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Luffa Cylindrica : An important medicinal plant

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ABSTRACT

Traditional system of medicine consists of large number of plant with various medicinal and pharmacological importances and hence represents a priceless tank of new bioactive molecules. Luffa cylindrica found all over the world. It is commonly known as 'tori' and has been recognized in different traditional system of medicines for the treatment of varied diseases of human being. The phytoconstituents present in it mainly belong to the category of flavonoids. Different part of this plant are traditionally claimed to be used for the treatment of broad spectrum of ailment including snake bites, convulsions, cramps, tetanus, emetic, cathartic, dropsy, nephritis, chronic bronchitis, asthma, sinusitis and fever to be list a few.

Keywords: Luffa Cylindrica, Phytochemistry, Pharmacological activity.

INTRODUCTION

Herbal medicine is still the mainstay of about 75-80% of the world population, mainly in developing countries, for primary health care because of better cultural acceptability, better compatibility with the human body and lesser side effects. The chemical constituents present in the herbal medicine or plant are a part of the physiological functions of living flora and hence they are believed to have better compatibility with human body. Natural products from plants are a rich resource used for centuries to cure various ailments. The use of bioactive plant-derived compounds is on the rise, because the main preoccupation with the use of synthetic drugs is the side effects which can be even more dangerous than the diseases they claim to cure. In contrast, plant derived medicines are based upon the premise that they contain natural substances that can promote health and alleviate illness and proved to be safe, better patient tolerance, relatively less expensive and globally competitive. So, in respect of the healing power of plants and a return to natural remedies is an absolute requirement of our time [1-3].

Luffa [Luffa cylindrica (L.) syn Luffa aegyptiaca Mill] commonly called sponge gourd, loofa, vegetable sponge, bath sponge or dish cloth gourd, is a member of cucurbitaceouse family.

The fruits of Luffa cylindrica are smooth and cylindrical shaped. One mature Luffa sponge will produce at least 30 seeds. Some will produce many more.

Luffa cylindrica has alternate and palmate leaves comprising petiole. The leaf is 13 and 30 cm in length and width respectively and has the acute-end lobe. It is hairless and has serrated edges. The flower of Luffa cylindrica is yellow and blooms on August-September. Luffa cylindrica is monoecious and the inflorescence of the male flower is a raceme and one female flower exists. Its fruit, a gourd, is green and has a large cylindrical shape and grows climbing on other physical solid materials.[4]

Taxonomy [5]

Luffa cylindrica Linn.

Kingdom	:	Plantae
Division	:	Mangoliophyta
Class	:	Mangoliosida
Order	:	Cucurbitales
Family	:	Cucurbitaceae
Genus	:	Luffa
Specie	:	Cylindrica

Vernacular Names

Hindi	:	Ghiatarui
Sanskrit	:	Rajakoshataki
Bengali	:	Dhundul
Tamil	:	Pikku
Telungu	:	Guttibira
Bombay state	:	Ghosali
Malayalam	:	Tureippirku

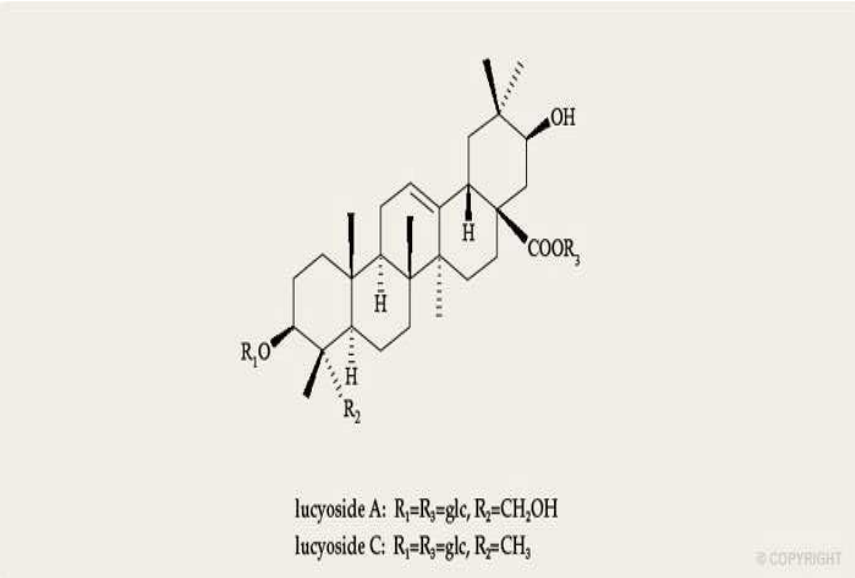
Geographical source

Luffa cylindrica is a sub-tropical plant, which requires warm summer temperatures and long frost-free growing season when grown in temperate regions. It is an annual climbing plant which produces fruit containing fibrous vascular system. It is summer season vegetable. It is difficult to assign with accuracy the indigenous areas of luffa species. They have a long history of cultivation in the tropical countries of Asia and Africa. Indo-Burma is reported to be the center of diversity for sponge gourd. The main commercial production countries are China, Korea, India, Japan and Central America.[4]

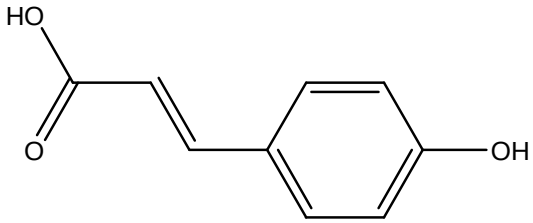
Phytochemistry

The fruit contains triterpenoid saponins: lucyosides A, B, C, D, E, F, G, H, I, J, K, L, M [1-2], ginsenosides Re, Rg1, etc. The leaf contains triterpenoid saponins: lucyin A, lucyosides G, N, O, P, Q, R[6-10], 21β- hydroxyoleanoic acid, 3-O-β-Dglucopyranosyl- maslinic acid[11],

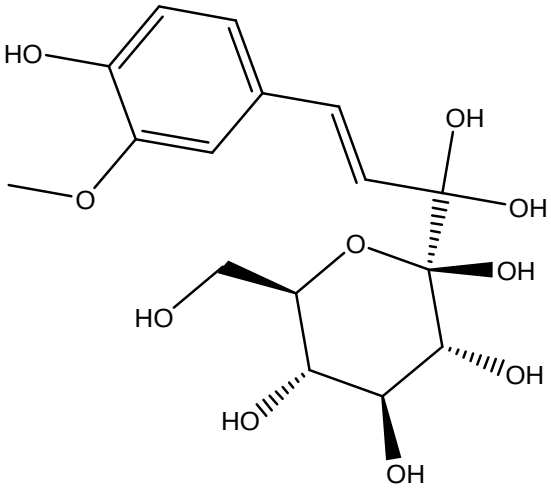
ginsenosides Re, Rg1[12]; flavonoids:apigenin[13], etc. The seed contains polypeptides: luffins P1, S [14], luffacylin [15] etc.



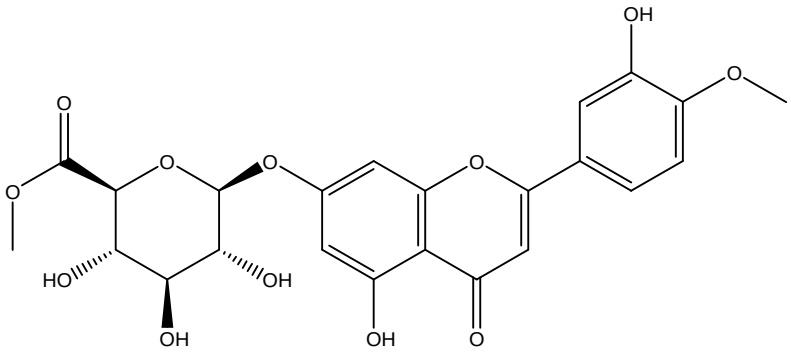
Du Q et al has carried out Hydrophilic antioxidant constituents in the fruits of the vegetable Luffa cylindrica (L.) which were separated by an antioxidant guided assay which was evaluated by radical scavenging effect on the DPPH radicals and concluded that the consumption of sponge gourds can supply some antioxidant constituents to human body[16]



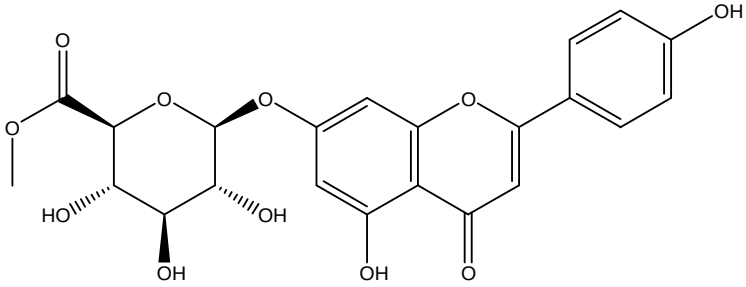
para-coumaric acid



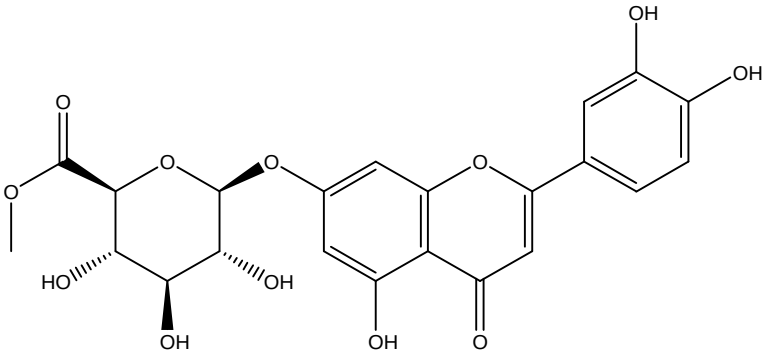
1-ortho-feruloyl-beta-D-glucose



diosmetin7-o--beta-D-glucuronide methyl ester



apigenin7-o--beta-D-glucuronide methyl ester



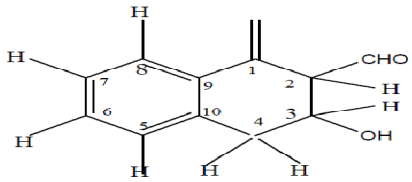
luteolin-7-o--beta-D-glucuronide methyl ester

Anamika Khajuria et al (2007) isolated Two triterpenoids sapogenins 1&2 from the ethanolic extract of the defatted powdered seed of L.cylindrica. Two triterpenoids sapogenins 1&2 were structure elucidation & characterized by ESIMS, 1DNMR and also 2NMR especially HSQC, HMBC and 1h-1H COSY techniques.[17]

Okuyama T et al (1991) two new fibrinolytic saponins, Lucyoside N and P, were isolated from the seeds of Luffa cylindrica Roem. (Cucurbitaceae). On the basis of chemical and spectral evidence, Lucyoside N was characterized as 3-O-beta-D-galactopyranosyl-(1----2)-beta-D-glucuronopyranosyl-28O-beta-D-xylopyranosyl-(1----4)-[beta-D-glucopyranosyl-(1----3)]-alpha-L -rhamnopyranosyl-(1----2) alpha-arabinopyranosyl quillaic acid. Lucyoside P was characterized as a gypsogenin glycoside with the same sugar moiety as Lucyoside [18]

Mohammad M. Hussain et al (2009) were isolated 3-hydroxy-1-methylene-2,3,4,4 tetrahydroxynapthalene-2-carbaldehyde (1), 22,23-dihydroxy spinasterol (2) from petroleum ether extract

of the fruits of Luffa cylindrical. The structures of the isolated compounds were elucidated by extensive spectroscopic studies including IR and high field NMR analysis. Petroleum ether extract (i.e. crude extract) exhibited mild to moderate antimicrobial activity.[19]



3-hydroxy-1-methylene-2, 3, 4, 4 tetrahydroxynapthalene-2-carbaldehyde

Biological and medicinal uses of plant luffa cylindrical

Plant is bitter tonic, emetic, diuretic and purgative and useful in asthma, skin diseases and splenic enlargement. It is used internally for rheumatism, backache, internal hemorrhage, chest pains as well as hemorrhoids. Young fruit can be eaten raw like cucumber or cooked like squash, while the young leaves, shoots, flower buds, as well as the flowers can be eaten after being lightly steamed. The seeds can be roasted as a snack, or pressed to produce oil. Externally, it is used for shingles and boils. The dried fruit fibers are used as abrasive sponges in skin care, to remove dead skin and to stimulate the circulation. The fruits are anthelmentic, carminative, laxative, depurative, emollient, expectorant, tonic and galactagogue and are useful in fever, syphilis, tumours, bronchitis, splenopathy and leprosy. The vine is most commonly grown for the fibrous interior of the fruits. Kernel of seed is expectorant, demulcent and used in dysentery. Seed oil is used in leprosy and skin diseases. Fruit is intensely bitter and fibrous. It has purgative property and is used for dropsy, nephritis, chronic bronchitis and lung complaints. It is also applied to the body in putrid fevers and jaundice.

Pharmacological actions of *Luffa Cylindrica*

1. Anti-inflammation

Intraperitoneal administration of water decoction of Sigualuo inhibited carrageenan induced plantar edema in rats [20].

P Muthumani et al has carried out phytochemical screening and Anti inflammatory, Bronchodilator and Antimicrobial activities of the seeds of Luffa cylindrica and concluded all the extracts revealed the presence of sugar, protein, alkaloids, flavonoids, sterols and glycosides as major constituents. Cu-1 is oil has shown more unstauration and less acid value which has been hydrolyzed and the resulting free fatty acids have been converted into their respective methyl esters for separation on GLC. CU-2 this is the unsaponifiable fraction of the oil. The sterols or related compounds are present in this fraction as the chemical and spectral data suggests. This showed very high antifungal and significant anti bacterial activity. CU-3 has significant anti-inflammatory activity. CU-4 showed bronchodilator activity. This extract showed very high degree of antifungal activity [21]

2. Anti-fungus

In vitro, luffacylin inhibited Mycosphaerella arachidicola and Fusarium oxysporum [15].

3. Analgesia and sedation
In mice, Intraperitoneal administration of water decoction of Sigualuo inhibited acetic acid-induced writhing, raised the pain threshold in hot plate and electric shock tests, reduced spontaneous activities, and synergized the effects of pentobarbital sodium [20,22].

4. Anti-myocardial ischemia
In a pituitrin-induced acute myocardial ischemia mouse model, oral administration of water decoction of Sigualuo lowered Twave increase in electrocardiogram, inhibited the decrease of heart rate, inhibited the raise in serum lactate dehydrogenase level and myocardial malondialdehyde level, and enhanced the activity of myocardial superoxide dismutase [23].

5. Anti-hypertriglyceride
In a hypertriglyceridema rat model, oral administration of water decoction of Sigualuo decreased serum cholesterol and triglyceride levels, increased high density lipoprotein-cholesterol, and reduced the body weight [24].

6. Immunostimulation
Oral administration of the petroleum ether fraction of the ethanol extracts of fruits, leaves and stems potentiated the cytophagic action and acid phosphatase activity of peritoneal macrophages in mice [25]. In vitro, 3-O-β-D-glucopyranosylmaslinic acid (contained in the leaf) enhanced the production of interleukin-1 and tumor neurosis factor-α in mouse thymocytes, and the production of interleukin-2 in mouse splenic cells [26].

7. Anti-allergy
Oral administration of ethanol extract of the stem inhibited homologous passive cutaneous anaphylaxis in rats, heterologous passive cutaneous anaphylaxis in mice, Arthus reaction in mice, and sheep red blood cell-induced delayed type hypersensitivity in mice [27].

8. Anti-asthma, anti-tussive and expectorant effects
Oral and Intraperitoneal administration of water decoction and ethanol extracts of Sigualuo suppressed SO2- and ammonium aerosol-induced cough in mice, and increased the respiratory tract phenol red excretion in mice. In guinea pigs, intraperitoneal administration of water decoction of Sigualuo inhibited histamine induced asthma.

9. MIscellaneoous
Sigualuo had anti-acute hepatic injury, cardiac stimulation, S180 sarcoma inhibitory, and anti-human immunodeficiency virus actions [28]. Oral administration of proteins isolated from the seeds exhibited anti-reproductive property in mice [29]. Luffin P1 inhibited trypsin [14]. Luffin S had ribosomeinactivating protein-like activity [14]. Intracerebroventricular administration of 3-O-β-D-glucopyranosyl-maslinic acid promoted the recovery from cerebral ischemia-induced behavioral disorders in rats [30]

CONCLUSION

The extensive literature review elaborates the use of luffa in various ways from the ancient time. It has been used throughout India as a vegetative source and also as natural remedy for treatment

for various degenerative disorders including inflammatory disorders and liver diseases. The biological and medicinal application of Luffa plant has been discussed in the present review. Its juice is used as a natural remedy for jaundice. Bitter luffa seeds and dry crusts are also available and can be used for the same purpose. The medicinal properties exhibited by plant may be attributed to the presence of flavonoids like apigenin and triterpenoid sapogenins like lucyin A, lucyosides G.

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