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A Review On Lantana Camara Plant

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ABSTRACT :

Lantana camara is a flowering plant belonging to the Verbenaceae family, commonly referred to as wild sage or red sage. This species is indigenous to the tropical areas of Central and South America but has since become an invasive species in numerous regions worldwide, including Asia, America, Africa, and Australia. The plant is distinguished by its striking, multicolored flowers, which typically range in color from red to yellow, orange, and pink, making it a favored choice for ornamental gardening. In addition to its aesthetic appeal, Lantana camara has demonstrated potential for various applications. It possesses medicinal properties, including antimicrobial, anti-inflammatory, and antioxidant effects, which are currently being investigated in both traditional and contemporary medical practices. Historically, it has been utilized to treat a variety of ailments, with scientific evidence supporting these traditional uses. Numerous studies have documented the phytoconstituents found in all parts of Lantana camara. Over the past few decades, scientists and researchers worldwide have conducted extensive investigations into the chemical composition of the entire plant, as well as its biological and pharmacological activities. These studies have confirmed the therapeutic potential of Lantana camara in modern medicine, positioning it as a promising candidate for drug discovery. This article provides a review of the pharmacological activities and toxicological aspects of Lantana camara.

KEYWORDS: Lantana camara is recognized for its antibacterial and anti-inflammatory properties,serving as a medicinal plant rich in phytoconstituents.

INTRODUCTION:

Medicinal plants serve as a significant source of compounds with medical relevance. Historically, these plants have been utilized to address various health issues. Analyzing these plants reveals a range of bioactive molecules that can
contribute to the creation of new pharmaceutical products. Recently, there has been an increasing interest in the pharmacological assessment of numerous plants utilized in diverse traditional medicinal systems. Over the past few decades, many traditionally recognized plants have undergone extensive investigation through advanced scientific methodologies, leading to the documentation of various medicinal properties, including anticancer, anti-inflammatory, antidiabetic, anthelmintic, antibacterial, antifungal, hepatoprotective, antioxidant, and larvicidal activities.

Lantana camara Linn., a flowering ornamental species from the Verbenaceae family, is commonly referred to as Lantana, Wild Sage, Surinam Tea Plant, Spanish Flag, and West Indian Lantana. This plant is well-regarded in traditional medicine, and recent scientific research has highlighted its potential applications in contemporary medical practices. The current review seeks to compile information regarding the morphology, distribution, phytochemistry, and medicinal attributes of L. camara, as well as to explore its future potential for further scientific research aimed at developing effective therapeutic agents.

Synonyms

Marathi	**Ghaneri,Tantani**
Hindi	**Raimuniya**
English	**Spanish flag,Wild sage**
Tamil	**Unnichedi**
Kannada	**Kakke,natahu**

Telugu	**Pulikampa**
Manipuri	**Samballei,Nongballei**
German	**Wandelroschen**
Brazil	**Cambara de espinto**
Arabic	**Multawiat Em Kalthoom ,Mina Shajary**
French	**Lantanier, Verbene**
Malaysia	**Ayam,Big sage ,Black sage**
Spanish	**Cinco negritos**

Biological Source :

It is flowering ornamental plant of Lantana Camara belonging to the family –
Verbenaceae Taxonomy :

Kingdom	**Plantae**
Subkingdom	**Tracheobionta**
Superdivision	**Spermotophyta**
Division	**Magnoliophyta**
Class	**Magnoliopsida**
Subclass	**Asteridae**
Order	**Lamiales**
Family	**Verbenaceae**
Genus	**Lantana**
Species	**Lantana Camara**

Geographical distribution :

Wild sage is prevalent in various regions of India, including Jammu-Kashmir, SouthIndia, Tamil Nadu, several areas of Maharashtra, Himachal Pradesh, and Uttar Pradesh. Additionally, it is distributed across the Caribbean and Central and northernSouth America, now found in approximately 60 tropical and subtropical nations, as well as temperate regions worldwide. Its range extends from the Greater Antilles, including the Bahamas and Bermuda, through the Lesser Antilles, and into Trinidadand Aruba. In the United States, it typically grows in coastal areas stretching from South America to northern Mexico, encompassing states from Georgia to Texas, aswell as regions in Peru, Brazil, and potentially northern Argentina and Bolivia.

Plant Description:

L. camara is a robust shrub that can grow in an erect or subscandent manner, characterized by its square-shaped stem and a pronounced scent reminiscent of black currants. This plant typically reaches heights of 1 to 3 meters and can spread up to 2.5 meters in width. It is notable for its stout, recurved prickles and is often depicted in images showcasing its foliage, flowers, and fruits.

Leaves :

The leaves exhibit an ovate or ovate-oblong shape, characterized by crenate serration and an acute or subacute apex. The upper surface is rugose, while both sides are scabrid. Typically, the leaves measure between 3 to 8 cm in length and 3 to 6 cm in width, displaying a green hue. Both the leaves and stems are covered with coarse hairs.When utilized as green mulch, the leaves serve as a significant source of phosphorus and potassium.

Flowers:

The flowers of L. camara are typically small and exhibit colors ranging from yellow or orange to red or scarlet, arranged in dense axillary clusters. The calyx is diminutive, whilethe corolla tube is slender, with the limb spreading to a width of 6–7 mm and divided into lobes of unequal size. There are four stamens organized in two pairs, and the ovary contains two ovules, being two-celled. Flowering occurs between August and March, although it can take place year-round if conditions of moisture and light are favorable. The flowers are generally orange, but may also appear in shades from white to red, with color changes occurring as they mature.

Roots:

The root system of this plant is exceptionally robust, and despite undergoing multiplecuttings, it continues to produce new, fresh shoots.

Fruits:

Ripe fruits are extensively consumed by birds and are often eaten by humans in variouscountries.

Flower

Fruit

Leaves

Roots

Pharmacological Activities of Lantana Camara :

Anticancer and antiproliferative activity

Research has shown that extracts form Lantana Camara can induce cytotoxic effects in various cancer cell lines . The plants bioactive compounds ,such as oleanolic acid ,ursolic acid, and lantadene A and B , have demonstrated the ability to inhibit the growth and proliferation of cancer cells . These compounds act through mechanisms like

1. Apoptosis Induction
2. Cell Cycle Arrest
3. Inhibition of Angiogenesis

Antiproliferative Activity of lantana camara involves suppressing the spread and growth of malignant cells .studies suggest that plant extracts can target multiple signalling pathways associated with cell proliferation such as

1. Downregulation of Oncogenes
2. Antioxidant properties

Antibacterial activity

Ethanolic extracts derived from the leaves and roots of L. camara have been documented to possess antibacterial properties. The evaluation of in vitro antibacterial activity was conducted using the microdilution method. These extracts demonstrated antimicrobial efficacy against Staphylococcus aureus, Proteus vulgaris,
Pseudomonas aeruginosa, Vibrio cholerae, Escherichia coli, as well as two
multidrug-resistant strains of E. coli and S. aureus. The antibacterial mechanism is attributed to the disruption of cell membranes, inhibition of protein synthesis, and interference with DNA and quorum sensing activities. Additionally, methanolic extracts from various parts of L. camara were assessed for antimicrobial activity against ten bacterial strains and five fungal species utilizing both the disk diffusion and broth microdilution methods. Notably, the leaf extract of L. camara exhibited themost significant activity against the Gram-positive Bacillus cereus and the
Gram-negative Salmonella typhi.

Antioxidant activity

The antioxidant properties of L. camara leaves were evaluated through reducing power activity and the 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay.The extracts from the leaves demonstrated a pronounced antioxidant effect, with younger leaves showing greater activity compared to older, mature leaves. The ethanolic extract of L. camara displayed notable antioxidant activity in in vivo studies.In vitro assessments were conducted using both the DPPH radical scavenging assay and the nitric oxide free radical scavenging assay, with the extracts revealing significant antioxidant capabilities in both tests.

Antihyperglycemic activity

The hypoglycemic effects of the methanol extract from the fruits of L. camara Linn were evaluated in Wistar albino rats with diabetes induced by streptozotocin.
Administration of the extract at doses of 100 and 200 mg/kg body weight led to a
dose-dependent reduction in serum glucose levels in these diabetic rats. Additionally,treatment with the extract demonstrated a positive impact on body weight. The underlying mechanism of the antihyperglycemic activity was also investigated.

1. Stimulation of insulin secretion
2. Inhibition of alphaglucosidase and alphaamylase enzyme
3. Improvement of insulin sensitivity
4. Antioxidant effects

Antiinflammatory activity

The aqueous extract of L. camara has been documented to exhibit anti-inflammatory properties in albino rats. Administration of the extract at a dosage of 500 mg/kg body weight resulted in a significant reduction in paw volume during the carrageenan-inducedpaw edema test in these animals.
Mechanism of anti-inflammatory activity

1. Inhibition of pro-inflammatory
2. Suppression of nitric oxide production
3. Inhibition of cyclooxygenase
4. Antioxidant effects

Wound healing activity

The wound healing properties of the ethanol extract from the leaves of L. camara have been documented in adult male Wistar rats. The topical application of this extract on wounds notably improved the healing process. Histological examinationsof the healed wounds corroborated the extract's effectiveness in promoting healing. Additionally, a separate study highlighted the wound healing activity of the aqueous extract from the leaves of L. camara in rats. The topical administration of this extract at a dosage of 100 mg/kg/day significantly accelerated wound contraction (98%), enhanced collagen synthesis, and reduced the overall healing time.

Antimotility activity

The methanol extract derived from the leaves of L. camara has been documented to exhibit antimotility effects in mice. The assessment of intestinal motility was conducted using the charcoal meal test. At a dosage of 1 g/kg of body weight, the extract was found to completely obstruct the movement of charcoal in normal mice.Furthermore, intraperitoneal administration of 125 and 250 mg/kg body weight revealed that the plant is devoid of diterpenoids while being abundant in essential oils. Compounds such as monoterpenes, triterpenes, flavones, coumarins, steroids, and iridoid glycosides have been identified in Lantana camara. Among these, triterpenes and flavones are the predominant secondary metabolites present. The leaf extracts of Lantana camara demonstrate a range of properties, including antimicrobial, fungicidal, insecticidal, and nematicidal activities, as well as exhibiting antimicrobial, immunosuppressive, and antitumor effects.

Hemolytic activity

The hemolytic activity of the aqueous extract of L. camara and its solvent fractions was assessed using a modified spectroscopic method at four distinct concentrations (125, 250, 500, and 1000 µg/ml). The results indicated that both the aqueous extract and its solvent fractions demonstrated minimal hemolytic activity against human erythrocytes. The hemolytic activity of the various extracts was ranked in the following order: chloroform fraction > hexane and ethyl acetate fraction (50:50) > aqueous extract > ethanol fraction > methanol fraction.

Antifungal activity

The antifungal properties of ethanol and hot water extracts from L. camara were evaluated against wood-decaying white and brown rot fungi. Both extracts demonstrated effective antifungal activity against these fungi; however, the ethanol extract showed remarkable potency even at a very low concentration of 0.01%. Additionally, L. camara was tested against Alternaria sp., a pathogen responsible for various plant diseases, particularly in vegetable crops. The antifungal assessment was conducted using the foodpoison plate method at three different concentrations of the extract: 10 mg/ml, 15 mg/ml,and 20 mg/ml. At the concentration of 20 mg/ml, L. camara displayed significant antifungal activity against Alternaria sp.

Anti mutagenic activity

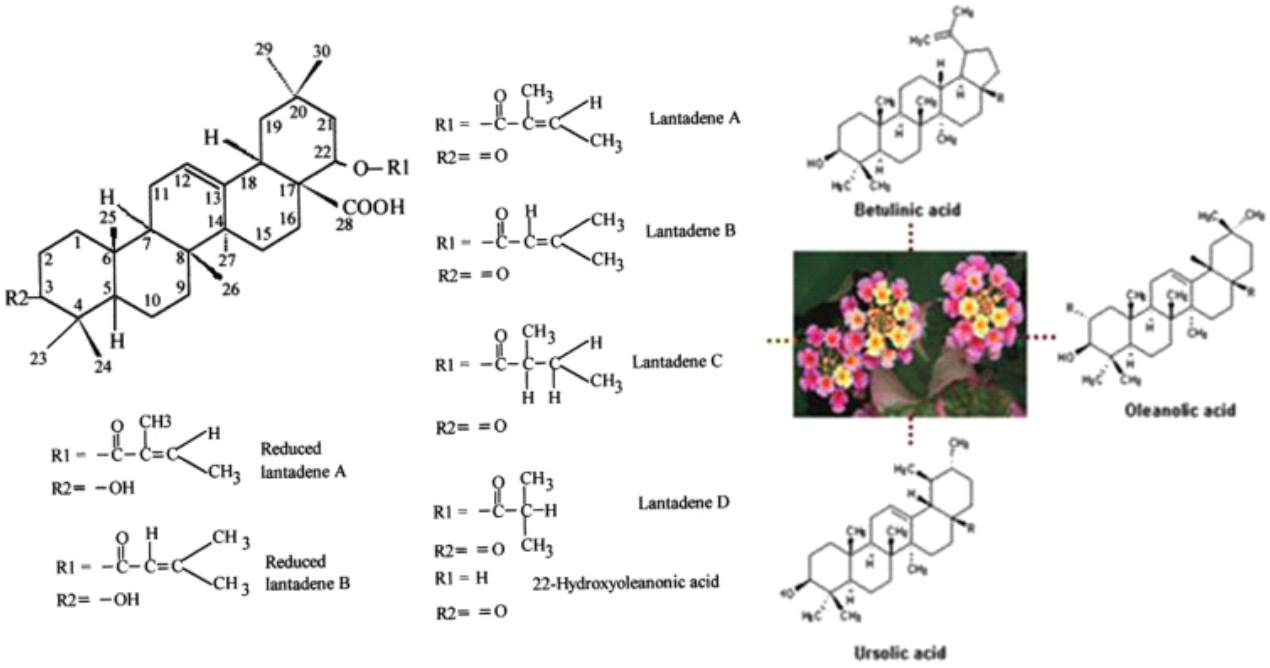
The compounds 22β-acetoxylantic acid and 22β-dimethylacryloyloxylantanolic acid derived from L. camara demonstrated antimutagenic properties. The assessment of anti-mutagenicity was conducted using the micronucleus test on Swiss mice. Both substances displayed significant antimutagenic activity against Mitomycin C-inducedmutagenesis in the murine model.

Antiulcerogenic activity

The methanol extract of L. camara leaves has been documented to possess antiulcerogenic properties against gastric lesions induced by aspirin, ethanol, and cold restraint stress in rats. Administration of the extract at doses of 200 and 400 mg/kg bodyweight prior to the onset of these lesions demonstrated a significant protective effect against ulcers caused by aspirin, ethanol, and cold restraint stress. Furthermore, the extract exhibited a dose-dependent antiulcerogenic activity across all experimental models.

Phytochemical constituents

L. camara possesses various components, including its leaves, stems, and roots, which are rich in flavonoids, alkaloids, tannins, proteins, catechins, phenols, saponins, steroids, anthraquinones, reducing sugars, and multiple tri-terpenoids. These compounds encompass significant phyto-molecules such as verbascoside, linaroside,lanatoside, umuhengerin, ursolic acid, carminic acid, caprylic acid, and phytol, which are primarily responsible for a range of biological activities [29-32]. Additionally, the essential oil derived from Lantana includes sabinene, β-caryophyllene, α-humulene, 1,8-cineole, and 8-hydroxy bicycle germacrene, along with the rare sesqui-terpenoid humulene epoxide-III and sabinene.



Conclusion :

Lantana camara is a versatile plant with the significant ecological ,medicinal ,andpharmacological importance .While it is widely recognized for its vibrant flowers and use as an ornamental plant ,it is also one of the most invasive species globally ,posing threats to native ecosystems and biodiversity . Its aggressive allowit to outcomplete native vegetation making its management a crictical concern in regions where it has spread Despite its invasive nature , Lantana camara has demonstrated a range of medicinal properties , including antibacterial ,anti-inflammatory ,antihyperglycemic ,anticancer, and antioxidantactivities . These effects are attributed to its rich content of bioactive compounds such as Flavonids ,terpenoids ,phenolics ,and essential oils . Research has shown itspotential in traditional and modern medicine ,offering promising applications for treating infections ,inflammation ,diabetes , and other health condition.

The dual nature of Lantana camara as both an invasive species and a source of valuable medicinal compounds highlights the need for balanced management strategies While efforts to control its spread and mitigate its ecological impact arenecessary , further research and development of its medicinal propertis could provide a sustainable and beneficial use for this plant .Through careful management and exploration of its pharmacological potential , Latana camara may serve asbotha botanical remedy and a resource for developing new natural products and treatments

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