



## SEED SURFACE CHARACTERISTICS AND PRELIMINARY PHYTOCHEMICAL ANALYSIS OF *JATROPHA CURCAS* LINN. SEEDS OF EUPHORBIACEAE

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### ABSTRACT:

India is richest in biodiversity. Plants are mostly use in medicinal purposes. The medicinal plants use for preparation of various drugs. The part of plant use for various purposes. The *Jatropha curcas* Linn. plant use medicinally as well as biodiesel production. The seeds of this plant use for biodiesel productions. The morphological and anatomical study of seed coat helps for seed identification process. The biochemical and phytochemical analysis helps to detect the various chemical content in them. The preliminary phytochemical observations helps to detect various chemical constituent like alkaloids, carbohydrates, reducing sugars, steroids, glycosides, flavonoids, terpenoids, saponine, protein, tannins, amino acids, volatile oil or essential oil, phenol etc. The thin layer chromatography technique shows the presence of amino acids in the *Jatropha curcas* Linn. seed sample. The Isoleucine and DL-Threonine found in them. From this study the *Jatropha curcas* Linn. seed use for the production of biodiesel which is economically benefited and other constituents also important for preparation of drugs for various diseases. The alkaloid, tannin, flavonoids are found maximum quantity in seeds. The morphological and anatomical observation also helps for taxonomical identification and variations in them.

**Key words:** - Seed morphology, Scanning electron microscopy (SEM), Seed anatomy, biochemical, phytochemical analysis, Euphorbiaceae

### INTRODUCTION:

Food, shelter and cloths etc. are the basic needs of man. Plants play a very important role in human life. From ancient period plants have given a great importance in various field. Naturally plant contain various compound so it is mostly use in medicinal industry like ayurveda, allopathy, homeopathy, herbal and cosmetics, aromatherapy etc. the various chemical constituents, secondary metabolites well present in them. *Jatropha curcas* is a member of the Euphorbiaceae family and is commonly known as Barbados nut, physic nut or purging nut. It is a small tree or bush-like plant that grows up to 5 m high. (MUHAMMAD NISAR UL HAQ *et al.* 2016). Naturally plant organs like root, stem, leaves, seeds, fruits,

flowers are mostly use in various purposes. The *Jatropha curcas* Linn. belonging to the family Euphorbiaceae. *Jatropha curcas* variously known as physic nut, purging nut or pig nut (Uche FI *et al.* 2008) (Igbiosa OO *et al.* 2009) and is used in folklore remedies for treatment of various ailments such as skin infections, gonorrhoea, jaundice and fever (Akinpelu DA *et al.* 2009). It is also known as ratanjot. So the seed identification is also the important process. For this seed coat study the micromorphological characters also help for the identification process. Jatrophin extracted from the latex has been used to treat various skin diseases, rheumatism and coughs and to promote wound healing (Uche & Aprioku 2008). Oil extracted from the *Jatropha* plant is used as biofuel.

## MATERIAL & METHODS

**Sample collection:-** Seeds of family Euphorbiaceae like *Jatropha curcas* Linn. were collected from local area. For seed coat study, all the seeds parameters were studied using dissecting and binocular microscope. Digital weighing balance was used for weighing the seeds in mg. The morphological observations of seeds were done followed by their photography, using 1 cm. scale.

**Seed coat morphology (SEM):-** To study the seed coat morphology scanning electron microscopy is most important. For this purpose, the individual seeds were dipped in alcohol for 5-10 min. to remove the dust from them. The seed mounted on pin type stubs using double sided adhesive tape or conductive silver paint to prevent charging of the surface during scanning and then coated with a very thin layer of gold in a polaron sputter coating unit. For spermoderm study of seed photomicrograph were taken in the scanning electron microscope (SEM) (LEO 430) at Birbal Sahani Institute of paleobotany, Lucknow.

**Seed coat anatomy:-** For the anatomical observation of seed coat study take the transverse sections of seed coat. Using permanent slide preparation method or double staining method place the section on various alcohol grades like 30%, 50%, 70%, 90% absolute alcohol, xylene, DPX etc. The staining like safranin and light green stain used for staining.

**For Protein test :-** The *Jatropha curcas* Linn. seed sample were used for detection of proteins. Biuret test and xanthoproteic test were done. In Biuret test seed powder treated with chemicals turns violet and xanthoproteic test gives yellow colouration which indicated the presence of protein. The concentration of protein in seeds were given in symbols (+, ++, +++, +++++)

**Preliminary phytochemical tests :-** The preliminary phytochemical analysis is most important for detection of various chemical constituents. Trease and Evans (1989) test were done. Qualitative phytochemical analysis of the crude powder of the seeds of the plant for the identification of phytochemicals like alkaloids, carbohydrates, reducing sugars, steroids, glycosides, flavonoides, terpenoides, saponine, protein, tannins, amino acids, volatile oil or essential oil. Preliminary phytochemical test were done using different extract.

**Thin Layer Chromatography:-** Using BAW (Butanol 80ml : Acetic acid 20ml: Water 20ml) solvent,

aqueous extract with seed powder, TLC plate (MERCK) silica with aluminium sheet, capillary tube, chromatography chamber, lid, wax for sealing, spray, etc. use for chromatography.

In the seed morphological observations externally seed shows 1.6 cm. - 1.00 cm (average size of 15 seed), obovate, black, 489.61mg (average weight of 15 seeds), bilateral, hilum apical, carunculate, morphologically seed surface smooth, surface of seed coat show breakages at some places and showing a waxy coating in it. (Fig-03) The scanning electron microscopy of *Jatropha curcas* Linn. black seed shows irregular cellular surface pattern, the cells are similar in structure at some places but irregular broken at some part. Surface shows broken cellular coating. (Fig-04) Anatomically seed coat shows outermost epidermis is chain like in appearance which is protected by hairy outgrowth that are densely developed. (Fig:-09) The hairs are elongated. (Fig:-10) The parenchymatous cells are developed below the epidermal layer, the cells isodiametric with intercellular spaces in them. (Fig:-11) The epidermal hairs elongated measuring 232.6  $\mu$ m in length and 23.26  $\mu$ m in

breadth. The parenchyma cell measures about 69.78 $\mu$ m in length and 46.52 $\mu$ m in breadth. (Fig-05,06,07,08,10,11) respectively.

### CONCLUSION

From the above biochemical observations *Jatropha curcas* Linn. seed shows the presence of protein in proper quantity.

When we treated seed powder of *Jatropha curcas* Linn. with different extract like methanol and aqueous extract respectively then we found that the maximum quantity of active constituent like alkaloids and tannins present in both the extract. Secondly the flavonoids occur in both. The carbohydrate, steroids, saponine, volatile oil or essential oil, phenol is found in them but reducing sugars, amino acids and protein are found less in amount in aqueous extract. Glycosides, terpenoids are not found in both the extract.

It is highly useful in research laboratories to separate, identify and characterize unknown compounds. A variety of small molecules like amino acids are separated by TLC technique. (Sadasivam and Manickam 2005). The qualitative analysis through TLC is considered to be most effective, and useful method for the separation and identification of complex mixtures of herbal drugs (Wagner and Bladt, 1996). In the thin layer chromatography when seed sample in aqueous is loaded on TLC plate it gives no.13- Isoleucine and no.21- DL-Threonine amino acid. (Fig: 09)

**Medicinal uses :-** Seed oil used internally and externally as an abortifacient. (Trivedi, 2004) Some of the bioactive constituents of this plant have been used to cure various diseases such as coated tongue, dysentery, infertility, gonorrhoea, hemorrhoids, skin infections and inflammation (Hassan *et al.* 2004).

**DISCUSSION:-** From the above observations the *Jatropha curcas* Linn. seeds show morphological and anatomical variations in seed coat. The scanning electron microscopy shows detailed surface study of seed coat. The micromorphological characters help for identification of seed. The anatomy also shows internal cellular variation of seed coat. The study help for seed identification taxonomic level. The biochemical and phytochemical study detected protein content in seed, alkaloids, carbohydrate, reducing sugars, steroids, glycosides, flavonoids, terpenoids, saponine, protein, tannins, amino acids, volatile oil or essential oil, phenol etc. Alkaloids, tannins and flavonoids are present in large quantity. Some are small quantity and others absent in seed sample. During the last few decades, numerous biologically and medicinally important phytochemicals including flavonoids, tannins, steroids, saponins, glycosides, cardiac glycosides, volatile oils have been reported in *J. curcas* seed, increasing its medicinal importance (Rachana *et al.* 2012). The oil from *Jatropha curcas* is mainly converted into biodiesel for use in diesel engines. In thin layer chromatography the amino acids like isoleucine and DL-Threonine in them. These all constituent present in seed contain active ingredients which detect various pathogenic microbes. So it is used in preparation of drugs in pharmaceutical industry on various diseases. Alkaloids have been shown to have anti-inflammatory and analgesic activities and to improve resistance against diseases (Gupta 1994). Phenols have been reported to have antiviral, antioxidant and antimicrobial activities (Vasantha *et al.* 2012). Oil extracted from the *Jatropha* plant is used as biofuel. The content of the seed are very useful in various field gives beneficial to society.

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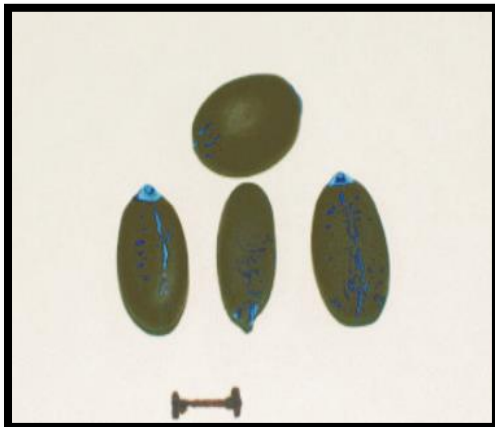
**Fig:-01**

**Fig:-01-**Habit of *Jatropha curcas* Linn.  
*Jatropha curcas* Linn.



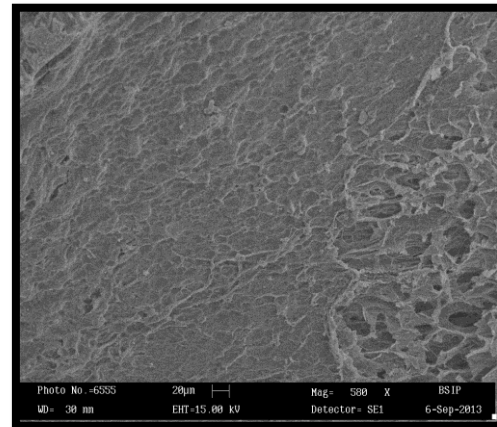
**Fig:-02**

**Fig:-02-** Inflorescence axillary compound cymes of *Jatropha curcas* Linn.



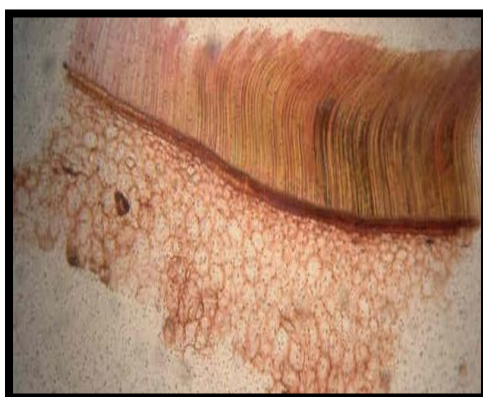
**Fig:-03**

**Fig:-03-** Black seeds of *Jatropha curcas* Linn .hilum carunculate,

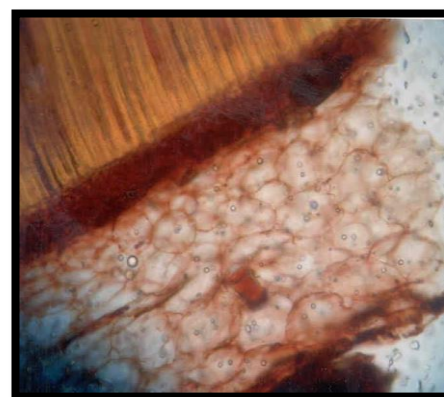


**Fig:04**

**Fig: 04-**580 X -SEM study of *Jatropha curcas* Linn. Seed with irregular cellular surface.

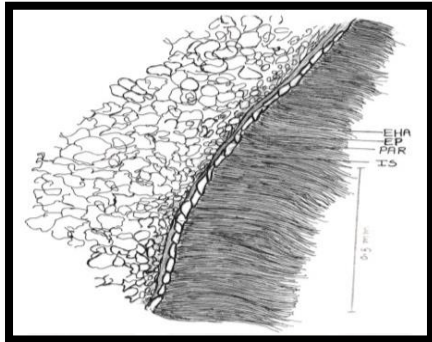


**Fig: 05**

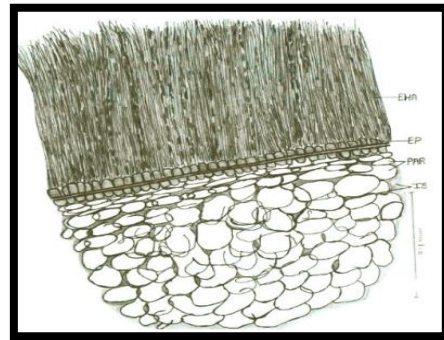


**Fig: 06**

**Fig:05-** 160X. T.S.of Seed coat of *Jatropha curcas* Linn. Seed showing epidermis with thick elongated hairs. **Fig:06** – 640X.T.S.of seed coat of *Jatropha curcas* Linn. shows magnified epidermis, parenchymatous cells with thick and elongated hairs.



**Fig: 07**



**Fig:-08**

**Fig: 07-** 100X T.S.of seed coat of *Jatropha curcas* Linn .hairy outgrowth densely developed. **Fig:-08**-400X T.S. of seed coat of *Jatropha curcas* Linn. chain like epidermis with elongated trichomes and parenchyma



**Fig: 09**



**Fig: 10**



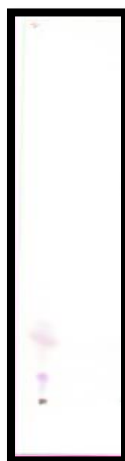
**Fig: 11**

**Fig: 09**-400X Chain like epidermis.**Fig:10**-400X Elongated trichomes **Fig: 11**-400X Parenchymatous cells (EHA-epidermal hair, EP-epidermis, PAR-parenchymatous cell, IS- isodiametric)

**Table - 01 - Study of concentration of protein in seed sample**

Sr. no	Botanical Name	Family	Biuret test	Xanthoproteic test
01	<i>Jatropha curcas</i> Linn.	<i>Euphorbiaceae</i>	+++	++

From the above biochemical observations *Jatropha curcas* Linn. seed shows the presence of protein in proper quantity.



**Fig: 09-** Thin layer chromatography shows detection of amino acids in *Jatropha curcas* Linn. seed detect- Isoleucine, DL-Threonine

**Table- 02- Preliminary phytochemical observations of seed sample**

Sr no	Test for active constituents	Methanol extracts	Aqueous extracts
01	Alkaloids	+++	+++
02	Carbohydrates	+	+
03	Reducing sugars	-	+
04	Steroids	+	+
05	Glycosides	-	-
06	Flavonoids	++	++
07	Terpinoids	-	-
08	Saponine	+	+
09	Protein	-	+
10	Tannins	+++	+++
11	Amino acids	-	+
12	Volatile oil or essential oil	+	+
13	Phenol	+	+

**Present (+) , Absent (-)**