ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 11| November 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402|| ISI Value

MEDICINAL PLANT AS SOURCE FOR NOVEL ANTI-MICROBIAL AGENTS [LANTANA CAMARA]

Mr.Awinash.S. Chavan [1], NikitaSahebraoWankhede[2*], Avinash. B. Rathod[3] Renuka.V.Wagh[4]

[1]Asst.Prof. (Faculty of P'chemistry) Roasaheb Patil Danve College of Pharmacy, Badnapur
[2]Student of Bachelor of Pharmacy , Raosaheb Patil Danve College of Pharmacy Badnapur ,Jalna
[3]Student of Bachelor of Pharmacy , Raosaheb Patil Danve College of Pharmacy Badnapur ,Jalna
[4]Student of Bachelor of Pharmacy , Raosaheb Patil Danve College of Pharmacy Badnapur ,Jalna
Raosaheb Patil Danve College of Pharmacy Badnapur , Jalna 431202

ABSTRACT

Introduction Earthworm (Pheretima posthuma) and plant (Lantana camara) extracts have been used for centuries to treat a variety of ailments; they have been shown to inhibit the growth of numerous harmful bacteria and are particularly useful for wound healing. To determine which is more effective for creating antiseptic ointment, we evaluated the antibacterial activity of the various organic extracts derived from these species against harmful bacterial strains. The disk diffusion and shaking flask tests were utilized to determine the antibacterial activity of the ethanol and acetone solvents employed for the extraction. Next, we determined the extracts' lowest inhibitory concentrations against both gram-positive and gram-negative microorganisms. When it came to Pseudomonas aeruginosa, Lantana camara exhibited the biggest growth inhibitory zone, followed by Serratia marcescens and StaphylococcusAureus is the abstract. While earthworm extract inhibited growth at a minimum level of 200µg/ml, plant extract had a minimum inhibitory concentration (MIC) of 150µg/ml. In contrast to the worm extract, we discovered that the ethanol extract of the plant (L. camara) demonstrated strong antibacterial activity. The use of Lantana camara extract to create an ointment to treat wound infections is supported by current research.

KEYWORDS: *antibacterial, harmful bacteria, Pheretima posthuman, and Lantana camara.*

HISTORY

Originally from Central and South America, Lantana camara is a perennial blooming shrub that is now extensively found throughout tropical and subtropical regions of the world. It is often referred to as Spanish flag or wild sage. It is a member of the Verbenaceae family and is distinguished by its thick clusters of tiny, colorful flowers that might be pink, red, or yellow and orange. The plant can reach a height of two meters and has a sturdy, woody stem.

Because of its capacity to spread quickly and establish itself in a variety of settings, such as disturbed woods, pastures, and degraded land, Lantana camara is frequently considered an invasive species.

OVERVIEW

The flowering plant Lantana camara, also referred to as lantana, is indigenous to the tropical Americas but has become well-known throughout the world for its aesthetic appeal and possible therapeutic uses. The plant's bioactive chemicals, which have a variety of biological functions, especially antibacterial effects, have been the subject of more recent research.

• Lantana camara extracts have been shown in numerous studies to have strong antiviral, antifungal, and antibacterial properties. As an example, research shows.

show the growth of several harmful bacteria, including Escherichia coli, Staphylococcus aureus, and Pseudomonas aeruginosa, as well as fungi like Candida albicans, can be inhibited by its leaf and flower extracts. Given the rise in antibiotic resistance, these results imply that Lantana camara may be a good source of natural antimicrobial agents that could replace manufactured antibiotics.

• Lantana camara has medicinal potential that goes beyond antibacterial uses; its extracts have demonstrated promise in the treatment of skin disorders, inflammatory illnesses, and even as a cancer treatment adjuvant. In light of the growing interest in using natural products for therapeutic purposes, the purpose of this review is to gather and examine the most recent research on Lantana camara as a source of antimicrobial agents, emphasizing its phytochemical components, processes, andailments, skin disorders, and even as a supplement to cancer treatment. Considering the growing demand for natural products for therapeutic uses, this The purpose of this study is to gather and evaluate the most recent research on Lantana camara. as an antibacterial agent source, emphasizing its phytochemical components, modes of action, and possible therapeutic uses.

Botanical Description

- Kingdom: Plantae
- Family: Verbenaceae
- Genus: Lantana
- Species: L. camara

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 11| November 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402|| ISI Value

Traditional Uses
- Fever reduction
- Wound healing
- Skin infections
- Respiratory tract infections

Phytochemical Profile
- Flavonoids (e.g., lantanoside, camarine)
- Phenolic acids (e.g., caffeic acid, ferulic acid)
- Terpenoids (e.g., lantanol, camarol)
- Alkaloids (e.g., lantanine)

Antimicrobial Activity
- Bacteria: Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa
- Fungi: Candida albicans, Aspergillus niger, Fusarium oxysporum
- Viruses: Herpes simplex virus, Influenza virus

Advantages
- Natural and sustainable source
- Broad-spectrum antimicrobial activity
- Low toxicity
- Potential for combination therapy

Methodology
- Plant collection and extraction
- Phytochemical analysis
- Antimicrobial activity evaluation
- Minimum inhibitory concentration (MIC) and minimum bactericidal/fungicidal concentration (MBC/MFC) determination

Objectives
- To evaluate the antimicrobial activity of Lantana camara extracts
- To identify the bioactive compounds responsible for antimicrobial activity
- To assess the potential of Lantana camara as a source of antimicrobial agent

Classification
- Kingdom: Plantae
- Family: Verbenaceae
- Genus: Lantana
- Species: L. camara

Common Names
- Lantana
- Wild Sage
- Shrub Verbena
- Yellow Sage
- Camara

Description
- Evergreen shrub
- Height: 2-4 meters (6-12 feet)
- Spread: 1-2 meters (3-6 feet)
- Leaves: Oval, pointed, 2-5 cm long, opposite
- Flowers: Small, fragrant, yellow, pink, or purple, in clusters
- Fruits: Small, round, purple berries

Habitat
- Native to tropical Americas (Mexico, Central America, South America)
- Naturalized in Africa, Asia, Australia, and Pacific Islands
- Grows in warm, humid climates
- Tolerates drought, salt, and poor soil

Cultivation
- Propagation: Seeds, cuttings, layering
- Soil: Well-draining, fertile
- Water: Regular, but drought-tolerant
- Sun: Full sun to partial shade
- Temperature: 20-30°C (68-86°F)

Uses
- Ornamental plant
- Medicinal plant (antimicrobial, anti-inflammatory, antioxidant)
- Insect repellent
- Food source for butterflies and birds

Chemical Constituents
- Flavonoids (lantanoside, camarine)
- Phenolic acids (caffeic acid, ferulic acid)
- Terpenoids (lantanol, camarol)
- Alkaloids (lantanine)

Medicinal Properties
- Antimicrobial (bacteria, fungi, viruses)
- Anti-inflammatory
- Antioxidant
- Anticancer
- Antidiabetic

Toxicity
- Toxic to humans and animals if ingested in large quantities
- Causes skin irritation and allergic reactions in some individuals

Interesting Facts
- Lantana camara is considered an invasive species in many regions.
- The plant's berries are toxic to humans and animals.
- Lantana camara has been used in traditional medicine for centuries.

1.Antimicrobial Action

Extracts from lantana camara have demonstrated strong efficacy against common infections as well as Gram-positive and Gram-negative bacteria.
such as Salmonella species, Pseudomonas aeruginosa, Escherichia coli, and Staphylococcus aureus.

Mechanism: It is thought that substances like flavonoids and tannins, which break down bacterial cell walls, prevent protein synthesis, and obstruct enzyme function, are what cause the antibacterial effect.

2. Activity Against Fungi

Strong antifungal qualities have also been shown by the plant, especially against fungi including Candida albicans, Aspergillus niger, and Fusarium oxysporum.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 11| November 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402|| ISI Value

Mechanism: By rupturing fungal cell membranes and impeding spore germination, essential oils and certain phenolic chemicals found in Lantana camara may suppress fungal growth.

3. Antiviral Action

Although less thorough, research on Lantana camara's antiviral properties is nonetheless encouraging. The extracts havesuppress demonstrated efficacy against specific viruses, such as influenza and the herpes simplex virus (HSV).

PLANT PROFILE



 Lantana camara
 Botanical Name : –Lantana camara Linn.
 common Name :- Lantana.
 Marathi Name :- Tantani, Ghaneri
 Family : Verbenaceae.
 Chemical constituents : Alkaloids, Flavonoids, tannins.
 Medicinal use : Exhibits antibacterial, Fungicides, Insecticidal
qualities, Leprosy treat, Skin rashes treat.

Technique and Content

Conventional Extraction Techniques

1. Solvent Extraction: The process of removing bioactive substances from Lantana camara plant components (leaves, stems, and roots) using solvents such as ethanol, methanol, or hexane.

2. Maceration: The process of extracting chemicals by soaking plant material in a solvent.

3**. Infusion**: To extract chemicals, plant material is steeped in hot water.

4. Decoction: Extracting chemicals by boiling plant material in water.

Techniques for Phytochemical Extraction

1. Alkaloid Extraction: The process of extracting alkaloids using solvents such as ethyl acetate or chloroform.

2**. Flavonoid Extraction**: Flavonoids are extracted using solvents such as methanol or ethanol.

3. Terpene Extraction: Terpenes are extracted using solvents such as dichloromethane or hexane.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 11| November 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402|| ISI Value

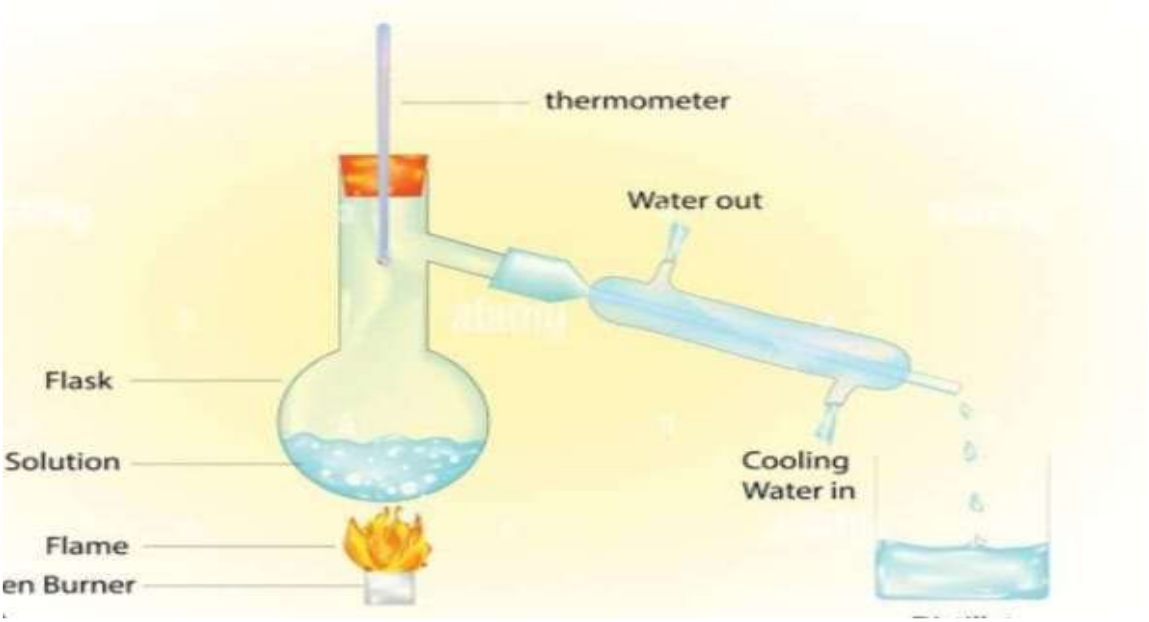


Fig. Soxhlet Apparatus



Fig. Decoction

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 11| November 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402|| ISI Value

CONCLUSION

The variety of bioactive chemicals that can be used as a therapeutic source in the creation of pharmaceuticals.

The ethanolic extract of L.camara leaf contains anti-oxidant, anti-metastatic, anti-cancer, anti-inflammatory, antibacterial, and anti-tumor effects, per an initial screening. The current research focuses on the antimicrobial qualities of additional pathogens and helpful microorganisms as well as their anti-insectidal activity against insects that harm plants.

Reports found in previous and ongoing research may lead to the development of a medication to protect plants against insects and microorganisms. In our research, a novel herbal insecticide (Lantocide) was created based on the properties of the ethanolic extract of L.camara. We are here with a natural insecticide solution because the globe is currently dealing with the terrible impacts of chemical pesticides. As a result, this extract might be studied further for usage as a better herbal pesticide in the marketplace.

Summary

The flowering plant Lantana camara, also referred to as lantana, is indigenous to the tropical Americas and has become well-known in

different regions of the world because of its possible medical benefits and aesthetic value. The plant's bioactive chemicals, which have a variety of biological functions, especially antibacterial effects, have been the subject of more recent research.

Future Scope

1. Pharmaceutical industry: Creating and promoting Lantana camara ointment in collaboration with pharmaceutical firms.
2. Cosmetics industry: Using lantana camara ointment in skincare products in partnership with cosmetics firms.
3. Herbal and Ayurvedic markets: Capitalizing on the rising demand for herbal and Ayurvedic goods.
4. Export prospects: Examining export prospects to nations where there is a significant need for herbal and natural products.

REFERENCES

1. *Anand, J., Choudhary, S., & Rai, N. (2018). Lantana camara enhances antibacterial potency of antibiotics and exerts synergistic inhibitory effect against pathogenic bacterial species. Oriental Pharmacy and Experimental Medicine, 18(4), 381–389. https://doi.org/10.1007/s13596-018-0321-2*
2. *Ayalew, A. A. (2020). Insecticidal activity of Lantana camara extract oil on controlling maize grain weevils. Toxicology Research and Application, 4, 2397847320906491 https://doi.org/10.1177/2397847320906491*
3. *Barros, I. L. E., Corrêa, J. L., Veiga, F. F., Bruschi, M. L., Negri, M., & Svidzinski, T. I. E. (2022). Chapter 7 – Effect of propolis on fungi of human clinical interest. In D. Boyacioglu (Ed.), Bee Products and Their Applications in the Food and Pharmaceutical Industries (pp. 173–199). Academic Press. https://doi.org/10.1016/B978-0-323-85400-9.00004-6*
4. *Bennour, C., Belgacem, A. B., & Nasr, H. B. (2021). A review of the management of Aphis fabae Scopoli (Hemiptera: Aphididae). JOURNAL OF OASIS AGRICULTURE AND SUSTAINABLE DEVELOPMENT, 3(1), Article 1. https://doi.org/10.56027/JOASD.052021*
5. *Dai, X., Wang, H., Ju, L.-K., Cheng, G., Cong, H., & Newby, B. Z. (2016). Corrosion of aluminum alloy2024 caused by Aspergillus niger. International Biodeterioration & Biodegradation, 115, 1–10. https://doi.org/10.1016/j.ibiod.2016.07.009*
6. *Doehlemann, G., Ökmen, B., Zhu, W., & Sharon, A. (2017). Plant Pathogenic Fungi. Microbiology Spectrum, 5(1). https://doi.org/10.1128/microbiolspec.FUNK-0023-2016*
7. *Erbasan, F. (2018). Brain abscess caused by Micrococcus luteus in a patient with systemic lupus erythematosus: Case-based review. Rheumatology International, 38(12), 2323–2328. https://doi.org/10.1007/s00296-018-4182-2*
8. *Ganjewala, D., Sam, S., & Khan, K. (2013). Biochemical compositions and antibacterial activities of Lantana camara plants with yellow, lavender, red and white flowers. https://doi.org/10.5053/ejobios.2009.3.0.10*
9. *Ghalehnoo, Z. (2018). Diseases caused by Staphylococcus aureus. Albanian 10. Gillela, S., Yadav, S. M., Sihag, K., Lubis, M. A. R., Wibowo,*
10. *Gillela, S., Yadav, S. M., Sihag, K., Lubis, M. A. R., Wibowo, E. S., Negi, A., Iswanto, A. H., Antov, P., & Kristak, L. (2024). A review on Lantanacamara lignocellulose fiber-reinforced polymer composites Biomass Conversion and Biorefinery, 14(2), 1495–1513. https://doi.org/10.1007/s13399-022-02402-7*
11. *Ianniello, N. M., Andrade, D. C., Ivancic, S., Eckardt, P. A., & Lemos Ramirez, J. C. (2019). Native valve infective endocarditis due to Micrococcus luteus in a non-Hodgkin's lymphoma patient. IDCases, 18, e00657. https://doi.org/10.1016/j.idcr.2019.e00657*
12. *K, G. (2017). Antimicrobial activities of Lantana camara Linn. Asian Journal of Pharmaceutical and Clinical Research, 10, 57-67.https://doi.org/10.22159/ajpcr.2017.v10i3.16378*
13. *Khursheed, A., Rather, M. A., Jain, V., Wani, A. R., Rasool, S., Nazir, R., Malik, N. A., & Majid, S. A. (2022). Plant based natural products as potential ecofriendly and safer biopesticides: A comprehensive overview of their advantages over conventional pesticides, limitations and regulatory aspects. Microbial Pathogenesis, 173, 105854. https://doi.org/10.1016/j.micpath.2022.105854*
14. *Kishore, U. (Ed.). (2021). Microbial Pathogenesis: Infection and Immunity (Vol. 1313). Springer International Publishing. https://doi.org/10.1007/978-3- 030-67452-6*
15. *Liu, L.-H., Wang, N.-Y., Wu, A. Y.-J., Lin, C.-C., Lee, C.-M., & Liu, C.-P. (2018). Citrobacter freundii bacteremia: Risk factors of mortality and prevalence of resistance genes. Journal of Microbiology, Immunology and Infection, 51(4), 565–572. https://doi.org/10.1016/j.jmii.2016.08.016*