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## Medicinal and Therapeutic Potential of *Citrullus Lanatus* (Watermelon) Fruit and Seeds: A Comprehensive Review

T. Shri Vijaya Kirubha\*, S. Viji, M. Vincilda Jose, R. Vinothini, V. Vishwa

Department of Pharmacognosy, Mother Terasa College of Pharmacy,

Illuppur, Pudukkottai 622 102. Tamil Nadu

Email: tsvkirubha@gmail.com



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**Abstract:** *Citrullus lanatus* (Watermelon) is a widely consumed fruit valued for its nutritional, hydrating, and medicinal properties. Beyond its traditional use as a refreshing food, watermelon has gained scientific attention due to the presence of bioactive compounds such as lycopene, citrulline, phenolic, flavonoids, and essential fatty acids. Both the edible pulp and seeds exhibit diverse pharmacological activities, including antioxidant, anti-inflammatory, cardio protective, antidiabetic, antimicrobial, and nephroprotective effects. This review consolidates current knowledge on the phytochemical composition, nutritional profile, traditional uses, and therapeutic potential of watermelon fruit and seeds. The available experimental and clinical evidence supporting its health benefits is critically discussed, along with safety aspects and future research directions. The findings suggest that *C. lanatus* may serve as a valuable functional food and a potential source of nutraceuticals.

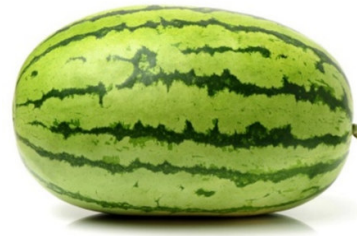
**Keywords:** *Citrullus lanatus*, watermelon, seeds, medicinal plants, antioxidants, functional food, phytochemicals

### 1. Introduction

Medicinal plants have been used for centuries as primary sources of therapeutic agents. In recent years, growing interest in natural products has promoted research into commonly consumed fruits with potential health benefits. *Citrullus lanatus*, commonly known as watermelon, belongs to the family Cucurbitaceae and is cultivated extensively in tropical and subtropical regions. It is valued for its high water content, pleasant taste, and nutritional richness.

Traditionally, watermelon has been used in folk medicine for treating urinary disorders, fever, dehydration, and digestive ailments. Recent scientific investigations have validated many of these traditional claims, revealing its diverse pharmacological activities. Moreover,

watermelon seeds, often discarded as waste, are now recognized as a rich source of proteins, lipids, minerals, and bioactive compounds. This review aims to provide a comprehensive overview of the medicinal and therapeutic potential of watermelon fruit and seeds based on available scientific literature.



### 2. Botanical Description and Distribution

*Citrullus lanatus* is an annual creeping or climbing plant with long trailing vines. The

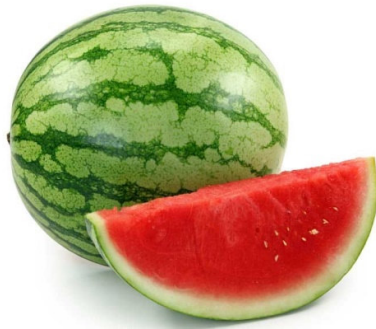
leaves are deeply lobed, and the flowers are yellow and unisexual. The fruit is a large pepo with a smooth green rind and red, pink, or yellow pulp. Seeds are flat, oval, and usually black, brown, or white.



Watermelon is believed to have originated in Africa and is now cultivated worldwide, particularly in Asia, Europe, and the Americas. It thrives in warm climates and well-drained sandy loam soils.

### 3. Nutritional Composition

#### 3.1 Nutritional Profile of the Fruit



Watermelon pulp consists of approximately 90–92% water, making it an excellent hydrating fruit. It contains carbohydrates, dietary fiber, vitamins, and minerals.

#### Major nutrients include:

- Vitamin C, vitamin A (as beta-carotene), and vitamin B6
- Potassium, magnesium, and calcium
- Natural sugars (glucose and fructose)
- Amino acids, particularly citrulline

#### Nutritional Profile of the Seeds



Watermelon seeds are nutritionally dense and rich in macronutrients and micronutrients.

Key components include:

- Proteins (16–18%)
- Lipids (25–30%), rich in unsaturated fatty acids
- Dietary fiber
- Minerals such as zinc, iron, phosphorus, and magnesium

The oil extracted from seeds contains oleic, linoleic, and palmitic acids, contributing to its nutritional and medicinal value.

### 4. Phytochemical Constituents

Watermelon contains a wide range of bioactive compounds responsible for its therapeutic effects.

#### 4.1 Lycopene

Lycopene is the major carotenoid in red watermelon pulp. It is a potent antioxidant known for its role in reducing oxidative stress and preventing chronic diseases.

#### 4.2 Citrulline

Citrulline is a non-essential amino acid that is converted into arginine in the body, enhancing nitric oxide production and improving vascular function.

#### 4.3 Phenolic and Flavonoids

Phenolic acids and flavonoids present in both fruit and seeds contribute to antioxidant and anti-inflammatory activities.

#### 4.4 Other Bioactive Compounds

Other constituents include alkaloids, saponins, phytosterols, tannins, and terpenoids, which collectively enhance pharmacological effects.

### 5. Traditional Uses

In traditional medicine systems, watermelon has been used for various therapeutic purposes:

- Treatment of dehydration and heat-related disorders
- Management of urinary tract infections
- Relief from constipation and digestive problems
- Reduction of fever and inflammation
- Enhancement of kidney function

Seed preparations have been used as vermifuges, tonics, and diuretics in some cultures.

## 6. Pharmacological and Therapeutic Activities

### 6.1 Antioxidant Activity

Watermelon exhibits strong antioxidant activity due to lycopene, vitamin C, and phenolic compounds. These antioxidants neutralize free radicals and protect cells from oxidative damage.

### 6.2 Anti-inflammatory Effects

Bioactive compounds in watermelon inhibit pro-inflammatory mediators, thereby reducing inflammation and tissue damage.

### 6.3 Cardio protective Activity

Citrulline and lycopene improve endothelial function, regulate blood pressure, and reduce cholesterol levels, contributing to cardiovascular health.

### 6.4 Antidiabetic Activity

Studies indicate that watermelon extracts may improve insulin sensitivity and regulate blood glucose levels, supporting its role in diabetes management.

### 6.5 Antimicrobial Activity

Seed and pulp extracts have demonstrated inhibitory effects against various bacterial and fungal pathogens in vitro.

### 6.6 Nephroprotective and Diuretic Effects

Watermelon promotes urine production and supports kidney function, aiding in detoxification and prevention of kidney disorders.

### 6.7 Gastro protective and Digestive Benefits

Dietary fiber and phytochemicals enhance gastrointestinal health, improve digestion, and prevent constipation.

### 6.8 Reproductive and Sexual Health

Experimental studies suggest that watermelon seeds may improve sperm quality

and reproductive hormone balance, although further clinical validation is required.

## Safety and Toxicological Aspects

Watermelon is generally considered safe for consumption in normal dietary amounts. However, excessive intake may cause gastrointestinal discomfort due to high water and sugar content. Individuals with renal disorders should monitor potassium intake. High doses of seed extracts in experimental studies have shown mild toxic effects, indicating the need for dosage regulation in therapeutic applications.

## Industrial and Nutraceutical Applications

Watermelon and its by-products have potential applications in food, pharmaceutical, and cosmetic industries. Lycopene-rich extracts, seed oil, and protein isolates are increasingly used in functional foods and dietary supplements. Seed oil is also utilized in skincare formulations due to its emollient properties.

## Conclusion

*Citrullus lanatus* fruit and seeds possess significant nutritional and medicinal value. Their rich composition of antioxidants, amino acids, fatty acids, and phytochemicals contributes to diverse pharmacological activities. Regular consumption of watermelon may promote hydration, cardiovascular health, metabolic balance, and immune function. Watermelon seeds represent an underutilized resource with promising nutraceutical potential. Further scientific validation and clinical research are necessary to fully establish their role in preventive and therapeutic medicine.

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