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# A MINI REVIEW ON PRODUCTION OF BIODIESEL FROM *JATROPHA CURCAS*

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## ABSTRACT

Biodiesel has pulled in extensive consideration amid the previous decade as a sustainable, biodegradable and non-poisonous fuel contrasting option to petroleum derivatives. Biodiesel can be gotten from vegetable oils (both consumable and non-eatable) and from creature fat. Jatropha curcas Linnaeus, a multipurpose plant, contains high measure of oil in its seeds which can be changed over to biodiesel. J. curcas is likely the most very advanced oilseed edit at present on the planet. The accessibility and supportability of adequate supplies of more affordable feedstock as vegetable oils, especially J. curcas and productive handling innovation to biodiesel will be vital determinants of conveying a focused biodiesel. Oil substance, physicochemical properties, unsaturated fat sythesis of J. curcas revealed in writing are given in this audit. The fuel properties of Jatropha biodiesel are practically identical to those of fossil diesel and affirm to the American and European benchmarks. This review provide a report on the J. curcas L. plant, the generation of biodiesel from the seed oil and research endeavors to enhance the innovation of changing over vegetable oil to biodiesel and the fuel properties of the Jatropha biodiesel. The innovative strategies that can be utilized to create biodiesel are given together their favorable circumstances and hindrances. The utilization of lipase as biotechnological answer for soluble base and corrosive catalysis of transesterification and its preferences is examined. There is have to do explore on the detoxification of the seed cake to expand the advantages from J. curcas. There is likewise need to do life-cycle appraisal and the earth effects of presenting extensive scale manors. There is likewise still a shortage of research about the impact of different development related variables and their collaborations and impact on seed yield. Numerous different zones that should be looked into on Jatropha curcas L. are brought up in this review.

**KEYWORDS:** Biodiesel, Transesterification, *Jatropha Curcas*, Fuel Properties, Vegetable Oil.

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## INTRODUCTION

Biofuels are considered to some degree, an answer for such issues as practical advancement, vitality security and a lessening of ozone harming substance discharges. Biodiesel, an ecological well disposed diesel fuel like petro-diesel in ignition properties, has gotten extensive consideration in the current past around the world. Biodiesel is a methyl or ethyl ester of unsaturated fat produced using sustainable organic assets, for example, vegetable oils (both palatable and nonedible), reused squander vegetable oil and creature fats (Demirbas, 2000; Kinney and Clemente, 2005; Wilson et al., 2005). The utilization of vegetable oils as alterative fills has been around since 1900 when the creator of the diesel motor Rudolph Diesel initially tried shelled nut oil in his pressure start motor (Shay, 1993). Nonetheless, because of modest oil based commodities such non-ordinary fuelsnever took off up to this point. Biodiesel gotten from surplus palatable oils like soybean, sunflower and rapeseed oils is as of now being utilized as a part of USA and Europe to lessen air contamination, to diminish reliance on draining petroleum derivative restricted in particular districts of the world and increments in unrefined petroleum costs (Ma and Hanna, 1999; Sarin et al., 2007; Ranganathan et al., 2008; Agarwal, 2007; Berchmans and Hirata, 2008; Foidl et al., 1996; Openshaw, 2000; Meher et al., 2006). The utilization of consumable oil to deliver biodiesel in Africa and other creating mainlands is not achievable in perspective of an enormous crevice amongst request and supply of such oils in the creating scene. There is hence, need to investigate elective non-consumable oil for use underway of biodiesel.

**Figure 1.Plant of *Jatropha curcas***

## PROCESSING TECHNIQUES

Characteristic vegetable oils and creature fats are squeezed to get raw petroleum which contains free unsaturated fats, phospholipids, sterols, water, odorants and different pollutions (Openshaw, 2000). In view of these mixes, high consistency, low unpredictability and the polyunsaturated character of the vegetable oils, they can't be utilized as fuel specifically in pressure motors (Banapurmath et al., 2008; Srivastava and Prasad, 2000). The determinations of the seed oil of J. curcas are delineated in Table 2 and the unsaturated fat arrangement of the seed oil of J. curcas is contrasted and other vegetable oils in Table 3. Jatropha seed oil has around 72% unsaturated fats with oleic corrosive predominatly taken after by lenoleic corrosive. The consistency of Jatropha oil is extensively lower than those detailed for some normal and tried oils at 30°C, for example, soybean (31cSt), cottonseed (36cSt), and sunflower (43cSt) and indicating its appropriateness for use as diesel fuel (Akintayo, 2004; Kamman and Phillip, 1985). To defeat the issues highlighted above of utilizing the vegetable oils straight forwardly, the oils require concoction change with the goal that they can coordinate the properties of fossil diesel.

The preparing methods that are for the most part used to change over vegetable oils including Jatropha oil into fuel shape are immediate utilize and mixing, pyrolysis, microemulsification and transesterification (Demirbas, 2000; Ma and Hanna, 1999; Nwafor, 2003). In spite of the fact that creation of biodiesel is a develop innovation, there is still a considerable measure continuous research to enhance the quality and yield of the biodiesel from vegetable oils.

## DIRECT USE AND BLENDING

In 1900 Dr Diesel showed his motor running on 100% shelled nut oil at World Exhibition in Paris. Caterpillar (Brazil) in 1980 utilized pre-ignition chamber motors with a blend of 10% vegetable oil to keep up aggregate power with no adjustments to the motor (Agarwal, 2007). A blend of degummed soybean oil and No. 2 diesel fuel in the proportion 1:2 did not bring about greasing up oil thickening and gelling dissimilar to a 1:1 proportion when tried for motor execution and crankcase oil thickness in a John Deere 6-barrel, 6.6 L dislodging, coordinate infusion, turbo charged for an aggregate 600 h (Adams et al., 1983). Pramanik et al. (2003) found that half mix of Jatropha oil could be utilized as a part of diesel motor with no major operational troubles yet additionally study is required on the long haul impact on motor. Be that as it may, coordinate utilization of vegetable oils and their mixes have for the most part been thought to be unsuitable and hard to use in both immediate and roundabout diesel motors. The undeniable issues are the high consistency, corrosive structure, free unsaturated fat substance, and in addition gum arrangement because of oxidation, polymerisation amid capacity and ignition, oil ring staying, carbon stores and thickening or gelling of greasing up oil and different issues (Ma and Hanna, 1999; Agarwal, 2007; Meher et al., 2006; Engler et al., 1983; Nath and Dutta, 1989; Peterson, 1986).

## FUEL PROPERTIES OF *JATROPHA* BIODIESEL

The fuel properties of Jatropha biodiesel are outlined in Table 1. Jatropha biodiesel has practically identical properties with those of fossil biodiesel and complies with the most recent principles for biodiesel.

Institutionalization is an essential for effective market presentation and infiltration by biodiesel, and numerous nations including Austria, Germany (DIN), Italy, France, United States (AST D) have characterized measures for biodiesel.

 

**Table 1.Comparison of the different technologies to produce biodiesel**

| Variable | Alkali catalysis | Acid catalysis | Lipase catalysis |
|---|---|---|---|
| Reaction temp (°C) | 60-70 | 55-80 | 30-40 |
| Free fatty acid in raw materials | Saponified products | Esters | Methyl esters |
| Water in raw materials | Interference with reaction | Interference with reaction | No influence |
| Yields of methyl esters | Normal | Normal | Higher |
| Recovery of glycerol | Difficult | Difficult | Ease |
| Purification of methyl esters | Repeated washing | Repeated washing | None |
| Production cost of catalyst | Cheap | Cheap | Relatively expensive |

## APPLICATIONS OF BIODIESEL IN COMBUSTION ENGINES

The properties of Jatropha oil, Jatropha biodiesel and fossil diesel are thought about in Table 2. The high thickness of vegetable oils prompts issues in pumping and splash attributes when utilized as a part of burning motors. The most ideal approach to utilize the vegetable oils as fuel in pressure start motors is to change over it into biodiesel. Biodiesel can be mixed in different extents with fossil diesel to create a biodiesel mix or can be utilized as a part of its immaculate shape. It can be utilized as a part of pressure start motors with almost no or no motor adjustments since it has properties like mineral diesel (Banapurmath et al., 2008; Devanesan et al., 2007).

**Table 2.Fuel properties of *Jatropha* oil, *Jatropha* biodiesel and fossil diesel (Kamman and Phillip, 1985; Matsumoto et al., 2001; Ban et al., 2001)**

| Property | *J.* oil | *J.* biodiesel | Diesel | Biodiesel standards | |
|---|---|---|---|---|---|
| | | | | AST D 6751-02 | DIN EN 14214 |
| Density (15°C, $kgm^{-3}$) | 940 | 880 | 850 | – | 860-900 |
| Viscosity ($mm^2s^{-1}$) | 24.5 | 4.8 | 2.6 | 1.9-6.0 | 3.5-5.0 |
| Flash point (°C) | 225 | 135 | 68 | >130 | >120 |
| Pour point (°C) | 4 | 2 | −20 | – | – |
| Water content (%) | 1.4 | 0.025 | 0.02 | <0.03 | <0.05 |
| Ash content (%) | 0.8 | 0.012 | 0.01 | <0.02 | <0.02 |
| Carbon residue (%) | 1.0 | 0.20 | 0.17 | – | <0.30 |
| Acid value ($mgKOHg^{-1}$) | 28.0 | 0.40 | – | <0.80 | <0.50 |
| Calorific value ($MJkg^{-1}$) | 38.65 | 39.23 | 42 | – | – |

Vegetable oils offer nearly a similar power yield with marginally bring down warm effectiveness when utilized as a part of diesel motors (Makkar et al., 1997; Pramanik, 2003; Agarwal and Agarwal, 2007; Tiwari et al., 2007). Notwithstanding, Banapurmath et al. (2008) announced that contrasted with the fossil diesel operation, biodiesel from Pongamia pinnata (Honge oil), J. curcas, Hevea brasiliensis (elastic) and Calophyllum inophyllum brought about poor execution related with higher discharges, yet in general it was seen that operation of the motor was smooth and existing motors could be worked with the biodiesel with no significant alteration.

 