



## PHYTOCHEMICAL AND BIOLOGICAL STUDIES ON *LEUCAS ASPERA*- REVIEW

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### Article Info

### ABSTRACT

#### Key words

*Leucas aspera*,  
Dronapushpi, Phyto  
constituents,  
triterpenoids



Plants are being used from more than 1000 years to treat many diseases. *Leucas aspera* commonly known as “Thumbai” or Gumma is found all over India. The plant is taken in use in the name as Dronapushpi. The plant is used traditionally as an antipyretic and insecticide. The plant had been reported to have anti diarrheal, anti inflammatory, analgesic, anti microbial, anti oxidant and insecticidal activities. It shows cytotoxic activity and as an antidote to snake venom. Bio active compounds such as lignans, flavanoids, coumarins, steroids, terpenes, fatty acids and aliphatic long chain compounds have been isolated. This review emphasizes the current literature on *L. aspera* and explains its taxonomical classification, botanical, phyto constituents and pharmacological outcomes.

### INTRODUCTION

Medicinal plants are the only source for the treatment of diseases in ancient days and since then numerous herbs and plants have been recognised as a medicinal plants because of their potency to cure ailments [1]. The newly discovered and the existing medicinal plants are being screened for many diseases and to identify significant therapeutic importance [2]. *Leucas aspera*, is a herb is widely distributed in Tropical Asia, Africa and grows in highland crop fields, homesteads, fallow lands and roadsides [3]. *Leucas aspera* commonly known as Thumbai is widely distributed throughout India from the Himalayas down to Ceylon. The plant is used traditionally as an antipyretic and insecticide. Flowers are used as stimulant, expectorant and diaphoretic. Leaves are considered useful in chronic rheumatism, psoriasis and other chronic skin eruptions. Bruised leaves are applied locally in snake

bites [4]. Many phyto chemicals belong to the class of terpenoids, fatty acids, glycosides, flavanoids, lignans and alkaloids were identified and isolated by using different extraction methods [5-6].



Vernacular names [7]

Sanskrit: Dronapushpi, Chitrapathrika,  
Chitrakshup

Punjab : Guldor

Bengali: Darunaphula, Hulkasha

Gujarat: Kulnphul

Hindi : Goma madhupati

Sindhi : Kubo

Maharashtra : Bahuphul

Telugu : Thummichittu

**Taxonomical classification [8]**

Kingdom : Plantae, plant

Sub kingdom : Tracheobionta, vascular

plant Super division : Spermatophyta, seed plant

Division : Angiosperma

Class : Dicotyledonae

Subclass : Gamopetalae

Series : Bicarpellatae

Order : Tubiflorae

Family : Labiatae

Genus : Leucas

Species : aspera

**Botanical description [7, 9-10]**

*Leucas aspera* is an annual, branched, herb erecting to a height of 15-60 cm with stout and hispid acutely quadrangular stem and branches.

**Leaves:** Yellowish green, 3-9 cm long, 1-2.5 cm wide, ovate or ovate-lanceolate, sub acute, more or less pubescent, crenate, serrate, pungent.

**Flowers:** Flowers are sessile, white, small in dens terminal or axillary whorls; bracts 6 mm long, linear, acute, bristle-tipped, ciliate with long slender hairs.

**Calyx:** Calyx variable, tubular, 8-13mm long; tube curved, contracted above the nutlets, the lower half usually glabrous and membranous, the upper half ribbed and hispid; mouth small, very oblique, not villous, the upper part produced forward; teeth small, triangular, bristle-tipped, ciliate, the upper tooth being the largest.

**Corolla:** Corolla 1 cm long; tube 5 mm long and pubescent above, annulate in the middle; upper lip 3 mm long, densely white woody; lower lip about twice as long, the middle lobe obviate, rounded, the lateral lobes small and sub acute.

**Fruit:** Schizocarpic carcerule, smooth, brown. **Seed:** 0.3 cm long, 0.1 cm wide, oblong, smooth, trigonous and dark brown.

**Habitat and Distribution**

*L. aspera*, a species within the Leucas genus is an aromatic herb widely distributed in tropical Asia, Africa, and grows as a competitive weed in highland crop fields, homesteads, fallow lands and roadsides [3].

**Some other species of Leucas[11]**

- *L. abyssicica*
- *L. biflora*
- *L. capensis*
- *L. capitata*
- *L. cephalotes*
- *L. ciliate*
- *L. deflexa*
- *L. hirta*
- *L. indica*
- *L. jamesii*
- *L. lanata*
- *L. linifolia*
- *L. lavandulaefolia*
- *L. martinicensis*
- *L. molissima*
- *L. plikenetti*
- *L. stricta*
- *L. urticaefolia*
- *L. Zeylanica*

**Past work on phyto chemistry**

Preliminary phyto chemical examination of *L. aspera* revealed the presence of triterpenoids in whole plant[12]. The entire plant is reported to contain ursolic acid, oleanolic acid and 3-sitosterol[13]. Aerial parts are reported to contain nicotine, sterols ( $\alpha$  siosterol and  $\beta$  sitosterol)[14]. Reducing sugars (galactose), diterpenes such as Leucasperones A and B, Leucasperols A and B, isopimarane glycosides (leucasperosides A, B and C) were reported[15]. Other compounds like asperphenamate, maslinic acid, linifolioside, nectandrin B, meso-dihydroguaiaretic acid, macelignan, acacetin, apigenin, chrysoeriol, apigenin, licarin, machilin C, chicarin, erythro-2-(4-

allyl-2,6-dimethoxyphenoxy)-1-(4-hydroxy-3-methoxyphenyl) propan-1-ol, myristargenol B[16]. X-thujene, u-farnesene and menthol were the major leaf volatiles identified. The flower is reported to contain amyl propionate, isoamyl propionate. Seed is reported to contain palmitic acid, stearic acid, oleic acid, linolenic acid[17]. Shoot is reported to contain phenolic compounds (4-(24-hydroxyl- 1-oxo-5-n-propyltetracosanyl)-phenol)[18], aliphatic ketols, long chain compounds (1-hydroxytetratriacontan-4-one,32-methyltetracontan-8-ol)[20], 5-acetoxytriacontane,  $\beta$  sitosterol[19] and dotriacontanol. Leucolactone isolated from the root of *L. Aspera* have been characterised as 3,3,16 c-dihydroxyoleanan-28-1, 3-olide[21].

#### Past work on phyto pharmacology

**Antifungal activity:** Chloroform and ether extract of *Leucas aspera* revealed its antifungal activity against *Trichophyton* and *Micropsorum gypseum*. *L. Aspera* reported to have both fungicidal and fungistatic action[22].

**Anti-Inflammatory activity:** *Leucas aspera* were investigated for anti inflammatory activity. Ethanol and distilled water extracts reported to have significant anti inflammatory activity. The extracts showed compelling anti inflammatory activity for acute and chronic inflammation. It showed activity against mast cell degranulation induced by propancolol and carbachol. Four different crude extracts petroleum ether, chloroform, ethanol, water were investigated. Ethanol and water extract showed significant anti inflammatory activity[23]. The anti inflammatory activity was also studied by formalin induced rat hind paw edema method with crude extract, alkaloid portion and non alkaloid portions of *L. aspera* and compared with phenyl butazone, it showed highest anti inflammatory activity followed by alkaloid portion and crude extract. The

non alkaloid did not show anti inflammatory activity.

**Antioxidant activity:** Ethanolic extracts of *L. aspera* roots showed significant antioxidant activity. The extracts of *Leucas aspera* roots exhibited high free radical scavenging activity. The extract significantly elevated antioxidant enzymes like superoxidase dismutase, catalase, glutathione peroxidase and decreased lipid peroxidation levels in liver[23]. In another study ethanolic extracts was subjected to acetic acid induced writhing inhibition, 1,1-diphenyl-2-picryl hydrazyl (DPPH) free radical scavenging assay and brine shrimp lethality bio assay for the screening of anti nociceptive, anti oxidant, and cytotoxic activity respectively. Methanolic extract of root possessed anti oxidant activity near the range of vitamin E.

**Hepato-protective activity:** The cold methanolic extract of the whole plant of *Leucas aspera* was reported to have significant hepato-protection in  $CCl_4$  induced liver damage. The elevation markers used were GOT, GPT, Alkaline phosphate, glucose, bilirubin, cholesterol and total protein. Silymarin was used as standard for comparison. The fresh juice showed good result against liver disorders[23]. Histological studies also supported the good recovery in MELA and standard pre-treated groups.

**Insecticidal repellent activity:** *Leucas aspera* is used for mosquito repellent and as insecticide. The extract showed larvicidal activity against first, second, third, fourth instar larvae of *Culex quinquefasciatus*[23].

**Anti diabetic activity:** Ethanol and petroleum ether extracts showed significant anti hyperglycaemic activity in alloxan induced rats as well as streptozocin induced hyperglycemic rats. The study was done to evaluate the effect of *L.aspera* leaves on experimental diabetes mellitus in rats. The study revealed the good

experimental results in lowering the blood glucose levels in a dose dependant manner and experimental diabetes mellitus induced patho-biological changes were more effective by ethanolic extract of *L.aspera* in dose dependant manner. The methanol extracts of *L. Aspera* was conducted in streptozocin induced diabetic rats for anti-hyperglycemic activity[23]. The oral administration of the extract at the doses of 100, 200 and 400 mg/kg body weight. The doses 100, 200, 400 body weight were showed significant decrease in blood glucose levels.400 mg/kg body weight dose was effective with the highest glycemic change of 34.45% at 8 hour of extract administration.

#### **Central Nervous System Activity:**

Ethanolic extract of *L. aspera* showed significant peripheral nociceptive activity at a dose of 400 mg/kg. The study was done by using pentobarbitone induced sleeping time test, the open field test and the hole cross test in Swiss albino mice. The results proved that the root possess biologically active constituents having CNS activity[23].

**Miscellaneous Activity:** The protective role of *L. aspera* against the snake venom poisoning was studied in mice. The study showed that the alcoholic extract treatment improved the survival time, which may be due to the stabilization of mast cells and inhibition of the secretion of platelet activating factor and the histamine[23].

#### **CONCLUSION**

Literature survey suggests the medicinal importance of *L. aspera*. Phyto chemical investigation revealed the presence of various chemical constituents like terpenes, sterols, glycosides, lignans, flavanoids and long chain compounds. Pharmacological studies revealed that *L. aspera* is having anti inflammatory, anti oxidant, antimicrobial, anticancer, anti diabetic, anti venom and phytotoxic activity. Thus there remains a tremendous

scope for further scientific exploration of *Leucas aspera* to establish their therapeutic efficacy and commercial exploitation.

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**Conflicts of interest:** There are no conflicts of interest.

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