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REVIEW ON PLUCHEA LANCEOLATA: PHYTOCHEMISTRY AND POTENTIAL PHARMACOLOGICAL ACTIVITIES

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ABSTRACT

Pluchea Lanceolata (DC.) C.B.Clarke, commonly known as Rasana, is a medicinal plant of the family Asteraceae that has a long history of use in Ayurveda and other traditional systems of medicine. The plant is particularly associated with the management of inflammatory and painful joint disorders. Published investigations have reported anti-inflammatory, anti-arthritis, analgesic, antipyretic, antioxidant, antimalarial and immunomodulatory or immunosuppressive activities. Phytochemical investigations have identified triterpenoids, sterols, flavonoids, lactones and other constituents, including α -amyrin, stigmasterol, quercetin, isorhamnetin, neolupenol-related compounds and taraxasterol acetate. Modern analytical studies have further detected diverse terpenoid, phytosterol and lipid-related constituents in leaf extracts. Experimental evidence therefore supports the pharmacological interest of *P. lanceolata*, particularly for inflammation and oxidative-stress-related research. However, much of the evidence remains preclinical, and plant-specific markers, dose standardization, mechanism-based studies and clinical validation remain important research needs. This review summarizes the botanical profile, traditional uses, phytoconstituents and reported pharmacological activities of *P. lanceolata*.

KEYWORDS: *Pluchea Lanceolata*, Rasana, Asteraceae, anti-inflammatory, anti-arthritis, antioxidant, antimalarial, antipyretic, analgesic.

INTRODUCTION

Pluchea Lanceolata is an accepted species in the genus *Pluchea* of the family Asteraceae. Kew records its native range from Senegal and Chad through Tanzania and from southern Iran to western and northern India, and describes it as a subshrub or shrub.

In Indian traditional medicine, the plant is widely recognized as Rasana and is valued mainly for conditions involving pain, inflammation and joints.

The scientific literature indicates that the pharmacological interest of *P. lanceolata* is strongly linked to its secondary metabolites. Triterpenoids, sterols, flavonoids and related compounds have been reported from different plant parts, with several studies connecting these constituents with anti-inflammatory and antioxidant effects.

DESCRIPTION

Pluchea Lanceolata is an erect undershrub that may reach approximately 1.2–1.5 m depending on the source and growing conditions. Botanical descriptions report slender, terete and softly pubescent stems and branches. Leaves are sessile, oblong to oblanceolate, coriaceous and finely silky-pubescent on both surfaces, with margins that may be entire or obscurely dentate toward the apex. The inflorescences are compact compound corymbs containing small pink flowers. World Flora Online describes the capitula as ovoid or campanulate, about 3–5 mm in diameter, while the Flora of India account reports heads around 6–7 mm.

The National Medicinal Plants Board describes Rasana as a perennial herb occurring in the Indo-Gangetic plains, commonly 30–60 cm tall, with sessile oblanceolate or oblong leaves and finely silky pubescence. It notes that the plant grows in open wastelands, including sandy-saline areas of low-rainfall regions.

Figure 01. Plant profile of *Pluchea Lanceolata* (schematic representation based on published botanical descriptions)

Plant part	Reported features / relevance
Leaves	Sessile, oblong/oblanceolate, coriaceous, pubescent; an important medicinal part.
Stem	Erect, terete, slender and softly pubescent.
Flowers	Small pink capitula arranged in compound terminal corymbs.
Roots / aerial parts	Used in different traditional and experimental preparations; aerial parts have been chemically investigated.



PHARMACOLOGICAL ACTIVITIES

Rasana has been used in Ayurveda and related indigenous systems for painful and inflammatory conditions, particularly disorders resembling rheumatoid arthritis. Traditional reports also include use as an analgesic, antipyretic, laxative and nervine tonic. The plant has additionally been associated with treatment of dyspepsia, bronchitis and abdominal disorders.

The historical importance of the plant provides a basis for pharmacological investigation, but traditional use should not be interpreted as proof of clinical efficacy. Current evidence is predominantly experimental and requires appropriate standardization and clinical confirmation.

P. lanceolata has a broad native distribution extending from parts of Africa and the Middle East to South Asia. Kew lists Afghanistan, Chad, India, Iran, Pakistan, Senegal, Tanzania and the West Himalaya among its native range.

In India, the species is documented from Uttar Pradesh, Haryana, Rajasthan, Maharashtra and West Bengal in the Flora of India account, while India Flora Online also records occurrences in Uttarakhand, Himachal Pradesh, Delhi, Punjab, Jammu and Kashmir and other regions.

SYNONYMS

Botanical databases list several historical names associated with *P. Lanceolata*. Kew currently accepts *Pluchea Lanceolata* (DC.) C.B.Clarke. The basionym is *Berthelotia lanceolata* DC.; other historical combinations include *Conyza proteifolia*, *Conyza proteiformis*, *Conyza rubra* and *Saussurea mucronata*.

COMMON / VERNACULAR NAMES

Region / Language	Common name
Ayurvedic / Sanskrit	Rasana
Hindi	Rasna, Roshna
Punjabi	Sarme, Reshami
Bhojpuri	Baisurai
Rajasthan	Chotakalia
Trade name	Rasna, Baisurai

TAXONOMY

Kingdom	Plantae
Phylum	Streptophyta
Class	Equisetopsida
Order	Asterales
Family	Asteraceae
Genus	<i>Pluchea</i>
Species	<i>Pluchea Lanceolata</i>

The family placement and accepted species name are consistent with current Kew and World Flora Online records.

Phytochemical investigations of *P. lanceolata* have identified several classes of secondary metabolites, particularly triterpenoids, sterols, flavonoids and lactones. The 2012 review by

Srivastava and Shanker emphasized the importance of triterpenoids in the reported anti-inflammatory activity of the plant.

Reported constituents include α -amyrin, β -amyrin caproate, stigmasterol, morentenol acetate, morentenol, neolupenol-related compounds, ψ -taraxasterol acetate, quercetin and isorhamnetin. A later GC–MS investigation of methanolic leaf extracts detected more than 50 compounds, with representatives of lignans, flavonoids, phytosteroids, terpenoids, saponins, glycosides and tannins.

Selected phytochemical groups and examples are summarized below.

Class	Examples reported
Triterpenoids	α -Amyrin, morentenol, morentenol acetate, neolupenol-related compounds, taraxasterol acetate, lupeol
Sterols / phytosterols	Stigmasterol, γ -sitosterol and related sterol constituents
Flavonoids	Quercetin, isorhamnetin
Terpenoids	Various terpenoid constituents identified by chromatographic profiling
Other compounds	Fatty acids, alcohols, glycosides, tannins and related metabolites

QUALITY CONTROL AND STANDARDIZATION

A published quality-control study of the aerial parts was undertaken because systematic quality-control information for the drug was limited. The study evaluated macroscopic and microscopic characteristics and preliminary phytochemical screening. □cite□turn0search35□

For future pharmacological and formulation work, authentication of plant material, geographic and seasonal documentation, extraction standardization, chromatographic fingerprinting and identification of suitable chemical markers are important. The major review also highlighted the historical lack of a plant-specific chemical marker for quality assurance.

1. ANTI-INFLAMMATORY ACTIVITY

Anti-inflammatory activity is one of the most consistently reported pharmacological properties of *P. Lanceolata*. An early experimental investigation reported significant anti-inflammatory activity of the ethanolic extract and localized activity to the hexane fraction.

The broader review literature similarly identifies triterpenoids, sterols and flavonoids as important contributors to the plant's biological profile. These findings provide a pharmacological basis for the traditional use of Rasana in painful inflammatory conditions, although the exact molecular mechanisms and active-marker relationships remain incompletely defined.

2. ANTI-ARTHRITIC ACTIVITY

Rasana has a long-standing traditional association with rheumatoid-arthritis-like disorders and joint swelling. Experimental evidence summarized in the literature indicates that decoctions or extracts of the plant can reduce inflammatory responses in arthritis-related models. The anti-inflammatory and immunomodulatory properties of the plant are considered relevant to this activity.

Because rheumatoid arthritis is a complex immune-mediated disease, the reported activity

should be regarded as preclinical evidence rather than evidence of clinical efficacy. Further studies using validated arthritis models, standardized extracts and mechanism-based biomarkers are warranted.

3. ANALGESIC ACTIVITY

Traditional use of *P. lanceolata* includes analgesic application, and the pharmacological review reports experimental support for analgesic effects. Such activity is pharmacologically relevant to the plant's use in painful inflammatory and musculoskeletal disorders.

4. ANTIPYRETIC ACTIVITY

Antipyretic activity has also been reported in the pharmacological literature summarized for *Rasana*. The traditional use of the plant for fever-like conditions is consistent with these observations, although the available evidence is primarily experimental and should not be equated with established clinical treatment.

ANTIOXIDANT ACTIVITY

Oxidative stress is an important component of many inflammatory and degenerative processes. Published work on *P. lanceolata* has reported antioxidant-related activity and the presence of flavonoids such as quercetin and isorhamnetin, which are recognized classes of phenolic compounds with radical-scavenging potential.

A recent GC–MS profiling study of methanolic leaf extracts also reported diverse phytochemical classes, including flavonoids, phytosteroids and terpenoids, providing additional chemical support for antioxidant research on the plant.

5. ANTIMICROBIAL ACTIVITY

The 2012 comprehensive review lists antimicrobial effects among the biological activities investigated for *P. lanceolata*. The activity is likely to depend on plant part, extraction solvent, concentration and microbial species. The current literature supports further investigation but does not establish a standardized antimicrobial preparation for clinical use.

6. ANTIMALARIAL ACTIVITY

Mohanty and colleagues evaluated the antimalarial and safety profile of *P. lanceolata* using in-vitro and in-vivo approaches. Methanol, butanol, ethyl acetate, chloroform and hexane extracts of aerial parts were investigated, together with the isolated compound taraxasterol acetate. The study was designed to provide experimental validation for the traditional use of the plant in malaria-like fever.

This work is important because it combines pharmacological screening with a safety assessment, but the findings should still be interpreted as preclinical evidence requiring further validation before therapeutic translation.

7. IMMUNOSUPPRESSIVE / IMMUNOMODULATORY ACTIVITY

A study of a 50% ethanolic leaf extract reported suppression of both humoral and cell-mediated immune responses in mice. The chloroform fraction showed significant suppression of CD4+ and CD8+ T-cell populations and reduced Th1-associated cytokine responses, including IL-2 and IFN- γ .

8. TOXICOLOGICAL AND SAFETY CONSIDERATIONS

Safety has been investigated in selected experimental studies, including the antimalarial study of aerial-part extracts. However, evidence from a limited number of animal experiments cannot establish comprehensive human safety. Extract composition may vary with geography, plant part, extraction method and dose. □cite□turn0search2□

The reported immunosuppressive activity is particularly important when considering repeated or high-dose administration because modulation of immune responses can have both therapeutic and adverse consequences.

9. POTENTIAL ANTI-OBESITY RESEARCH RELEVANCE

For research specifically focused on anti-obesity activity, *P. lanceolata* should currently be considered an exploratory candidate rather than a plant with established anti-obesity efficacy. The literature located for this review strongly supports anti-inflammatory, antioxidant and immunomodulatory investigation, while direct high-fat-diet-induced obesity evidence for *P. lanceolata* leaf extract was not established by the core sources used here. Therefore, an anti-obesity project would represent a hypothesis-driven extension of the plant's pharmacological profile rather than a conclusion already proven by the reviewed literature.

A suitable preclinical study could evaluate changes in body weight, food intake, adipose-tissue mass, serum lipid profile, glucose homeostasis, hepatic markers, inflammatory mediators and oxidative-stress biomarkers. Such work should use an authenticated plant material, standardized extraction procedure and appropriate vehicle and positive-control groups.

10. OTHER REPORTED ACTIVITIES

The comprehensive review of *P. lanceolata* describes additional experimental activities including muscle-relaxant, CNS-stimulant, anti-implantation, contraceptive and toxicological investigations. These observations broaden the pharmacological profile of the plant but also demonstrate why activity-specific safety and mechanism studies are required before therapeutic claims can be made.

MECHANISTIC INTERPRETATION AND RESEARCH PERSPECTIVES

The pharmacological profile of *P. lanceolata* appears to arise from a chemically diverse mixture rather than from a single universally established active compound. Triterpenoids have been repeatedly associated with anti-inflammatory effects, while flavonoids and other phenolic constituents provide a plausible basis for antioxidant activity. Experimental immunosuppression additionally suggests that the plant can influence immune-cell function and cytokine-associated responses.

Important research priorities include:

- Authentication and botanical standardization of raw material.
- Development of reproducible extraction and fractionation procedures.
- HPTLC/HPLC/LC–MS or GC–MS fingerprinting for quality control.
- Identification of validated chemical markers linked to biological activity.
- Mechanism-based studies of inflammatory, oxidative and immune pathways.

- Pharmacokinetic and bioavailability studies of major active constituents.
- Acute, subacute and chronic toxicity evaluation.
- Well-designed animal studies followed by appropriately controlled clinical research.

CONCLUSION

Pluchea Lanceolata (Rasana) is a traditionally important medicinal plant of the Asteraceae family with a substantial preclinical pharmacological literature. Its strongest documented research themes include anti-inflammatory and anti-arthritis activity, together with analgesic, antipyretic, antioxidant, antimalarial and immunosuppressive effects.

The plant therefore represents a promising subject for pharmacogenetic, phytochemical and pharmacological research. At the same time, the available evidence is predominantly preclinical, and the absence of standardized plant-specific markers and adequate clinical validation limits direct therapeutic conclusions. Future work should prioritize standardized extracts, mechanism-oriented experiments, toxicological characterization and clinically relevant endpoints.

For anti-obesity research in particular, direct evidence should be generated experimentally rather than assumed from the plant's other pharmacological properties. This distinction is important when designing a high-fat-diet-induced obesity study or preparing a research manuscript.

Activity	Evidence / relevance
Anti-inflammatory	Strong historical research interest; ethanolic and fractionated extracts and taraxasterol acetate have been investigated.
Anti-arthritis	Supported by traditional use and experimental literature relating to inflammatory joint conditions.
Analgesic	Traditional and experimental reports indicate pain-relieving potential.
Antipyretic	Reported in pharmacological literature and consistent with traditional use for fever.
Antioxidant	Associated with flavonoids and other phytochemicals; oxidative-stress models have been investigated.
Antimalarial	In-vitro and in-vivo extracts and taraxasterol acetate were investigated.
Immunosuppressive	Leaf ethanolic extract and chloroform fraction affected humoral/cell-mediated responses and T-cell/Th1 markers.
Antimicrobial	Reported as part of the broader pharmacological profile; activity depends on extract and organism.
Anti-obesity	Direct evidence is insufficient in the core literature reviewed; suitable for exploratory preclinical research.

NOTE ON EVIDENCE QUALITY

The activities summarized here are based primarily on botanical reviews, phytochemical studies and animal or in-vitro experiments. They should not be presented as proven clinical treatments without appropriate human evidence.

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