International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.6 October - November – 2022
DOI:10.46647/ijetms.2022.v06i06.019 ISSN: 2581-4621

# A Review on Medicinal Plant *Leucas Aspera*

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**Abstract**
*Leucas aspera* (Willd.) Linn. (Family: Lamiaceae) commonly known as 'Thumbai', and is distributed throughout India from the Himalayas down to Ceylon. *L. aspera*, a species are widely distributed in tropical Asia, Africa and grows as a competitive weed in highland crop fields, homesteads, fallow lands and roadsides. Many phytochemicals belong to the classes of terpenes, terpenoids, sterols and fatty compounds, glycosides, long-chain compounds, flavonoids, lignans, alkaloids and others were identified and isolated by different extraction methods. These extracts were being investigated for their vide varieties of biological activities. Therefore, in this narrative review of literature we aimed to describe and delineate on medicinal perspectives of plant *L. aspera*.
**Keywords:** *Leucas aspera*, Traditional uses, Pharmacological activities, Antimicrobial, Antioxidant

## 1. Introduction

Medicinal plants are the only source for the treatment of diseases in ancient days and since then numerous herbs and plants have been recognized as medicinal plants because of their potency to cure various ailments [1]. Medicinal plants are the rich source of lead molecules for new drug discovery and hence the biological importance of medicinal plants is increasing rapidly nowadays [2]. The newly discovered and the existing medicinal plants are being screened for many diseases to identify the significant therapeutic importance. Several medicinal plants have been investigated against mitigation and cure of a variety of devastating diseases such as cancer [3].

*Leucas aspera* (Willd.) Linn. (Family: Lamiaceae) commonly known as 'Thumbai' [4], and is distributed throughout India from the Himalayas down to Ceylon [5]. The plant is used traditionally as an antipyretic and insecticide. Flowers are valued as stimulant, expectorant, aperient, diaphoretic, insecticide and emmenagogue. Leaves are considered useful in chronic rheumatism, psoriasis and other chronic skin eruptions. Bruised leaves are applied locally in snake bites [4].

*L. aspera*, a species are widely distributed in tropical Asia, Africa and grows as a competitive weed in highland crop fields, homesteads, fallow lands and roadsides. Many phytochemicals belong to the classes of terpenes, terpenoids, sterols and fatty compounds, glycosides, long-chain compounds, flavonoids, lignans, alkaloids and others were identified and isolated by different extraction methods [6-8]. These extracts were being investigated for their vide varieties of biological activities. With this context, in the present narrative review of literature we focused to describe and delineate on medicinal perspectives of plant *L. aspera*.

## 2. Taxonomy and Botanical Description

Kingdom: Plantae, Plant
Subkingdom: Tracheobionta, Vascular plant
Super division: Spermatophyta, Seed plant
Division: Angiosperma
Class: Dicotyledonae
Sub-class: Gamopetalae
Series: Bicarpellatae
Order: Tubifl orae
Family: Labiatae
Genus: *Leucas*

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Species: *aspera*

*L. aspera* is an annual, branched, herb erecting to a height of 15-60 cm with stout and hispid acutely quadrangular stem and branches. Leaves are sub-sessile or shortly petiolate, linear or linearly lanceolate, obtuse, pubescent up to 8.0 cm long and 1.25 cm broad, with entire or crenate margin; petiole 2.5-6 mm long; flowers white, sessile small, in dense terminal or axillary whorls; bracts 6 mm long, linear, acute, bristle-tipped, ciliate with long slender hairs; calyx variable, tubular, 8-13 mm 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 1 cm long; tube 5 mm long and pubescent above, annulate in the middle; upper lip 3 mm long, densely white-woolly; lower lip about twice as long, the middle lobe obviate, rounded, the lateral lobes small, subacute. Fruit nutlets, 2.5 mm long, oblong, brown, smooth, inner face angular and outer face rounded (Figure 1) [9].

**Fig 1.** Showing *Leucas aspera* plant

## 3. Perspectives on Phytochemistry of *L. aspera*

Preliminary chemical examination of *L. aspera* revealed presence of triterpenoids in entire plant [10]. Whole plant is reported to contain oleanolic acid, ursolic acid and 3-sitosterol [11]. Aerial parts are reported to contain nicotine [12], sterols [13], two new alkaloids (compound A m.p. 61-2°, α-sitosterol and β-sitosterol) (m.p. 183-4°), reducing sugars (galactose), glucoside (230-1°) [14], diterpenes (leucasperones A and B, leucasperols A and B, isopimarane glycosides (leucasperosides A, B and C), together with other compounds like asperphenamate, maslinic acid, (-)-isololiolide, linifolioside [15], nectandrin B, meso-dihydroguaiaretic acid, macelignan, acacetin, apigenin 7-O-[6′-O-(p-coumaroyl)-3D-glucoside], chrysoeriol, apigenin, erythro-2-(4-allyl-2,6dimethoxyphenoxy)-1-(4-hydroxy-3-methoxyphenyl)propan-1ol, myristargenol B, and machilin C, (-)-chicanine, (7R,8R)- and (75,85)-licarin A [16]. Among the 25 compounds identified from the leaf volatiles, u-farnesene (26.4%), x-thujene (12.6%) and menthol (11.3%) were the major constituents. The flower is reported to contain 10 compounds; among them amyl propionate (15.2%) and isoamyl propionate (14.4%) were dominant [17]. Seed is reported to contain palmitic acid (6.25%), stearic acid (2.84%), oleic acid (42.07%), linoleic acid (48.11%), and linolenic acid (0.65%). The unsaponifiable fraction contained 3-sitosterol and ceryl alcohol [18,19]. Shoot contained novel phenolic compounds (4-(24-hydroxy-1-oxo-5-n-propyltetracosanyl)-phenol)[20], aliphatic ketols (28-hydroxypentatriacontan-7-one, 7-hydroxydotriacontan-2-one)[21], long-chain compounds (1-hydroxytetratriacontan-4-one, 32-methyltetratriacontan-8ol) [22], nonatriacontane [20], 5-acetoxytriacontane, β-sitosterol [21], and

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dotriacontanol [22]. Leucolactone (I), isolated from the root of L. aspera have been characterized as 3,3,16c-dihydroxyoleanan28-1,3-olide [23].

## 4. Perspectives on Traditional Uses

The juice of the leaves of *L. aspera* is used in psoriasis, chronic skin eruption, in chronic rheumatism and applied to disperse painful swellings [24]. The flowers are being warmed with a little honey and given orally for cough and cold to children [25]. The leaves are used as an insecticide and mosquito repellent in rural areas [26]. The juice of leaf is used as local application for psoriasis and chronic skin eruptions. It can be used as insecticidal also by sprains extract of the plant on other plants by mixing with water. It is also used in gyaenocological and obstetrical problem like hastening menstruation. The leaves are applied to the bits to serpents, poisonous insects and scorpion sting. The extract of plant is used with honey in case of abdominal pain and also in digestion [26].

## 5. Perspectives on Pharmacological Applications

***Antimicrobial activity:*** The methanol extract of *L. aspera* flowers, its fractions, the alkaloidal residue and the expressed flower juice showed good antibacterial activity for methanol extract and methanol fraction with maximum activity for the alkaloidal residue [27]. The essential oils from *L. aspera* possessed bacteriostatic activity against *Staphylococcus aureus, Vibrio cholerae, Salmonella typhi, Klebsiella aerogenes, Escherichia coli, Proteus vulgaris, Pseudomonas pyocyanea* and *Dys. Flexneri* [28]. Furthermore, *in-vitro* study of chloroform and ether extracts of *L. aspera* revealed its antifungal activity against *Trichophyton* and *Microsporum gypseum*. The minimum inhibitory concentration was found to be 5 mg/mL. *L. aspera* had both fungistatic and fungicidal actions [29].

***Antioxidant and prostaglandin inhibitory activities:*** The extract of *L. aspera* showed both activities, that is, inhibition at 3-4 g/mL against PGE1- and PGE2 induced contractions in guinea pig ileum and a 1,1-diphenyl-2picrylhydrazyl (DPPH) radical scavenging effect. Phytochemical investigation suggested the presence of nectandrin B, mesodihydroguaiaretic acid, macelignan, acacetin, apigenin 7-O-[6′-O(p-coumaroyl)-3-D-glucoside], chrysoeriol, apigenin, erythro-2(4-allyl-2,6-dimethoxyphenoxy)-1-(4-hydroxy-3-methoxyphenyl) propan-1-ol, myristargenol B and machilin C, (-)-chicanine, (7R,8R)- and (75,85)-licarin A [16].

***Toxicity evaluation of herbal smoke and synthetic mosquito mat on Culex quinquefasciatus:*** The smoke of leaves of *L. aspera* are more toxic to the filarial vector mosquito, *Culex quinquefasciatus* than the synthetic mosquito mats, which contain 4% d-allethrin [30].

***Antinociceptive, antioxidant and cytotoxic activities:*** The ethanolic extract of *L. aspera* was subjected to acetic acid induced writhing inhibition, 1,1-diphenyl-2-picryl hydrazyl (DPPH) free radical scavenging assay and brine shrimp lethality bioassay for screening of antinociceptive, antioxidant and cytotoxic activity respectively. The ethanolic extract of *L. aspera* root produced significant inhibition in acetic acid induced writhing in mice at the doses of 250 and 500 mg/kg. The extract showed a significant free radical scavenging activity with an $IC_{50}$ of 8 µg/ml. The extract showed significant lethality to brine shrimp [31].

## 6. Conclusions

In conclusion, *L. aspera* is a wild herb or shrub which is having medicinal value to a great extent and is available abundantly in field of India, and also adjoining areas in India. It is easily available at a very low cost. Phytochemical and pharmacological investigations on *L. aspera* revealed the presence of various chemical constituents like terpenes, sterols, glycosides, lignans, flavonoids and long-chain fatty compounds which are responsible for pharmacological activities. *L. aspera* can be used in crude form as well as in extract form and also in the refined form as a medicine.

## 7. Future Perspectives

Despite applications of *L. aspera* in green synthesis of nanoparticles, majority of research work done is limited to its preliminary evaluation. It is imperative to identify and isolate the promising active

DOI:10.46647/ijetms.2022.v06i06.019 ISSN: 2581-4621

constituents and to study them in mechanistic levels against specific targets of deadly diseases. Extensive research has to be done in this direction to transform *L. aspera* the roadside weed into an important medicinal plant [32].

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