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Full Length Research Paper

A Tropical Oil Seed Plant *Jatropha curcas* in Shimoga District, Karnataka

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Abstract
Jatropha curcas is a multipurpose plant with many attributes and considerable potential. It is a tropical plant that can be grown in low to high rainfall areas and can be used to reclaim land, as a hedge and/or as a commercial crop. Thus, growing it could provide employment, improve the environment and enhance the quality of rural life. The establishment, management and productivity of *Jatropha* under various climatic conditions. The development of *Jatropha curcas* as a possible energy crop in India an alternative fuel produced from domestic, renewable resources and it can be blended at any level with petroleum diesel to create a biodiesel blend and can be used in compression ignition (diesel) engines with no major modifications. The oil obtained from the seeds of *Jatropha Curcas* holds promise as fuel used as alternative for diesel. These have a variety of uses, but the economic exploitation of these plants has remained neglected for long time. Survey of *Jatropha Curcas* plant species at the study area was conducted during April 2010-Oct.2010 to know the density of the species and impact of morphological characteristics on the yield efficiency of the species.

Key words: *Biofuels, Jatropha Curcas, Economy, Petroleum Products, Rural Employment*

Introduction

All countries of the world, including those with surplus energy, are banking upon vegetable oil as an alternative source of energy by way of biodiesel. Developing countries cannot afford to utilize edible vegetable oil or even used vegetable oil. However, many of these countries, like India, have large tracts of wastelands and a tropical climate. The oil extracted from plants such as *Jatropha*, *Pongamia*, etc., can be processed onto bio fuel. In fact, *Jatropha* is very hardy plant that grows well in semi arid conditions and is not browsed by cattle or attacked by pests. The process involved in producing bio fuel from these plants can generate employment especially in the rural area. (Source www.biospectrumindia.com). Indian economy is one of the fastest growing economies in the world and the energy demand is growing at state if 4.6% every year. (IEA 2001; Planning commission 2003). The transport sector has witnessed a rapid surge in energy demand, diesel, petrol, and compressed natural; gas are main fuels used on the transport sector. In 2007/08. 70% of the country's crude oil requirement was met by importing 18.36 billion dollar worth of crude oil . as this rate, the country would require 5.8 million barrels oil /day by 2030, of which more than 94% will be met through oil imports (EIA 2001). Extreme dependence on petroleum as a primary energy source entails considerable risks, both from energy security as well as the environmental point of view. In this context, biodiesel emerges as an important alternative transport fuel. Globally, among all biofuels, is already being produced at a fair scale. Global biodiesel production during 2005 is estimated to be 41 million kilolitres. Of which about 70% is used as fuel (Shete 2005). Majority of the production and consumption takes place in Brazil and USA.

Biodiesel has many advantages over petroleum diesel. Biodiesel operates in compression ignition engines just like petroleum diesel. It requires no engine modification and increases engine life. It is biodegradable and non-toxic. Biofuel have a prominent role in environmental protection and poverty reduction, presently energy security can be achieved by shift towards renewable. Biofuel play a key role in this regard. According to an estimate Asian countries would drive the future energy demand, but the insufficient policy guidelines have hampered the adaptation of biodiesel as a viable alternative (Ram Mohan.. et.al.,2006).

The renewable liquid fuel produced from biological raw material is a good substitute for petroleum diesel. It is gaining worldwide acceptance as an environment- friendly solution to the energy problem. It is an accepted option for achieving energy security, reduction in imports, rural employment, and for improving the agricultural economy. Biodiesel results in substantial reduction of unburnt hydrocarbons, carbon monoxide and particulate mater. The IOCL (Indian oil corporation Ltd) reported that the maintenance cost of vehicles run on biodiesel has no sulphur and very little aromatic hydrocarbons, and has about 10% built in oxygen that helps it to burn freely. A higher cetane number improves the combustion.

Study Area

Shimoga, a place known for its scenic beauty, flush green lush forests, eye-catching waterfalls, cool climate is situated in the Malnad region bounded by Sahyadri Ghats at an mean elevation of 640 AMSL in the western part of Karnataka. Shimoga is situated between 13o27' and 14o39' north latitude and 74o38' and 76o4' east longitude. The district is spread over an area of 1058,000 Hectares with a forest area of 327,000 Hectares. The eastern part of district comes under the semi-malnad zone with plain topography and occasional chains of hills covered with
semi-deciduous vegetation.

Fig: 1 Location Map of Study Area showing Sampling Staions

Shimoga district is rich in flora and fauna, the dense forest and green shrub jungles are main producers of sandalwood, rosewood, teak and other exotic timber. The other important trees found around the district with rich yields. Shimoga farmers are feeding the people of Shimoga and other districts of Karnataka by producing good quality paddy, coconut, Ragi, Pepper, Areca and Sugarcane.

Four sampling sites were selected from all over the Shimoga district The sampling sites are located on a study map (fig.1).

Seed Sources

For the present study seeds were collected from the four regions that is Sagar, Thirthalli, Sorobha and Bhadravathi area of Shimoga. The physiologic, Physiographic and climatic conditions of the places where seeds are collected are given in Table-1

Study Sites	Soil type	Annual rainfall (mm)	Temperature (^{0} C)
Sagar	Red Soil	1200	20-30
Thirthalli	Loamy soil	1100	20-30
Sorabha	Red & Black	955	24-32
Bhadravathi	Black soil	700	26-34

Note : * Average Temperature during April 2009-Oct.2010

Description of tested plants

There are many tree species which bear seeds rich in oil having properties of excellent fuel and which can be possesses into diesel substitute. In Karnataka the important commercial non-edible oil yielding plants are, *Pongamia pinnata, Jatropha curcas , Azadirachta indica, Madhuca longifolia ,Schlichera oleosa, Garcinia indica , Calophyllum inophyllum* and manymore. The oil obtained from such seeds is chiefly used for manufacture of soaps, candles, paints, varnishes, linoleum, and lighting for medicinal purposes. Among the various oil yielding plants *Jatropha curcas* were selected for the study. The detailed description of the plants are as follows :

Jatropha curcas

Family - Euphorbiaceae
English - Purging Nut, Physic nut
Hindi - Bagberenda
Kannada - Adalu haralu, Kaadu Haralu

The study was conducted by selecting 4 sites of Sagar, Thirthalli, Bhadravathi and Sorabha area Shimoga dist (see fig:1). The survey was conducted in the months of April 2010-Oct.2010. In each location, mature pods from healthy seeds were collected. The pods were sun-dried and split longitudinally for separating the seeds. From each location 50 seeds were selected at random and their length, breadth and thickness were measured. Seed weight was determined with a sample of 60 seeds. Number of pods and seeds per kg and recovery percentage were also calculated and the moisture was estimated by a low constant temperature method. The seedlings were dried in a hot air oven at 90^0 C for 24 hours and the dry weights were determined. The data were analyzed for standard deviation.

Results and Discussion

Seed weight was highest in Sagar seeds followed by Thirthalli and Sorabha while the lowest was in seeds of Bhadravathi. Seed length, breadth and thickness were also higher in Sagar and lower in Bhadravathi seeds. Later, the generated data pertaining to girth, height and canopy were correlated with yield. The height & yield is significant in seeds of site-1and 2, but it is insignificant in seeds of site-3 &4. The number of seeds per kg was highest in Sagar, lowest in Bhadravathi. The differences in weight, length, breadth, thickness and number per kg of the seeds were substantial among the different seed lots. Similar seed morphological observations have been made by Athaya (1985). Moisture content varied significantly among the seeds and it varied from 1.2 % to 0.7% in Sagar to

Bhadravathi (table-2). The highest germination percentage and vigor index were observed in seeds collected from Sagar while the lowest was in Bhadravathi seeds. Large seeds may have more food required for vigorous early growth of seedlings. The seeds in the present study showed wide variation in seed germination. This type of variation is depends on the topography and soil type of the study area. The highest yield was noticed in Sagar site, because the rainfall of this area is higher than the other sites. Bhadravathi site having lowest seeds weight, because this study site receiving lees amount of rainfall compare to other study sites. It is concluded that this *Jatropha curcas* is grow well in rainfall areas than that of drier zones.

Table-2. Variation in physical characteristics of *Jatropha curcas* seeds.

Location	Seed length (mm)	Seed breadth (mm)	Seed Thickness (mm)
Sagar	1.88	1.4	1,2
Thirthalli	1.76	1.2	1.0
Sorabha	1.66	1.0	0.9
Bhadravathi	1.53	0.8	0.7

References

Allen, O.N and Allen E.K. 1981. The Leguminosae The University of Wiscons in press 812 pp

Anon, 1986. The useful plants of India. Publications and Information's directorate, C.S.I.R, New Delhi, India.

Athaya, C.D. 1985. Ecological studies of some forest tree seeds. Seed morphology. Indian. J. For., 8:33-36.

C.S.I.R, 1948-1976. the Wealth of India. 11 vols. New-Delhi.

C.S.I.R, 1976. Pongamea pinnata Pierre. Wealth of India, Raw materials, 8:206-211.

Dutta A.C, 1970. Botany for Degree students. Oxford University press, London.240 pp.

Kackar, N.L.Solanki, K.R. and Jindal, S.K. (1986). Variation in fruit and seed characters of Prosopis cineraria (L) Mac bride in Thar Desert . Indian J. For., 9:113-115.

Ponnammal, N., M.C. Arjuna, T. Gunamani and K.A. Antony. 1993. Germination and seedling growth of Azadaricta indica A., Juss. J.Tree Sci., 12:65-68.

R.A.Khimani,B.N.Satodiya and R.G.Yadav. 2003. Cultivation Aspects of *Jatropha* : An overview. Proceeding of the National work shop on Jatropha and other oil seeds held at Pune, India.

Ram Mohan., M.P., Thomas Phillippe.G.T and Shiju.M.V., (2006) Biofuels laws in Asia: instruments for energy access, security, Environmental protection and rural empowerment , Asian Biotechnology and Developmental review. Vol- 8(2), , pp-51-75.

Shete N.2005; biofuel development unit; bio resource technology an international conference on Biofuels 2012; vision to reality, New delhi, October 17-18 2005, organized by TERI.

Standards and Warranties,. National Biodiesel Board Web Page, http://www.biodiesel.org/resources/fuelfactsheets/standards_and_warranties.shtm, Accessed on November 3, 2003.