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SCREENING FOR THE POTENTIAL BIOACTIVITIES OF *JATROPHA CURCAS*

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***Abstract*— The potential use of *Jatropha curcas L* was investigated by taking dried seeds. Seeds were then crushed, and oil was extracted using Rota evaporator apparatus from kernel seeds. The phytochemical screening of the oil shows the presence of some bioactive compounds like Antioxidants, Flavanoids, tannins etc. By Tran's esterification methods, we observe good amount of biodiesel by using methanol, KOH and ultra-sonication at lesser reaction time. In addition to these, In the present study the seedcake were obtained after extraction and it was analyzed to know its coagulation properties.**

***Keywords*— Alkaloids, *Jatropha curcas*, Rota Evaporator, Transesterification.**

I. INTRODUCTION

The fuels used in the industry and petroleum products produces high amounts of harmful gases like carbonmonooxide, nitrogen dioxide, chlorine etc that which causes air pollution and it also causes severe illness to living organisms. Several fuels are used in day to day activities i.e.; in shipping purposes etc. The presences of carbon and Hydrogen in fuel amalgamate with air where combustion takes place and liberates heat. From last 50 years there is a rapid increase in the release of toxic substances released into the environment by burning Fossil fuels produces high amount of oxides like sulphur and nitrogen.

At present there is an urgent need of replacing these harmful fuels with Biofuels to reduce the environmental pollution. Therefore in these current study showed that *Jatropha curcas L* plays vital role in producing Biodiesel which has many advantages like ecofriendly, easily available and sustainable. The vegetable oils which extracted from *Jatropha curcas L* used as a fuels in engines which is high in viscosity acts as a alternative Biofuel. The extraction and manufacturing of Biodiesel from *Jatropha curcas L* is inexpensive, and nonedible and belongs to the family Euphorbiaceae.B100 is a pure Biodiesel used in any kind of petroleum engines for transportation Being a viable source, it is gaining attention all over the world today. Biodiesel was registered with U.S. Environmental protection Agency as a fuel under section 211(b) of clean Air Act, with the help of American Society of Testing And Materials (ASTM).(Nazar J., Ramesh A. and Nagalingam B.(2009) done Experimental Investigation on the Use of Vegetable Oil extracted from Jatropha curcas L in a performance Diesel Engine when used as a primary fuel in a ignition engine.

Benefits of biodiesel

The main benefit of Biodiesel extracted from *Jatropha curcas L* is carbon neutral Biodiesel is rapidly biodegradable and completely non-toxic, meaning spillages represent far less of a risk than fossil diesel spillages. Biodiesel has a higher flash point than fossil diesel and so is safer in the event of a crash.

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Crop	*Kg oil/ha*	Liters oil/ha	US gal/acre	Oil Content
Castor beans	*1188*	1413	151	50% - 55%
Coconut	*2260*	2689	287	70%
Corn (maize)	*145*	172	18	12%
Cotton	*273*	325	35	13% - 15%
Jatropha	*1590*	1892	202	30% - 35%
Palm oil	*5000*	5950	635	35%
Peanuts	*890*	1059	113	36%
Rapeseed	*1000*	1190	127	37%
Soybean	*375*	446	48	15%

ADVANTAGES OF BIODIESEL:

1. Produced from sustainable / renewable biological sources.
2. Eco-friendly and oxygenated fuel.
3. Sulphur free, less Carbon (CO) and HC, particulate matter and aromatic compound emissions. "Dennis et al. (2016)
4. Income to rural community.
5. Biodiesel provides better engine lubrication than Low Sulphur Petro diesel.

The process of Extracting oils from jatropha is as
Cultivation of Jatropha Curcuas L plants
Isolation of oils from seeds,
Refining
Transesterification

BOTANICAL FEATURES

Leaves: Five lobed with spiral Phyllotaxis

Flowers: Male and female flowers are produced, Petiole length ranges from 6.1 to 23.1 nm.plant is monoecious and occasionally these are hermaphroditic.

Fruits: Fruits are produced during winter seasons some plants produced fruits throughout the season and some produces 2to 3 times in a year

Seeds: Seeds are mature when capsule changes from green to Yellow. They yield 25%to 40% oil by weight and it also contain curcasin, Palmitic acids etc.

Genome: The whole genome was sequenced by *Kazusa DNA Research Institute*, Chiba Japan in October 2010.

Jatropha Curcas plants have the following unique qualitiesApproximately 33% of oil yield Fast Growth and Low Maintenance It has great Durability which is more than 45 yearsPer acre yield of 3.6 metric tons of fruits in the first three years and multiply after the third year. Transesterification process takes place in order to produce high quality of Biodiesel .In pilot Biodiesel Jatropha oil is blended with alcohol for transesterification reaction, the process is done under specific duration with reaction temperature and with vigorous agitation. After the reaction taken place the glycerol is mixed with the fuel in settling tank. The fuel is collected and washed to get pure Biodiesel. The fuel properties *of jatropha* biodiesel produced in the pilot plant are given in the shows the feedstock for biodiesel production and their physicochemical properties. "Gubitz et al. (2016)

MEDICINAL PROPERTIES

- Jatropha is used for diseases like cancer, piles, snakebite, paralysis, dropsy etc.
- Jatropha 1-2 roasted seeds are reported to act as a purgative but larger doses may be dangerous. The seeds have been substituted for castor oil and are sometimes called 'larger castor oil'. The oil is widely used for skin diseases and to soothe pain such as that caused by rheumatism.

ALTERNATIVE TO PETROLEUM DIESEL

There are a number of varieties of Jatropha. Best among these is Jatropha curcas as it yields oil bearing seeds. Some of the others are
Jatropha curcas (nontoxic)
Jatropha curcas x Jatropha integrerrima
Jatropha gossypifolia

The chemical properties of jatropha oil are given below

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Item	Value
Acid Value	**38.2**
Saponification Value	**195.0**
Iodine Value	**101.7**
Viscosity(at 31^{0}C), Centistokes	**40.4**

II. MATERIALS AND METHODS

A. Sample Preparation

About 100gms of Jatropha seeds were taken from the garden in Vijayawada and were grounded with the help of mortar and pestle to make the fine powder.
Extraction of oils from *Jatropha curcuras L*

Materials

1. Jatropha seeds powder
2. 95% Hexane.

Procedure

About 50gms of Jatropha seed powder was taken and transferred to the Rota evaporator and 350ml of 95% hexane was added. The oil was extracted by rotaevoporation at boiling point.
The operation of channel separation is applied on the watermarked color image to generate its sub images, and then 2-level discrete wavelet transform is applied on the sub images to generate the approximate coefficients and detail coefficients.

B. PHYTOCHEMICAL SCREENING

1. Seed sample

A. TEST FOR TANNINS

The extract taken in water and it should be warm and filtered. Nearly 50ml of filtrate was allowed to react with 1% of ferric chloride solution. About 3gms of extracted seed powder was dissolve in 15ml of distilled water and allowed to soak for at least one hour and then the sample was collected .This was filtered and then subjected to phytochemical test as test 1 sample .
Oil obtained by extraction from seeds is considered as test 2 sample for analysis

MATERIALS

1. Chloroform
2. Concentrated sulphuric acid
3. Alpha-naphthol alcoholic solution:10gms alpha naphthol dissolved in 100ml ethanol.
4. Ferric chloride solution 5%: 5gms in 100ml distilled water.
5. Iodine solution: 29g potassium iodide and 10g iodine crystals in 100ml of water.

B. TEST FOR STEROLS (SALKOWASKI TEST)

Take 1 ml of extract and dissolve it in 2ml of chloroform and then add 2ml of conc. sulphuric acid from the sides of test tube. Now test tubes was shaken for few minutes

C. TEST FOR GLYCOSIDE

Take 1 ml of extract and then add 2ml of methanol. To this add alphanaptholalcoholic solution into the test-tube.

D. TEST FOR SUGAR

Small quantity of extract was dissolved in 4ml of distilled water and filtrate was subject to iodine test.

E. TEST FOR SAPONINS

1ml of extract was diluted with distilled water to 20ml and shake in for 15 minutes

F. Tran's esterification

It is a process where fats/alcohol reacts chemically in presence of sodium or potassium hydroxide which acts as a catalyst

1. **TRANSESTERFICATION PROCEDURE**

2 types of methodology were implemented for transesterification

1) About 0.5gms of NaOH pellets was weighed and to make a fine powder. To 50ml of extracted oil NaOH powder was added and dissolved. After dissolving the NaOH, the solution was undergone ultra sonication for 3-4 hours.

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2) About 50ml of extracted oil was mixed with 200ml of methanol and mixed thoroughly and allowed to ultra sonication.

2. After a few hours the solutions were separated by the influence of sound waves.After the transesterification process is completed , the mixture is allowed to settle down for 5 min. The product formed during transesterification was separated after vigorous shaking using a separator flask. The bottom layer consists of Glycerin and upper layer consists of biodiesel.

C. ANALYSIS OF BIODIESEL AND GLYCERIN PROPERTIES

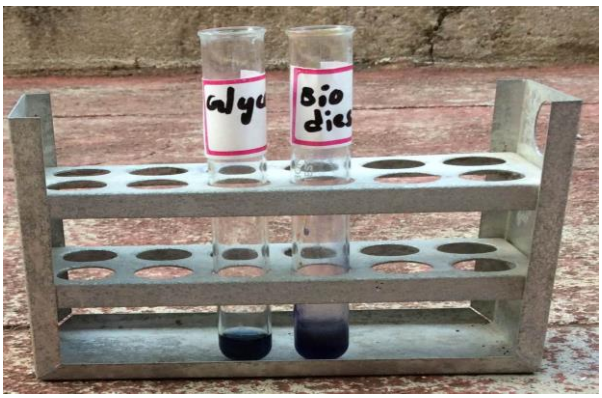
1. **pH**

After separation of biodiesel from the glycerin, the pH was checked with the help of universal indicator or litmus paper by taking 1ml of biodiesel and 1ml of universal indicator.

To 1ml of glycerin and 1ml of universal indicator.

2. **Freezing point:**

The two fractions were refrigerated to analyze their property at freezing condition.



D. PREPARATION OF SEED EXTRACT AND COAGULATION ACTIVITY ANALYSIS

The remaining seed powder after extracting the oil called as seed cake was taken and 5% suspension was made by soaking in water for 2 hours. The sample was undergone centrifugation for 10min at 5000rpm.The insoluble materials and the supernatant was separated after centrifugation and the resulting supernatant was collected in a separate test tube. This was considered as test sample.

Two samples were considered for the analysis of coagulation activity by the seed cake extract

1) Rain water and
2) Sand water.

About 200µl of extract was added to 1800µl of rain water to this solution was made up to the volume of 2ml. The absorbance was measured with the calorimeter for every 30 minutes time interval.

After the heat treatment:

The extract was heated for 10mins and then coagulation activity was tested. The same process was repeated again after heat treatment and finally the absorbance was measured for every 30 minute.

III. RESULTS AND DISCUSSION

1. PHYTOCHEMICAL SCREENING

The phytochemical tests for Jatropha oil extract

TABLE 1.

TESTS	**Jatropha oil extract (Test 1)**	**Jatropha Seed extract (Test 2)**	**Distilled water (control)**
Test of	_	+	_

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Sterols			
Test of Glycoside	–	–	–
Test of Tannin	–	–	–
Test of Sugar	+	–	–
Test of Saponin	–	–	–

The phytochemical analysis results in the observation of, the absence of flavanoids in the oil and the presence of sterols in seed cake.

2. PROPERTIES OF EXTRACTED OIL

Yield: The percentage yield of oil from seed is 50%.

pH: Using universal indicator the pH was found to be basic indicating its low acidic nature.

State: Fluid at room temperate and freezing condition.

3. PROPERTIES AFTER TRANSESTERIFICATION OF OIL

A. Biodiesel: Methyl esters

Yield: The percentage yield of oil from seed is 40%

pH: Using universal indicator the pH was found to be basic.
State: Fluid at room temperate.

B. Glycerin

Yield: The percentage yield of oil from seed is 60%.

1. pH
Using universal indicator the pH was found to be basic.

2. State
Gel at room temperate.

4. COAGULATION ACTIVITY OF SEED CAKE

TABLE 2. Sample 1/ rain water

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RAIN WATER	ABSORBANCE	TIME
BLANK	0.00	3:16
1	0.15	3:16
2	0.15	3:46
3	0.11	4:16
4	0.11	4:46

Graph 1

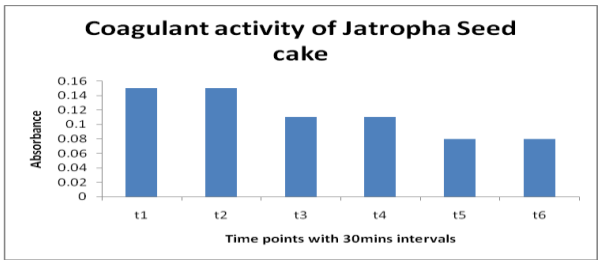
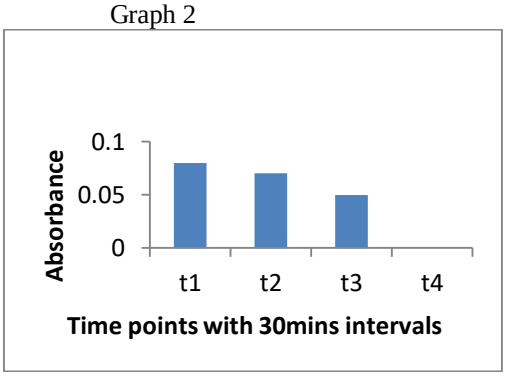


Table 3. Sample 2/ Sand water

SAND WATER	ABSORBANCE	TIME
BLANK	0.00	5:30
1	0.08	5:30
2	0.07	6:00
3	0.05	6:30
4	0.00	7:00

Graph 2



5. ANALYSIS FOR TEMPERATURE STABILITY OF COAGULANT PROPERTY

TABLE-4. Sample 3/ rain water

RAIN WATER	ABSORBANCE	TIME
BLANK	*0.00*	12:00
1	0.04	12:00
2	0.02	12:30
3	0.01	1:00
4	-0.01	1:30

Graph -3

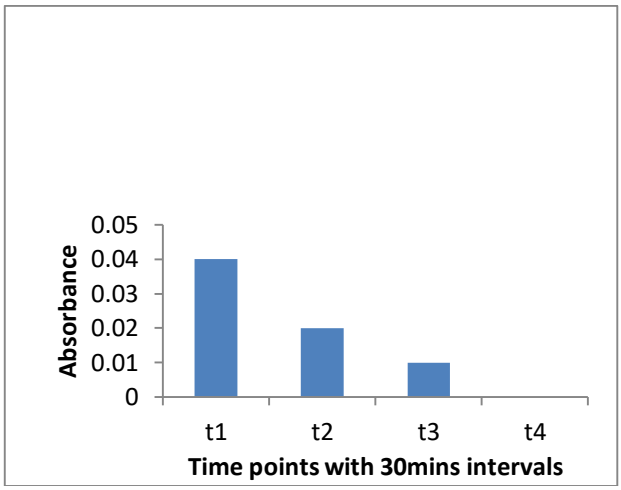
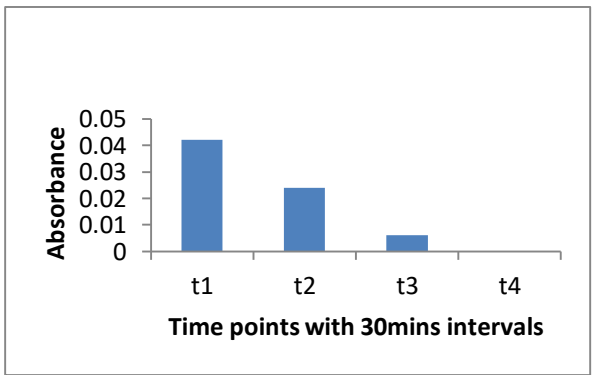


TABLE 5. Sample 4/ Sand water

SAND WATER	*ABSORBANCE*	*TIME*
BLANK	0.23	2:30
1	0.42	2:30
2	0.24	3:00
3	0.06	3:30
4	-0.03	4:00

Graph 4



From above analysis, the Seed cake is found to have the property of coagulation which is thermo stable. The property could be due to the sterol component in the seed cake extract which is evident in the phytochemical screening.

IV. CONCLUSION

The present study helped in the production of biodiesel from *Jatropha curcuas L* seeds with less time reaction time using catalyst, solvent and ultra sonication and Transesterification process. The chemical properties of biodiesel produced to be further analyzed. And also the potential coagulant activity of seed cake was also proved which is to be further analyzed for the pure component for the activity

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