IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, July 2024

Pharmacognostic Investigation on the Seeds of Jatropha Curcas Linn

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Abstract: *Jatrophacurcas Linn.is a known medicinal plant in traditional system of medicine . All the parts of the plant are credited with medicinal properties. Oil from the seeds is depurative and antiseptic; considered to be useful in scabies, eczema and ringworm diseases and as a cleaning application for wounds, sores and ulcers.[1] The objective of present work were pharmacognostic , physicochemical and phytochemical studies jatrophacurcas unripe and ripe seeds. macroscopic, microscopic, and powder features, phytochemical ,physicochemical properties were determined using standard method. After decades of a strong emphasis on modern medicine, there has been a growing interest among people in ancient healing systems such as Ayurveda, Siddha, and Unani. Due to the negative side effects often linked with synthetic medications, herbal remedies are increasingly significant in health care, particularly in developing nations.*

Keywords: jatrophacurcas seed, ash value determination

I. INTRODUCTION

These studies are essential for identifying and authenticating plant materials. Simple pharmacognostic techniques used in standardizing plant materials include examining their morphological, anatomical, and biochemical characteristics.. Jatrophacurcaslinn. (JCL) belongs to the family Euphorbiaceae The botanist Carl Von Linne first classified the plants in 1753, he gave it the botanical name "Jatrophacurcas" from the Greek word "Jatros" meaning a "Doctor" and "trophe" meaning "nutrition".ven Carl Linnaeus recognized the medicinal potential of this plant. In India, Jatrophacurcas is widely distributed across almost all states and is commonly cultivated as a live fence to protect agricultural fields from livestock damage, as it is not consumed by cattle.

Jatropha Curcas
Synonym: Barbados Nut, Poison Nut
Family : Euphorbiaceae

Botanical Classification :
Kingdom : Plantae
Class:Magnoliopsida
Order: Malpighiale
Family: Euphorbiaceae
Genus : Jatropha
Division :Tracheophyta
Species : J.Curcas

Comman Name:
Hindi : Ratanjot
English : Physic nut
Marathi : MogliErand
Tamil : Kattamanakku

DOI: 10.48175/IJARSCT-19206

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Assamese : Bhenda

IMAGE:

Green Yellow Black

"Yellow" "Black"

II. MATERIAL AND METHOD

PLANT COLLECTION :

The unripe and ripe seed of jatrophacurcas were collected from kavthemahankal ,sangli, Maharashtra,india .The ripe and unripe seeds were separated. The samples collected were dried at 40-50 ^{0} C .The tranverse section were made for microscopically details and pharmacognosticalevaluatin of various contents present in seed .fresh sample were used for anatomical studies and dried part were powdered, sieved and stored in air tight container for further use.

SEED:

The chemical constituents of Jatrophacurcas seeds include fatty acids like oleic acid, linoleic acid, and palmitic acid. These seeds also contain proteins, carbohydrates, and some toxic compounds like phorbol esters. The oil extracted from Jatrophacurcas seeds is used for various purposes such as biodiesel production. jatropha seeds possess various activities such as being a source of biodiesel production. The oil extracted from Jatropha seeds can be used to produce biodiesel, which is a renewable and environmentally friendly alternative to traditional fossil fuels. This activity makes Jatropha seeds valuable in the field of sustainable energy production

III. PHARMACOGNOSTICAL STUDY

[A] **Macroscopic, microscopic and powder microscopy study**

The seeds of jatrophacurcas were subjected to macroscopic studies .The parameters evaluated were the arrangement, size, shape, base, margin, apex, colour, odour, taste. For microscopic evaluation of seeds, thin transverse sections were made.The powder microscopy of dried powder of seeds was studied using standard procedures.The characteristic features observed were recorded by taking their photographs

[B] Physicochemical analysis:

The physicochemical parameters like loss on drying, total ash, acid-insoluble ash, water-soluble ash, sulphated ash, nitrated ash and carbonated ash and extractive values in solvents of different polarity were determined in both un-ripe and ripe seeds of jatrophacurcas as per WHO guidelines. [7].

[C] Physicochemical Definitions of Various Terms Ash value: The residue remaining after ignition is called ash content of the drug. Formula: Ash value can be determined by any of the three following methods:

Types of ASH VALUE

- Total ash value
- Water soluble ash value.

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- Acid insoluble ash value
- Sulphated ash value
- Moisture content

1. **Total ash value:** It is method used to measure the total amount of material remaining after ignition.
2. **Water soluble ash**: Water soluble ash is the difference in weight between total ash and residue after treatment of total ash with water.
3. **Acid insoluble ash**: Acid insoluble ash is the residue obtained after boiling the total ash with dil.HCL and igniting the remaining insoluble matter.
4. **Sulphated ash value**: The sulfated ash value measures the quantity of residual material left from a sample after it has been ignited in the presence of sulfuric acid.
5. **Moisture content**: Moisture content refers to the amount of water contained within a soil mass. This can include water that is naturally present in the soil or water that has been added artificially. The term moisture content is otherwise known as water content.[8]

Determination of ash value for ripe seed

1. Determination of Total ash value

Procedure

Weigh the crucible and record its weight to four decimal places.
Weigh approximately 2 g into crucible.
Record weight to 4 decimal places.
Ash sample at 600°C for 2 h. (Bring temperature rapidly to 600)
Coolindesiccatorandweighwithin1hafterreachingroomtemperature
Weigh the ashed sample and note its weight to four decimal places.
Calculate % Ash and record value with one decimal. [9]

Calculation:

Weight of empty silica crucible = 31.55 gm
Weight of powdered crude drug = 2gm
Weight of silica crucible with ash = 31.69 gm
Weight of ash = weight of silica crucible with ash – weight of empty silica= 31.6-31.55=0.14gm
Ash value for 100 gm of crude drug = 0.14/2 x 100=7 %

2. Acid-insoluble ash:

Procedure:-

Using 25 ml of dilute HCI wash the ash from the dish used for total ash into a 100 ml beaker.
Place a mesh gauze over a Bunsen burner and heat for five minutes. Filter through an 'ashless' filter paper, wash the residue twice with hot water.Heat a crucible in the flame, then cool and weigh it. Put the filter-paper and residue together into the crucible, heat gently until vapours cease to be evolved and then more strongly until all carbon has been removed. Cool in desiccator. Weigh the residue and calculate acid-insoluble ash of the crude drug with reference to the air-dried sample of the crude drug.[3]

Calculation:

Weight of silica crucible (Wc)= 25.14 gm
Weight of sample drug (Ws)= 2gm
Weight of silica crucible +total Ash weight (Wf)= 25.36gm
Acid insoluble ash = Wf – Wc ÷ Ws×100 =25.36-25.14/2X100 =11%

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3) Determination of moisture content:
Procedure
First, weigh the empty silica crucible. Then, slowly add 1.5 g of powdered drug.Then take the weight of silica crucible with powdered drug .keep the crusible in hot air oven for 15 min at 105^0c after that crucible transfer into desiccator for 15 to 20 min and finally measure the weight of the crucible.[4]

Calculation:-
Weight of empty dish = 32.86gm
Weight of empty dish +weight of drug = 34.36 gm
Weight of empty dish + weight of drug after drying = 34.28 gm
Moisture content = 34.36-34.28=0.08 gm For 1.5 gm of drug content = 0.08 gm
Therefore, 100 gm of crude drug contain = 0.08÷1.5 × 100
Moisture content = 5.33%

4. Determination of sulphated ash:
Procedure:-
First weight the empty silica crucible then add 2gm of drug powder and weight it.Then add 3 to 4 drops of conc.H2SO4 then keep it in incinator and slowly increase the temperature. It becomes a red hot and converts into ash. Then it remove from the incinator and keep aside for few min then keep it into the desiccator for 20 min.and measure the weight of crucible sulphated ash.[5]
Calculation:-
Weight of crucible(W1)= 30.63gm
Weight of crucible +weight of crude drug (W2)=32.63gm
Weight of crude drug (W2-W1)= 2g
Weight of crusible +sulphatedash(W3) =30.58gm
Sulphated ash = W3-W1= 30.58-30.63=0.05gm

5. Determination of Water soluble ash:
Procedure:
Using 25 ml of water, wash the ash from the dish used for total ash into a 100 ml beakerPlace a mesh gauze over a Bunsen burner and heat for five minutes. . Filter through an 'ashless' filter paper; wash the residue twice with hot water. Ignite a crucible in the flame, cool and weigh.Put the filter-paper and residue together into the crucible, heat gently until vapours cease to be evolved and then more strongly until all carbon has been removed. Cool in desiccators.Weigh the residue and calculate the acid-insoluble ash of the crude drug relative to the air-dried sample of the crude drug. .[6]

Calculation:
Weight of silica crusible (Wc)= 27.53 gm
Weight of sample drug (Ws)= 2gm
Weight of silica crusible +total Ash weight (Wf)= 27.69gm
Acid insoluble ash = Wf – Wc ÷ Ws×100 =27.69-27.53÷2×100 =8%

Determination of ash value for Un-ripe seed :
1.Determination of Total ash value:-
Calculation:-
Weight of empty silica crucible = 29.23gm
Weight of powdered crude drug = 2gm
Weight of silica crucible with ash = 29.38 gm
Weight of ash= weight of silica crucible with ash – weight of empty silica= 29.38-29.23=0.15gm
Ash value for 100 gm of crude drug = 0.15/2×100 = 7.5 %

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2. Acid-insoluble ash
Calculation:
Weight of sample drug (Ws) = 2gm
Weigh of silica crusible (Wc) =31.55gm
Weight of silica crusible +total Ash weight (Wf)= 31.91gm
Acid insoluble ash = Wf – Wc ÷ Ws×100 = 31.91-31.55÷ 2 ×100 =18%

3. Determination of moisture content:-
Calculation:-
Weight of empty dish = 27.70gm
Weight of empty dish +weight of drug = 29.2 gm
Weight of empty dish + weight of drug after drying = 28.8gm
Moisture content= 29.2-28.8=0.4gm For 1.5 gm of drug content =0.4gm
Therefore, 100 gm of crude drug content = 0.4 ÷1.5 × 100
Moisture content =73.33%

4. Determination of sulphated ash:
Calculation:-
Weight of crusible(W1)= 27.70gm
Weight of crusible +weight of crude drug (W2)= 29.7gm
Weight of crude drug (W2-W1)= 2gm
Weight of crusible +sulphated ash (W3) = 27.83gm
Sulphated ash = W3-W1= 27.83-27.70=0.13gm

5. Determination of Water soluble ash**:**
Weight of sample drug (Ws) = 2g
Weight of silica crusible (Wc) =27.55gm
Weight of silica crusible +total Ash weight (Wf)= 27.85gm
Acid insoluble ash = Wf – Wc ÷ Ws×100 = 27.85-27.55÷ 2 ×100 = 15%

Qalitativean Phytochemical analysis:
The process to qualitatively analyze the presence of phytoconstituents in both unripe and ripe seed powders was conducted as per the established procedure.
Fixed oil were detected by using Saponification test.
Saponificationtest :Sample + 0.5N Alcoholic Potassium Hydroxide + Drop of Phenolpthalein, heat on water bath for 1-2 hour.
Observation : The formation of soap or partial neutrilization of alkali indicates the presence of fixed and fats.
Sample + Copper sulphatesolution(1%) + 10% NaOH solution Observtion : clear blue solution Sample + Pinch of sodium hydrogen sulphate Observation: Pungent odour [10]

IV. RESULT

Organoleptic and microscopic characteristic :
The size of Jatrophacurcas seeds is typically around 2 to 2.5 centimeters in length, and the shape is usually oval or ellipsoidal. These seeds are relatively small and have a distinct shape that helps in their identification. The odor of Jatrophacurcas seeds is somewhat nutty or earthy, and the taste is bitter due to the presence of toxic compounds like phorbol esters. It's important to be cautious with these seeds as they are not safe for consumption.
Seed image

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Table 1: organoleptic characteristics of jatrophacurcas seed

parts	Observations	
part	Seed	Seed
Hilum	Round and circular	Round and circular
Size	2 to 2.5 cm	2 to 2.5 cm
Shape	oval or ellipsoidal	oval or ellipsoidal
Colour	Light brown or Black	Light brown or Black
Odour	nutty or earthy	nutty or earthy
Taste	bitter	bitter

Microscopic characteristic:

Fig-1 T.S.of Seed coat of Jatrophacurcas Linn. Seed showing epidermis with thick elongated hairs
Fig:2– 640X.T.S.of seed coat of Jatrophacurcas Linn. shows magnified epidermis, parenchymatous cells with thick and elongated hairs.

Powder microscopic study :

Analyzing the powder microscopy of Jatrophacurcas seed powder involves examining its cellular structure, starch grains, oil droplets, and other components under a microscope. It's commonly done to assess its quality, purity, and potential applications in industries like pharmaceuticals and biofuel production.

Physicochemical analysis:

The physcicochemical analysis of Jatrophacurcas unripe and ripe is given in Tablel 2 The loss on drying (Moisture content of unripe seed powder was 73.33%. while that of ripe seed powder was 5.33% the total ash of ripe seed of about 7%.while that of un-ripe seed was about 7.5% the water soluble ash of un-ripe seed was 15%.while that of ripe seed powder was 8% the sulphated ash and un-ripe seed powder was 0.13% while that of ripe seed powder 0.05% in both the seeds the total ash, water soluble ash and sulphated ash of un-ripe seed was slightly less then that of ripe seed the loss on drying and acid insoluble ash of un-ripe seed was slightly more than ripe seed

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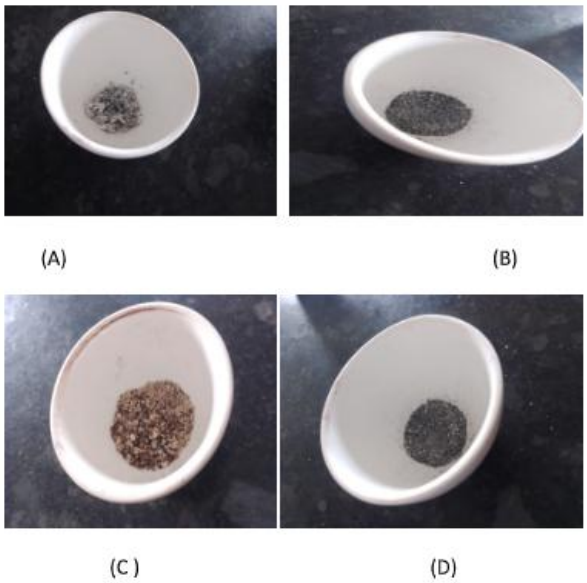

A. Total ash value
B. Sulphated ash
C. Loss of moisture
D. Acid insoluble ash

Table: 2 Physicohemicalanalysis of jatrophacurcas unripe and ripe seed

Parameters	% value (W/W) seed	
Unripe		ripe
Loss on drying	73.33	5.33
Total ash	7.5	7
Water soluble Ash	15	8
Acid insoluble Ash	18	11
Sulphated Ash	0.13	0.05

Qualitaive Phytochemical analysis of crude powder:
The qualitative phytochemical analysis of crude powder of unripe seed showed presence of PhorbolEster, proteins, lipids such as fats and oils ,organic acid like malic acid and citric acid .while ripe seed show presence of alkaloids

V. CONCLUSION

In both the seeds the total ash, water soluble ash and sulphated ash of un-ripe seed was slightly less than that of ripe seed. The loss on drying and acid insoluble ash of unripe seed was slightly more than ripe seed. To maintain the therapeutic efficacy of natural drugs, it is very essential to lay down quality control and standardization parameters Pharmacognostic studies are crucial because the parameters established in such investigations serve as reference standards for identifying specific plants and their parts. Ensuring the quality, purity, and authenticity of the drug helps to preserve its efficacy. Pharmacognostic studies are thus very important and parameters established in such studies can act as reference standards and identity of that particular plant and part. The quality, purity and authenticity of the drug can be maintained which in turn will help to maintain its efficacy. The pharmacognostic studies will help in establishing its botanical identity .The Jatrophacurcas seeds has microscopic characteristics and powder study revealed the specific characters that are the diagnostic characters of this plant. . It will help to identify the plant when intact or when in powder form These parameters will help to correctly identify the plant and prevent it from being adulterated . Loss on

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drying value tells the moisture content of the sample and whether it is properly dried or not.If it is elevated, it can promote the growth of microorganisms, potentially leading to the sample's deterioration. .If the level is high, it can promote the growth of microorganisms, potentially leading to the sample's decay. . Jatrophacurcas seeds contain a high percentage of oil, which can be used to make biodiesel. The oil is made up of several fatty acids, including: Palmitic acid: 13% ,Stearic acid: 2.53%, Oleic acid: 48.8%, Linoleic acid: 34.6%

In conclusion, it can be stated that the parameters evaluated in this study can act as reference standards of Jatrophacurcas un-ripe and ripe seeds.These characteristics of the seeds are essential for diagnostics and can aid in creating a monograph. They help ensure the identity, authenticity, and purity of this valuable medicinal plant. The data generated from this research will serve as a standard to identify adulterants. Results from photochemical studies will assist researchers in selecting the appropriate solvent for drug formulations. The evaluated parameters and established standards are sufficient to distinguish genuine drugs from adulterated ones.

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