

Genus *Luffa* - an Ethnopharmacological and Phytochemical review.

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Abstract - *Luffa acutangula* and *Luffa cylindrica* are the two important species under the genus *Luffa*. These two species are used by traditional medicinal practitioners for treating various human disorders. The phytochemical analysis of the various parts of these plants has revealed many phytoconstituents of medicinal importance. The wide distribution of these species has made it easily available and many experimental pharmacology studies have been conducted to prove its efficacy and to support its culinary and therapeutic use.

Key words: *Luffa acutangula*, *Luffa cylindrica*, phytochemistry and ethnopharmacology

Introduction

Genus *Luffa* which belongs to Cucurbitaceae family is a tropical or sub tropical vine. *Luffa* is a warm climate fast growing plant and it grows up to a height of 15 feet. . The formal botany genus name *Luffa* was introduced by Botanist Joseph piton de Tournefort in 1706.

***Luffa acutangula* (L.) Roxb**

It is also called as angled luffa, ridge gourd, vegetable guard and Chinese okra. Some of the Asian varieties are Summer long, Hybrid green diamond, Lucky Boy, Hybrid Asian pride, hybrid Extra long.

Leaves of *Luffa acutangula* are orbicular in outline, 15-20 cm long, palmately 5-7 angled or sublobate and scabrid. Male flowers are arranged axillary in 12-20 flowered racemes and female flowers solitary. Fruits are 15-30 cm long, clavate-oblong, tapering towards the base, and are longitudinally ribbed (Fig. 1)



Fig 1. *Luffa acutangula* fruits.

Phytochemistry

Phytochemical analysis of fruit extracts of *Luffa acutangula* extracts has revealed the presence of Sterols, Glycosides, saponins, carbohydrates, flavinoids and Triterpenes (1). Seeds of *Luffa acutangula* showed the presence of saturated and unsaturated fatty acid palmitic, stearic, oleic, linoleic acid. While the fruits contain cucurbitacin B, cucurbitacin E and oleanolic acid (2).

Ethnopharmacology

The pounded leaves are applied locally in splenitis, hemorrhoids, ringworm infection and leprosy. Juice of the fresh leaves is installed into the eyes of children in granular conjunctivitis. Fruit is demulcent, diuretic and

nutritive. The seeds possess purgative, emetic and anthelmintic properties (3). As per folk lore claims, whole plant is useful in treating jaundice, tetanus, vomiting, insanity and itches (4).

Safety profile

Hydro alcoholic extract of *Luffa acutangula* fruits was found to be safe up to 10000 mg /kg in Swiss Mice. (5). Petroleum ether extract of *Luffa acutangula* (whole plant) was safe up to 2500 mg/ka in rats. (6)

Experimental Pharmacology

Animal experimentations have revealed analgesic, anti-inflammatory, hepatoprotective and cerebroprotective activities of various extracts of *Luffa acutangula* (Table 1.)

Table 1. Experimental Pharmacology studies on *Luffa acutangula*.

Plant part	extract	Dose	Activity	Method	Reference
Seeds	Alcoholic extract	200 and 400 mg/kg B.W.	Analgesic activity (P<0.05) at 30 minutes	Tail Flick method	(5)
seeds	Alcoholic extract	200 and 4000 mg/kg B.W.	Analgesic activity (P<0.05) at 30 minutes	Tail Immersion method	
Seeds	Alcoholic extract	200 and 4000 mg/kg B.W	Anti-inflammatory activity (P<0.05) at 60 , 120 , and 180 minutes	Hind paw oedema method	
Fruits	Petroleum ether and ethanol extracts	150 mg/kg	Hepatoprotective activity	Carbon Tetrachloride induced liver damage	(1)
Fruitss	Hydro alcoholic extract	400 mg/kg	Hepatoprotective activity	Carbon Tetrachloride induced liver damage	(5)
Fruits	Hydro alcoholic extract	200 and 400 mg/kg	Hepatoprotective activity	Rifampicin induced liver damage	
Whole Plant	Petroleum Ether extract	200 and 400 /kg B.W.	Cerebroprotective activity	Bilateral carotid artery Occlusion induced stroke	(6)

Luffa cylindrica . Roem

It is also known as smooth luffa and sponge luffa. Some of the Asian varieties are Edible Ace, Smooth Boy, Hybrid Smooth Beauty, Hybrid summer Cross, Extra long smooth, Hybrid Southern Legacy. Hybrid Jupiter.

Leaves of *Luffa cylindrica* are orbicular-reniform, 10-20 cm long, palmately 5 (rarely 7) lobed and both surfaces are finely scabrous. Male flowers are arranged axillary in 4-20 flowered racemes and female flowers are solitary. Fruits are 12-30 cm long, cylindrical, blunt at the end with marked longitudinal lines (Fig. 2-4).



Fig 2. *Luffa cylindrica* fruits.



Fig 3. Leaves and flowers of *Luffa cylindrica*



Fig 4. Dried fruit, sponge and seeds of *Luffa cylindrica*.

Phytochemistry

Preliminary phytochemical screening revealed the presence of carbohydrates, flavanoids, glycosides and saponins in *Luffa cylindrica* fruit extracts (7).

A new saponin of penotacyclic triterpenoid named lucyoside O has been isolated from the leaves of *Luffa cylindrica* (8)

The peptide, namely luffacyclin with antifungal activity has been isolated from *Luffa cylindrica* seeds (9). Two triterpenoid saponins (1 & 2) were isolated from ethanolic extract of seeds of *Luffa cylindrica* and were found to exhibit immunomodulatory effect in Balb/C mice (10).

Ethnopharmacology

Luffa cylindrica is used in traditional medicine; fruits are used in the traditional Chinese medicine as an anthelmintic, stomachic, antioxidant and antipyretic (11). Crushed leaves are used to alleviate pain and inflammation and heat rashes of children in summer. It is used in the treatment of hemorrhage from bowels or bladder, hemorrhoids, jaundice, menorrhagia, haematuria, leprosy and spleenopathy. Antiseptic, anthelmintic, carminative, emmenagogue and galactagogue, properties of ripe fruits have also been reported (12).

Safety profile

The methanolic extract of the leaves of *Luffa cylindrica* was found to be safe in Wistar rats upon single exposure up to dose of 2000mg /kg orally (13). Acute toxicity study of methanolic extract *Luffa cylindrica* fruits has shown that, it is safe up to 3000mg/kg in Wistar rats (14). Aqueous and alcoholic extracts of fruits of *Luffa cylindrica* were found to be safe in Swiss mice up to dose of 2000 mg/kg. (7).

Experimental Pharmacology

Various extracts of *Luffa cylindrica* have shown analgesic, anti-inflammatory, hepatoprotective, anti-hyperglycemic and wound healing activities in experimental animals (Table 2).

Table 2. Experimental Pharmacology studies on *Luffa cylindrica*.

Plant part	extract	Dose	Activity	Method	Reference
Fruits	Aqueous extract	100 mg/kg B.W.	Analgesic activity (P<0.01)	Acetic acid Induced writhing	(7)
	Alcoholic extract	100mg/kg B.W.	Analgesic activity (P<0.001)	Acetic acid Induced writhing	
	Alcoholic extract	100mg/kg B.W.	Analgesic activity (P<0.01) at 60 minutes P<0.001 at 90 and 120 minutes	Tail immersion method	
Leaves	Ethanol extract	500mg /kg B.W.	Analgesic activity P<0.01 at 2 nd Hour	Analgesy Meter Test	(12)
Flowers s	Ethanol extract	500mg /kg B.W.	Analgesic activity P<0.01 at 2 nd Hour	Analgesy Meter Test	
Fruits	Ethanol extract	500mg /kg B.W.	Analgesic activity P<0.05 at 1 hour	Analgesy Meter Test	
Fruits	Methanolextract	200 and 400 /kg B.W	Analgesic activity	Acetic acid induced writhing	(16)
Leaves	Methanolic extract	250 and 500mg /kg B.W.	Hepatoprotective activity	Paracetamol induced liver damage	(13)
Fruits	Aqueous extract	200 and 400 mg/kg	Hepatoprotective activity	Paracetamol induced liver damage	(11)
Fruits	Alcoholic extract	200 and 400 mg/kg	Hepatoprotective activity	Paracetamol induced liver damage	
Fruits	Methanolic extract	200 and 400 /kg B.W.	Anti-hyperglycemic activity	Alloxan induced diabetes	(14)
Leaves and Flowers	Ethanol and hexane extracts	150 mg/kg	Anti-inflammatory	Hind paw oedema method	(17)
Flowers	Ethanol and hexane extracts	500,750 and 1000 mg/kg	Antiemetic activity	Chick emesis method	
Whole plant	Chloroform extract	50 mg/kg	Anti-inflammatory activity	Hind paw oedema	(18)
Whole plant	Chloroform extract	10% (W/W)	Wound healing activity	Excision wound method	

Conclusion

Review of the literature pertaining to phytochemistry and ethnopharmacology and experimental Pharmacology reveals potential nature of *Luffa acutangula* and *Luffa cylindrica* species. Advanced experimental Pharmacology studies may further unfold and strengthen its lesser/unknown therapeutic uses.

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