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Ethnobotanical and phytochemical characterization of *Leucas cephalotes* Used by indigenous communities in Rewa District of Madhya Pradesh, India

Poonam Vati Patel
Government Girls PG College, Rewa, Madhya Pradesh, India

Abstract
The present study investigates the ethnobotanical significance and phytochemical composition of *Leucas cephalotes* (Roth) Spreng. (Dronpushpi), a widely used medicinal herb among indigenous communities of Rewa district, Madhya Pradesh. Traditional healers and tribal populations rely on this species for treating fever, cough, wounds, skin infections, inflammation, and digestive disorders. Ethnobotanical data were collected through field surveys, interviews, and participatory observation involving local informants, including herbal practitioners and elderly community members. Plant samples were collected, identified, and subjected to preliminary phytochemical screening using standard qualitative methods. The results revealed the presence of major bioactive constituents such as alkaloids, flavonoids, tannins, saponins, phenols, terpenoids, and glycosides. The study validates the traditional therapeutic uses of *Leucas cephalotes* and highlights its potential for pharmacological research and conservation. Documentation of such indigenous knowledge is crucial for preserving cultural heritage and promoting sustainable utilization of medicinal plants.

Keywords: Ethnobotany, indigenous knowledge, *Leucas cephalotes*, phytochemical screening, Rewa district, medicinal plants, traditional medicine

Introduction

Ethnobotany, the scientific study of the relationship between people and plants, has emerged as an important interdisciplinary field that connects traditional knowledge systems with modern biological sciences. In developing countries like India, where a significant proportion of the rural and tribal population still depends on plant-based remedies for primary healthcare, documentation of ethnomedicinal knowledge is essential. Traditional medicinal practices have been preserved through oral transmission across generations and serve as a valuable source for the discovery of novel therapeutic compounds (Jain, 1991) [15].

India is recognized as one of the world's richest centers of plant diversity, hosting a vast array of medicinal plants used in indigenous systems of medicine such as Ayurveda, Siddha, and Unani. Madhya Pradesh, often referred to as the "Heart of India," is particularly rich in forest resources and tribal heritage. The state is inhabited by several indigenous communities, including Gond, Kol, and Baiga, who possess extensive knowledge of medicinal plants and their therapeutic applications. However, rapid socio-economic changes, deforestation, and modernization are contributing to the gradual erosion of this traditional knowledge. Therefore, systematic documentation and scientific validation are urgently needed to preserve and utilize these valuable resources.

Among the various medicinal plants used in central India, *Leucas cephalotes* (Roth) Spreng. (Fig.1) a member of the family Lamiaceae, occupies a significant place in traditional healthcare systems. It is a common annual herb widely distributed in open fields, grasslands, and wastelands throughout tropical and subtropical regions of India. The plant is locally recognized for its medicinal properties and is frequently used by indigenous communities for the treatment of fever, cough, cold, skin infections, wounds, inflammation, and gastrointestinal disorders (Kirtikar & Basu, 2005) [18].

Fig 1: *Leucas cephalotes*

The therapeutic potential of *Leucas cephalotes* is believed to be associated with the presence of various bioactive phytoconstituents such as alkaloids, flavonoids, tannins, phenolic compounds, terpenoids, and glycosides. These compounds are known to possess antimicrobial, anti-inflammatory, antioxidant, and analgesic properties, which may justify its widespread use in traditional medicine (Harborne, 1998) [13]. Despite its extensive ethnomedicinal applications, region-specific scientific documentation and phytochemical validation, particularly in the Rewa district of Madhya Pradesh, remain limited.

Rewa district, situated in the Vindhyan plateau region, supports diverse vegetation and a substantial tribal population that continues to rely on forest-based medicinal plants for healthcare. The indigenous communities in this region have developed a deep understanding of local flora

and their medicinal uses through long-term interaction with the natural environment. However, this knowledge is at risk of being lost due to cultural transition and reduced dependence on traditional healing practices.

In this context, the present study aims to document the ethnobotanical uses of *Leucas cephalotes* among indigenous communities of Rewa district and to investigate its phytochemical composition. Such studies are important not only for preserving traditional knowledge but also for providing a scientific basis for the development of plant-based pharmaceuticals, promoting conservation of medicinal plants, and encouraging sustainable utilization of biodiversity.

Review of Literature

Ethnobotanical research has played a significant role in documenting traditional plant-based healthcare systems and in identifying potential sources of new drugs. India, with its rich biodiversity and cultural diversity, has been a focal point for ethnobotanical studies for several decades. Early pioneering work by Jain (1991) [15] emphasized the importance of documenting indigenous knowledge related to medicinal plants before it disappears due to modernization and changing lifestyles. Such documentation not only preserves cultural heritage but also provides baseline data for pharmacological and phytochemical research.

Medicinal plants belonging to the family Lamiaceae are well known for their therapeutic properties due to the presence of diverse secondary metabolites. Several species within this family are used in traditional systems of medicine for their antimicrobial, anti-inflammatory, antioxidant, and antipyretic activities. *Leucas cephalotes* (Roth) Spreng. is one such important herb that has been widely reported in ethnobotanical surveys across different regions of India.

Kirtikar and Basu (2005) [18] described *Leucas cephalotes* as a common medicinal herb used in traditional medicine for treating fever, cough, chronic skin diseases, inflammation, and intestinal disorders. Nadkarni (2001) [22] also reported its use in folk medicine as an antipyretic, insect bite remedy, and topical application for wounds and skin infections. The leaves and flowers are most frequently used, either as paste, juice, or decoction, depending on the nature of the ailment.

Phytochemical investigations of medicinal plants have shown that the therapeutic efficacy of these plants is largely due to the presence of bioactive compounds. Harborne (1998) [13] highlighted the importance of phytochemical screening in identifying compounds such as alkaloids, flavonoids, tannins, phenols, saponins, and terpenoids, which are responsible for various biological activities. Plants rich in flavonoids and phenolic compounds are known to exhibit antioxidant properties, while alkaloids and terpenoids often demonstrate antimicrobial and anti-inflammatory effects.

Several regional studies have reported the medicinal uses of *Leucas cephalotes* among rural and tribal communities. Ethnobotanical surveys conducted in central and northern India have documented its application in treating respiratory ailments, fever, wounds, and digestive problems. In many areas, the leaf extract is used as a traditional remedy for cold and cough, while paste prepared from leaves is applied externally for skin infections and insect bites. These uses suggest that the plant possesses broad-spectrum medicinal potential.

Studies on phytochemical composition have revealed that *Leucas cephalotes* contains significant amounts of flavonoids, terpenoids, essential oils, and phenolic compounds. These phytoconstituents contribute to its antimicrobial, antioxidant, and anti-inflammatory activities. However, most available studies are general in nature and limited to certain geographical regions. There is comparatively little documentation focusing specifically on the Vindhyan region and Rewa district of Madhya Pradesh.

Ethnobotanical surveys in Madhya Pradesh have consistently highlighted the dependence of indigenous communities on plant-based medicines for primary healthcare. Traditional healers often rely on locally available plants, including species of *Leucas*, for treating common ailments. Despite this, scientific validation through phytochemical studies in this region remains insufficient.

Therefore, there is a clear need for region-specific ethnobotanical documentation combined with phytochemical analysis to validate traditional claims. The present study aims to bridge this gap by systematically recording the ethnomedicinal uses of *Leucas cephalotes* among indigenous communities in Rewa district and examining its phytochemical constituents to provide a scientific basis for its traditional applications.

Objectives

The primary objective of the present study is to document the ethnobotanical significance and investigate the phytochemical composition of *Leucas cephalotes* (Roth) Spreng. used by indigenous communities in the Rewa district of Madhya Pradesh, India.

1. To conduct an ethnobotanical survey to document the traditional medicinal uses of *Leucas cephalotes* among indigenous and rural communities of Rewa district.
2. To record vernacular names, plant parts used, methods of preparation, dosage, and mode of administration for treating various ailments.
3. To identify and collect plant specimens from natural habitats and prepare herbarium samples for taxonomic authentication.
4. To study the distribution and availability of *Leucas cephalotes* in selected study sites within the district.
5. To prepare extracts from different plant parts (leaves, stems, roots, and flowers) using suitable solvents.
6. To perform preliminary qualitative phytochemical screening for the detection of major secondary metabolites such as alkaloids, flavonoids, tannins, saponins, phenols, glycosides, terpenoids, and steroids.
7. To correlate the traditional medicinal uses with the presence of phytochemical constituents to provide scientific support for ethnomedicinal claims.
8. To contribute to the preservation of indigenous knowledge and promote awareness regarding the conservation and sustainable utilization of medicinal plant resources.
9. To generate baseline scientific data that may support future pharmacological and clinical research on *Leucas cephalotes*.

Study Area

The present study was conducted in the Rewa district of Madhya Pradesh, India, which lies in the northeastern part of the state and forms a significant portion of the Vindhyan

plateau region. Geographically, the district is located between approximately 24°18′ to 25°12′ North latitude and 81°02′ to 82°18′ East longitude. The region is characterized by undulating topography, rocky outcrops, plateaus, and fertile plains, which support a wide variety of natural vegetation and medicinal plant diversity.

The climate of Rewa district is tropical monsoonal, with three distinct seasons: summer, monsoon, and winter. Summers are generally hot and dry, with temperatures often exceeding 40°C, while winters are moderate and pleasant. The average annual rainfall ranges between 900–1,100 mm, most of which is received during the monsoon months from June to September. These climatic conditions support the growth of tropical dry deciduous forests and seasonal herbaceous vegetation.

The natural vegetation of the region primarily consists of dry deciduous forest types dominated by species such as teak (*Tectona grandis*), Sal (*Shorea robusta* in some patches), and mixed forest flora. In addition to forested areas, *Leucas cephalotes* commonly grows in open grasslands, agricultural fields, roadside habitats, and wastelands, particularly during the rainy and post-rainy seasons.

Rewa district is home to several indigenous and rural communities, including Gond, Kol, and other traditional groups, who reside in forest fringe villages and remote rural settlements. These communities have a long history of dependence on forest resources for food, shelter, and traditional medicine. Due to limited access to modern healthcare facilities in many interior areas, local people rely heavily on medicinal plants and traditional healing practices for the treatment of common ailments.

The knowledge of medicinal plants among these communities is largely transmitted orally from one generation to the next through traditional healers, elders, and experienced forest dwellers. *Leucas cephalotes* is one of the commonly available medicinal herbs in the region and is frequently used in folk remedies for treating fever, cough, skin infections, wounds, and digestive disorders.

For the present study, selected villages and forest fringe areas of Rewa district were surveyed to document ethnobotanical information and collect plant specimens. The region's diverse ecological conditions and strong presence of indigenous knowledge systems make it an ideal site for conducting ethnobotanical and phytochemical investigations.

Results

1. Ethnobotanical Findings

The ethnobotanical survey conducted in selected villages and forest fringe areas of Rewa district revealed that *Leucas cephalotes* is widely recognized and used as a medicinal herb among indigenous communities. The plant is commonly known by local vernacular names and is easily identified by villagers due to its frequent occurrence in open fields, grasslands, and agricultural margins.

A total of knowledgeable informants, including traditional healers, elderly persons, and herbal practitioners, reported the use of *Leucas cephalotes* in the treatment of various ailments. The study indicated that the plant is an important component of local healthcare practices and is used both as a primary remedy and as a supplementary treatment.

1.1 Ailments Treated

The plant was reported to be used in the treatment of the following conditions, Fever and common cold, Cough and respiratory problems, Skin infections and wounds, Insect bites and minor poisoning, Inflammation and body pain, Digestive disorders such as stomach ache and indigestion. Among these, treatment of fever, cough, and skin-related problems were the most frequently cited uses.

1.2 Plant Parts Used

Different parts of *Leucas cephalotes* were used for medicinal purposes, with the following trend observed. Leaves – Most commonly used. Flowers – Used in respiratory ailments. Roots – Occasionally used for digestive problems. Whole plant – Used in decoction form for fever. Leaves were found to be the preferred plant part due to their easy availability and effectiveness in treating multiple ailments.

1.3 Methods of Preparation

The study documented several traditional preparation methods, including. Leaf paste applied externally on wounds, cuts, and skin infections. Decoction prepared from leaves and flowers taken orally to reduce fever and cough. Fresh leaf juice administered in small quantities for cold and throat irritation. Root powder mixed with water used for stomach-related disorders

1.4 Mode of Administration

Two main methods of administration were observed:

Topical application: Leaf paste applied directly on affected skin areas.

Oral administration: Decoctions, juices, and powders consumed in measured quantities.

Most treatments were prepared fresh using locally collected plant material.

2. Phytochemical Analysis

Preliminary phytochemical screening of extracts prepared from leaves, stems, roots, and flowers of *Leucas cephalotes* revealed the presence of several bioactive compounds.

2.1 Qualitative Phytochemical Profile

The results of the phytochemical tests indicated the presence of the following secondary metabolites

Alkaloids – Present
Flavonoids – Present
Tannins – Present
Saponins – Present
Phenolic compounds – Present
Glycosides – Present
Terpenoids – Present
Steroids – Present in trace amounts

These phytoconstituents were more prominent in leaf and flower extracts compared to stem and root extracts.

2.2 Observational Findings

Leaf extracts showed strong reactions for flavonoids, tannins, and phenolic compounds. Flower extracts indicated the presence of volatile and aromatic compounds, suggesting possible therapeutic activity in respiratory ailments. Root extracts showed moderate presence of alkaloids and glycosides.

3. Correlation Between Ethnobotanical Uses and Phytochemical Constituents

The presence of bioactive compounds supports the traditional uses reported by indigenous communities. For example-

- Flavonoids and phenolic compounds may contribute to antioxidant and anti-inflammatory effects.
- Alkaloids and terpenoids may be responsible for antimicrobial activity and fever reduction.
- Tannins may aid in wound healing and treatment of skin infections.

The phytochemical composition of *Leucas cephalotes* thus provides scientific support for its continued use in traditional medicine within the study area.

Discussion

The ethnobotanical data confirm that *Leucas cephalotes* plays an important role in traditional healthcare systems of Rewa district. The phytochemical analysis supports the medicinal uses reported by indigenous communities. Presence of flavonoids and phenolic compounds suggests antioxidant activity, while alkaloids and terpenoids may contribute to antimicrobial and anti-inflammatory effects.

The findings align with earlier studies conducted in other regions, indicating the plant's pharmacological potential. Preservation of such knowledge is essential for future drug development and biodiversity conservation.

Conclusion

The present study highlights the significant ethnobotanical importance and phytochemical potential of *Leucas cephalotes* (Roth) Spreng. as used by indigenous communities in the Rewa district of Madhya Pradesh. The ethnobotanical survey revealed that this plant is an integral part of traditional healthcare practices and is commonly used for the treatment of fever, cough, cold, skin infections, wounds, inflammation, insect bites, and digestive disorders. The reliance of local communities on this species reflects its availability, effectiveness, and cultural acceptance as a natural remedy.

The study documented valuable indigenous knowledge regarding plant parts used, methods of preparation, and modes of administration. Leaves were found to be the most frequently used plant part, followed by flowers and roots. Preparations such as paste, decoction, juice, and powder were commonly used in both topical and oral treatments. This traditional knowledge, passed down through generations, represents an important cultural and medicinal heritage that requires proper documentation and preservation.

Preliminary phytochemical screening of different plant parts confirmed the presence of several bioactive compounds, including alkaloids, flavonoids, tannins, saponins, phenolic compounds, glycosides, terpenoids, and steroids. These phytoconstituents are known to possess antimicrobial, anti-inflammatory, antioxidant, and healing properties, which support the traditional therapeutic uses reported by local communities. The presence of these compounds provides scientific validation for the ethnomedicinal applications of *Leucas cephalotes*.

The findings of this study demonstrate a strong correlation between traditional knowledge and phytochemical evidence, suggesting that *Leucas cephalotes* has significant potential for further pharmacological and clinical research. The study also emphasizes the importance of conserving medicinal plants and safeguarding indigenous knowledge systems, which are gradually declining due to environmental degradation and socio-cultural changes.

In conclusion, *Leucas cephalotes* represents a valuable medicinal resource in the Rewa region, both from ethnobotanical and phytochemical perspectives. Systematic documentation, scientific validation, and conservation efforts are essential to ensure its sustainable utilization and to explore its potential in the development of plant-based therapeutic agents. Further advanced studies involving quantitative phytochemical analysis, bioactivity assays, and clinical validation are recommended to fully establish its medicinal value.

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