

# SIGNIFICANCE OF *JATROPHA CURCAS* OIL TO RURAL POVERTY ALLEVIATION IN NIGERIA



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## Abstract

This paper reviewed the significance of *Jatropha* oil to rural poverty alleviation in Nigeria. The oil from the seeds of this plant is edible and can also be used as biofuel in the transportation and energy sectors. The crops can be mechanically or manually harvested. The oil yield is comparable to that of soyabean without genetic improvement. *Jatropha* produces renewable energy in the form of bio diesel, which emit 8% less CO<sub>2</sub>, 100% lower SO<sub>2</sub> and has a higher flash point than fossil diesel fuel. Presently, the production of bio diesel from *Jatropha* industries are relatively very low. But, as it grows to large scale and the infrastructure is developed, the costs of producing and marketing *Jatropha* biodiesel may decline in the future. Biofuel, as alternative energy source among other key factors, has contributed to the current food crisis and debate. Access to affordable energy is essential for the reduction of poverty and economic growth. There is therefore the need for alternate energy sources as a result of the rise in oil prices, fear of future shortages and the greater awareness of climate change impacts. This will be a great boom to the development and enhancement of the quality of life. *Jatropha curcas* have positive impacts in rural areas where poor people have limited options to meet their energy needs.

**Key words:** *Jatropha* oil, rural, poverty alleviation and significance

## Introduction

In recent times, the world has been confronted with an energy crisis due to depletion of resources and increased environmental problems. This situation has led to the search for an alternative fuel that is sustainable and also environmental friendly (Barnwal and Sharma, 2005). Therefore, bio-diesel derived from plant species has been a major renewable source of energy where *Jatropha curcas* have been chosen as most potential species for varying situations. To the rural society, the crops can create regular employment opportunities, as it provides never ending marketing potential. Due to potential demand and better marketing opportunities, cultivation of *Jatropha* appears viable. *Jatropha* may not replace other important food crops since it is meant for flood free wastelands and unutilized fallow lands or less productive lands and in turn will not have a major impact on cropping pattern. Among the many species, which yield oil as a source of energy in the form of biodiesel, *Jatropha curcas* has been identified as most suitable oil seed bearing plant due to its various favourable attributes like hardy nature, short gestation period, adaptability in a wide range agro-climatic conditions, high oil recovery and quality of oil. The crop is suitable particularly for garden land situations yet less productive, no irrigation facilities. Fernandes, *et al* (2010). Besides the crop must not replace other important food crops and in turn will not have a major impact on cropping pattern. The use of *Jatropha* oil in the production of soap in rural areas gives direct benefit, where as indirectly this will help to save edible vegetable oil. The large scale cultivation of *Jatropha curcas* on wastelands with poor soils and low rainfall in drought prone areas could provide regular employment and could improve their living conditions by providing additional income. *Jatropha* is economically viable not only to the growers but also to the processors and end users. The crop can easily be raised without any difficulty the rural women can be engaged in all kinds of activities like raising seedlings, collection of seeds, dehulling, deshelling etc.

## Significance of *Jatropha Curcas* Oil to Rural Poverty Alleviation in Nigeria

As a source of bio-fuel, *Jatropha curcas* can have positive impacts in rural areas where poor people have limited options to meet their energy needs. Using *Jatropha* oil as primary household energy can help to decrease deforestation and increase energy efficiency. If combined with appropriate technologies, it can also allow sustainable, low cost, off-grid electricity generation, with the added benefits of reducing women domestic chores and increasing opportunity for rural industry and employment. Energy markets are much larger than the food markets. The emerging markets for biofuels offer an unparalleled opportunity to benefit the poor on a large scale through agriculture. In this view, *Jatropha curcas* production can be especially beneficial to poor producers living in remote areas that are far from the consumption centres, where inputs are more expensive and prices lower, making food production, non competitive. In these areas, the challenge of providing poor rural people with meaningful income generating opportunities remains largely unaddressed. The niche products that are often proposed as alternatives to the usual agricultural commodities (apiculture, medicinal and aromatic plants, etc.) have usually limited demand, long marketing chains and low producer prices. If adequate mechanisms are developed to ensure that a fair share of the value generated by *Jatropha* business goes to the

farmers, the development of *Jatropha curcas* production chains can stimulate rural economic growth through additional capital inflows, create demand for goods and services that provide employment, reduce rural-urban migration and create linkages and synergies between development actors. Economies of scale are necessary for farmers to take advantage of *Jatropha curcas* opportunity. Small scale farmers face obstacles in accessing supply chains, transporting harvests to processing plants or selling through middlemen. The creation of cooperatives or producer companies can bundle the interest of the poor, accumulate and attract capital and partnerships for the necessary investments, organize feedstock supplies in large quantities and, in turn, create a countervailing power to the larger firms operating in the energy market.

However, for several reasons, both technical and economic, the full potential of *Jatropha* is far from being realized. The growing and management is insufficiently documented and there is little experience in marketing its products. To overcome the constraints that limit the full exploitation of *Jatropha curcas* potentialities in rural poverty alleviation. These actions concern the quantification of the real yield potential of *Jatropha curcas* in the different agro-ecological regions of Nigeria, the selection and the multiplication of high yielding ecotypes adapted to the local growing conditions, the development of improved production practices suited to pure stand cultivation and intercropping systems involving *Jatropha curcas*, the quantification of cost and returns for all the steps of the *Jatropha* chain value, the development of sustainable organisational models of local production chains that can be appropriated by small-scale *Jatropha* growers in order to allow them to benefit fully of the potential of the crop, and the research of profitable outlets and marketing arrangements for *Jatropha* products. (Ariza-Montobbio *et al* 2010).

#### **Significance of *Jatropha* Products as Hedge**

*Jatropha* is an excellent hedging plant generally grown in most part of Nigeria as live fence for protection of agricultural fields against damage by livestock such as cattle and goat. In addition to seed yields, it serves the purpose of bio diesel and is well adapted to household or small-scale industrial activity.

#### **Charcoal**

In simple charcoal making, 70–80% of wood energy is lost with yield of only 30% in an industrial process, where charcoal is still one of the few simple fuel options. *Jatropha* wood is a very light wood and is not popular as a fuel wood source because it burns too rapidly. The use of press cake as a fertilizer is more valuable to increase crop production than charcoal making from it (Benge, 2006). However, the extraction of oil from *Jatropha* seeds is of much higher economic value than converting the wood to charcoal. Converting *Jatropha* seed shells into charcoal would be economically feasible, only if we have a large source of seed shells from *Jatropha* plantations. The scientist concluded that *Jatropha* wood would not be of much value for either charcoal or firewood (Benge, 2006).

#### **Medicinal Uses**

All parts of *Jatropha* (seeds, leaves and bark) have been used in traditional medicine and for veterinary purposes for a long time (Daniel and Lorna, 2007).

Some compounds (Curcacycline A) with anti tumor activities were reportedly found in this plant (VandenBerg *et al.*, 1995). Substances such as phorbol esters, which are toxic to animals and humans, have been isolated and their molluscidal, insecticidal and fungicidal properties have been demonstrated in lab-scale experiment and field trials (Nwosu and Okafor, 1995; Solsoloy and Solsoloy, 1997). The seed oil can be applied to treat eczema, pimples and skin diseases and to soothe rheumatic pain (Heller, 1996).

#### **Green Manure and Fertilizers**

Seed cake is a by-product of oil extraction. *Jatropha* seed cake contains curcin, a highly toxic protein similar to ricin in castor, making it unsuitable for animal feed. However, it does not have potential as a fertilizer or bio gas production (Staubmann *et al.*, 1997; Gubitz *et al.*, 1999), if available in large quantities; it can also be used as a fuel for steam turbines to generate electricity. The defatted meal has been found to contain a high amount of protein in the range of 50–62%, and the level of essential amino acids except lysine is higher than the FAO reference protein (Makkar *et al.*, 1998). Being rich in nitrogen, the seed cake is an excellent source of plant nutrients. In a green manure trial with maize in Nigeria, the application of fresh leaves and seed cake of physic nut biomass resulted in increase yield of maize crops (Adebisi, *et al.*, 2019). Another use of *Jatropha* seed cake is as a straight fertilizer, its properties were compared with those of other organic fertilizers with regard to nitrogen, phosphorus and potassium content.



PLATE1: Sample of *Jatropha* seed cake.

### Soap Production

The soap is said to have medicinal properties. Due to relative high production costs *Jatropha* herbal soap is not competitive with conventional soap. The glycerin that is a by-product of biodiesel can be used to make soap, and soap can be produced from *Jatropha* oil itself. In either case the process produces a soft, durable soap and its linoleic acid content in *Jatropha* kernel oil is of possible interest for skincare. Furthermore, (Goonasekera *et al.* 1995) showed that various solvent extracts of *Jatropha* have an abortive effect. The oil has a strong purgative action and is also widely used for skin diseases and to soothe pain such as that caused by rheumatism. The oil is used as a cathartic purgative and for the treatment of skin ailments (Duke, 1998). The latex itself has been found to be a strong inhibitor to water melon mosaic virus (Tewari and Shukla, 1992). The leaves and latex are used in the healing of wounds, refractory ulcers, and septic gums and as a styptic in cuts and bruises. A proteolytic enzyme (curcain) has been reported to have wound healing activity in mice (Nath and Dutta, 1997; Villegas *et al.*, 1997).



PLATE2: Samples of Medicated *Jatropha* soap.

### Non-Energy Source

It is a woody plant and, therefore, its various parts can be used for a number of purposes, especially as fuel, sticks and poles. In some countries, the live pole is used to support vines such as the vanilla plant. Bees pollinate their flowers, thus it is possible to have a papiery in association with *Jatropha* areas. A varnish can be made from the oil and the leaves could be feed stock for silk worms but not everywhere.

Recent investigations carried out all over the world have demonstrated that *Jatropha curcas* could contribute drastically to the improvement of the living conditions of rural populations in the least developed countries of our planet. *Jatropha curcas* is a multiple function hardy shrub which can be used for medicinal purpose, to prevent and/or control erosion, to reclaim land, to produce pesticides, to contain or exclude farm animals when grown as living fence and be planted as a commercial crop. The seed contains a high rate of non-edible oil that

can be used for soap making, in the cosmetic industry, as a diesel/kerosene substitute or extender and as a feedstock for agrofuel production. This latter use may be of importance when examining practical substitutes for fossil fuels to assure energy autonomy of tropical non oil producing countries and to counter greenhouse gas accumulation. Also, like all trees, *Jatropha curcas* fixes atmospheric carbon, stores it in wood and assists in the build up of soil carbon. If combined with appropriate technologies, it can also allow sustainable, low-cost, off-grid electricity generation, with the added benefits of reducing women's domestic chores and increasing opportunity for rural industry and employment. Energy markets are much larger than the food markets. The emerging markets for biofuels offer an unparalleled opportunity to benefit the poor on a large scale through agriculture. In this view, *Jatropha curcas* production can be especially beneficial to poor producers living in remote areas that are far from the consumption centres, where inputs are more expensive and prices lower, making food production, non competitive. In these areas, the challenge of providing poor rural people with meaningful income generating opportunities remains largely unaddressed. The niche products that are often proposed as alternatives to the usual agricultural commodities (apiculture, medicinal and aromatic plants, etc.) have usually limited demand, long

marketing chains and low producer prices. If adequate mechanisms are developed to ensure that a fair share of the value generated by *Jatropha* business goes to the farmers, the development of *Jatropha curcas* production chains can stimulate rural economic growth through additional capital inflows, create demand for goods and services that provide employment, reduce rural-urban migration and create linkages and synergies between development actors. (Davison, 2011).

However, for several reasons, both technical and economic, the full potential of *Jatropha* is far from being realized. The growing and management is insufficiently documented and there is little experience in marketing its products. To overcome the constraints that limit the full exploitation of *Jatropha curcas* potentialities in rural poverty alleviation.

### Conclusion

As a source of bio-fuel, *Jatropha curcas* can have positive impacts in rural areas where poor people have limited options to meet their energy needs. Using *Jatropha* oil as primary household energy can help to decrease deforestation and increase energy efficiency. The eradication of poverty requires universal access to economic opportunities that will promote sustainable livelihood and base social services. The participatory micro level poverty alleviation is probably the stepping stone towards achieving goal of poverty alleviation.

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