



Pharmacological Significance and Ecological Perspectives of *Lantana camara*: A Comprehensive Review

Kate Pooja Yuvraj¹, Shweta Devidas Kothimbire², Waghmare Sweeti Mohan³

¹ Swastyadarpan pratishthan's

SHANTINIKETAN COLLEGE OF PHARMACY

¹⁻³ Corresponding Author:

Shantiniketan College of Pharmacy, Dhotre

Taluka – Parner, District – Ahmednagar

Email ID: samuadsul03@gmail.com

Phone No: 7820945118

ABSTRACT :

The genus *Lantana* (family Verbenaceae) comprises over 150 species of flowering shrubs, predominantly native to tropical and subtropical America. Among them, *Lantana camara* L. is the most widely distributed and studied species due to its remarkable adaptability and extensive use in traditional medicine. Initially introduced as an ornamental plant in the 17th century, *L. camara* has naturalized across more than 50 countries and is now considered both ecologically invasive and pharmacologically valuable. It thrives in diverse climatic and soil conditions, displaying strong drought resistance and persistence through both sexual and vegetative propagation. Despite its toxicity to humans and livestock, the plant has been employed in folk medicine for treating wounds, fevers, rheumatism, and gastrointestinal disorders. Phytochemical studies reveal the presence of various bioactive compounds such as oleanolic acid, flavonoids, terpenoids, and tannins, which contribute to its multiple pharmacological activities including antimicrobial, anti-inflammatory, antioxidant, anticancer, and hepatoprotective effects. Modern pharmacological research supports these traditional uses and highlights *L. camara* as a potential source of new therapeutic agents. However, its invasive behavior poses ecological concerns, demanding balanced strategies for its utilization and management. This review focuses on the taxonomy, distribution, phytochemistry, pharmacological potential, and ecological implications of *Lantana camara*, emphasizing its dual role as an invasive weed and a valuable medicinal plant.

Keywords: *Lantana camara*, Verbenaceae, phytochemistry, antimicrobial, antioxidant, anti-inflammatory, invasive species, oleanolic acid.

Introduction :

There are over 150 species of herbs in the genus *Lantana* (family Verbenaceae), which includes bushes and shrubs that are 0.5–2 m tall⁽¹⁾. Seven species—six from South America and one from Ethiopia—are included in the genus *Lantana*, according to Linnaeus' 1753 *Species Plantarum* description (Munir, 1996). Although some taxa are native to tropical Asia and Africa, *lantana* is primarily native to subtropical and tropical America⁽²⁾. Today, it may be found in about 50 countries, where hundreds of cultivar names are used to nurture various species for their blossoms⁽³⁾. Although the number of *Lantana* species that have been documented ranges from 50 to 270 distinct and sub-specific entities, 150 species seems to be a more accurate estimate (Munir, 1996). It is challenging to categorize the genus taxonomically considering species.

The most common species in this genus, generally referred to as wild or red sage, grows lushly in tropical, sub-tropical, and temperate climates up to 1800 meters above sea level (Parsons, 1992). Tropical regions of Africa and America are home to the plant (Nayar, 1977). However, because they are an introduced species, they can be found all over the world, particularly in the Australian-Pacific region. In the late 1600s, Dutch explorers brought *lantana* from Brazil to the Netherlands⁽⁴⁾. Later, they also explored tropical, sub-tropical, and temperate regions (Sharma et al., 1988).

In the 18th and nineteenth century, nurserymen commercialized and popularized many colourful forms of *Lantana*, and it is now cultivated world-wide as an ornamental plant. Of the 650 cultivar names in the genus, the majority are associated with the *L. camara* complex. *L. camara* has been cultivated for its flowers over 300 years and now has hundred of cultivars and hybrids and distinguished morphologically, physiologically and genetically .



Fig No:1 Lantana camara

Morphology Of Lantana Camara:

Lantana camara is a woody perennial shrub belonging to the family Verbenaceae. It is characterized by its vigorous growth, aromatic foliage, and brightly colored inflorescences(5). The plant exhibits considerable variation in morphology due to hybridization and environmental influences, leading to the existence of numerous cultivars and varieties(6).

1.Habit

A woody shrub or sometimes a scrambling vine, growing 2–3 meters tall under favorable conditions. The plant forms dense thickets through branching and vegetative propagation(7). The stem becomes woody and quadrangular with age, often covered with fine hairs and sometimes short prickles(8).

2. Root

The root system is well developed, fibrous, and deep penetrating, providing strong anchorage and drought resistance(9). Secondary roots are extensive and contribute to vegetative propagation through reshooting(10).

3. Stem

Young stems are green, quadrangular, and hairy, turning brown and woody with maturity. The stems may exhibit spines or prickles, aiding in climbing and protection against herbivory(11).

4. Leaves

Leaves are simple, opposite, decussate, and borne on short petioles. They are ovate to ovate-lanceolate 2–10 cm long), with a coarsely serrated margin and rugose (rough) surface(12). The leaves emit a strong aromatic odor when crushed, due to the presence of volatile oils and trichomes. Venation is reticulate and prominent on the underside(13).

5. Inflorescence and Flowers

The inflorescence is a compact axillary or terminal head (umbel) consisting of 20–40 small tubular flowers. Flowers are hermaphroditic, zygomorphic, and pentamerous(14). The corolla is tubular with five lobes, exhibiting multiple color variations — yellow, orange, pink, red, or purple — depending on cultivar and flower age. Calyx is short and 5-toothed; stamens are epipetalous (attached to the corolla tube). Ovary is bicarpellary and superior with two locules(15).

6. Fruit

The fruit is a small, fleshy drupe, initially green and turning dark purple to black upon ripening. Each fruit generally contains one or two seeds enclosed in a hard endocarp(16). Unripe fruits are toxic to humans and animals due to triterpenoid compounds(17).

7. Seed

Seeds are small, hard, and ovoid, exhibiting prolonged viability in soil. They are primarily dispersed by birds and small mammals, which aids the plant's invasiveness and wide ecological distribution(18).



(i) Flower and leaves

(ii) Stem

(iii) Roots

(iv) Fruits

Fig No 2 : Morphology Lantana Camara

Objectives:

The primary objectives of this review are to:

1. Summarize the botanical characteristics, distribution, and taxonomy of *Lantana camara*.
2. Highlight the phytochemical constituents responsible for its diverse pharmacological activities(19)
3. Review the traditional and ethnomedicinal uses of *Lantana camara* across different cultures(20).
4. Evaluate the pharmacological properties such as antimicrobial, antioxidant, anti-inflammatory, anticancer, and hepatoprotective effects(21).
5. Discuss the toxicological aspects and potential risks associated with human and animal exposure(22).
6. Examine the plant's ecological and invasive behavior and its impact on native ecosystems(23).
7. Emphasize the need for sustainable utilization and further research to explore therapeutic compounds while managing its invasiveness(24).

Botanical Description

- **Scientific Name:** *Lantana camara* L(25).
- **Family:** Verbenaceae.
- **Common Names:** Wild sage, red sage, lantana, Spanish flag, tickberry
- **Growth Habit:** Woody shrub or climbing vine, growing up to 2–3 meters tall.
- **Leaves:** Ovate, rough and aromatic when crushed; arranged oppositely(26).
- **Flowers:** Small, tubular, arranged in clusters (umbels); colors vary widely — red, orange, pink, yellow, purple — depending on cultivar and age.
- **Fruits:** Small drupes (berries), green when unripe, turning black-purple when ripe(27).

Habitat & Ecology

- **Native Range:** Tropical and subtropical Americas (especially Central and South America)(28).
- **Introduced Range:** Africa, India, Australia, Southeast Asia, Pacific islands, and beyond(29).
- **Altitude Range:** Found from sea level up to 1800 meters above sea level(30).
- **Soil Preference:** Tolerates a variety of soil types including poor and degraded soils(31).
- **Climatic Preference:** Grows best in warm climates with moderate rainfall; drought-tolerant once established(32).
- **Pollinators:** Attracts butterflies, bees, and moths(33).

Toxicity

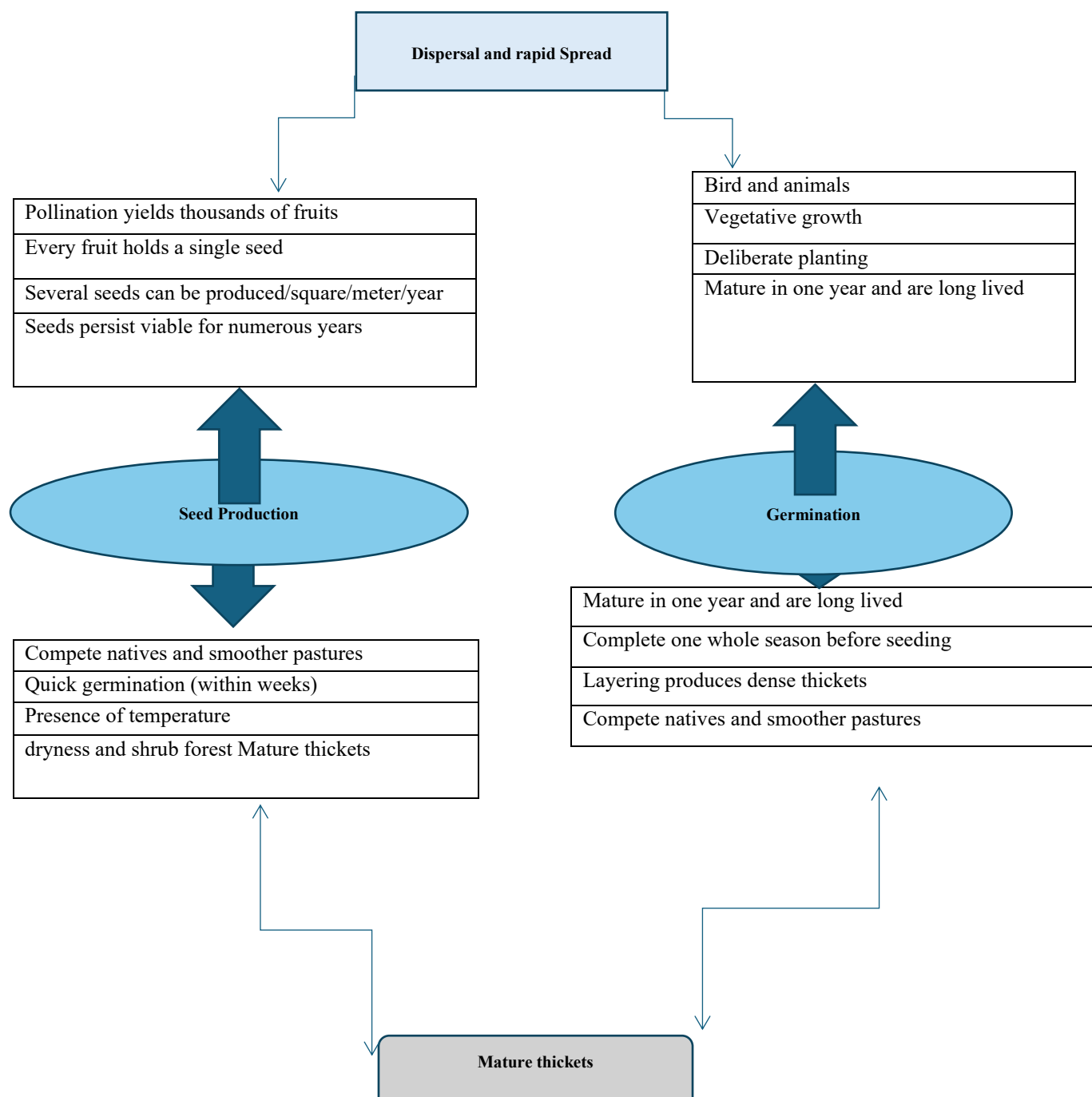
- 1) **To Humans:**
 - Unripe fruits are **toxic if ingested**, especially by children(34).
 - Can cause nausea, vomiting, diarrhea, and in severe cases, liver damage.
- 2) **To Animals:**
 - **Highly toxic to livestock** (especially cattle, sheep, goats, horses).
 - Symptoms include photosensitivity, liver failure, and death if consumed in large amounts(35).

Life Cycle and Propagation

Lantana camara propagates via both sexual (seed) and asexual (vegetative) methods. Each plant can produce up to 12,000 fruits per year, with birds and animals serving as primary seed dispersers. Seeds often germinate more effectively after passing through digestive tracts. Insects such as bees, moths, and butterflies facilitate pollination(36).

Lantana camara's normal life cycle begins with the seeds being dispersed by a variety of dispersion agents, including fruit-eating birds and a few animals (Figure 3)(37). Up to 12,000 fruits can be produced annually by a single plant (Mack et al., 2000). Numerous investigations demonstrate that the germination process begins as soon as the seed passes through a bird or mammal's digestive tract (Khoshoo and Mahal, 1967). Insects like thrips, bees, moths, and butterflies frequently pollinate plants (Goulson and Derwent, 2004). In addition to these, vegetative proliferation methods include reshooting and layering. The persistence of *Lantana camara* is confirmed by its repeated growth at the base of stems. According to several research, seed viability lasts between two and five years (Wijayabandara et al., 2011).

However, exact time of seed viability is still unknown and is mostly dependent on plant varieties, soil types and moisture levels (Raizada and Raghubanshi, 2010). Anthropogenic disturbances (burning, slashing, clearing, construction activities) facilitate its germination and propagation. The growth of the plant occurs all year round but the peak is reached after summer rains(38). The species takes only few weeks to germinate. The dryness and open canopy promotes early germination. The mature thickets once established, continue to persist for long(39). The plant starts producing seeds after completing one season. In the area of its establishment, it competes with native flora and subsequently smothers pasture through its allelopathic nature. The species die only under extreme. A typical life cycle of species is depicted in Figure 3.

FIG NO 3- Life cycle of *Lantana camara*

Pharmacology of *Lantana camara* :-Many contemporary medications have been derived from natural sources, which is astounding(40). In addition to treating wounds, the leaves of *Lantana camara* are used as an emmenagogue, diuretic, expectorant, and antirheumatic to treat gastrointestinal disorders. They are also used as an insecticide and as a tonic for stomachaches.

Numerous pharmacological characteristics of the *lantana camara* plant have been reported, including antipyretic, antithrombin, anti-inflammatory, antibacterial, antimutagenic, anticancer, inhibitors of the enzyme acetylcholinesterase, and antinoceptive effects.

28–30 There are reports of tannins, saponins, flavonoids, and terpenoids in stem and fruit. 30 The plant's root contains a major bioactive ingredient called "oleanolic acid." Table 1 lists the different compounds that are extracted from the various sections of the *Lantana camara*(41).

Phytochemical Composition:-*Lantana camara* is a rich source of diverse bioactive compounds, primarily belonging to classes such as triterpenoids, flavonoids, alkaloids, saponins, tannins, steroids, and glycosides. The chemical profile varies with plant part, environmental conditions, and extraction method. Among the most studied compounds, oleanolic acid and its derivatives are considered the principal bioactives, exhibiting strong anti-inflammatory and hepatoprotective potential.

Other identified constituents include lantadene A and B (triterpenoids responsible for hepatotoxic effects), apigenin, camaraside, lantanoside, camarinic acid, and martynoside, which collectively contribute to the plant's pharmacological diversity(42).

The leaves and stems are rich in oleanonic acid and flavonoids, while the roots and fruits contain phenolic acids and terpenoids. Essential oils extracted

from aerial parts have been shown to contain monoterpenes and sesquiterpenes such as caryophyllene, germacrene D, and β -pinene, known for antimicrobial and antioxidant properties.

This broad phytochemical diversity underlies the plant's extensive therapeutic applications in both traditional and modern medicine(43).

The broad pharmacological spectrum of *Lantana camara* can be attributed to its rich phytochemical diversity. While its toxicity limits certain applications, the plant remains a valuable candidate for drug discovery, natural product research, and herbal formulations. Further studies focusing on mechanistic pathways, dosage standardization, and toxicity reduction are essential to transform this invasive species into a sustainable medicinal resource(44).

Reported Medicinal Uses:

- **Leaves:** Used as emmenagogue, diuretic, expectorant, antirheumatic, and insecticide. Also employed in treating wounds and stomach ailments.
- **Pharmacological Effects:** Anti-inflammatory, antibacterial, antipyretic, antitumor, antimutagenic, anticancer, and antinociceptive.

Sr. No.	Part	Compounds	Action
1	Leaves and stem	Oleanonic acid	Anti-inflammatory
2	Leaves	Lactones comprising euphanes	Anti-thrombin
3	Aerial parts	Lantoside and Camarinic	Nematicidal
4	Roots, stem and leaves	Oleanonic acid	Antitumor, Antimicrobial, antiinflammatory
5	Leaves	Apigenin	Antiproliferative
6	Branches and leaves	Martynoside	Cardioactive
7	. Leaves	Camaraside	Anti-tumour

Table No 1:Parts of *Lantana camara* with their useful compounds

Pharmacological Activity of *Lantana camara*

Lantana camara, a widely distributed tropical and subtropical plant, has long been recognized for its rich phytochemical profile and diverse pharmacological properties(45). Traditionally used in folk medicine across many cultures, various parts of the plant—leaves, stems, roots, and fruits—have demonstrated significant therapeutic potential. Recent scientific investigations have validated many of these traditional claims, uncovering a wide range of bioactive compounds with promising pharmacological effects.

1. Antimicrobial and Antibacterial Activity

One of the most studied properties of *Lantana camara* is its strong antimicrobial activity. Extracts from the leaves and flowers exhibit inhibitory effects against a variety of bacterial strains, including *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. These effects are primarily attributed to the presence of flavonoids, terpenoids, and essential oils, which disrupt microbial cell membranes and inhibit microbial growth. This supports its traditional use in treating wounds and skin infections.

2. Anti-inflammatory and Analgesic Effects

Both in vitro and in vivo studies have demonstrated the anti-inflammatory properties of *L. camara*, largely due to the presence of oleanolic acid and related triterpenoids. These compounds inhibit key mediators of inflammation, such as prostaglandins and cytokines. Extracts have also shown analgesic activity, indicating potential use in managing pain and inflammatory conditions such as arthritis and rheumatism.

3. Anticancer and Antitumor Potential

Recent studies have explored the antitumor potential of *Lantana camara*. Compounds such as apigenin, camaraside, and oleanonic acid, found in various plant parts, exhibit cytotoxic effects against cancer cell lines. These compounds interfere with cancer cell proliferation, induce apoptosis (programmed cell death), and suppress angiogenesis. While preliminary, these findings suggest a strong potential for development into cancer therapeutics.

4. Antioxidant Activity

L. camara is rich in phenolic compounds and flavonoids, which are known antioxidants. These compounds scavenge free radicals and reduce oxidative stress, a contributing factor in aging and chronic diseases such as cardiovascular disorders and neurodegeneration. The antioxidant property enhances the plant's value in herbal formulations for preventive health care.

5. Hepatoprotective and Gastroprotective Effects

Extracts of *L. camara* have shown protective effects against chemically induced liver damage in animal studies. The hepatoprotective activity is attributed to the antioxidant properties and the ability to stabilize cell membranes and prevent lipid peroxidation. In traditional medicine, leaf decoctions are used to treat stomachaches and gastric ulcers, indicating possible gastroprotective roles.

6. Anthelmintic and Nematicidal Activity

The aerial parts of *L. camara* contain lantoside and camarinic acid, which have nematicidal activity. These compounds are effective against parasitic worms and nematodes, supporting the use of the plant in treating intestinal parasitic infections.

7. Other Activities

Additional pharmacological effects include antipyretic (fever-reducing), antithrombin (blood-thinning), and diuretic actions. Some extracts also exhibit insecticidal and repellent properties, making them useful in pest management.

Traditional & Ethnomedicinal Uses

Despite its invasiveness, *Lantana camara* has been widely used in traditional medicine(46):

Sr no.	Part Used	Traditional Uses
1	Leaves	Wound healing, skin infections, fever, cough, cold, rheumatism
2	Roots	Treat malaria, respiratory issues, and gastrointestinal disorders
3	Flowers	Used for ornamental purposes; sometimes in teas
4	Fruits	Occasionally used in folk remedies (though toxic when unripe)

Table No 2: Traditional & Ethnomedicinal Uses

Research & Conservation Perspectives

- **Medicinal Potential:** Significant interest in isolating new compounds with anticancer, antimicrobial, and anti-inflammatory activity(47).
- **Conservation Conflict:** Despite being invasive, its ecological role in some degraded environments (as a cover species or pollinator attractor) is being studied(48).
- **Genetic Studies:** High genetic diversity within *Lantana camara* complex; important for understanding resistance to control measures and developing cultivars with reduced invasiveness(49).

Conclusion

Lantana camara represents a paradoxical species—valued for its rich pharmacological potential yet notorious for its ecological invasiveness. Its diverse bioactive compounds justify continued scientific exploration for drug development. Sustainable management and biotechnological research are essential to harness its medicinal value while mitigating its environmental impact.

REFERENCE:-

1. Day MD, Zalucki MP. *Lantana camara* Linn.(Verbenaceae). Biological control of tropical weeds using arthropods. 2009 Jan 1:211-46.
2. Urban AJ, Simelane DO, Retief E, Heystek F, Williams HE, Madire LG. The invasive 'Lantana camara L.' hybrid complex (Verbenaceae): a review of research into its identity and biological control in South Africa. *African Entomology*. 2011 Mar 1;19(1):315-48.
3. Miller P. The gardeners dictionary: containing the methods of cultivating and improving all sorts of trees, plants, and flowers, for the kitchen, fruit, and pleasure gardens; as also those which are used in medicine. With Directions for the culture of vineyards, and making of wine in England. In which likewise are included the practical parts of husbandry. author and sold; 1754.
4. Negi GC, Sharma S, Vishvakarma SC, Samant SS, Maikhuri RK, Prasad RC, Palni LM. Ecology and use of *Lantana camara* in India. *The Botanical Review*. 2019 Jun 15;85(2):109-30.
5. Alqahtani MM. COMPARATIVE STUDY OF MORPHOLOGICAL, ANATOMICAL, MOLECULAR AND ESSENTIAL OIL OF LANTANA HORRIDA AND LANTANA CAMARA VERBENACEAE. *Pak. J. Bot*. 2025 Oct 1;57(5):1795-802.
6. Rodionov AV, Amosova AV, Belyakov EA, Zhurbenko PM, Mikhailova YV, Punina EO, Shneyer VS, Loskutov IG, Muravenko OV. Genetic consequences of interspecific hybridization, its role in speciation and phenotypic diversity of plants. *Russian Journal of Genetics*. 2019 Mar;55(3):278-94.
7. Kumar GM. Propagating shrubs, vines, and trees from stem cuttings. Washington State University Extension; 2016.
8. Kellomäki S. Structure of Selected Tree Species. In *Management of Boreal Forests: Theories and Applications for Ecosystem Services* 2022 Mar 1 (pp. 85-109). Cham: Springer International Publishing.
9. Ennos AR. The mechanics of root anchorage.
10. Awotedu BF, Omolola TO, Akala AO, Awotedu OL, Olaoti-Laaro SO. Vegetative propagation: A unique technique of improving plants growth. *World News of Natural Sciences*. 2021;35:83-101.
11. West TP. Woody plant structure. In *Stress physiology of woody plants* 2019 Apr 17 (pp. 1-14). CRC Press.
12. DEN R. III. SHRUBS.
13. Alamgir AN. Pharmacognostical Botany: Classification of medicinal and aromatic plants (MAPs), botanical taxonomy, morphology, and anatomy of drug plants. In *Therapeutic use of medicinal plants and their extracts: Volume 1: Pharmacognosy* 2017 Sep 8 (pp. 177-293). Cham: Springer International Publishing.
14. Weberling F. Morphology of flowers and inflorescences. CUP Archive; 1992 Sep 3.
15. Singh K, Rajput BS, Umrao R, Kumar S. E-Reading Manual On.
16. Grierson W. Fruit development, maturation, and ripening. In *Handbook of plant and crop physiology* 2001 Sep 18 (pp. 165-182). CRC Press.
17. Roy A, Saraf S. Limonoids: overview of significant bioactive triterpenes distributed in plants kingdom. *Biological and Pharmaceutical Bulletin*. 2006;29(2):191-201.
18. Fenner MW. Seed ecology. Springer Science & Business Media; 2012 Dec 6.
19. Chaubey S, Rastogi N, Srivastava M. Exploring the medicinal potential of *Lantana camara*: a comprehensive review of phytochemicals and therapeutic application. *Phytochemistry Reviews*. 2025 Apr 18:1-31.

20. Nawaz A, Ayub MA, Nadeem F, Al-Sabahi JN. Lantana (*Lantana camara*): A medicinal plant having high therapeutic potentials—A comprehensive review. *International Journal of Chemical and Biochemical Sciences*. 2016;10:52-9.
21. Al-Hussaniy HA, Al-Tameemi Z, Al-Zubaidi B, Oraibi AI, Naji FA, Kilani S. Pharmacological properties of *Spirulina* species: Hepatoprotective, antioxidant and anticancer effects. *Farmacia*. 2023 Jul 1;71(4):670-8.
22. Hernández AF, Tsatsakis AM. Human exposure to chemical mixtures: Challenges for the integration of toxicology with epidemiology data in risk assessment. *Food and Chemical Toxicology*. 2017 May 1;103:188-93.
23. Mattos KJ, Orrock JL. Behavioral consequences of plant invasion: an invasive plant alters rodent antipredator behavior. *Behavioral Ecology*. 2010 May 1;21(3):556-61.
24. Shrivastava R, Modi G, Satpathy PS, Bandyopadhyay S, Kumar Y, Yadav I. Natural Products Revolutionizing and Innovative Drug Discovery and Development Strategies: Healthcare Challenges and Future Perspectives. *Journal of Applied Bioanalysis*. 2024;10(1):20-38.
25. Ghisalberti EL. *Lantana camara* L.(verbenaceae). *Fitoterapia*. 2000 Sep 1;71(5):467-86.
26. Martin LC. *A Naturalist's Book of Wildflowers: Celebrating 85 Native Plants in North America*. The Countryman Press; 2021 Mar 23.
27. MacAloney ML. Ornamental shrubbery of the Montreal District.
28. Morellato LP. South America. Phenology: an integrative environmental science. 2003 Oct 31:75-92.
29. Turner H, Hovenkamp P, Van Welzen PC. Biogeography of Southeast Asia and the west Pacific. *Journal of Biogeography*. 2001 Feb;28(2):217-30.
30. Chapman RF, Karlens T, Resaland GK, Ge RL, Harber MP, Witkowski S, Stray-Gundersen J, Levine BD. Defining the “dose” of altitude training: how high to live for optimal sea level performance enhancement. *Journal of applied physiology*. 2014 Mar 15;116(6):595-603.
31. Zia-ur-Rehman M, Murtaza G, Qayyum MF, Saifullah, Rizwan M, Ali S, Akmal F, Khalid H. Degraded soils: origin, types and management. In *Soil science: Agricultural and environmental perspectives 2016* Aug 2 (pp. 23-65). Cham: Springer International Publishing.
32. Haefele SM, Kato Y, Singh S. Climate ready rice: augmenting drought tolerance with best management practices. *Field Crops Research*. 2016 Apr 1;190:60-9.
33. Frankie GW, Thorp RW. Pollination and pollinators. In *Encyclopedia of Insects 2009* Jan 1 (pp. 813-819). Academic Press.
34. Gruszecka-Kosowska A. Human health risk assessment and potentially harmful element contents in the fruits cultivated in the southern Poland. *International Journal of Environmental Research and Public Health*. 2019 Dec;16(24):5096.
35. Abdisa T, Dilbato Dinbiso T. Toxic plants and their impact on livestock health and economic losses: A comprehensive review. *Journal of Toxicology*. 2024;2024(1):9857933.
36. Dervash MA, Yousuf A, Sandhu PS, Ozturk M. *Lantana Camara*.
37. Dervash MA, Yousuf A, Sandhu PS, Ozturk M. *Lantana Camara*.
38. Levine JM, McEachern AK, Cowan C. Rainfall effects on rare annual plants. *Journal of Ecology*. 2008 Jul;96(4):795-806.
39. Weatherall-Thomas CR. *Seed dynamics and seedling survival in mainland thicket of the Eastern Cape* (Doctoral dissertation, Nelson Mandela Metropolitan University).
40. Rishton GM. Natural products as a robust source of new drugs and drug leads: past successes and present day issues. *The American journal of cardiology*. 2008 May 22;101(10):S43-9.
41. Kabbashi AS. *Biological activities and phytochemical analysis of some selected medicinal plants* (Doctoral dissertation, International University of Africa).
42. Chaubey S, Rastogi N, Srivastava M. Exploring the medicinal potential of *Lantana camara*: a comprehensive review of phytochemicals and therapeutic application. *Phytochemistry Reviews*. 2025 Apr 18:1-31.
43. Halder M, Jha S. Medicinal plants and bioactive phytochemical diversity: a fountainhead of potential drugs against human diseases. In *Medicinal plants: Biodiversity, biotechnology and conservation 2023* Jul 8 (pp. 39-93). Singapore: Springer Nature Singapore.
44. Chaubey S, Rastogi N, Srivastava M. Exploring the medicinal potential of *Lantana camara*: a comprehensive review of phytochemicals and therapeutic application. *Phytochemistry Reviews*. 2025 Apr 18:1-31.
45. Nawaz A, Ayub MA, Nadeem F, Al-Sabahi JN. Lantana (*Lantana camara*): A medicinal plant having high therapeutic potentials—A comprehensive review. *International Journal of Chemical and Biochemical Sciences*. 2016;10:52-9.
46. Dervash MA, Yousuf A, Sandhu PS, Ozturk M. Traditional Medicinal Uses and Scientific Validation of *Lantana camara*. In *Lantana Camara: Ecological and Bioprospecting Perspectives 2025* Oct 1 (pp. 53-61). Cham: Springer Nature Switzerland.
47. Cuevas-Cianca SI, Romero-Castillo C, Gálvez-Romero JL, Juárez ZN, Hernández LR. Antioxidant and anti-inflammatory compounds from edible plants with anti-cancer activity and their potential use as drugs. *Molecules*. 2023 Feb 3;28(3):1488.
48. Kuebbing SE, Nuñez MA, Simberloff D. Current mismatch between research and conservation efforts: the need to study co-occurring invasive plant species. *Biological Conservation*. 2013 Apr 1;160:121-9.
49. Urban AJ, Simelane DO, Retief E, Heystek F, Williams HE, Madire LG. The invasive '*Lantana camara* L.' hybrid complex (Verbenaceae): a review of research into its identity and biological control in South Africa. *African Entomology*. 2011 Mar 1;19(1):315-48.