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Lantana Camara : A Medicinal Plant

Sajan Gulde[1] and Pranita Sanjay Dudhe[2]
Student, Vardhaman College of Pharmacy, Karanja (Lad), Maharashtra, India[1]
Associate Professor, Vardhaman College of Pharmacy, Karanja (Lad), Maharashtra, India[2]

Abstract: *Large areas of dry-moist forests and other culturable wastelands have been overrun by lantana on the Indian subcontinent, which may have changed ecosystem services, biodiversity, and landscape ecology. In addition to forest and barren areas, it has infiltrated the majority of Indian grazing lands (13.2 million hectares), and its control is expected to cost US$70 per hectare. Rapid spread, severe infestation, allelopathy, opportunistic growth habit, reproductive biology features, and a persistent resistance to burning and cutting make this invasive weed unique.(1)*

With an emphasis on its ecological characteristics, including biomass productivity, reproductive biology, invasiveness, allelopathy, eradication strategies, and commercial applications documented from India, this research examines the state of knowledge regarding Lanthana camara. The literature evaluation indicates that lantana's economic benefits and advantages outweigh its drawbacks, necessitating more research on cost-benefit analysis when making decisions about its management and eradication.(1).

Keywords: camara lantana. India's ecology, invasion, eradication, and effects, both positive and negative.[(2)]

I. INTRODUCTION

There are over 150 species of herbs in the genus Lantana (family Verbenaceae), which includes bushes and shrubs that can reach heights of 0.5 to 3 m. According to Linnaeus' 1753 Species Plantarum, the genus Lantana comprises seven species, six of which are found in South America and one in Ethiopia (Munir, 1996).

Although certain taxa are native to tropical Asia and Africa, lantana is primarily found in subtropical and tropical America. It is currently found in about 50 countries, where hundreds of cultivar names are used to nurture various species for their flowers.[(3)]

Although there are between 50 and 270 distinct and sub-specific Lantana species known to exist, 150 species seems to be a more accurate estimate (Munir, 1996).

Due to species instability, frequent hybridisation, changing inflorescence morphology with age, and flower colour variation with age and maturity, the genus is challenging to taxonomically describe (Munir, 1996). Typically, L. Camara .[(3)]

Lantana Introduction in India

Variant L. Camara aculeata Moldenke, often referred to as Lantana wild sage, is a low, erect or sub-scandent woody perennial shrub that grows to a height of 0.3 to 1.8 meters or more. It has robust, recurved prickles and a potent black currant scent. In addition to species with horticultural potential, seven or eight species, including L. Camara, L. Indica, L. Veronicifoila, and L. Trifolia, have been reported in India (Rajendran & Daniel, 2002). There are three known L. Camara types from India.

These three varieties are L. Camara var. Nivea Bailey, L. Camara var. Mista Bailey, and L. Camara var. Aculeata Moldenke. The most prevalent of these is L. Camara var. Aculeata. There are several different kinds of L. Camara, some of which are polyploids.[(4)]

Lantana camara is a polyploid complex with a hybrid origin. Polyploids ranging from 2x to 7x (x = 11) make up the population in India (Kumar & Subramaniam, 1986). The morphological traits of various L. Camara populations vary significantly, including habit, thorniness, and traits of the leaf, flower, and inflorescence as well as fruit size.

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It is quite challenging to distinguish between the types and variants based solely on morphological characteristics. The stems of the majority of them bear recurved prickles. However, they grow less vigorously, set seeds less easily, and become less prickly—or even unarmed—when cultivated. Dwarf varieties have been created to grow as hedges along home borders and in hanging baskets.[5]

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In the early nineteenth century, lantana was introduced to India as an attractive hedge plant in Calcutta (Hakimuddin, 1929) and as an ornamental plant in the National Botanical Garden in 1807 (Kohli et al., 2006).

However, over time, this plant has proliferated throughout the nation's open spaces, including the boundaries of agriculture fields, railway tracks, and open woodlands. It is now widespread all over India and has fully naturalised In Kathgodam, district Nainital, L. Camara was first introduced in the North West Himalayan region in 1905 (Hakimuddin, 1929; Hiremath & Sundaram, 2005).[6]

In addition to forest and barren regions, it has infiltrated over 13.2 million hectares of pasture land in India. L. Camara is found throughout the tropical and subtropical regions, including India's protected forest regions. It has also made its way into several temperate regions (Kimothi et al., 2010). Two species, Lantana camara and L. Indica, have been shown to flourish widely in all submontane and montane zone habitats up to 2000 m altitude in the Garhwal Himalaya (north India) as well (Dobhal et al. 2010; Bisht al., 2012).

It is extensively Found throughout tropical and subtropical woods, it is primarily linked to Tectona grandis, robusta, Pinus roxburghii, Acacia catechu, Dalbergia sissoo, and other evergreen and diverse forests. Its possible distribution across practically all of India has been anticipated by niche models (Ray & Ray, 2014). [7]

Historical Importance

- *Traditional Medicine:* For generations, lantana has been utilised in traditional medicine, especially in Asia, Africa, and Latin America. The plant's many parts are used to cure skin disorders, rheumatism, and fever.
- *Insect Repellent:* The plant is a natural insecticide because of its potent aroma, which deters mosquitoes and other insects.
- *Dye Plant:* Fabrics can be naturally dyed using lantana leaves and blooms.[8]

Cultural Importance

- *Spiritual Practices:* Lantana is thought to have spiritual qualities that protect against evil spirits and bring good fortune in certain African and Afro-Caribbean traditions.
- *Folklore:* Lantana is linked to protection, fertility, and love in many civilisations.[8]

Significance to the Environment

- *Biodiversity*: Lantana offers a variety of creatures, including birds, butterflies, and small mammals, food and shelter. The plant's large root system aids in the prevention of soil erosion.[8]

Additional Importance

- *Ornamental Value*: Lantana is a popular choice for gardens and landscapes because of its colourful blossoms.
- *Invasive Species:* Regrettably, lantana has outcompeted native plants and may be detrimental to local ecosystems in many areas, making it an invasive species.[8]

Phytochemical profile for lantana

Primary phytochemicals include

1. Triterpenoids: The main triterpenoids in lantana are betulinic acid, oleanolic acid, and ursolic acid.
2. Flavonoids : The primary flavonoids found are lute Olin, and quercetin.

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3. phenolic acids : garlic acid, ferules acid, and caffeine.
4. Essentialoils: Sesquiterpenes (including caryophyllene and germacrene) and monoterpenes (like limonene and pentene) are found in lantana essential oils.[9]

Secondary phytochemicals include

1. Alkaloids: Reports of trace levels of alkaloids, including camarine and lantanine, are made.
2. Saponins: The haemolytic action of lantana is facilitated by the presence of saponins.
3. Glycosides: There are phenolic and flavonoid glycosides (such as quercetin-3-Orutinoside).
4. Sterols: stigmasterol and β-sitosterol have been found.[9]

Biological Processes

Lantana's phytochemicals support a range of biological functions, such as:

1. *Antimicrobial* : Works well against viruses, fungi, and bacteria.
2. *Anti-inflammatory :* activities of oleanolic acid and ursolic acid are demonstrated.
3. *Antioxidant* : Phenolic acids and flavonoids support antioxidant activity.
4. *Insecticidal* : Triterpenoids and essential oils have insecticidal qualities.
5. *Hepatoprotective* : Extracts from lantanas have liver-protective properties.[10]

Toxicity

1. *Toxicity to livestock* : Lantana is toxic to cattle, sheep, and goats due to its hepatotoxic triterpenoids.
2. *Allergic reactions* : Some individuals may experience allergic reactions to Lantana extracts or essential oils.[10]

Future Research Directions

1. Standardization of extracts : Standardizing Lantana extracts to ensure consistent phytochemical profiles.
2. Clinical trials : Conducting clinical trials to validate traditional uses and potential therapeutic applications.
3. Toxicity studies : Investigating toxicity mechanisms and safe dosages.[11]

Medical properties for lantina

Traditional Uses:

- *Anti-inflammatory* : Lantana's leaves and stems have been used to treat inflammation, swelling, and pain.
- *Antimicrobial* : The plant's extracts have shown antibacterial and antifungal properties, effective against various microorganisms.
- *Antipyretic* : Lantana has been used to reduce fever and alleviate symptoms of malaria.
- *Wound healing* : The plant's extracts have been applied topically to accelerate wound healing.
- *Skin conditions* : Lantana has been used to treat eczema, acne, and other skin conditions.[12]

Modern Research

- *Cancer treatment* : Lantana extracts have shown cytotoxic effects against certain cancer cell lines.
- *Antiviral activity* : Lantana has demonstrated inhibitory effects against viruses, including HIV and herpes.
- *Neuroprotective effects* : Lantana extracts may help protect against neurodegenerative diseases.[12]

Important Information

1. *Toxicity* : The berries of lantana are poisonous and should not be eaten.
2. *Allergic reactions* : Using lantana products may cause skin irritation or allergic.
3. *Pregnancy and breastfeeding* : lantana usage is not advised during these times.[13]

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Methodology for Lantana

Methodologies of Qualitative Analysis

1. *Narrative Research* : Examines the experiences and tales of Latina people or groups.
2. *Ethnography*: Comprehensive research on the customs, social dynamics, and cultural practices of Latina communities.
3. *Content Analysis* : Examines how Latina experiences are portrayed in literature, art, and the media.[14]

Methodologies of Quantitative Analysis

1. *Survey Research* : Gathers information via surveys or interviews in order to comprehend demographics, attitudes, and behaviours.
2. *Statistical Analysis* : Analyses patterns and trends in health, educational, and economic results.[14]

Mixed-Methods Approaches

1. *Case Study Research* : Combines qualitative and quantitative data to understand specific contexts or phenomena.
2. *Participatory Action Research (PAR)* : Involves Latina communities in the research process to promote social change.[15]

Theoretical Frameworks

1. *Intersectionality* : Examines how race, gender, class and other identities intersect to impact Latina experiences.
2. *Latina Feminism* : Centres the perspectives and voices of Latina women.
3. *DE colonial Theory* : Challenges dominant Western epistemologies and highlights indigenous knowledge.[15]

CONCERNING LANTANA

Botanical Name : Lantana Camara Linn
Typical Names:
English : Lantana Weed
Hindi : Raimuniya
Marathi : Tantani,Ghaneri
Family : Verbenaceae
Plant Type : Shrub
Kingdom : Plantae
Ayurvedic Described
Name in Sanskrit : Vanacchedi, Chaturangi

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Qualities : Guna, Guru, Virya,Sita, Rasa
Healing Uses : The plant soothes vitiated vata and kapha conditions.[16]

MORPHOLOGY

Growing between 1.2 and 2.4 meters (or even more), Lantana camara is a robust shrub that is low-erect or subscandent. Its recurved, robust prickles have a strong scent of black currents. It has a very robust root system. Multibranched shrub that can grow in vines, thickets, or clumps.[17]

- **STEM** : Tiny, recurved prickles are found on square stems. The stems and branches are angular in shape and arranged with curved spines along the edges.
- **LEAVES**: Opposing, brilliant green leaves with round, serrated margins that are around 6 cm long grow along the stem.
- **FLOWER:** Their diameter is around 2.5 cm, and their colours range from pale cream to yellow, white, pink, orange, red, lilac, and purple. Insects and butterflies pollinate the blooms.
- **FRUIT**: When ripe, the glossy, spherical, meaty, purplish-black fruits have a diameter of around 3 mm and range in hue from blue to black.[17]

TYPES OF LANTANA SPECIES

Lantana species are popular garden plants due to their striking blooms and ability to attract native pollinators. However, because some species can spread quickly, be sure to check your state's or region's list of invasive plants before starting a lantana garden. Generally speaking, all lantana species require hot, humid weather to thrive. Many of these species can be found in the southern United States. If the environment is suitable, lantana species are incredibly low care and make a beautiful addition to your yard.[18]

1) Common Lantana (Lantana camara)

One of the lantana flower types that is most commonly grown is the common lantana, also known as shrub verbena. This species can be grown as an annual or in a container in cooler climes. Although this is a fantastic plant to add some colour to your house or yard, if you reside in a tropical climate, exercise extra caution. In Texas, Florida, Hawaii, and some regions of Australia, the common lantana is regarded as invasive due to its rapid proliferation.[19]

Native Range : Central and South America.

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2) Trailing Lantana (Lantana montevidens)

This plant is a great option for dense ground cover because of its broad spread, thick leaves, and beautiful blooms.

It is also a hardy plant that has gotten into gardens all around the southern United States, although being less invasive than its relative L. Camara.

The tiny hairs on the plant can irritate skin, thus it should be avoided. Range locally.[19]

Tropical regions of South America (the species' name comes from its discovery near Montevideo, Uruguay).

3) Buttonsage (Lantana involucrata)

This charming tiny shrub is a native lantana species in the United States. The common name for this lantana plant comes from the sage-like scent of the crushed leaves.[19]

Native Range : Central and South America to South Florida

4) Popcorn Lantana (Lantana Trifolia)

Also called lavender popcorn, this lantana plant is as much cultivated for its decorative fruit as for its flowers.

Giving the plant its common name, the fruits form in bundles that look like individual Pieces of purple popcorn! Don't be tempted to eat them, however, many lantana species are Poisonous.[19]

Local Range : West Indies, Mexico, Central, and South America.

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ETHANOPHARMACOLOGY

- Around the world, lantana camara L. Is utilised as a medicinal plant to cure a wide range of ailments.
- Its leaves can be boiled to make a tea, and its decoction is used to treat tetanus, malaria, Cough, and wounds.
- In Ghana, bronchitis is treated with an infusion made from the entire plant, while stomach ache is treated with a powdered root mixed with milk.
- Lantamine, a noteworthy steroid obtained from L. Camara leaves, possesses cardio tonic potentials, according to a previous study.
- Cuts, rheumatisms, ulcers, tetanus, malaria, cancer, chicken pox, asthma, ulcers, swelling, eczema, tumours, high blood pressure, bilious fever, ataxia of abdominal viscera, sores, measles, fevers, colds, and high blood pressure are all conditions that the plant's leaves are used to treat in a number of Asian countries.
- Historically, its leaves have been used as a stomachache tonic and an insecticide.
- In Ghana, bronchitis is treated by infusing the entire plant. The powdered root was given to kids in milk as a febrifuge and to relieve stomachs.
- Lantana oil is utilised externally to treat skin irritations such as leprosy and scabies and as an antibacterial for wounds.[20]

PROPERTIES OF LANTANA CAMARA MEDICINAL

- The Lantana camara plant has been used to treat a variety of ailments. It was found to be utilised in conventional cancer and tumour treatments. In Central and South America, the leaves were applied as a poultice to treat measles, chicken pox, and wounds.
- Additionally, Camara preparations are used to treat colds, rheumatism, asthma, and high blood pressure.
- Fever, the flu, and stomachache were all treated with a tea prepared from the flowers and leaves of Lantana camara.
- In Ghana, the entire plant was used to treat bronchitis, and children who had stomachache were given milk with the powdered root
- An alkaloid fraction was extracted from the leaves that slowed blood pressure, accelerated deep breathing, and made canines shudder.
- It was suggested that in addition to reducing fevers, it might help treat hypertension and asthma. The claims that lentamente, a steroid from the leaves, had cardiac tonic characteristics and that lantamine, an alkaloid from the stem 13 bark and roots, exhibited antipyretic and antispasmodic activities have not been proven to be true.
- The roots of Lantana camara are rich in oleanolic acid. A translactone-containing triterpene with Hepatoprotective qualities was also shown to have thrombin-inhibitory action from lantana leaves.
- A pentacyclic triterpenoid that contains lantadene A, B, C, and oleanolic acid has drawn interest in therapeutic research due to its anti-inflammatory, anti-bacterial, anti-cancer, and anti-AIDS properties (major).[21]

HERBAL MEDICINE

- Because certain lantana species contain dangerous compounds, it is essential to look into the phytochemistry of this plant. In 1943, P. G. J. Louw carried out the first thorough analysis of L. Camara's chemical constituents.
- He reported the isolation of Lantanin, the primary active component of the Lantana shrub, with the molecular formula C32H44O5, which he subsequently called Lantadene A, in 1948 after Lantadene B, with the chemical formula C33H4805, was extracted from every part of the bush (Louw, 1948).
- Lantadenes are believed to be responsible for almost all of the biological characteristics of lantana, including its fungicidal, insecticidal, nematicidal, antipyretic, antibacterial, and antimutagenic effects.
- Secondary metabolites of lantana, such as alkaloids, terpenoids, phenolics, iridous glycosides, furan naphthoquinones, flavonoids, phenyl ethanoid glycosides, and other substances, may be partly responsible for some of these biological functions.

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- The initial research on Lantana species focused on the essential oils; the highest output via hydro distillation of the leaves was 0.2%, and from the flowers, it was up to 0.6%
- 16.2% lignin, 26% cellulose, 21% hemicellulose, and 31% hot water-soluble fibre make up the dry weight of lantana.
- Worldwide, a great deal of research has been conducted on L. Camara's antibacterial properties. It is used in Indian medicine as a diaphoretic, intestinal antiseptic, sudorific, and to treat rheumatism, malaria, and tetanus. Additionally, leaf extracts possess nematicidal, insecticidal, fungicidal, and antibacterial qualities. It aids in the treatment of tumours, fistulae, and pustules. A plant decoction is recommended for tetanus, rheumatism, malaria, and atoxia of the abdominal viscera.
- Pounded leaves can be used to treat cuts, ulcers, and swelling regions. A mixture of fruits and herbs is used to make a lotion for wounds.[22]

LANTANA INDUSTRIAL USE

The scientific community is investigating the plant's potential use beyond its use as a component in perfumes.

- Originally introduced as an ornamental garden to most countries.
- The leaves' essential oil has adulticidal properties against certain mosquito species. As an addition to synthetic insecticides, this species can be used for oil-based pesticides.
- In addition to being used as an antiseptic for wounds, the leaf oil is used to treat skin irritations.
- Lantanine, an alkaloid that resembles quinine and has potent antipyretic and antispasmodic effects, is found in the bark of the stem and roots.
- The shoots' acid extracts have antibacterial properties against Escherichia coli.[23]
- Pulp, paper fibre, fuel wood, fertiliser, and creating roofing materials are all possible uses for lantana biomass (NAS, 1981). Its straw is used to make manure and biogas products.
- For the pulp and paper industries, it might be a useful raw material.As raw materials for paper pulp, the stalks have been tested; they comprise cellulose (30.6%), lignin (14.0%), furfuroids (21.6%), and ash (3.50%).
- Lantana biomass is directly utilised for a number of reasons, the most significant of which is as additional fuelwood for human warmth and cooking.
- One direct use of biomass from the wild is the production of furniture from lantana.
- This tactic may help manage lantana weed and improve the use of foreign species at the same time. Even after lopping, it regenerates quickly and produces large biomass outputs.
- Although lantana stems are thin, its wood is incredibly strong and resilient, making it suitable for a variety of crafts including wickerwork.
- Because bamboo supplies are expensive and limited, and because lantana has overtaken bamboo woods, the Soliga of Karnataka are now using it in their wickercraft.
- Paper Industry: If the sulphate procedure is used to lantana stems, pulp for writing and printing paper can be created.
- Rubber Industry: A material found in lantana roots has the potential to be utilised in the production of rubber.[24]

LANTANA OIL

Measles, chicken pox, scabies, and skin fungus are among the common skin diseases that it is used to treat. In addition to having a wonderfully calming, balancing, and cooling impact, it has great respiratory qualities that can deepen and calm breathing. It is a wonderful wound healer, has strong antimicrobial properties, and can help halt bleeding. Utilised in massage and energy healing.

The oil is sourced from hill farmers in Uttarakhand and has been authorised by the Centre for Aromatic Plants of the state.[25]

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At-Home Use of Lantana Essential Oil

1. Mix lantana plant essential oil extract with water to revitalise an area. The ensuing mist smells woodsy and flowery.[26]

2. The blend can be used as a diffuser. When washing your sweaters or flannel shirts, add a few drops of the essential oil to your liquid detergent for a wonderful woodsy scent.

3. As you clean the house, use it to add freshness to the air. Simply add a few drops of the essential oil to each new bag you put in the hoover; it's that simple. If your hoover has a washable filter, you can add a few drops to it. As you hoover, your house will smell amazing.

4. To create a natural and fresh scent in your house, you can mix it with disinfectants or mop water.

5. Put a few drops on the air filters in your furnace. Allow the aroma to permeate your houses.[26]

A NATURAL HOME REMEDY USING LANTANA LEAVES

Cough : When inhaled, the natural cooling properties of lantana leaves might help relieve a cough.

Flu (Influenza) : When afflicted with the flu, lantana leaves' inherent cooling properties can aid in lowering fever.

Headache : A classic home cure for getting rid of headaches is lantana leaf tea.

Indigestion symptoms : Tea made from lantana leaves can help relieve a variety.

Joint Pain : One of lantana leaf's therapeutic use is as a natural treatment for rheumatic joint pain.[27]

ANTIMICROBIAL

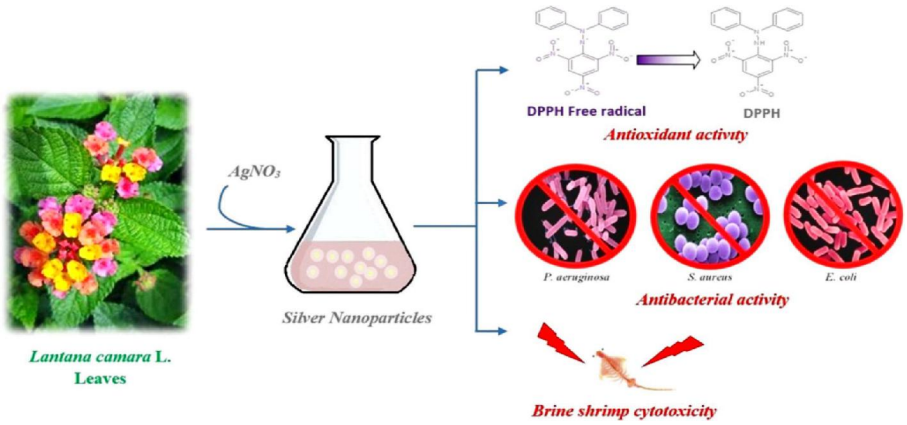

Fig. Silver nanoparticles made with a terpene-rich extract of Lantana camara L. Leaves exhibit antioxidant, antibacterial, and cytotoxic properties.

Ethyl acetate, acetone, and chloroform extracts of yellow, lavender, red, and white flowers as well as Lantana camara leaves were prepared and their antibacterial qualities evaluated using the agar well diffusion method. With the exception of Salmonella aureus, only ethyl acetate extracts demonstrated the highest level of efficacy against all microorganisms. Extracts of acetone or chloroform did not considerably inhibit the bacterium. All four varieties of L. Camara flower extracts had zone of inhibition values between 10 and 21 mm, and their antibacterial properties were essentially the same. The extracts from the yellow and white flowers of L. Camara exhibited the highest inhibitory action against Bacillus subtilis, with respective zones of inhibition of 21 and 20 mm.[28]

Leaf extracts demonstrated lesser inhibitory activity than flower extracts against all tested bacteria, with a zone of inhibition area ranging from 9 to 15 mm. The bacteria that reacted most favourably to camara flower and leaf extracts was found to be Escherichia coli. It was shown that all L. Camara flower and leaf extracts were highly susceptible to Bacillus subtilis and P. Aeruginosa. L.camara produced minimum bactericidal concentrations (MBCs) and minimum inhibitory concentrations (MICs) of 37.5 mg/ml against Salmonella aureus and pseudomonas aeruginosa, and it showed notable results against mycobacterial tuberculosis. L. Camara is used to treat microbiological diseases since its ethanoic extract shows effectiveness against Bacillus substilis and pseudomonas.[28]

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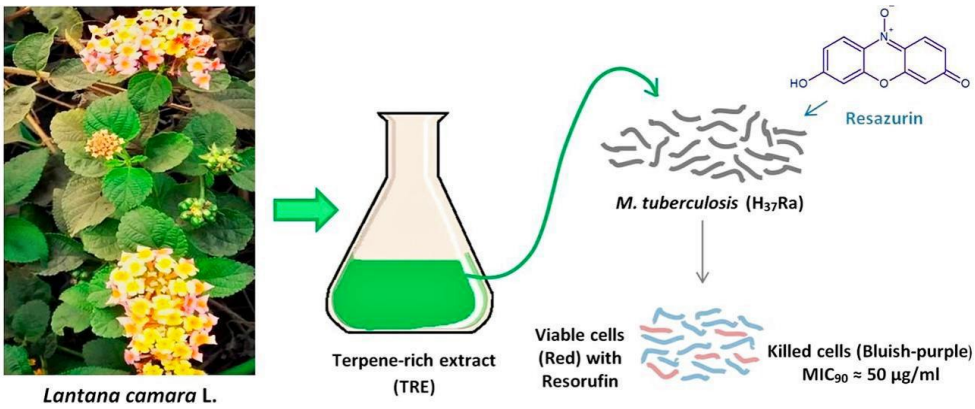
ANTIMYCOBACHERIAL ACTIVITY



Using the Resazurin Microliters Assay (REMA), the antibacterial activity of a terpene-rich extract of Lantana camara L. Leaves against mycobacteria is assessed.

The leaves of the infamous weed Lantana camara L. (Verbenaceae) are abundant in terpenes, which can be found in the form of essential oil. Terpenes exhibit strong antibacterial and antimicrobial properties. Depending on the waxes' and lipids' saponification properties, unspecified petroleum ether It is possible to prepare extracts that simply contain terpenes. When compared to any solvent extract, the terpene-rich extract (TRE) of L. Camara.[29]

Leaves has demonstrated stronger antioxidant and antibacterial properties. The rifampicin-sensitive and rifampicin-resistant strains of Mycobacterium tuberculosis (MTB), H37Rv and TMC-331, respectively, are recognised as international standards. Both the H37Rv and wild strains had rifampicin levels of 1.0 g/ml, however TMC-331 hardly responded to the medication.[29]

While the minimum bactericidal concentration (MBC) for rifampicin was 2.0 g/ml for both strains, the H37Rv strain of M. Tuberculosis needed 30 g/ml for the methanol extract of L. Camara and 20 g/ml for the TMC-331 and wild strains. L. Camara extracts showed a competitive advantage (MTB) by outperforming rifampicin by a large margin against the rifampicin-resistant strain of Mycobacterium tuberculosis.[30]

II. CONCLUSION

Demand for natural medicine has increased significantly in recent years. Thus, it should go without saying that the development of herbal medicines that is in are beneficial to people depends on study on medicinal plants.

Lantana camara is one of the most significant medicinal plants utilised in traditional medicine worldwide. As a result, Lantana camara is widely known for its use in traditional medicine worldwide. Research on the therapeutic qualities of L. Camara, both scientific and ethnomedical, has shown that it is a useful plant and a potential target for drug development.

It has also been claimed that it can be applied topically to treat leprosy and scabies, as well as to calm itching skin and act as an antiseptic on cuts.

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