Ethnobotanical Studies
4.1. Hyptis suaveolens Poit.

Species Identity:

**Taxonomy**

- Kingdom: Plantae
- Sub Kingdom: Tracheobionta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Sub Class: Asteridae
- Order: Lamiales
- Family: Lamiaceae
- Genus: Hyptis
- Species: suaveolens

**Vernacular names:**

- Tamil: Kanathulasi/Ramathulasi
- Hindi: Wilayati Tulsi
- Telungu: Sima Tulsi, Mahavina
- Bengali: Bilati Tulsi
- Oriya: Ganga Tulasi

**DISTRIBUTION:**

Favors dry open locations on roadsides and on waste grounds introduced from tropical America and runs wild.

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*BIOCHEMICAL EVALUATION OF TWO TRADITIONAL DRUG SOURCES AGAINST EHRLICH ASCITES CARCINOMA*

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PLATE 1- *Hyptis suaveolens* Poit.

Habit.
DESCRIPTION:

Erect, strong-scented, aromatic herb up to 1.5 m tall with quadrate hairy stems and ovate to obovate leaves 3-5 cm long and 2-4 cm wide, the margins serrulate, lower surface densely hairy; petioles up to 3 cm long; flowers in small cymes, branch ends with reduced leaves. Calyx 5 mm long in flower, in fruit 10 mm long, ribbed with 5 aristate teeth. Corolla blue. Nutlets dark brown or blackish, about 1.2-1.5 mm long, slightly notched at the end.

MEDICINAL USES

Plant is used as stimulant, carminative, sudorific and lactagogue. Infusion used in the treatment of catarrhal conditions, uterus infections and parasitical cutaneous diseases. Leaf juice is used for healing wounds, and this plant is effective in the treatment of cold, coughs, consumption and lung complaints. A decoction of the root is valued as an appetizer. The root is chewed with betel nuts as a stomachic.

CHEMICAL COMPOSITION:

The chemical composition of the essential oils obtained by hydrodistillation of fresh leaves from *Hyptis suaveolens* Poit. growing in Cameroon were analysed by GC and GC-MS. The oil of *H. suaveolens* was rich in sabinene (20.6%), β-caryophyllene (17.5%) and bergamotol (10.9%).

The composition of nine samples of essential oil of individual plants in fruiting stage of *Hyptis suaveolens* Poit. from Brazilian Cerrado was investigated by GC–MS. Spathulenol, 1,8-cineole and (E)-caryophyllene were the principal constituents. Latitude seems to be the most important environmental factor influencing the oil contents. Pattern of geographic-variation in essential oil
composition indicated that sesquiterpenes are mainly produced in the samples grown at lower latitudes and altitudes.\textsuperscript{113}

The essential oils of \textit{Hyptis suaveolens} Poit. produced from mild plants growing at two different locations (Bangalore and Hyderabad) in India have been examined by capillary GC and GC/MS. The chief constituent found in both the oils was 1,8-cineole (31.5-35.3\%).\textsuperscript{114}

The leaf oils of \textit{Hyptis suaveolens} Poit. were isolated by hydrodistillation and separated by GC. Of the 56 components separated, 47 were identified by GC/MS. Monoterpenes represented the largest portion with 1,8-cineole (38.7\%), sabinene (19.9\%), terpinolene (8.5\%), beta-pinene (6.4\%), gamma-terpinene (4.8\%), alpha-pinene (2.9\%), limonene (2.6\%), myrcene (1.3\%) and terpinen-4-ol (1.2\%). Of the sesquiterpenes, the predominant were beta-caryophyllene (2.5\%) and germacrene-B (1.2\%). All other components including the unknown were in concentrations of less than 1\%.\textsuperscript{115}

\begin{figure}[h]
\centering
\includegraphics[width=0.8\textwidth]{images.png}
\caption{Beta-Caryophlene and Alpha Amyrin}
\end{figure}

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Hyptis suaveolens Poit. contains high percentage yield of crude alkaloids and flavonoids ranging from 10.44 to 14.32% and 9.28 to 12.54%, respectively. Only *H. suaveolens* is devoid of saponins. Tannins and phenols were present in all plants. The nutritional values of the phytochemicals were also assessed with a view of establishing and understanding their nutritional uses. The plants contained crude protein (9.19 to 17.94%), crude fibre (4.88 to 9.04%), ash (5.68 to 6.88%), Carbohydrate (66.24 to 75.87%), crude lipid (3.48 to 4.90%) and food energy (357.68 to 373.26 mg/cal).\(^\text{116}\)

**Biological activity**

The antioxidant activity of methanolic extract of *Hyptis suaveolens Poit.* was evolved In-vitro by 1,1-Diphenyl-2- picrylhyrazyl (DPPH) radical scavenging activity using gallic acid and butylated hydroxyanisole as reference standards. They exhibited strong antioxidant radical scavenging activity with IC\(_{50}\) value of 0.4, 1.5 and 14.04 \(\mu\)g/ml for gallic acid, BHA and *Hyptis suaveolens* respectively. The antioxidant activity of methanol extract could be due to the presence of flavones.\(^\text{117}\)
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Steam Distilled Essential Oil Of *Hyptis Suaveolens* Poit. Yielded 32 Terpenoid Compounds When Subjected to Gc/Ms Analysis. The Compounds Were identified from their Retention Time, Mass Spectral Fragmentation Patterns and Correlation With Database Ms Data. Limonene; Thujane; α-Pinene; α-Phellandrine; 3-Cyclohexen-L-ol; 4-Methyl-L-(L-Methyl Ethyl)-3-Cyclohexen-L-ol; 3-Cyclohexen-1-Carboxyaldehyde; Elemene; 4, 11, 1 L-Trimethyl-8-Methylene Bicyclo [7.2.0] Undec-4-Ene; Octahy-Dro-1, 4-Dimethylazulene; 5α, 8β, H-9β, H-10α- Labd-14-Ene; 5α-Androst-9(L L)-En-12-One and 5α-Androstan-2,11-Dione were the Major Components Identified. The Essential Oil Inhibited The growth of both Gram-Positive and Gram-Negative Bacteria as well as revealed mild antifungal activity.118

The effect of water extract of *Hyptis suaveolens* Poit. was evaluated for 6-month chronic toxicity in Wistar rats. Control group received distilled water orally 10 ml/kg/day. The extract was orally given to five treatment groups at the doses of 5, 50, 250, 500 and 500 mg/kg/day for 6 months. The last group was served as the recovery group. In all the groups significant changes were not observed in the body weights, actual and relative organ weights. The results of hematological, biochemical parameters and histopathological lesions showed that the extract did not produce any significant toxicity. Therefore, it may be concluded that the extract of *H. suaveolens* at the given dose did not produce any significant toxic effect in rats during 6-month period of the treatment.119

The effects *H.suaveolens* on Lymphocyte proliferation were studied and its natural killer (NK) cells activity was observed. The extract significantly stimulated human lymphocyte proliferative responses at various concentrations and significantly enhanced NK cells activity.120

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*BIOCHEMICAL EVALUATION OF TWO TRADITIONAL DRUG SOURCES AGAINST EHRLICH ASCITES CARCINOMA*

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4.2. Leonotis nepetaefolia .R. Br

Species Identity

Taxonomy

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<th>Plantae</th>
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Vernacular names

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DISTRIBUTION

Annual lion's ear was originally native to tropical and subtropical Africa. However, it is now naturalized all over the world along road sides, abandonedly in fields and in disturbed areas. It is listed as an invasive garden plant in Australia and a
PLATE 2- *Leonotis nepetaefolia* R.Br.

Habit.
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pest plant in Hawaii, but this is not really a serious pest in most areas, because it mainly grows in areas already highly disturbed, or where the original vegetation has been destroyed. Locally common at forest margins, on rocky hillsides and river banks and in tall grassland of the Eastern and Western Cape Provinces. Present in throughout Indian and almost all districts of Tamilnadu. Common in moist wasteland, roadsides and hedges rare in forest.

Description

A tall erect plant 1.2-1.8 m high; stem stout, obtusely quadrangular with thickened angles, deeply sulcate, finely pubescent. Leaves 6.3-15 by 3.8-10 cm membranous, ovate, acute, coarsely crenate- serrate, finely pubescent on both sides, base shortly cuneate running down into the petiole; petioles 2.5-10 cm long, winged in the upper part. Flowers in axillary dense globose many flowered whorls 3.8-6.3 cm diam; floral leaves lanceolate, deflexed; bracts reaching 16 by 1.5 mm, linear, strongly spinous-pointed, deflexed; pubescent. Calyx 2 cm long, ribbed, tubular, in curved, the lower part puberulous, the upper part densely pubescent or villous and also bristly with long white hairs; tube reticulately veined within, not villous at the oblique mouth; teeth 8-9, unequal, the upper much larger reaching 8 mm. long, ovate, acute, the others triangular, all with strong sharp spinous points. Corolla 2.5 cm. long, orange scarlet; tube 1.3 cm long, glabrous below, densely clothed in the upper part with orange scarlet hairs, annulate inside with 3 transverse parallel rings of white hairs, the 2 upper rings closer together than the middle and lower rings; upper lip 1.3 cm, long, densely woolly with orange-scarlet hairs; lower lip 4-5 mm. long, deeply 3 lobed, the lobes oblong, obtuse, the middle lobe slightly long. Nutlets 4 mm. long, oblong, obovoid, obliquely truncate and with a deep triangular pit at the apex, the inner face sharply angular, the dorsal face rounded, the margins ribbed.

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Medicinal Uses

Used in Amenorrhea, cold, burn, convulsions and in fever used as a depurative, emmenagogue, and laxative. Also used in malaria, rheumatism and as a tonic. The ash of the flower heads are applied to burns and scalds, mixed with curds and applied to ringworm and other itchy diseases of the skin.

Chemistry

A new labdane diterpenoid, leonotinic acid (1), possessing an \( \alpha \) and \( \beta \)-butenolide unit, was isolated from the aerial parts of *Leonotis nepetaefolia*.

4,6,7-Trimethoxy-5-methylchromen-2-one a new coumarin has been isolated from the leaves of *Leonotis nepetaefolia*.

Nepetaefolinol, a new diterpenoid from *L. nepetaefolia*, is identified as 9,13-epoxy-6\( \beta \)-hydroxy-8\( \alpha \)-labdane-16,15:19,20-diolactone (1) on the basis of chemical and spectroscopic evidence. Two new minor components of the extract are leonotinin [8\( \beta \),17:15,16-diepoxy-9-hydroxylabda-13(16), 14-dien-19,6\( \beta \)-olactone](7) and 8\( \beta \),17:9,13-diepoxylabdane-16,15:19,6\( \beta \)-diolactone.

Studies on three new diterpenoids namely, hydroxy-dilactone nepetaefolinol (9,13-epoxy-6\( \beta \)-hydroxy-8\( \alpha \)-labdane-16,15 :19,20-diolactone), dehydrated nepetaefolinol (9,13-epoxylabd-5-ene-16,15:19,20-diolactone) and isomeric tetrol (15,16-epoxy-labda-13(16),14-diene-6\( \beta \),9,17,19-tetrol: which is the reduction product of new diterpenoid leonotinin) isolated from *Leonotis nepetaefolia*.

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**BIOCHEMICAL EVALUATION OF TWO TRADITIONAL DRUG SOURCES AGAINST EHRLICH ASCITES CARCINOMA**

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Three new acylated iridoids were isolated from the methanol extract of *Leonotis nepetaefolia* R. Br. (*Labiatae*). Their structures were elucidated as 10-O-(cis-3,4-dimethoxycinnamoyl) geniposidic acid (2), 10-O-(trans-feruoyl) geniposidic acid (3) and 10-O-(trans-caffeoyl) geniposidic acid (4) on the basis of the spectroscopic data.\textsuperscript{125}

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**BIOCHEMICAL EVALUATION OF TWO TRADITIONAL DRUG SOURCES AGAINST EHRLICH ASCITES CARCINOMA**

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Biological Activity

Traditionally, the leaf is used in rheumatic affections and also serves as a tonic. Flower heads are used against scalds, burns, ringworm, and some skin diseases. Crushed root is applied locally for facilitating breast milk. Seeds are used in fever. It has antioxidant and antibacterial properties.\(^\text{126}\)

Major compounds such as Nepetaefolinol, Dehydrated nepetaefolinol, isomeric tetrol possess interesting pharmacological activity.\(^\text{124}\)

The new iridoid glycoside, 10-O-(trans-caffeoyl) geniposidic acid isolated from Leonotis nepetaefolia showed a strong In-Vitro antioxidant activity in (DPPH) method.\(^\text{125}\)

Nepetaefolinol was evaluated for its antifungal activity against two keratinophilic fungi, viz. Microsporum gypseum and Trichophyton terrestre isolated from soils of Chhindwara by Keratin bait technique. Both the test fungi were found to be sensitive to nepetaefolinol. T. terrestre was found to be more sensitive than M. gypseum. The MIC values for T. terrestre and M. gypseum were 125 µg/ml and 250 µg/ml respectively. However, in comparison to miconazole nitrate it showed less activity (MIC 7.81 µg/ml for M. gypseum and 15.62 µg/ml for T. terrestre.\(^\text{127}\)