

A-REVIEW OF PHYTOCHEMICAL, MEDICINAL AND NUTRITIONAL SIGNIFICANCE OF COLEUS AMBOINICUS WITH REFERENCE OF AYURVEDA

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Abstract

Coleus amboinicus is one of the important aromatic plant amongst the *Coleus* family (Lamiaceae), which is grown as a garden-plant in India. A review of the records in both folkloric and scientific literatures indicates that *Coleus amboinicus* has been used in variety of diseases in traditional system of medicine in India and the use of the leaf juice as an antiepileptic, cough, fever and other communicable diseases. In the present study an attempt has been made to validate information of *Coleus* extracts of leaf, stem and root extracts separately pointed to various health issues. On morpho-anatomical observation, the leaf and stem showed presence of numerous multicellular covering and glandular trichomes, whereas thin-walled phellogen is the distinct character of root. On physicochemical aspects, leaf shows higher extractive values, ash value, and moisture content compared to stem and root parts. All the three extracts on phytochemical screening showed the presence of alkaloids, flavonoids, saponins, tannins, triterpenoids, and only leaf and stem extracts have shown the presence of carotenoids in addition. The anticonvulsant potency was found to be more with leaf extract than stem extract and least in root extract. Total phenolics, flavonoids, alkaloids and saponin contents were also found to be more in the leaf extract compared to stem extract and least in root extract. Results from these studies provide a significant rationale for the traditional use of this plant as an anticonvulsant. The leaf extract shown to be more prominent in all the aspects.

Key words: *Coleus amboinicus*; morpho-anatomy; antioxidant; anticonvulsant.

Introduction:

Coleus amboinicus is a well-known member of the Lamiaceae family. It can be found practically everywhere in India. It is a medicinal herb that has been utilised in folklore medicines (syrup) for therapy[2]. It can also be used to treat other conditions such as the flu, pneumonia, and epilepsy. According to photochemical analysis, it contains flavonoids such as apigenin, luteolin, and salvigenin [1].

Lamiaceae is a family of over 200 taxa and species in the 3200 with a history of disease treatment and food consumption [25]. The botanical name of this herb, *Plectranthus amboinicus*, assists us in determining its taxonomic position [26]. Ambon, a mountainous, rich island in the Maluku Islands near Indonesia, is referred to as *amboinicus* in this example[3]. The plant spread throughout the East Indies and Africa, and it was even naturalised in Latin America by the Spanish, who termed it "oregano de la Hoja Ancha [4]. " Cuban oregano may still be found growing wild in the rainforests of Indonesia and Malaysia, and it is a popular house plant worldwide due to its ease of cultivation and ability to withstand neglect [2].

Coleus aromaticus is a member of the Lamiaceae (Labiatae) family and the genus *Coleus* (now known as *Plectranthus*). It is a large juicy perennial aromatic herb that grows 30-90 cm tall and has thick, fleshy leaves and stem [5]. This is a densely branched, succulent herb with aromatic, distinctively scented leaves[26]. This plant is widespread across India and is also planted in gardens due to its taste and perfume; the leaves of this plant are perfect for flavouring meat and fish, since it boosts the taste of the dishes and may also be used to mask undesirable odours [3,4]. There is plenty of room for research into its uses in the food business [5,6]. *Coleus amboinicus*, commonly known as Indian borage or Mexican mint, is a perennial herb that has been valued for centuries for its medicinal properties [7]. This plant, belonging to the Lamiaceae family, is native to tropical and subtropical regions and is widely distributed across Asia, Africa and the Americas. Revered for its aromatic leaves and diverse traditional uses, *Coleus amboinicus* has garnered increasing attention in the scientific community for its potential pharmacological benefits [8]. The utilization of *Coleus amboinicus* in traditional medicine is deeply rooted in various cultures, where it has been employed as a remedy for a spectrum of ailments. The herb's distinctive aromatic profile and therapeutic versatility have led to its integration into traditional healing practices, with preparations derived from its leaves often administered as decoctions, infusions, or poultices [9]. The resurgence of interest in *Coleus amboinicus* within the scientific community is driven by the need to explore and validate its traditional uses through rigorous pharmacological investigation. Researchers are delving into the phytochemical composition of the plant, seeking to identify the bioactive compounds responsible for its diverse medicinal effects [10]. Additionally, modern scientific methodologies are being employed to elucidate the underlying mechanisms of action and assess the safety and efficacy of this botanical treasure [11].

Table:1 . Various local names in some Indian states

S .no	Name of the state	State Language	Local names
1	Karnataka	Kannada	Doddapatre, doddapatre soppu
2	National language speaking states	Hindi	Patta ajavayin, Patharchur, Amroda, pathercheer
3	Assam , Nagaland, Mizoram	English	Country borage, Indian borage, Indian mint

4	West Bengal	Bengali	Amalkuchi
5	Kerala	Malayalam	Panikoorka
6	Gujarat	Gujarati	Ovapan
7	Maharashtra	Marathi	Pan ova, Pathurchur
8	Indian ancient books	Sanskrit	Karpuravalli, Sugandhavalakam, Parnayavani
9	Andhra Pradesh	Telugu	Kapparillaku , vaamu
10	Telangana	Telugu	Kapparillaku , vaamu

[10 *Coleus amboinicus*]**Geographical Distribution of *Coleus amboinicus*:**

Coleus amboinicus is widely grown in India and Malaysia. It can also be grown in gardens and can be seen growing in different Asian and American countries. This plant is widely cultivated and naturalised throughout the tropics of both the old and new worlds [9]. It is also known as Cuban oregano, Spanish thyme, Orégano Brujo (Puerto Rico), Indian borage, Mexican thyme, or Mexican mint [7,8].

Table 2. *Coleus amboinicus* vernacular names and traditional usage utilised by locals in their different nations.


Country	Vernacular Names	Traditional Uses
Barbados	Poor man's pork, Broad leaf thyme	Folk medicine, Culinary
Cambodia	Sak dam ray	Folk medicine, Culinary
China	Da shou xiang	Folk medicine, Home garden
Cuba	orégano; orégano de Cartagena	Folk medicine, Culinary
Fiji	Rhaivoki, Sage	Folk medicine, Culinary
Germany	Jamaika thymian	Folk medicine, Culinary
Guyana	Thick leaf thyme, broad leaf thyme	Folk medicine, Culinary
India	Indian Borage, Pashan Bhedi, Karpooravalli, Patharchur	Folk medicine, Culinary, Home garden
Indonesia	Torbangun, Daun Kutjing	Folk medicine, Culinary, Home garden
Malaysia	Daun bangun-bangun, Pokok bangun-bangun	Folk medicine, Culinary, Home garden
Philippines	Latai, Suganda, Oregano	Folk medicine, Culinary, Home garden
Puerto Rico	Puerto Rican oregano brujo, Cuban oregano	Folk medicine, Culinary
South Africa	Sup mint, French thyme, Indian mint	Folk medicine, Culinary, Home garden

Thailand	Hom duan huu suea, Niam huu suea	Folk medicine, Culinary
USA	Indian Borage, Country borage, Spanish thyme, Mexican mint, French thyme, Indian mint	Culinary, Home garden
Vietnam	Can day la	Folk medicine, Culinary
West Indies	French thyme, Spanish thyme, Broad-leaf thyme	Folk medicine, Culinary

Taxonomy:

Coleus amboinicus (Loureiro) Sprengel belongs to the Lamiaceae, or mint family. Plectranthus is a paleotropical oil-rich genus in the Nepetoideae subfamily[12]. It contains over 300 species of annual or perennial herbs or subshrubs, many of which are succulents [18]. Many *Coleus amboinicus* species have commercial and medical importance. *Coleus amboinicus* is one of the most important fragrant medicinal succulent plants, having characteristic smelling leaves and short soft erect hairs [13].

Table: 3. Classification of *Coleus amboinicus*

Division	❖ <i>Magnoliophyta</i>	
Kingdom	❖ <i>Plantae</i>	
Clade	❖ <i>Angiosperms</i>	
Class	❖ <i>Magnoliopsida</i>	
Order	❖ <i>Lamiales</i>	
Family	❖ <i>Lamiaceae</i>	
Genus	❖ <i>Plectranthus</i>	
Species	❖ <i>Coleus aromaticus</i>	
Synonyms [11]	❖ <i>Coleus amboinicus</i> <i>Lour.</i>	

Plant morphological studies:

Herbs are evergreen, fragrant, and can be three to ten years old. This plant has the ability to climb and can grow up to a height of around one meter [14]. Its leaves are simple, light and thick, with an opposing arrangement of fat green leaves that are 2-3 cm long. The leaves are generally oval or triangular in form, with large, sharp cuts at the base and apex [9]. The undersides of the leaf margins have crenate surfaces that are coated in many glandular hairs that form the winter trunk, which contains tomatoes (which are thickly covered in soft, short hairs) [15]. Flowers feature two lips, the lower bearing four narrow teeth and the upper oval and thin. The calyx of the flower is bell-shaped, and the throat within is smooth [8]. With a

narrow tube, enlarged throat, and small lips, the corolla is five times larger than the calyx and has a pale violet colour [10].

3. Phytochemistry

Coleus amboinicus chemical composition and pharmacological activities have been studied in a broad and expanding body of literature [16]. The literature review highlighted the presence of various kinds of phytochemicals, including 76 volatiles and 30 non-volatile compounds. Recently, phytochemists and biologists have been interested in isolating certain bioactive components of *Coleus amboinicus* and understanding their pharmacological significance [17]. However, the chemical profile and accumulation pattern of bioactive elements in different portions of the plant, as well as their essential oil concentration, vary based on a variety of factors, including geographical features, climate and stage of plant material collection [2]. Furthermore, differences in phytochemical content can be caused by the method of extraction and identification. Currently, only a few papers have stated the separation and verification of particular *Coleus amboinicus* compounds [17]. As a result, accurate identification, separation, and quantification of phytochemicals is critical for understanding their pharmacological and biological relevance. Phytochemicals found in *Coleus amboinicus* include monoterpeneoids, diterpenoids, triterpenoids, sesquiterpenoids, phenolics, flavonoids, and esters [26]. This section goes over the specifics of these bioactive components [19].

Available chemical constituents: - The main chemical compounds discovered in the essential oil of *Coleus amboinicus* are • carvacrol (28.65%) • thymol (21.66%) • α -humulene (9.67%) • undecanal (8.29%) • γ -terpinene (7.76%) • p-cymene (6.46%) • caryophyllene oxide (5.85%) • α -terpineol (3.28%) • B-selinene (2.01%) [20].

Table:4. Phytochemical analysis & Medicinal uses of *Coleus amboinicus*:

S. NO	CONSTITUENTS	ETHANOLIC EXTRACT	AQUEOUS EXTRACT
1	Alkaloids	+	+
2	Sugar and Carbohydrates	+	+
3	Glycosides	+	+
4	Protein	+	+
5	Amino acid	+	+
6	Steroids	-	-
7	Saponin	-	-
8	Flavonoids	+	+
9	Quinone	+	+
10	Tannins	+	+
11	Anthocyanin	-	-
12	Phenolic compounds	+	+
13	Terpenoids	+	+
14	Fixed oil and fats	-	-
15	Gums & mucilage	-	-
16	Resins	-	-



Source: www.researchgate.net

Pharmacological activity: -

Coleus amboinicus, sometimes referred to as Indian Borage, is described along with its pharmacological properties, traditional uses, medicinal applications, side effects, and method of treating typhoid [21]. Herbal or folk medicine has utilised *Coleus aromaticus* to treat a variety of ailments, including colds, asthma, constipation, headaches, coughs, fevers, and skin disorders. The Comoros peninsula's dried leaves of *Coleus amboinicus* were purified in order to extract the essential oil [22]. Carvacrol (23.0%) and O-cymene (7.7%), among other compounds, were detected in the oil by gas chromatography/mass spectrometry (GC/MS) and capillary gas chromatography (GC) [25]. In order to type an influenza group of antigen, the antimicrobial activity of *Coleus amboinicus* arising leaf essential oil was studied utilising circulating antibody detection [23]. According to the data, *Coleus amboinicus* essential oil has greater antibacterial action against Gram-positive (*Staphylococcus aureus*) bacteria than it does against Gram-negative (*Escherichia coli*) bacteria. For *S. aureus* and *E. coli*, the minimum inhibitory concentration (MIC) was 0.1% and 0.2%, respectively [24].

Discussion:

It has been discovered that *Coleus amboinicus* influences several physiological systems and treats a variety of illnesses, including as antineoplastic, anti-inflammatory and anti-anxiety conditions. Nevertheless, additional clinical research, utilising animal models, is required to validate its anticancer properties and its potential as an antitumor agent in combination with other medications. It is unknown how the plant affects the heart and endocrine system, but it may help with conditions related to the central nervous system. Concerns concerning the calibre of currently available toxicity research are raised by the dearth of systematic toxicity investigations.

Summary and Conclusion:

This review aims to provide a comprehensive overview of the medicinal properties and pharmacological investigation of *Coleus amboinicus*. Through an exploration of its traditional uses, phytochemical constituents, and emerging scientific evidence, we seek to contribute to the growing body of knowledge surrounding this herb, paving the way for potential therapeutic applications and drug development. As the scientific community continues to unveil the mysteries of *Coleus amboinicus*, the integration of traditional wisdom with modern research holds the promise of unlocking novel treatments and enhancing our understanding of this valuable medicinal plant.

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Conflict of interest

The authors report no conflict of interest.

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