



Study the Evaluation and Standardization Parameters of Citrullus Lanatus

Shraddha Nagesh Auti¹, Shreya Uttam Shirsat², Shubhangi Dnyaneshwar Panchal³, Sneha Suresh Sharma⁴, Pritam Dnyaneshwar Gole⁵, Rahul Vishnu Borkar⁶, Dr. Sachin C. Kale.⁷

^{1,2,3,4,5,6,7}Anuradha College Of Pharmacy, Anuradha Nagar, Sakegaon Road Chikhli, Dist. Buldhana, 443201

ABSTRACT :-

Watermelon (*Citrullus lanatus*) is a nourishing and popular fruit in the world. Watermelon is grown in favourable climates from tropical to temperate regions worldwide belong to the family Cucurbitaceae. Watermelon contains phytochemicals such as polyphenols, flavonoids, stilbenes/ lignans, and is rich source of carotenoids, lycopene. Watermelon contains cucurbitacin E which is anti-inflammatory phytonutrient and amino acids such as L-arginine and citrulline.

It is the major source of vitamin C and vitamin A. In the nutritional composition of watermelon includes carbohydrates, sugar, soluble and insoluble fibres. Moreover, it contains good amount of potassium and magnesium.

Watermelon by-products which can be produced such as juice, smoothies, dips, seed oils, medicines, ethanol etc., consumption of watermelons imparts various health benefits such as chemical components of watermelon enhance its capacity to scavenge the low-density lipoprotein (LDL) and high-density lipoprotein (HDL) in a cell membrane.

A plethora of evidence shows that it can be effective for weight loss. Several epidemiological studies showed it has phytochemicals that can reduce risk of Cardiovascular Disease (CVD) aging related ailments, obesity, diabetes, ulcers, and various types of cancers.

Watermelon pomace is reported to be a concentrated source of lycopene as compared to the juice. This review shows up to date information on nutritional and Phytochemical constituents of watermelon, its wastage and by products and different methods used for dehydration, extraction and analysis of its chemical constituents.

Citrullus lanatus has been reportedly used widely in traditional herbal medicine. The leaves of *Citrullus lanatus* is analgesic, anti-inflammatory, mosquitocidal, gonorrhoea and anti microbial property. The fruits of *Citrullus lanatus* are eaten as a febrifuge when fullyripe or even when almost putrid. The fruit is used as a diuretic, anti-cancer, for treatment of high BP, antiviral and is effective in the treatment of dropsy and renal stones. The seed is also a good vermifuge and has a hypotensive action. It is demulcent, pectoral and tonic. It is sometimes used in the treatment of the urinary tract infections as well as bed wetting. The root is purgative and in high dose it can also serve as emetic.

Fatty oil in the seed, as well as aqueous or alcoholic extracts, had been reported to paralyze tapeworms and roundworms. The seed oil has an anthelmintic action which is better than that of pumpkin seed oil.

INTRODUCTION



Medicinal Plants

A plant is any plant which, in one or more of its organs, contains substances that can be used for therapeutic purposes, or which are precursors for semi-synthetic compounds. When a plant is designated as 'medicinal', it is implied that the said plant is useful as a drug or therapeutic agent or an active ingredient of a medicinal preparation. Medicinal plants may therefore be defined as a group of plants that possess some special properties or virtues that qualify them as articles of drugs and therapeutic agents, and are used for medicinal purposes.

History of medicinal plants

Plants have been used for medicinal purposes from 5000 BC with the emergence of the Indus Valley Civilization. The indigenous system of medicine, viz.-Ayurvedic, Siddha and Unani, have been in existence for several centuries. The country has 45,000 different plant species and 15000 medicinal plants that include 2000 plants used in Ayurveda, 700 in Unani, 600 in Siddha, 450 in Homoeopathy and 30 in modern medicines. The drugs are derived either from the whole plant or from different parts like leaves, stem, bark, root, flower, seed etc. Some drugs are prepared from excretory plant product such as gum, resins and latex.

Significance of medicinal plants to human beings

- (1) Many of the modern medicines are produced indirectly from medicinal plants, for example aspirin.
- (2) Plants are directly used as medicines by a majority of cultures around the world, for example Chinese medicine and Indian medicine.
- (3) Many food crops have medicinal effects, for example garlic.
- (4) Medicinal plants are resources of new drugs. It is estimated there are more than 250,000 flower plant species.

Hence studying medicinal plants helps to understand plant toxicity and protect human and animals from natural poisons. Cultivation and preservation of medicinal plants protect biological diversity, for example metabolic engineering of plants.

Future of medicinal plants

Medicinal plants have a promising future because there are about half million plants around the world, and most of their medical activities have not been investigated yet, and their pharmacological activities could be decisive in the treatment of present or future studies.

Characteristics of medicinal plants

Medicinal plants have many characteristics when used as a treatment, as follow:

- Synergic medicine - The ingredients of plants all interact simultaneously, so their uses can complement or damage others or neutralize their possible negative effects.
- Support of official medicine - The components of the plants proved to be very effective in the treatment of complex cases like cancer diseases.
- Preventive medicine - It has been proven that the component of the plants also has the ability to prevent the appearance of some diseases which can help to reduce the use of the chemical remedies and reduce the side effect of synthetic treatment.

REVIEW OF LITERATURE

A literature review is an evaluative report of studies found in the literature related to the selected area of research. The review describes, summarizes, evaluates and clarifies the literature available in the present research. It is a step towards further investigation on a particular work. It denotes with works derived from primary and secondary sources.

Itoh T et al., (1981) has demonstrated the co-occurrence of the C-24 epimers spinasterol and chondrillasterol in seeds of *Citrullus lanatus* (Cucurbitaceae) and seeds of bottle guard (*Langenaria leucantha* var. *gourda*) by ¹³C NMR spectroscopy method.[12]

1. Mahla HR, Rathore SS, Venkatesan K, Sharma R. 2018. Analysis of fatty acid methyl esters and oxidative stability of seed purpose watermelon (*Citrullus lanatus*) genotypes foredible oil. *J Food Sci Technol* 55(4): 1552–1561. [CrossRef] [PubMed] [Google Scholar]
2. FAOSTAT. 2020. Statistical database. Food and Agriculture Organization of the United Nations. Available from <http://www.fao.org/faostat/en/#data/QC> (last consult: 2020/25/06). [Google Scholar]
3. Elmataeshy ME, Sokar MS, Bahey-El-Din M, Shaker DS. 2018. Enhanced transdermal permeability of Terbinafine through novel nanoemulgel formulation; Development, in vitro and in vivo characterization. *Futur J Pharm Sci* 4(1): 18–28. [CrossRef] [Google Scholar]
4. Shaker DS, Ishak RAH, Ghoneim A, Elhuoni MA. 2019. Nanoemulsion: A review on mechanisms for the transdermal delivery of hydrophobic and hydrophilic drugs. *Sci Pharm* 87(3): 17. [CrossRef]

AIM AND SCOPE OF THE PRESENT STUDY

The use of herbal products is global importance because of their low side effects, accessibility and affordability when compared with conventional medicine. *Citrullus lanatus* (watermelon) is popular in indigenous system of folk medicine and it is known to contain bioactive compounds such as cucurbitacin, triterpenes, sterols and alkaloids, vitamins, minerals.

Citrullus lanatus has been reportedly used widely in traditional herbal medicine. The **leaves** of *Citrullus lanatus* is analgesic, anti-inflammatory, mosquitocidal, gonorrhoea and antimicrobial property. The **fruits** of *Citrullus lanatus* are eaten as a febrifuge when fullyripe or even when almost putrid. The **fruit** is used as a diuretic, anti-cancer, for treatment of high BP, antiviral and is effective in the treatment of dropsy and renal stones. The **seed** is also a good vermifuge and has a hypotensive action. It is demulcent, pectoral and tonic. It is sometimes used in the treatment of the urinary tract infections as well as bed wetting. The **root** is purgative and in high dose it can also serve as emetic. **Fatty oil in the seed**, as well as aqueous or alcoholic extracts, had been reported to paralyze tapeworms and roundworms. **The rind** of the fruit is prescribed in cases of alcoholic poisoning and diabetes. *Citrullus lanatus* is used in Northern Sudan for burns, swellings, rheumatism, gout and as laxative.

The biological activities reviewed include antimicrobial, antioxidant, anti-plasmodial, anti-inflammatory, anti-prostatic hyperplasia activity, anti-giardial activity, anti-oxidant, analgesic properties, its effects on the histology of the kidney of adult Wistar rats, antisecretory, antidiabetic, laxative, anti-ulcerogenic and hepatoprotective activities. In view of its wide pharmacological and biological activities, it's traditionally reported therapeutic potential such as, antihypertensive, anti-diarrhoeal, as well as its in-depth toxicity studies.

PLANT PROFILE

DESCRIPTION

It is an annual climbing or trailing herb, with hairy stem up to 10m long. Tendrils divided at the tip into two or three parts. Separate male and female flowers are borne on the same plant.

Botanical Source: *Citrullus lanatus* (Thunb). Matsum. & Nakai

Family: Cucurbitaceae

Synonyms: *Citrullus vulgaris* Schrad., *Colocynthis citrullus* Linn., *Citrullus citrullus* (L.),

Cucubertia citrullus L., *Anguria citrullus* Mill., *Momordica lanata* Thunb.

Common Names: Watermelon, wild watermelon, sweet melon (English); Egusi melon (English, Kenya); pastèque, melon d'eau (French).

Vernacular Names

Malaysia : Tembikai

English : Watermelon

India : Karingda

Chinese : Da zi gua zi xi gua.

Tamil : Pitcha.

Sanskrit : Tarambuja.

Hindi : Tarbuj

GEOGRAPHY & DISTRIBUTION:

Citrullus lanatus is thought to be native to Africa. It is found in grassland and bushland, mostly on sandy soils, and often along watercourses or near water, up to 1,785 m above sea level. It flourishes in dry climates and requires only limited rainfall. Some say that the Kalahari region (Botswana, Namibia and South Africa) as the area of origin, whereas others suggest it is native to north eastern Africa.

HABITAT: Grassland and bushland, often along watercourses.

Classification:

Kingdom : Plantae - Plants

Subkingdom : Tracheobionta - Vascular plants

Superdivision : Spermatophyta - Seed plants

Division : Magnoliophyta - Flowering plants

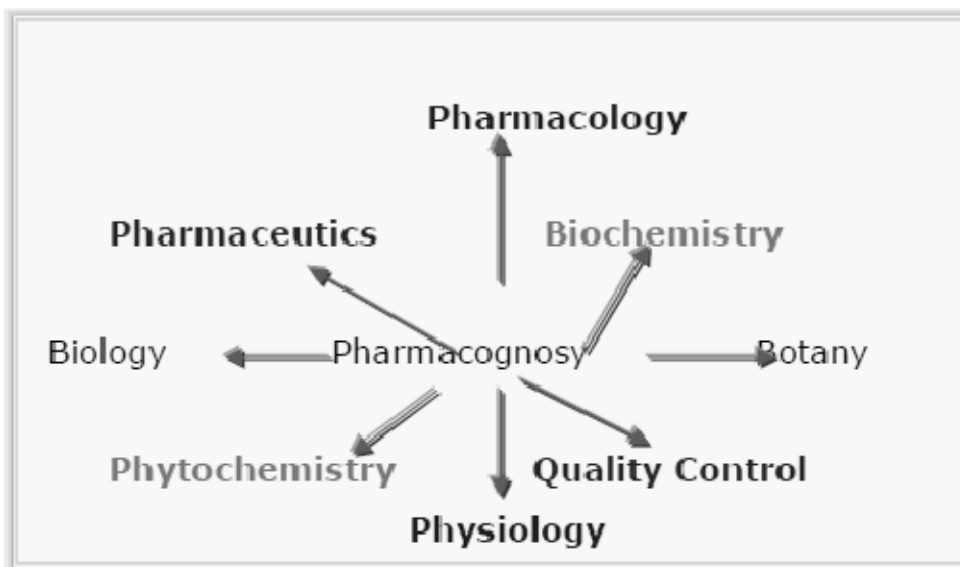
Class : Magnoliopsida – Dicotyledons

Subclass : Dilleniidae



Order : Violales
 Family : Cucurbitaceae
 Genus : Citrullus Schard - watermelon
 Species : *Citrullus lanatus* (Thunb.) Mastum. & Nakai var *lanatus*

PHARMACOGNOSTICAL STUDIES

Pharmacognosy is the study of medicines derived from natural sources. The study of the physical, chemical, biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources is the definition given by The American Society of Pharmacognosy.



Herbarium of *Citrullus lanatus* (Thunb)

	HERBARIUM
	<p>SCIENTIFIC NAME:- Citrullus Lanatus FAMILY:- Cucurbitaceae GENUS:- Citrullus SPECIES :- Lanatus LOCALITY :- Chikhli COLLEGE :- Anuradha College of Pharmacy Chikhli.</p>
<p>04/04/2023 Date:</p>	<p> Professor</p>

MICROSCOPICAL EVALUATION

Anatomy of the leaf: The leaf has very thick abaxially hanging midrib and thin lamina . The midrib is 1.9mm thick and 1.7mm wide. It has four thick ridges alternatively deep furrows. The adaxial part of the midrib has short, tick cone. The epidermis has



Habitat and Whole Plant of *Citrullus lanatus* (Thunb.) Matsum. & Nakai

LEAF OF Citrullus lanatus (Thunb.) Matsum. & Nakai



FLOWER OF Citrullus lanatus (Thunb.) Matsum. & Nakai



FRUITS OF Citrullus lanatus (Thunb.) Matsum. & Nakai



SEEDS OF Citrullus lanatus (Thunb.) Matsum. & Nakai

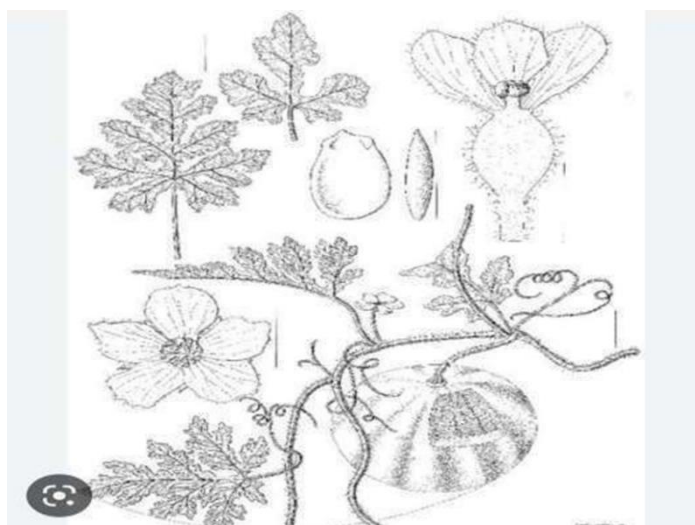


DORSAL VIEW OF Citrullus lanatus (Thunb.) Matsum. & Nakai LEAF.



VENTRAL VIEW OF Citrullus lanatus (Thunb.) Matsum. & Nakai LEAF.



LINE DRAWING OF *Citrullus lanatus* (Thunb.) Matsum. & Nakai.**Uses Of Watermelon**

<i>Parts</i>	<i>Uses</i>
<i>Fruit</i>	<i>Anticancer, Gonorrhoea, Renal Failure, UTI, Alcohol Poisoning, Oedema, Inflammation, High Blood Pressure, Burning Sensation in Body, Fatigue.</i>
<i>Seed</i>	<i>Increase Cardiovascular Health, Strengthen the immune system, Anthelmintic, Diabetes treatment, Beneficial for hair strength, Beneficial for healthy and glowing skin, Boost of energy level.</i>
<i>Leaves</i>	<i>Analgesic, Anti inflammatory.</i>
<i>Flower</i>	<i>Diuretic, Coolant</i>

Result And Discussion

Mixture Of 25% HCL and 96 % Ethanol Observation and Calculation Of RF Values

$$\text{R.F. Value} = \frac{\text{Distance Travelled By Solute}}{\text{Distance Travelled By Solvent}}$$

R.F. Value = 5/6

R.F. Value = 0.83

SUMMARY AND CONCLUSION

The present study entitled the “**Pharmacognostic, Phytochemical evaluation of the Leaves of *Citrullus lanatus* (Thunb.) Matsum. & Nakai. (Cucurbitaceae)**” focuses on a plant which is commonly available throughout India and traditionally used in treatment of various ailments.

Studies on the leaves of *Citrullus lanatus* are still lacking. Hence to exploit its potential use prompted the present study to investigate the leaves of this plant with clear scientific protocol.

The chapter on **Literature Review** deals with the information regarding the pharmacognostical, phytochemical evaluation of the *Citrullus lanatus* plant and other species of *Citrullus*.

The chapter on **Pharmacognostical studies** highlights on

- ❖ Macroscopical features were studied and the adherence of general characters to the family *Citrullus lanatus* was found.
- ❖ Microscopical study reveals the presence of actinocytic stomata, multi cellular uniseriate unbranched epidermal trichomes. Vascular system of the midrib is multistranded, a large abaxial median bundle, two adaxial bundle. All the bundles are bicollateral having phloem strand both outer and inner side of the xylem. The epidermal cells are small elliptical or rectangular and thin walled. Spongy parenchyma cells small and spherical. Palisade zone consists of single layer of cylindrical cells, loosely arranged.
- ❖ Quantitative microscopic studies namely stomatal number, stomatal index, vein islet number, vein termination number, ash value, extractive value, loss on drying value etc.,
- ❖ Also studied cell powder microscopy, fluorescence analysis of powder and the results help in achieving a trouble-free identification and authenticity of the plant leaf or in powder form in future.

The chapter on Phytochemical Evaluation deals with

- ❖ Preliminary phytochemical screening reveals the presence of carbohydrate, alkaloids, flavanoids, protein & amino acids, glycosides etc.,
- ❖ Quantitative determination of secondary metabolites (phenol, flavanoid, tannin content) has been carried out.
- ❖ TLC

REFERENCES

1. www.medicinalplants in india mp.blogspot.in.
2. Arya R, Baishya I, Sarma J, Begum A. Forest-Based Medicinal Plants Rendering Their Services to The Rural Community of Assam, India. *International Journal of Applied Biology and Pharmaceutical Technology*. 2013; 4(4): 11.
3. www.Ayurvedaherbs. Wordpress.com.
4. Naui M, Dutta BK, Hajra PK. Medicinal Plants Used in Major Diseases by Dimas Tribe of Barak Valley. *Assam University Journal of Science & Technology. Biological and Environmental Sciences*. 2007; 1: 19.
5. www.mdnasirahmed. wordpress.com.
6. www. Cancer research.com.
7. Erhirhie EO and Ekene NE. Medicinal Values on *Citrullus lanatus* (Watermelon): Pharmacological Review. *International Journal of Research in Pharmaceutical and Biomedical Sciences*. 2013; 4 (4): 1305-1307.
8. Pino JA, Marbot R, Agüero J. Volatile components of watermelon (*Citrullus lanatus* L.). *Journal of Essential Oil Research* 2003; 15(6): 379-380.
9. Goswami DN. Fatty acid analysis of major and minor seed oils. 2nd World Congress on "Biotechnological developments of Herbal medicine". NBRI, Lucknow, UP, India 2003; February 20-22: 146.
10. Fukushige H, Hildebrand DF. Watermelon *Citrullus lanatus* hydroperoxidase greatly increases C6 aldehyde formation in transgenic leaves. *Journal of Agricultural and Food Chemistry* 2005; 53(6): 2046-2051.
11. Chatwal GR, *Organic Chemistry*, 1st edn, Himalaya Publishing Home, Mumbai. 2000; 2: 539
12. Kokate CK, Purohit AP and Gokhale JB, *Pharmacognosy*, Nirali Prakasham, Pune, 36th edition; 593-597.
13. Chatwal GR and Anand SK. *Instrumental Methods of Chemical Analysis*. 2009; 2: 566-68.
14. Itoh T et al., (1981) has demonstrated the co-occurrence of the C-24 epimers spinasterol and chondrillasterol in seeds of *Citrullus lanatus* (Cucurbitaceae) and seeds of bottle guard (*Langenaria leucantha* var. *gourda*) by ¹³C NMR spectroscopy method.[12]
15. Perkin S et al., (2006) have determined the carotenoid content (84.97%) of *Citrullus lanatus* by HPLC method and lycopene content of *Citrullus lanatus* by colorimetric assay. The total lycopene content was used to separate watermelon cultivars into low (more than 50mg/kg fw), average (50-70mg/kg fw), high (70-90mg/kg fw), and very high (less than 90mg/kg fw). Cultivars varied greatly in lycopene content, ranging from 33 to 100mg/kg.[38]

16. Shaker DS, Ishak RAH, Ghoneim A, Elhuoni MA. 2019. Nanoemulsion: A review on mechanisms for the transdermal delivery of hydrophobic and hydrophilic drugs. *Sci Pharm* 87(3): 17. [CrossRef]
17. Ouassor I, Aqil Y, Belmaghraoui W, Hajjaji SE. 2020. Characterization of two Moroccan watermelon seeds oil varieties by three different extraction methods. *OCL* 27: 13. [CrossRef] [EDP Sciences] [Google Scholar]
18. Mahla HR, Rathore SS, Venkatesan K, Sharma R. 2018. Analysis of fatty acid methyl esters and oxidative stability of seed purpose watermelon (*Citrullus lanatus*) genotypes for edible oil. *J Food Sci Technol* 55(4): 1552–1561. [CrossRef] [PubMed] [Google Scholar]
19. FAOSTAT. 2020. Statistical database. Food and Agriculture Organization of the United Nations. Available from <http://www.fao.org/faostat/en/#data/QC> (last consult: 2020/25/06). [Google Scholar]
20. Elmataeeshy ME, Sokar MS, Bahey-El-Din M, Shaker DS. 2018. Enhanced transdermal permeability of Terbinafine through novel nanoemulgel formulation; Development, in vitro and in vivo characterization. *Futur J Pharm Sci* 4(1): 18–28. [CrossRef] [Google Scholar]
21. Shaker DS, Ishak RAH, Ghoneim A, Elhuoni MA. 2019. Nanoemulsion: A review on mechanisms for the transdermal delivery of hydrophobic and hydrophilic drugs. *Sci Pharm* 87(3): 17. [CrossRef]