purposes. Soap production on a jatropha oil basis is possible with only two additional ingredients: lye and carbonate. Besides energy security and environmental benefits, jatropha offers a potential opportunity to address the issues of rural livelihoods and poverty. The objective of this paper was to study the importance of Jatropha tree for biofuel in 21st century.

Key Words : Jatropha cultivation, Biodiesel, Fuel, Oilseed, Small farmers

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Jatropha is a genus of flowering plants in the Spurge family. Most of these are native to the Americas, with 66 species found in the old World. Plants produce separate male and female flowers (Jatropha, 2016). Jatropha grows in tropical and sub tropical regions, with cultivation limits at 30°N and 35°S. It is not sensitive to day length and may flower at any time of the year (Jatropha cultivation, 2016). Production of biodiesel from oil and ethanol from sugar based resources are considered as the best substitute of diesel and gasoline, respectively in the country (Dwivedi, 2011).

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 (Choksi, 2014). It was planted on an estimated 900,000 ha around the world, 760,000 in Asia, 120,000 in Africa and perhaps 20,000 in Latin America (Soliman and He, 2015). Biodiesel refers to a diesel-equivalent, processed fuel derived from biological sources. Biodiesel fuels are attracting increasing attention worldwide as a blending component or a direct replacement for diesel fuel in vehicle engines (Demirbas, 2009).

The Jatropha plant once planted in the field starts fruiting after 2 years and continues upto 30-40 years. Jatropha can grow easily from seeds. Bold and disease free seeds from fresh collections are to be used for obtaining better germination percentage and growth performance (Punia, 2013). Production and use of bio-

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diesel are becoming an important concern across different countries of the world including India (Mathys, 2008). Besides energy security and environmental benefits, jatropha offers a potential opportunity to address the issues of rural livelihoods and poverty (Brittaine and Lutaladio, 2010).

MATERIAL AND METHODS

The paper is based on secondary information. Information are called from published sources, like as journals, books, news papers, government reports, magazines etc.

RESULTS AND DISCUSSION

In India, Jatropha is grown in almost all the state. Even so, from the perspective of water, Jatropha cultivation to provide feedstock for biodiesel production is in India considered an option for making productive use of wastelands while at least partly avoiding conflicts with downstream environmental flow requirements (Garg, 2016). Jatropha incentives in India are a part of India's goal to achieve energy independence by the year 2012. Jatropha oil is produced from the seeds of the *Jatropha curcas*, a plant that can grow in wastelands across India and the oil is considered to be an excellent source of bio-diesel (Jatropha Biodiesel in India, 2016).

In North-East India, jatropha plantation was started in 2007, mostly at small farmers' level with direct and indirect initiatives of the government and the private sector. However, adoption and expansion of jatropha plantation in the rural areas largely depend on profitability from such plantations at farmers' level (Goswami *et al.*, 2011).

Jatropha seed is a good feedstock for the bio-diesel

industry and plantation of jatropha is beneficial to poor growers in areas where there are few opportunities for alternative farming strategies and livelihood options (Freim, 2008). Researchers, policy makers and civil society organizations have been discussing the potential of biofuels as partial substitutes for fossil fuels and thereby as a simultaneous solution for climate change and rural poverty (Montobbio and Lele, 2010).

Straight jatropha oil is a possible feedstock for biodiesel production. Oil extraction can be done either mechanically or chemically. The oil can be used for lighting purposes. Soap production on a jatropha oil basis is possible with only two additional ingredients: lye and carbonate (Wahl, 2009). One of the major economic benefits that would accrue to a state from the increased use of biodiesel is the presence of a facility that creates energy from locally generated input that adds value to the state's industrial and income base (Jain *et al.*, 2011).

Economics of Jatropha biodiesel production in the biodiesel processor were developed and started with oil of Jatropha. The cost of production for the processor was around Rs. 5000 and plant age was considered approximately 10 years (Nevase, 2012). The oil yielding plant *Jatropha curcas* L. is a multipurpose and drought resistant large shrub, which is widely cultivated in the tropics as a live fence (Yadav and Krishna, 2012).

The Government of India has launched a National Biofuel Mission in the year 2003, which mandates blending of bio-diesel with high speed diesel at 5 per cent by the year 2012, 10 per cent by 2017 and 20 per cent after 2017 (Shinoj *et al.*, 2010). So the interest for cultivation of such tree will increase. Based on recommendations from the Planning Commission of India and the IOC-IR agreement, Jatropha-based biodiesel is

Table 1: Jatropha cultivation in India

State	Plantation (ha)	State	Plantation (ha)
Andhra Pradesh	355	Mizoram	500
Arunachal Pradesh	185	Meghalaya	113
Bihar	10	Maharashtra	1634
Chhattisgarh	604	Madhya Pradesh.	742
Gujarat	1129	Nagaland	440
Haryana	460	Rajasthan	176
Jharkhand	700	Tamil Nadu	464
Karnataka	374	Uttar Pradesh	779
Kerala	50	Uttarakhand	618
Manipur	250	West Bengal	100
Sikkim	100	Grand Total	10083

Source: Ministry of Agriculture, Govt. of India

poised to take an increasingly large role in the Indian transportation sector (Whitaker and Heath, 2009).

Conclusion :

Biodiesel fuel has better properties than petro diesel fuel; it is renewable, biodegradable, non-toxic, and essentially free of sulfur and aromatics. Biodiesel seems to be a realistic fuel for future. Biodiesel has the potential to economically, socially, and environmentally benefit communities as well as countries, and to contribute toward their sustainable development. The major challenges of biodiesel are its cost and limited availability of fats and oil resources. The cost of raw materials accounts for 60 to 75 per cent of the total cost of biodiesel fuel (Barua, 2011).

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