

**PHARMACOGNOSTIC AND  
PHYSICOCHEMICAL ANALYSIS OF  
THE SEEDS OF *Citrullus lanatus* L**



**D. Prasanthi**  
**Institute of Pharmaceutical Technology**  
**Sri Padmavathi Mahila Visvavidyalayam**  
**Tirupati-517502**



# CONTENTS

- INTRODUCTION
- OBJECTIVE
- MATERIALS AND METHODS
- RESULTS
- DISCUSSION
- CONCLUSION
- REFERENCES



# INTRODUCTION

- Ayurveda is the oldest and most widely practiced system of medicine, which incorporates entire plants or their parts.
- The therapeutic efficacy of drugs used in various systems greatly depends on the use of proper and genuine raw materials.
- Because of these, assurance of safety, quality, and efficacy of medicinal plants and herbal products has now become a key issue.
- Pharmacognostic studies play a vital role in assessing the quality, purity and identification of plant drug.





The misuse of herbal medicine or natural product starts with wrong identification which can be solved by pharmacognostic studies of medicinal plants.

According to WHO, the pharmacognostic evaluation of a medicinal plant is the first step to be carried out to establish its identity and purity<sup>1</sup>.

Hence present study deals with pharmacognostic, physicochemical preliminary phytochemical studies of see *Citrullus lanatus*.





# PLANT PROFILE

**Kingdom-** Plantae

**Phylum-** Embryophyta

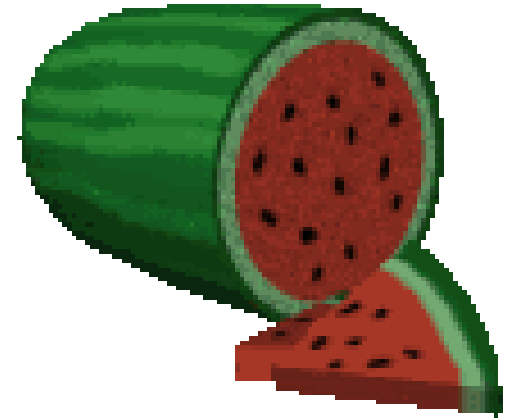
**Class-** Dicotyledoneae

**Order:** Cucurbitales

**Family:** Cucurbitaceae

**Genus:** *Citrullus*

**Species:** *lanatus*



**Vernacular names:** Watermelon (English), Tarbooz (Hindi), Tarbuj (marathi), Puccha (Telugu).

Edible Parts: Fruit, Leaves, Oil,  
Seeds.



### **Medicinal Uses:**

**Seed** is diuretic and tonic. used in the treatment of the urinary passages, a good vermifuge and has hypotensive action.

**Fruit** is used as a febrifuge, diuretic, effective in the treatment of dropsy and renal stones.

**Rind** of the fruit used in cases of alcoholic poisoning and diabetes.

**Root** is purgative, emetic (large doses).



# OBJECTIVE



The main objective of the present work is to evaluate pharmacognostic properties of seeds of *Citrullus lanatus* including:

- Macroscopy
- Microscopy
- Physicochemical parameters
- Fluorescence analysis
- Preliminary phytochemical screening





# *MATERIALS AND METHODS*







Seeds were purchased and authenticated by the Botanist.



A specimen was deposited (Specimen No: 640)



Seeds were used for T. S. and powder microscopy.

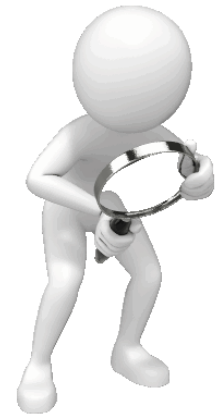


Seeds were shade dried and powdered.



Extract was prepared by hot extraction method and used for phytochemical screening

# Macroscopy



Seeds were evaluated for:

## **Organoleptic Characters**

- Colour
- Odour
- Taste

## **Quantitative Macromorphology**

- Length
- Thickness

## **Extra Features**

- Shape
- Texture
- Inner Surface
- Outer Surface



# Microscopy



- The paraffin embedded seeds were sectioned (10 to 12  $\mu\text{m}$ ) with the help of Rotary Microtome.
- Dewaxing was done.
- Sections were stained with toluidine blue or safranin, fast–green and IKI (for starch).
- Powder microscopy was carried out for the seed powder and specific diagnostic characters were recorded<sup>2</sup> .





# *Physico-chemical parameters*

Total ash value

Acid insoluble ash value

Water soluble ash value

Moisture content

pH

Alcohol soluble Extractive

Water soluble Extractive



# Fluorescence analysis



The fluorescence characters of the powdered seeds with different chemical reagents were studied by observing under day light and UV light.





# Preliminary phytochemical studies

The prepared hydroalcoholic extract was subjected for preliminary phytochemical studies for identifying the presence of various phytoconstituents like alkaloids, glycosides, aminoacids, flavonoids, steroids, etc.<sup>3-4</sup>



# Preliminary phytochemical screening

S.NO	Phytochemicals	Name of the test
1.	Alkaloids	Dragendorff's test, Mayer's test
2.	Amino acids	Ninhydrin test
3.	Saponins	Froth test
4.	Flavonoids	Shinoda test
5.	Glycosides	Borntrager's test
6.	Steroids	Liebermann Burchard test, Salkowski test
7.	Tannins	Lead Acetate test
8	Carbohydrates	Molisch's test
9	Oils and fats	Filter paper test
10	Proteins	Millon's test
11	Phenolics	Ferric chloride test





# RESULTS





# MACROSCOPY



## **Organoleptic Characters**

Colour: brown

Odour: odourless

Taste: mildly sweet

## **Quantitative Macromorphology**

Length: 7x5x2mm

Thickness: seed coat-550microns,  
cotyledons-40 microns

## **Extra Features**

Shape: flattened, ovoid

Texture: slippery to touch when moistened

Inner Surface: yellowish white

Outer Surface: vertical thin dark brown  
markings



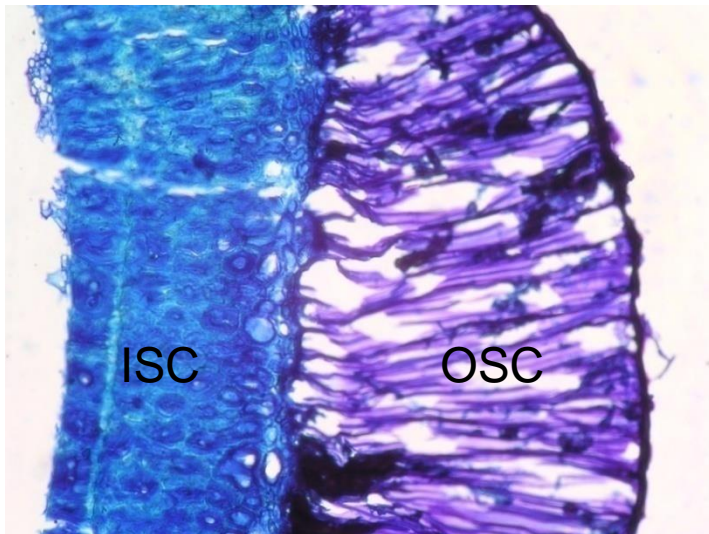
# MICROSCOPY



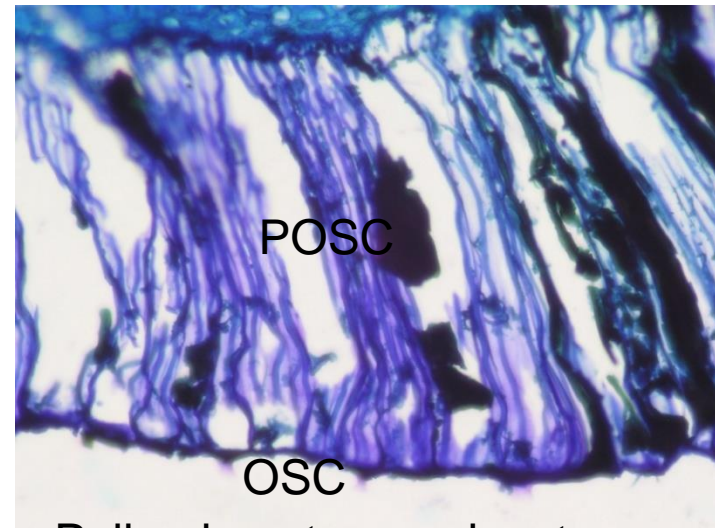
Surface of the seeds



Single seed enlarged



T. S. of seed coat

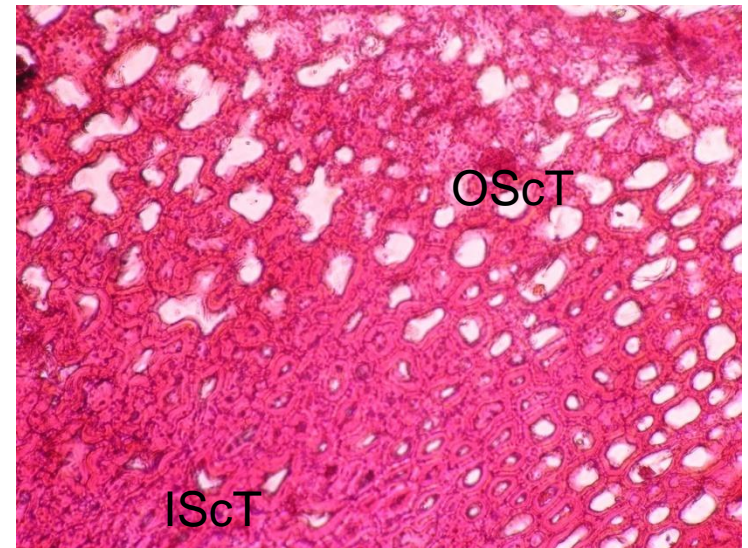


Palisade outer seedcoat

# Structure of seed



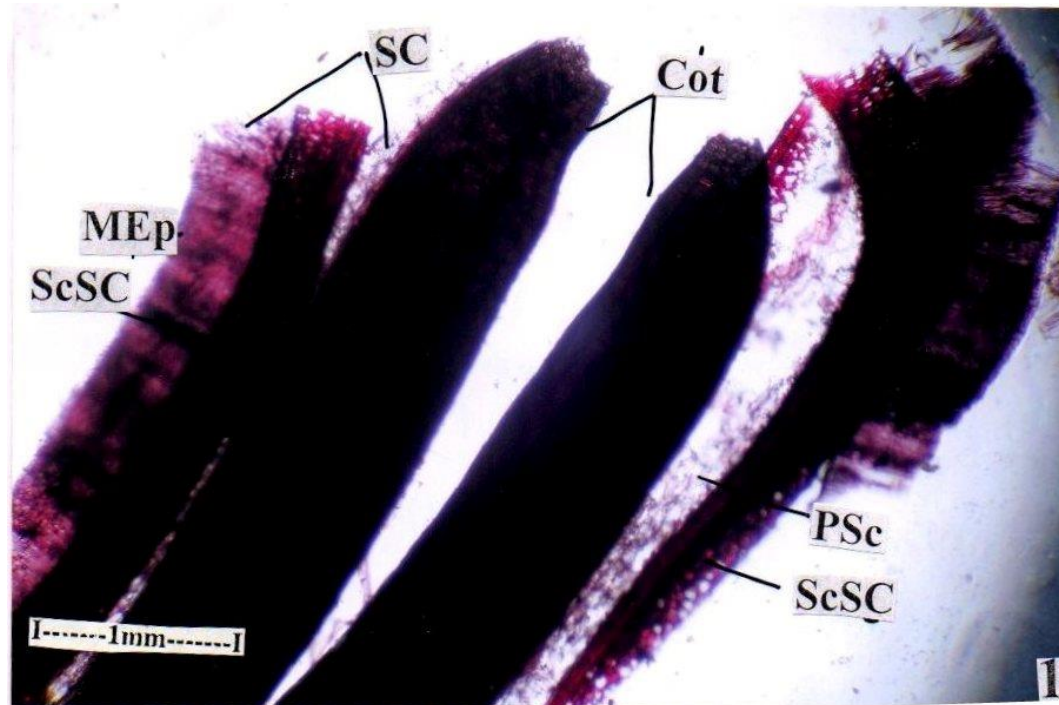
Sclerotesta showing two zones of sclereids



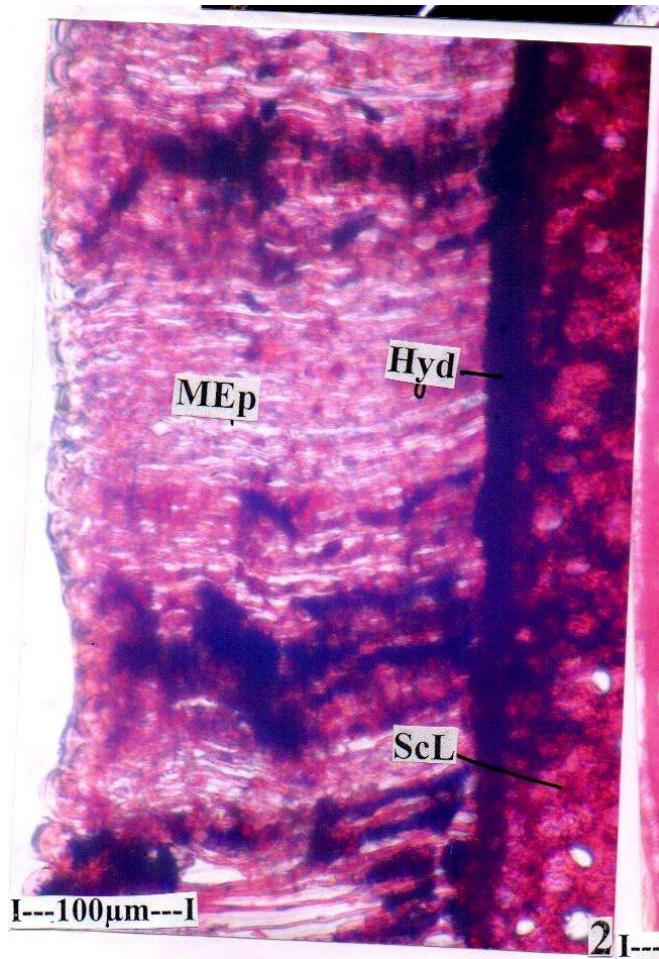
Sclerotesta-cells enlarged



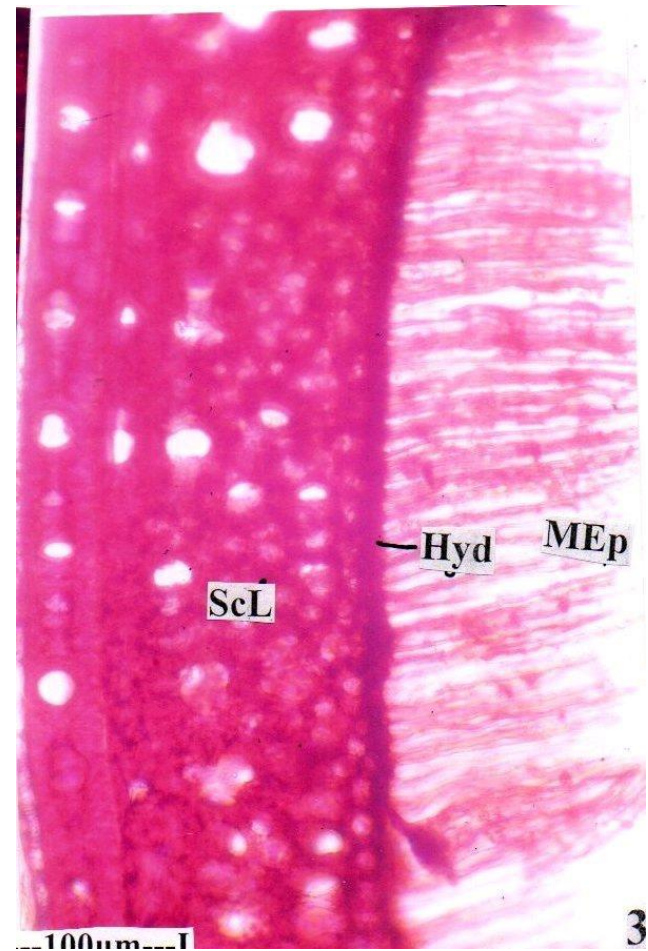
# POWDER MICROSCOPY



Fragment of the seed with two cotyledons with seed coat

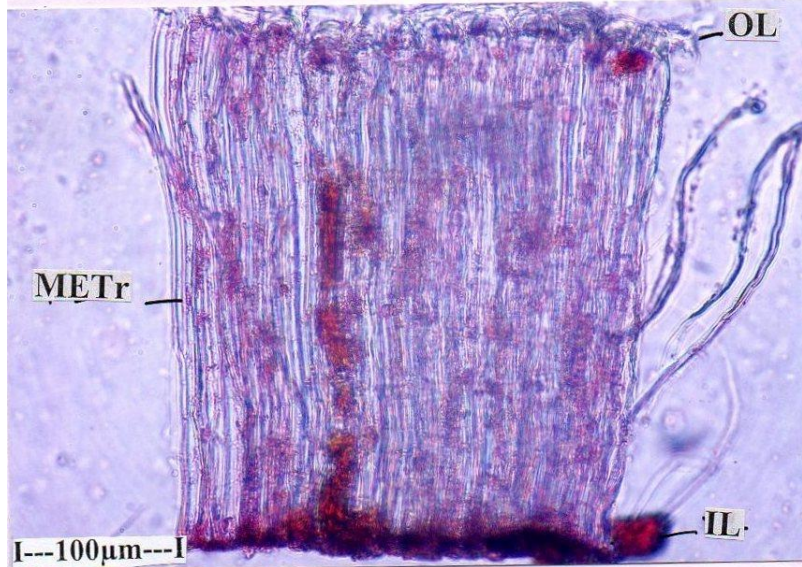


Seed coat with  
mucilaginous hairy  
epidermis

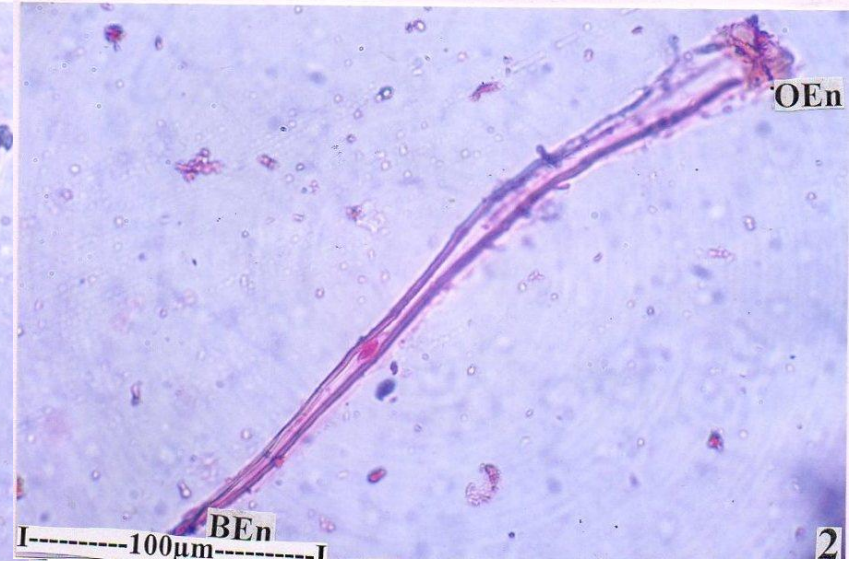


Seed coat with  
sclerenchymatous hypodermis  
and inner endodermal zone





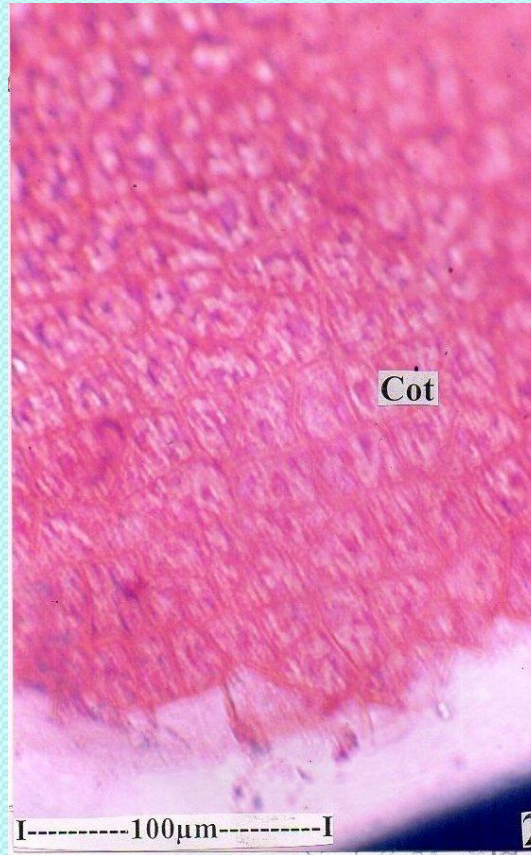
Mucilaginous epidermis made up of long thin trichomes



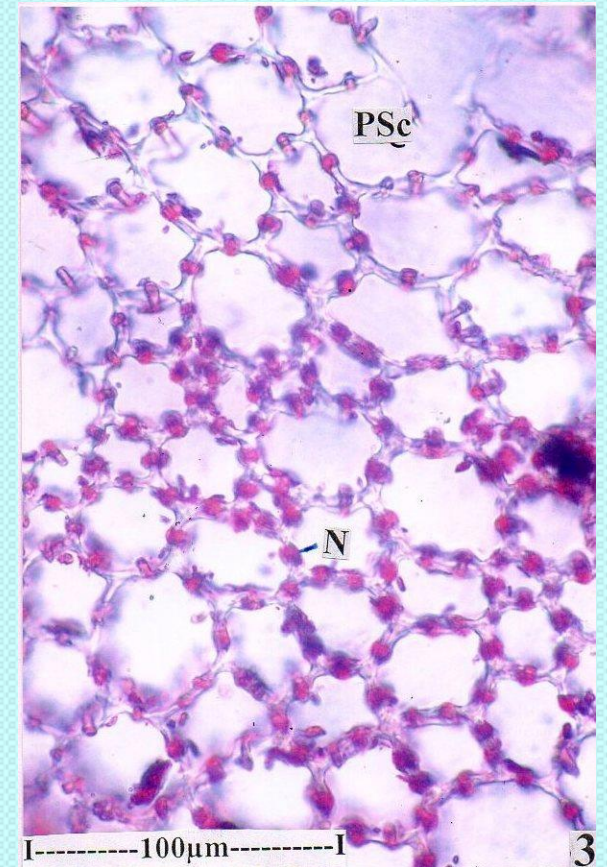
Single epidermal trichome



Sclerotic endodermal layer in surface view



Cells of the cotyledon



Innermost layer of parenchyma cells in sectional view

# Physicochemical parameters



S. no	Parameters	Result
1.	Alcohol soluble extractive	7.2%
2.	Water soluble extractive	9.6%
3.(a)	pH (for 1% solution)	6.5
(b)	pH (for 10% solution)	5.9
4.	Moisture content	11.3%
5.	Total ash content	7.25%
6.	Acid insoluble ash (w/w %)	2.5%
7.	Water soluble ash (w/w %)	0.5%





# Fluorescence Analysis



Powdered drug	Visible/day light	Ultraviolet light
Powder as such	brownish white	brownish white
Extract as such	Coffee brown	Greenish brown
Powder+ distilled water	brownish white	Yellowish white
Powder + ethanol	brownish white	Yellowish white
Powder+ conc. HCl	Light brown	black
Powder + picric acid	yellow	green
Powder+ aqueous NaOH	Yellowish white	Dark yellowish white
Powder+ aqueous KOH	Light yellow	yellow
Powder+ conc.H <sub>2</sub> SO <sub>4</sub>	Brick red	Blackish green
Powder + chloroform	Light brown	Light brown
Powder+ ammonia	Creamish yellow	yellow
Powder+ alcoholic KOH	brownish white	brownish white
Powder+ petroleum ether	Brownish white	Brownish white
Powder+ methanol	Brownish white	Brownish white

# Preliminary Phytochemical screening



S.NO	Phytochemicals	Result
1.	Alkaloids	negative
2.	Amino acids	positive
3.	Saponins	negative
4.	Flavonoids	positive
5.	Glycosides	positive
6.	Steroids	positive
7.	Tannins	Positive
8	Carbohydrates	positive
9	Oils and fats	positive
10	Proteins	negative
11	Phenolics	positive



# DISCUSSION

Ash values are helpful to determine quality and purity of crude drug.

It indicates presence of various impurities like carbonate, oxalate and silicate.

The water soluble ash is used to estimate the amount of inorganic compound present in drugs.

The acid insoluble ash consists mainly silica and indicate contamination with material.



Moisture content of drugs should be at minimal level to discourage the growth of bacteria or fungi during storage.

Estimation of extractive values determines the amount of active constituents in a plant material when extracted with a particular solvent.

The extractions of any crude drug with a particular solvent yield a solution containing different phyto constituents.

It not only gives an indication whether the crude drug is exhausted or not but also valuable for the synthesis of complex chemical substances and to screen biological activities.





The ultra violet light produces fluorescence in many natural products which do not visibly fluoresce in daylight.

If substances themselves are not fluorescent, they may often be converted into fluorescent derivatives or decomposition products by applying different reagents.

Hence crude drugs are often assessed qualitatively in this way and it is an important parameter for pharmacognostic evaluation of crude drugs.





# CONCLUSION

- ❖ The present study i.e., pharmacognostic and physicochemical studies of *Citrullus lanatus* is helpful in the characterization of the crude drug.
- ❖ Physiochemical and phyto-chemical analysis of seeds confirm the quality and purity of plant and its identification.
- ❖ The information collected is useful for further pharmacological and therapeutical evaluation of seeds of *Citrullus lanatus*.





# REFERENCES

- World Health Organization. Quality control methods for medicinal plant materials, WHO Library, Geneva. 1998, pp.1-115.
- Harborne JB. Phytochemical methods—A guide to modern techniques of plant analysis.2nd Ed. London: Chapman and Hall;1984, p.9-15.
- Kokate CK, Khandelwal KR, Pawar AP, Gokhale SB. Practical Pharmacognosy 3<sup>rd</sup> edition, Nirali Prakashan Pune. 1995; pp:137.
- Esau K. Plant Anatomy. John Wiley and Sons, New York, 1964, 767. Esau K Anatomy of seed plants. John Wiley and sons Newyo Pg. no:.550.



# Acknowledgement

I am thankful to **DST-WOS-A** [SR. WOS-A LS 425 2012(G)] for financially supporting my research work i.e., “Design and Evaluation of Polyherbal formulation for Nephroprotector activity”.





Thank You

