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**Review**

# A Review on Cosmeceutical Perspective of *Luffa Acutangula*

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## Abstract

*Luffa acutangula i*s known as ridge gourd, it is atropical plant traditionally used in various medicinal systems for its anti-inflammatory, antioxidant, and antimicrobial properties. Recent research highlighted its potential applications in cosmetics due to its rich phytochemical profile, which included flavonoids, saponins, and polyphenols. Furthermore, its mild exfoliating properties, resulting from its natural fibres and enzymes, made it a suitable ingredient in facial scrubs and masks. The *luffa acutangula* possess several pharmacological activities such as anti-inflammatory, anti-oxidant, anti- microbial and many more the biological active component purporting to have skincare benefits and can be used in the product such as moisturising, antiaging, anti-acne cream, exploitation, etc. the intention of the article of *luffa acutangula* is to focus on cosmetic importance and its benefits.

**Keywords:** Anti-inflammatory, Anti-oxidant, Anti-microbial, *luffa acutangula*, biological effect

## INTRODCTION

*Luffa acutangula* belongs to the family Cucurbitaceae, is commonly known as the ridge gourd and it is used as vegetable in Asian countries. The fruits of *luffa acutangula* contained tanning, saponins, Anthroquinone, sterols, glycosides, carbohydrates, reducing sugar, flavonoids, phenolic compounds, quinines, lignin's, Cucurbitacins, oil and triterpenes, according to a phytochemical examination of the extract pharmacological research revealed that *luffa acutangula* add a number of beneficial properties, including those that were anti-microbial, anti-parasitic, anti-cancer, anti-oxidant, hypoglycemic, Hepatoprotective, Cardioprotective, nephroprotective, and gastro protective, anti-inflammatory, analgesic, immunomodulatory, abortifacient, anti-cataleptic and behavioral changing[1]. india is said to be one of the main area of origin centers further more,

information from several experimental studies the critically evaluated to support the traditional and therapeutical use of *luffa acutangula* [(2)]

**Habit and Habitat**

It can thrive in all sorts of soil, in naturalized tropics and subtropics, and can we grown in the summer or during rainy season, luffa acutangula is a climbing herb that is cultivated in overall India. It is propagated by seeds, which can be sown in either June or July or in February or in March [(3)]

## Botanical Aspects

The roots are yellowish-brown in colour, nearly cylindrical in shape, 8–12 cm long, 0.7 cm thick, and comprise tendrils. The stem is brownish yellow in colour, 0.2–0.4 cm thick, five angled, glabrous, and consists of tendrils. The leaf is brownish yellow in colour, 3–8 cm long; somewhat twisted, wrinkled, and angular, while the lamina is pale (or light green) in colour, 6–9 cm long, crumpled, and broad. The male flower is 1.3 cm long, light greenish yellow in colour, occurring in small racemes with pubescent calyx and lanceolate lobes. Three stages are present, and the corolla is yellow, while the female flower is solitary, yellow, and has a pedicel that is 5–10 cm long.[(4)]

**Fig 1: luffa entire plant[(36)]**


**Fig 2: luffa flower[(36)]**

## Taxanomical classification

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Cucurbitales
Family : Cucurbitace
Sub Family : Cucurbitoideae
Tribe : Benincaseae
Sub tribe : Luffinae
Genus : Luffa
Species : acutangula
Synonyms : poppya Neck.ex M.Roem, Trevauxia steud, orth.var, Trevouxia scop, Turia f [(5)]

## Vernacular names

Bengali : Zinga, Titotorai ,Titojhinga, Ghoshalata.
English : Ribbed gourd, silk gourd, Ridge gourd, Angled loofah, Chinese okra, Sinkw towel sponge, vegetable sponge.
Gujarat : Turiya, Kadawa.
Hindi : Turai, satputia, Jhimani.
Kannada : heerekayi
Malayalam : PeerKam, Athanga.
Marathi : Dodka Turiya, Divali, Kadudodaki, kadushirali, kadu turai, Ranturai.
Punjab : Turiya, Jhinga, Shirola.
Urdu : Turai.
Assam : Zika.

Japan : Hechima.
Philippines : Patola.
China : Sigua, Oyong.
Indonesia : Sigua, Oyong.
Korea : Susemi.
Tamil : peerkangai.
Telugu : beerakaya [5,6]

## Phytoconstituents

Several phytochemicals are identified in *luffa acutangula* like carbohydrates, carotenoids, lipids, proteins, phytin, amino acids [alanine, arginine, cysteine, glutamic acid, glycine, hydroxyproline, leucine, serine, tryptophan], pipecolic acid, flavonoids, and saponins are the primary chemical components of *luffa acutangula* [7]. The seeds of luffa acutangula also contain sapogenin, oleanolic acid, and bitter compound called cucurbitacin B. It was found that the oil properties of *luffa acutangula* had iodine values of 99.5, saponification values of 190.8, and acid value of 10.5, respectively, and the melting point between -3 degree Celsius and minus 10 Degree Celsius [8]

## Nutritional value

The ridge gourd fruit is most frequently prepared as a vegetable. It is a very nutritious plant, but if eaten raw, it tastes harsh. Ridge gourd act as appetiser and it is a rich nutritional plant (Table 2). Ridge gourd has a sweet flavour, is cooling, and is simple to stomach. These make up a low-calorie diet, which is recommended for those with diabetes. The ridge gourd's soft pulp and skin are both utilised in a variety of cuisines, particularly in South Indian cooking [9]

**Table 1: Chemical component discovered in *luffa acutangular***

| Part Studied | Chemical constituents identified | References |
|---|---|---|
| **FRUIT** | Luffeine, vitamins, and minerals | (10) |
| **SEEDS** | Lignin, Tannin, Phenol, Flavonoid and Alkaloid<br>Palmitic, stearic, myristic, and fixed oil acids.<br>Chito-oligosaccharides and lectin. oleanolic acid, sapogenin, luffangulin, and cucurbitacin B. | (11) |

**Table 2: values of *luffa acutangula's* nutrition**

| Parts studied | Food material | References |
|---|---|---|
| Fruit that can be consumed | Carbohydrate, dietary fiber, organic acid, Ca, K, Mg, Zn, thiamine, riboflavin and niacin | (12) |
| Fruit | Protein, carbohydrates, crude fiber, total fat, energy value, vitamin E, vitamin C, free fatty acid, P, S, Mo, Mg, Si and Fe | (10) |
| Seeds | Amino acids, phosphorous, iron and magnesium | (11) |

## Geographical distribution

1. *Luffa acutangula* is a plant native to the Indian subcontinent and commonly found in tropical and subtropical regions worldwide.
2. This plant can be found in various countries across Asia, including Bangladesh, China, India, Japan, Kazakhstan, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam, and Yemen.
3. In Africa, Luffa acutangula is present in countries such as Benin, Chad, Ghana, Kenya, Madagascar, Mauritius, Nigeria, and Uganda.
4. The plant is also found in North America, specifically in the USA, Mexico, and Central America.
5. Additionally, Luffa acutangula can be seen in Central America and the Caribbean, including Costa Rica, Cuba, the Dominican Republic, Jamaica, and Trinidad.
6. South American countries like Brazil, Peru, and Ecuador are also home to this plant.
7. *Luffa acutangula* is distributed in Australia as well [4,5 ]

## METHODOLOGY

**Methods used for Collections**

The fruit are collected during August and September when they are mature and fully developed, before they become too fibrous. The fruits are washed to remove dirt and debris. The fruit are then dried, either by shade drying or an extended period [e.g., 25 days or by using methods like sun- drying or oven- drying at lower temperature [e.g., 55 Degree Celsius for 72 hours] the dried fruits are ground into a fine powder using a grinder [13]

**Methods used for Extraction**

Ridge gourd peel, flesh, and seeds were prepared for extraction by washing, peeling, deseeding, and slicing into small pieces. These components were then shade-dried for 10 days and powdered. The powder was stored in airtight containers. To create the aqueous extract, 5g of powder from each component was boiled in 100ml of sterile water for 20 minutes at 60°C, cooled, filtered, and refrigerated for later use.[14]

## Standards

Studies conducted on identity, purity and strength of *luffa acutangula* revealed that it Contain

1. Total Ash value not more than 16%
2. Foreign matter not more than 2%
3. Acid-insoluble ash not more than 4%
4. Water soluble extract not more than 13%
5. Alcohols soluble extract not more than 6%[15,16]

## Traditional Uses

A local inhabitant from reserve forest of Mahadevpur widely uses the fruit for diabetes treatment. apart from this, the plant is also used by the tribes of western Maharashtra on insect bite. Fruit powder is applied topically to treat swollen hemorrhoids. The kernel of the seed is used as an efficient remedy for dysentery while the juice of the fruit is applied to cure the headache. Oral administration of seed powder is extensively used for the treatment of urinary bladder stone in Rajasthan. Local application of pulverized leaf is reported to be used in splenitis, hemorrhoids, ringworm infection, and leprosy while the juice of the leaves is administered into the eye for treatment of granular conjunctivitis in children.in addition, the fruit possesses demulcent and diuretic properties while the seed have purgative, emetic and anthelmintic properties. The dried fruit powder is useful in preventing premature graying of hair. The root of the plant is laxative and used in dropsy [17]

# Pharmacological action of luffa acutangula

The various studies have shown that the extract of different part of *luffa acutangula* contain different secondary metabolites such as flavanoids, tannin, phenolic acid, saponin Etc. and possess different pharmacological action. They are as follow

**ANTI INFLAMMATORY ACTIVITY**

Anti-Inflammatory is the property of a substance or treatment which reduce swelling or inflammation [18] . Flavonoid have been reported as the most important bioactive compounds which exhibited a wide range of biological activity such as anti –inflammatory [14]. Hydro alcoholic extract of leaves of *luffa acutangula* possess significant anti- inflammatory activity [19]. Ethanolic extract of the *luffa acutangula* fruit have a significant anti-inflammatory effect on paw edema induced by carrageenan in wistar albino rats [20] these extract was found to have anti-inflammatory activity

**ANTI-BACTERIAL EFFECT**

An anti-bacterial is an agent that kills bacteria or stop their growth. [21] The Diffusion method revealed that the antibacterial activity of *luffa acutangula* had a zone of inhibition value ranging from 5 to 13 mm. Of the various fractions tested, n-hexane extracts of both plants showed the strongest inhibitory activity, followed by chloroform extracts, while ethyl acetate extracts showed little to no activity on the tested microorganisms. The n-hexane extract of luffa acutangula showed the highest sensitivity in Staphylococcus aureus (13 mm), Bacillus megaterium (13 mm), and Shigella dysenteriae (13 mm) [22]. metanalic extract of *luffa acutangula* fruit inhibit the growth of B. Subtilis, S. Aureus, P. aeruginosa and E. coil but did not inhibit the growth of E. Aerogenes and S. Thypi. Extract which had the highest antibacterial activity was ethyl acetate extract followed by chloroform, butanol, and hexane extract [23]

**ANTI-OXIDANT EFFECT**

Anti-oxidant are compound that combine to prevent oxidative damage to cells and tissue by [ reactive oxygen species [24]. Anti-oxidant are molecule that oxidize themselves instead of other molecule. These compound interact with free radical and stop a chain reaction before vital molecule are harmed [25]. Hasanat et al. has shown the ant- oxidant effect of 3 different extract of the chloroform, n-hexane, and ethyl acetate of the leaves of *luffa acutangula* has been studied using [DPPH] assay and the extract were found to increase in a concentration-dependent manner. IC50 of the chloroform, n-hexane and ethyl acetate extracts was 57.81, 50.95, 51.77 µg/ml [22]

**ANTI-MICROBIAL EFFECT**

An microbial is an agent that prevents the growth of microbial colonies and may destroy microorganisms [26]. *Luffa acutangula* had anti-microbial activity. The ethanolic extract of *luffa acutangula* leaves exhibit a stronger anti-microbial activity on streptococcus pyrogens. The antimicrobial screen for the studied plant reveald that *luffa actangula* leaves confer a higher degree of resistance to *streptococcus pyrogens* [20mm], *candida albicans* [18mm] followed by *streptococcus pneumonia* [17mm]. The plant extract suggested that the plant could be used for the management of infection caused by the tested micro organisms (27)

**ANTI-ANALGESIC EFFECT**

The analgesic effect of the luffa acutangula ethanolic seed extract was assessed using the carrageenan-induced rat paw edoeme method and the tail flick and tail immersion procedures(28). By using the tail flick and tail immersion procedures, the extract demonstrated considerable analgesic efficacy as it is compared with diclofenac sodium (29)

**WOUND HEALING**

*Luffa acutangula* is used for bleeding from wounds the pulp of *luffa acutangula* helps in stop bleeding from the wound by ground the pulp of the *luffa acutangula* and by applying on the wound and it is effective for wound healing [30]

**EXFOLITING ACTIVITY**

*Luffa acutangula* is well known for is exfoliting activity in which the *luffa acutangula* is allowed to dry at it is mature stage. This loofah sponge has been used traditionally exfoliting product while bathing. This activity of *luffa actangula* is helpful against pimples and acne problems. This plant is considered to helpful in removing dead cells from the skin thus making the skin more than smooth and shining. Loofah sponge is effective in fighting the body odor.

**Fig 3: Dry fruits (36)**

**COSMETIC USES**

- *Luffa acutangula* has a good source of phytochemicals like flavanoids, tannins, saponins, etc and various pharmacological activities due to which it can be used in various cosmetic product formulation.
- *Luffa acutangula* also contain flavanoids and nutrients like iron, magnesium, vitamins C and E and zinc making it a good antiaging ingredient for skin and eyes (31,32). Flavanoids are stronger antioxidants and effective secondary metabolic product as they help to provide protection against oxidation at a cellular level by interfering in enzyme activity, chelation of redox-active metals,and by scavening free radicals[33,34]
- The cosmetic formulation of the plant extract improve the appearence of the skin by reducing the wrinkles on the face. This improves the skin elasticity when it's applied or consumed

- Saponins and flavanoids are the key ingredients of *luffa acutangula* which are used as anti-inflamatory effects this prevents the redness, swelling, and discomfort caused by inflamation[33]
- As *luffa acutangula* containing the anti-inflamatory activity this plant extract can be used in anti-acne formulation. As acne is the inflammatory skin disease that occur due to blockage of in polybase and inflammation that are caused by bacteria. The seed of the luffa acutangula have potential against acne causing bacteria and hence used they can be used in topical anti-acne preparation and may resist the bacteria(35)
- *Luffa actangula* be used as bathing sponge because of its soft anfd non scratching effect on the skin
- *Luffa actangula* seed oil contain moisturising property the oil helps to moistur the skin
- Therefore the extract of *luffa acutangula* can be used in cosmetic appropriate cosmetic formulation aming at the prevention of acne, dandruff owing to antibacterial properties. It can be used in hand sanitizer and medicated talcum powder due to its antimicrobial property

## CONCLUSION

*Luffa acutangula* is a green herbal plant that plays an important role in all around world the current review documented the existing information about phutochemical, pharmacology effect of luffa acutangula as a promising plant that the plant is rich in phenolic acids, flavanoids, saponins, and vast biological constituents. It is more effective as the herbal component when used in modern formulation such as exfoliting, anti-ageing, moisturizers, anti-acne and it can be safe and cost effective. This review serves the purpose of aiding in future research work on this plant

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