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PHYSICAL PROPERTIES OF DIFFERENT TREATED SEED SAMPLES OF *JATROPHA CURCAS*

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Abstract

The *Jatropha curcas*seed from different treated samples was conducted to investigate the physical properties of the different *Jatropha curcas*seed treated like control (T_1), chemical fertilizer (T_2) and organic manure (T_3). The effect of the *Jatropha curcas* seed individual physicalproperties indicate that the unit mass, length, width and volumeof jatrophacurcas seeds and kernels were measured. The results reveal that there are significant chemical properties to *Jatropha curcas*andit's also sufficient to development ofseedsfor biodiesel production.

Key words: *Jatropha curcas*; Seed; physical properties; Biodiesel

1. Introduction

Plants have been an important source of medicines for thousands of years. The World Health Organization estimates that up to 80 percent of people still rely mainly on traditional remedies such as herbs for their medicines (Leena *et al.,* 2003).There are thousands of species of medicinal plants used globally for the cure of different infections and they are recommended for treating various diseases (Syed Ismail et al., 2002, Arekemase et al., 2011).

Jatropha curcas is a shrub belonging to the Euphorbiaceae family. It is cultivated in central and South America, South East Asia, India and Africa (Gubitz*et al.,* 1999; Archana *et al.,* 2011). Jatropha comes from the Greek words jatrós meaning medical and trophé meaning food (FHIA, 2008).It is a poisonous, semi evergreen shrub or small tree, reaching a height of 6 m, 20 ft (Janick et al., 2008). It is an ornamental plant which is also employed to cure various infections in traditional medicine (Arekemase*et al.,* 2011). The knowledge of physical and chemical properties of agricultural products is very essential for the design of suitable machines and equipment for the production, handling, processing and storage of these products (Idowu*et al.,* 2012). For biodiesel, physico chemical properties are a set of property specifications measured by specific American Society for Testing and Material (ASTM). Jatropha curcas is one of the non-edible oil expanded widely in many countries such as South East Asia (Indonesia, Malaysia and Thailand), India, Pakistan and Africa. Among the various non edible feedstock's, jatrophacurcas has been found more suitable for biodiesel production and it a substitute for petrol diesel besides edible oil (palm oil and soyabean oil).Physical, mechanical and chemical properties of seed and kernel are needed for the design of equipment to handle, transport, process, store and assessing the product quality [1, 9, 10].The knowledge of physical properties of agricultural products is very essential for the design of suitable machines and equipment for the production, handling, processing and storage of these products. The objective of this study is to determine the design related physical properties of

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*Jatropha curcas*found. These parameters will be useful in designing equipment for production, handling, processing and storage of the *Jatropha curcas*.

2. Materials and Methods

2.1. Collection and preparation of Jatropha curcas seed samples

The seeds of *Jatropha curcas* were collected from Department of Agronomy, Faculty of Agriculture, Annamalai University, TamilNadu. Three different treated samples Control (T_1), Chemical fertilizer (T_2), Organic manure (T_3) seed were separated (Fig.1.). This work was carried out in the Department of Mechanical Engineering Laboratory, Annamalai University.

Fig.1. Different treatment samples of *Jatropha curcus*seeds.

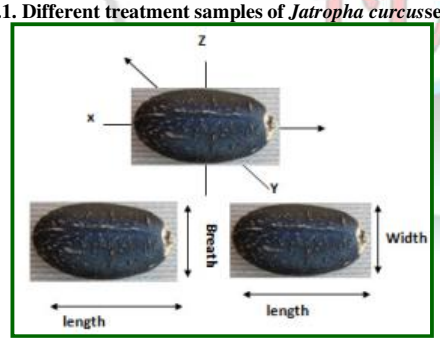

Fig.2: Three major dimensions of a jatrophacurcas seed

3. Results and Discussions

The present investigation aims to assess the status of *Jatropha curcas* seed samples. The physical properties of different treated Control (T_1), Chemical fertilizer (T_2) and Organic manure (T_3)*Jatropha curcas* seed had been investigated by various methods were studied such as unit mass, length, width and volumevalues were estimated respectively.The geometrical characteristics the different treated seed samples are presented in Table 1.

Geometrical dimensions namely length (x), width (y) and breadth (z) of jatrophacurcas seeds were measured with a digital Vernier caliper with an accuracy of ± 0.01 cm.

Table-1: Physical properties of *J.Curcas* seed

Parameter	Treatments		
	T1	T2	T3
Unit mass (mg)	0.26±0.055	0.45±0.042	0.6±0.060
Length (mm)	15.20±1.21	16.95±1.02	17.75±0.85
Width (mm)	10.27±0.73	10.73±0.59	11.5±0.440
Volume, Vu (cm^3)	0.69±0.011	0.80±0.019	0.90±0.010

From the Table 1, it is seen that unit mass of a seed is around 0.26±0.055-0.6±0.060 mg for all the three treated samples. Among them, the sample T3 shows the higher value of the unit mass and T1 shows the lower value of unit mass and the sample T2 shows a moderate value of unit mass. It is seen that the seed length is around 15.20 ± 1.21-17.75±0.85 mm for all the three treated samples. The seed length of the chemical fertilizer treated sample (T2) is 16.20 ± 1.02 mm and that of the organic manure (T3) treated sample is 17.75 ±0.85 mm.

It is observed from that seed width is around 10.27±0.73-11.5± 0.440 mm for all the three treated samples. Among them, the sample T3 shows a higher value of width and the sample T1 shows the lower value of width. It is seen that seed volume is around 0.69 ± 0.011-0.90±0.010 (cm^3) for all the three treated samples. Results show that the sample T3 shows a higher value of volume 0.90±0.010 cm3 and the sample T1 shows the lower value of 0.69±0.011 and the sample T2 shows a moderate value of `0.80±0.019 cm3.

It is observed from the results that the unit mass of a kernel of jatrophacurcas

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is around 0.13-0.36 mg for all the different treated samples. The results show that the sample T3 has more unit mass than that of other treated samples T1 and T2. It is obvious that unit mass of a seed is more than that of kernel of jatrophacurcas(Bahnasawy et al., 2007; Mohsenin et al., 1980).

Moreover, a comparison with the obtained results from several literatures had been done and found that most of the parameters of ASTM specification. These results based on it proved that *jatrophacurcas* could be utilized as a feedstock for biodiesel. Many researches were conducted on *jatrophacurcas* biodiesel production, properties and engine performance/emission characteristic. Therefore, *jatrophacurcas* biodiesel had been scientifically proved and could be used to replace petrol diesel in the future studies.Similar results have been reported by various authors for the untreated samples of jatrophacurcas (Garnayak et al., 2008; Sirisomboon et al., 2007).

4. Conclusion

The physical properties of *Jatropha curcas* seed unit mass, length, width and volume values were estimated.The physical properties, when compared to three treated samples were investigated.The investigation of Jatropha*curcas* different treated seed samples, the high yield is in (T_3)treated sample. This study shows that most of the properties evaluated for the biodiesel. All the studied seed exhibited good physicochemical properties and could be useful as biodiesel feedstock. It is sufficient to yield *jatropha* oil for biodiesel production.

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