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Lantana camara: A Medicinal Plant Having High Therapeutic Potentials: A Review

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ABSTRACT

Lantana camara, a globally recognized invasive weed, has been found to significantly impact soil ecosystem properties in Southeast Australia. Despite its widespread presence, quantitative data on its effects on soil have been limited. A study conducted in four sites west of Brisbane, Australia, compared soil samples collected beneath and away from Lantana camara infestations. The sites varied in landscape and land use. Lantana camara is a highly invasive plant species that has caused significant damage worldwide. In Ethiopia, this review paper examines its dispersal mechanisms, threats, and potential management strategies. Biological characteristics and dispersal agents: The plant's reproductive strategies and ability to be spread by various agents have contributed to its successful dispersal. Hotspot areas: Debre Zeit, Dire Dawa, Harar, and Somali regions are particularly affected by Lantana camara infestations. Threats to biodiversity and agriculture: The weed poses a significant risk to Ethiopia's biodiversity, agriculture, human health, animal health, and national parks.

KEYWORDS: Lantana camara Linn., Pharmacology, Antimicrobial activity, biological characteristics.

INTRODUCTION

Lantana camara is a hardy, evergreen shrub with a distinctive odour. It is a highly invasive species found in tropical, subtropical, and temperate regions worldwide, including India's Himachal Pradesh, Uttarakhand, Uttar Pradesh, and northeastern states. Various parts of Lantana camara have been used traditionally for treating various ailments. The leaves have been employed as an anti-tumour, antibacterial, and antihypertensive agent. The roots have been used to treat malaria, rheumatism, and skin rashes. The plant contains a variety of bioactive compounds, including triterpenoids, flavonoids, alkaloids, and glycosides, which contribute to its medicinal properties. Extracts from Lantana camara leaves have demonstrated larvicidal activity against mosquitoes, while extracts from the flowers have shown repellent properties (Jitendra Patel, 2011). Lantana camara is an erect branching perennial shrub 0.5 – 2 meters in height that belong to Verbenaceae family that is found growing wildly in many hot parts of the world. The shrub has many folklores medicinal uses across the world such as a cure for respiratory problems, skin disorders, wounds, and malaria. It is also used to as an abortifacient as a remedy for wounds, toothache, headache and rheumatism (Sore A. Millycent, 2017). The invasive neotropical shrub/climbing species *Lantana camara* (Verbenaceae) has significantly modified key ecosystem processes in various habitats worldwide, including India, China, Southern Africa, Australia, and New Zealand. Ranked among the world's top 100 invasive species *L. camara* has detrimental effects on native species. Despite extensive research and control efforts, particularly in Australia, understanding the below-ground impacts of *L. camara* invasion remains limited, with most studies focusing on China and continental India. In Australia, Gentle and Duggin (1997) demonstrated the allelopathic effects of *L. camara*, which can disrupt regeneration processes by inhibiting germination, reducing early growth, and increasing mortality of indigenous species. Consequently, *L. camara* can outcompete native seedlings and disrupt community development. This study aims to address the knowledge gap in Australia regarding the below-ground ecological impacts of *L. camara* invasion, contributing to a broader understanding of its effects on terrestrial ecosystems (Perrett, 2010).

Invasive Alien Species are species which are introduced unintentionally or intentionally into a natural environment where they are not normally found, with serious negative consequences for their new environment. Such species are also termed environmental

weeds and may alter ecosystem structure and function. The unusual increase in the movement of these invasive alien species due to various reasons such as increased transport, trade, travel has accelerated their rate of introduction everywhere and these activities provide pathways for these species to cross biogeographical barriers that would usually block their way, with harmful consequences on native biological diversity. Thus, as one of the greatest drivers of native biodiversity loss, invasive alien species can pose a threat to ecosystem integrity and function and therefore, to human well-being (Abebe, 2018).

TAXONOMY

- Kingdom: Plantae
- Subkingdom: Tracheobionta
- Super division: Spermotophyta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Subclass: Asteridae
- Order: Lamiales
- Family: Verbenaceae
- Genus: Lantana
- Species: L. camara. (Mishra, 2014).

GEOGRAPHICAL DITSRUBUTION

Lantana camara, a tropical plant native to Central and Northern South America, has spread to numerous countries worldwide. It is now found in regions as diverse as New Zealand, Mexico, Florida, Trinidad, Jamaica, and Brazil. In Africa, it has established itself in countries including Kenya, Uganda, Tanzania, and South Africa. Lantana camara was likely introduced to India before the 19th century. Today, it is widely distributed throughout the country. It is known by various names in different Indian languages, including Raimuniya (Hindi), Chaturangi and Vanacehdi (Sanskrit), Arippu and Unnichedi (Tamil), Aripoov, Poochedi, Konginipoo and Nattachedi (Malayalam), Thirei, Samballei and Nongballei (Manipuri), Tantani and Ghaneri (Marathi), Pulikampa (Telegu), Kakke and Natahu. (Kanada) (Sanjeeb Kalita, 2012).

MORPHOLOGY

Lantana camara is a robust shrub that can grow up to 3 meters tall and 2.5 meters wide. It has a distinct tetragonal stem and a strong, pleasant scent.

Leaves

The leaves are ovate or ovate-oblong in shape, with serrated edges and a rough texture. They are typically green and covered with fine hairs. Leaves can be used as green mulch, providing essential nutrients like phosphorus and potassium to the soil.

Inflorescences

Lantana camara produces dense, dome-shaped clusters of flowers, typically containing 20-40 sessile flowers. These clusters are found in the axils of opposite leaves.

Flowers

The flowers are small and can vary in colour from yellow or orange to red or scarlet. They have a slender corolla tube and a spreading limb divided into unequal lobes. The flowers are typically held in clusters and can change colour as they age.

Fruits

The fruits are round and fleshy, often consumed by birds and sometimes by humans.

Roots

The plant has a strong root system that allows it to regenerate even after repeated cuttings (Attarde, 2021).

MEDICINAL PROPERTIES

Lantana, a plant known for its antiseptic, antispasmodic, carminative, and diaphoretic qualities. The bark of the stems and roots contains a quinine-like alkaloid called lantanine, which has strong antipyretic and antispasmodic properties. Extracts from Lantana leaves have been shown to have anti-inflammatory, antipyretic, and analgesic effects. Additionally, extracts from Lantana trifolia have exhibited anti-inflammatory and analgesic properties (Om P. Sharma, 2007).

PHYTOCHEMISTRY

The leaves, stem, and fruit of the plant contain various bioactive compounds such as triterpenoids, alkaloids, flavonoids, tannins, saponins, glycosides, and terpenoids. The root of the plant is known to contain oleanolic acid, and Lantana camara is also a rich source of essential oils. The essential oil composition of Lantana camara from Saudi Arabia is different compared to that reported from other countries. Cis-3-hexen-1-ol and 1-hexanol, key constituents of Lantana camara essential oils, were reported for the first time from Saudi Arabia. β-caryophyllene, a vital compound present in all the essential oils composition reported so far, is suggested to be investigated further as a potent marker for Lantana camara essential oils (Muzammil Shah, 2020). The essential oil of Lantana camara contains several compounds, including sabinene, 1,8-cineole, ß-caryophyllene, α-humulene, humulene epoxide-III, and 8-hydroxy bicyclogermacrene (M.K. Lonare, 2012).

TOXICITY

Lantana camara, a noxious weed with toxic effects on animals. The red flower variety (L. camara var. aculeata) is particularly toxic and prevalent in tropical and subtropical regions. Lantana poisoning can lead to hepatotoxicity, photosensitization, and intrahepatic cholestasis. The main toxic compound is lantadene, which causes various pathological changes in the liver. Lantana toxicity also affects haematological and biochemical parameters. While there are no highly effective treatments for Lantana poisoning, activated charcoal, vaccination, and supportive therapy can help manage the toxic effects. Despite its harmful effects, Lantana camara also has some beneficial properties, including anti-inflammatory, hepatoprotective, and antitumor actions. The main toxic compounds are lantadenes, which are pentacyclic triterpenes. Lantadenes can cause hepatotoxicity, photosensitization, and jaundice in animals. There are two forms of lantadene: crystalline and amorphous. The amorphous form is particularly icterogenic in guinea pigs (Rakesh Kumar, 2016).

NUTITIVE VALUE OF LANTANA CAMRA

Lantana camara as a potential livestock feed. It highlights the high protein content in Lantana camara leaves, which compares favourably to other proteinous plants. The low neutral detergent fibre (NDF) and acid detergent fibre (ADF) content suggest that Lantana camara is digestible for ruminants. Overall, the study suggests that Lantana camara can be a valuable protein supplement for livestock feed, especially in areas with limited access to traditional feed sources (Malizo Ntalo, 2022).

USES

Therapeutic uses

Lantana camara in different parts of the world. It has been used to treat a wide range of ailments, including stomach ailments, malaria, sore throat, cough, conjunctivitis, toothache, skin rashes, itching, headache, cold, jaundice, rheumatism, cough, colds, asthma, pyrexia, fever, influenza, stomach-ache sores, chicken pox, measles, high blood pressure, cancers, tumours, cuts, rheumatism, ulcers, vermifuge, leprosy, scabies, gastrointestinal diseases, ENT disorders, diarrhoea, pulmonary diseases, bilious fevers, catarrhal infections, tetanus, atoxy of abdominal viscera, memory impairment, and as an anti-inflammatory, antipyretic, antispasmodic, and antibiotic agent. Additionally, Lantana camara has been used as a sudorific, carminative, antiseptic, antispasmodic, antiemetic, and insecticide (Piush Sharma, 2013).

Traditional uses

Lantana camara in India. Despite its toxicity, it has been used as a wild pest control agent in certain regions. It is also a popular garden plant and has been used as a hedge and ground cover. Lantana camara improves soil fertility, retains humus, and checks soil erosion. It has been used to support yam vines in the Pacific islands and as a natural insect repellent in rural areas (Piush Sharma, 2013).

ECOLOGY

Lantana camara as a major invasive weed in tropical and subtropical regions. It has been ranked among the world's 100 worst invasive alien species due to its ability to form dense stands that exclude native seedlings. Lantana camara produces a large number of seeds that are dispersed by birds and mammals. It can also spread through layering and is drought tolerant. The weed affects ecosystem functioning by reducing biodiversity and increasing susceptibility to fire. Lantana camara can invade diverse habitats, but it prefers open, unshaded areas. While it can grow on various soil types, it prefers well-drained soils and does not tolerate water logging (S TAYLOR, 2012).

IMPACT OF LANTANA CAMRA ON NATIVE FLORA

As an invasive species, Lantana camara competes with native plants for resources like sunlight and land. This competition can lead to the decline of native plant species. The spread of Lantana camara has been observed to negatively impact the growth and distribution of native grasses like Saccharum spontaneous in India. Lantana camara's ability to thrive in diverse climates and its tendency to overlap with native vegetation make it a particularly problematic invasive species (Sushree Sangita Barik, 2020).

PHARMACOLOGICAL ACTIVITY

Antihyperglycemic activity

Methanol extracts of Lantana camara fruits and leaves were found to reduce blood glucose levels in streptozotocin-induced and alloxan-induced diabetic rats, respectively. Additionally, the extract treatment showed positive effects on body weight, HbA1c profile, and liver cell regeneration (Reddy, 2013).

Antiprotozoal activity

Extracts from various parts of the plant have shown activity against different protozoan parasites, including Plasmodium falciparum (malaria), Leishmania species (leishmaniasis), and Trypanosoma cruzi (Chagas disease). The compounds responsible for the antiprotozoal activity include oleanolic acid, ursolic acid, lantadene A, and lantanilic acid (K, 2017).

Anti-fungal activity

Various compounds present in the oil, including cyclic hexadepsipeptide, pentacyclic triterpenoid, b-caryophyllene, and caryophyllene oxide, have shown strong anti-fungal activity against different fungal species. Lantana essential oil has been found to be effective against Aspergillus Niger, Penicillium Digitatum, Aspergillus Nidulans, Cladosporium Herbarium, Rhizopus nigricans, Alternaria sp., and Sitophilus granarius. The anti-fungal activity of the oil is concentration-dependent, with higher concentrations showing stronger activity. The compounds responsible for the anti-fungal activity include cyclic hexadepsipeptide, pentacyclic triterpenoid, β-caryophyllene, and caryophyllene oxide (Aamir Nawaz, 2016).

Wound healing properties:

Lantana camara. Extracts from the leaves of the plant have been shown to have antiseptic and anti-leprosy activities. Both ethanol and ethyl acetate extracts of Lantana camara have been found to enhance wound healing by increasing the rate of wound contraction, promoting collagen synthesis, and decreasing wound healing time. Additionally, a paste prepared from Lantana camara leaves can be applied topically to cuts to aid in wound healing (B. Sivakumar, 2022).

Antimicrobial activity:

Extracts from the dried leaves of the plant have been shown to have antimicrobial activity against Escherichia coli, Bacillus subtilis, and Staphylococcus aureus. Among the different solvent extracts tested, ether extract showed the highest antimicrobial activity.

Ethyl acetate extract showed resistance to S. aureus and E. coli, while aqueous extract showed resistance to B. subtilis. Methanolic extract showed moderate antimicrobial activity, and aqueous extract showed minimum antimicrobial activity (Singh, 2023).

Antibacterial activities:

Extracts from the leaves and flowers of the plant, obtained with ethyl acetate, have shown antibacterial activity against various bacteria. The zone of inhibition for leaf extracts ranged from 10-21 mm, while for flower extracts it ranged from 9-15 mm. The study also found that the biochemical parameters (lipids, carbohydrates, and proteins) were similar among the four different Lantana camara varieties. However, the antibacterial activities varied among the varieties and the type of tissue used (Patel Jitendra1*, 2010).

Mosquito-controlling activity

Essential oils from the leaves of the plant have been found to be adulticidal against various mosquito species, including Anopheles culicifacies, Anopheles stephensi, Culex quinquefasciatus, Aedes aegypti, and Aedes albopictus. Lantana camara oil has also shown repellent activity against Aedes aegypti when applied to the skin. Additionally, extracts from the leaves and flowers of Lantana camara have been found to have larvicidal activity against the third and fourth instar larvae of Aedes aegypti and Culex quinquefasciatus. The larvicidal activity is concentration-dependent, with higher concentrations showing greater mortality (Gurubaxani Sevak B*, 2016).

CONCLUSION

Lantana camara, a widely available and cost-effective plant, contains a rich array of phytoconstituents including alkaloids, glycosides, saponins, steroids, terpenoids, flavonoids, carbohydrates, coumarins, and essential oils. This review article highlights its promising potential for therapeutic applications. With its demonstrated antioxidant, antibacterial, anti-inflammatory, and analgesic properties, Lantana camara could be a valuable resource for developing novel herbal medicines. Future research may explore its potential in formulations such as anti-inflammatory or antibacterial creams and analgesic tablets. Most of the pharmacological studies were preliminary, carried out in animals and are not sufficient for the development of a pharmaceutical product. Still, intensive preclinical and clinical studies are required to evaluate the efficacy and toxicity of these plant products.

REFERENCES

1. Aamir Nawaz, M. A.-S. (2016). Lantana (Lantana camara): A Medicinal Plant Having High Therapeutic Potentials – A Comprehensive Review. *International Journal of Chemical and Biochemical Sciences , 10*, 52-59.
2. Abebe, F. B. (2018, June 15). Invasive Lantana camara L. Shrub in Ethiopia: Ecology, Threat, and Suggested Management Strategies. *Journal of Agricultural Science, 10*(07), 1916-9760 .
3. Attarde, L. D. (2021, August 31). PHYTOCHEMICAL AND MEDICINAL STUDY OF LANTANA CAMARA LINN. (VERBENACEAE) -A REVIEW . *International Journal of Pharmacognosy , 8*(8), 317-328.
4. B. Sivakumar, V. G. (2022, October 16). A REVIEW ON MEDICINAL PROPERTIES OF LANTANA CAMARA LINN. *World Journal of Pharmaceutical Research, 11*(15), 273-281.
5. Gurubaxani Sevak B*, G. S. (2016, February). Lantana camara from forest edge towards pharmacy front: An overview. *Int. J. of Life Sciences*(A6), 137-140.
6. Jitendra Patel, G. K. (2011, Jnauary-March). PHYTOCHEMICAL AND ANTHELMINTIC EVALUATION OF LANTANA CAMARA (L.) VAR. ACULEATE LEAVES AGAINST PHERETIMA POSTHUMA. *Journalof Global Trends in Pharmaceutical Sciences, 2*(1), 11-20.
7. K, G. (2017). ANTIMICROBIAL ACTIVITIES OF LANTANA CAMARA LINN. *Asian Journal of Pharmaceutical and Clinical Research, 10*(3), 57-67.
8. M.K. Lonare, M. S. (2012, August 28). LANTANA CAMARA: OVERVIEW ON TOXIC TO POTENT MEDICINAL PROPERTIES. *International Journal of Pharmaceutical Sciences and Research, 3*(9), 3031-3035.
9. Malizo Ntalo, K. E. (2022, January 11). Lantana camara: Poisonous Species and a Potential Browse Species for Goats in Southern Africa—A Review. *Sustainability, 14*, 01-10.
10. Mishra, A. (2014, October-December). ALLELOPATHIC PROPERTIES OF LANTANA CAMARA: A REVIEW ARTICLE . *International Journal of Innovative Research and Review , 2*(4), 32-52.
11. Muzammil Shah, H. F. (2020, June). Lantana camara: A Comprehensive Review on Phytochemistry, Ethnopharmacology and Essential Oil Composition. *Letters in Applied NanoBioScience, 9*(3), 1199-1207.
12. Om P. Sharma, S. S. (2007, October 10). A Review of the Hepatotoxic Plant Lantana camara. *Critical Reviews in Toxicology, 37*(4), 313-352.
13. Patel Jitendra1*, Q. M. (2010). Phytochemicals and Pharmacological Activities of Lantana Camara Linn. . *Research J. Pharmacology and Pharmacodynamics, 2*(6), 418-422.

14. Perrett, O. O. (2010, October 20). Lantana camara L. (Verbenaceae) invasion effects on soil physicochemical properties. *Biol Fertil Soils*.
15. Piush Sharma, B. S. (2013, Oct-Dec). Phytochemical and Pharmacological profile of lanata camara L: An Overview. *Journal of Advanced Pharmacy Education & Research*, *3*(4), 294-305.
16. Rakesh Kumar, R. K. (2016, June 25). Lantana camara: AN ALIEN WEED, ITS IMPACT ON ANIMAL HEALTH AND STRATEGIES TO CONTROL. *Journal of Experimental Biology and Agricultural Sciences*, *4*(3), 322-337.
17. Reddy, N. M. (2013). Lantana Camara Linn. Chemical Constituents and Medicinal Properties: A Review. *Scholars Academic Journal of Pharmacy (SAJP) , 2*(6), 445-448 .
18. S TAYLOR, L. K. (2012, April). Impacts of climate change and land-use on the potential distribution of an invasive weed: a case study of Lantana camara in Australia. *European Weed Research Society Weed Research*, *52*, 391-401.
19. Sanjeeb Kalita, G. K. (2012, June). A Review on Medicinal Properties of Lantana camara Linn. *Research J. Pharm. and Tech*, *5*(6), 711-715.
20. Singh, M. K. (2023). A review paper on pharmaceutical potential of Lantana camara Plant . *National Journal of Pharmaceutical Sciences*, *3*(1), 10-15.
21. Sore A. Millycent, M. K. (2017, April 18). EVALUATION OF ANALGESIC, ANTI-INFLAMMATORY AND TOXIC EFFECTS OF LANTANA CAMARA L. . *International Journal of Phytopharmacology , 8*(3), 89-97.
22. Sushree Sangita Barik, R. P. (2020, August 4). Lantana camara L.: An emerging threat to native flora and livestock: A review. *Journal of Pharmacognosy and Phytochemistry*, *9*(5), 2363-2366.

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