

Powder microscopy of *Elsholtzia griffithii* Hook

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Abstract

Elsholtzia griffithii (family Liliaceae), commonly known as East India Mint, is an aromatic annual herb reaching up to 50 cm in height and characterized by a strong lemon-like fragrance. The species naturally occurs in disturbed forests and mountain valleys at altitudes of 400–600 m in Northeast India, where it is also widely cultivated. Traditionally, East India Mint is utilized as a seasoning herb and valued in folk medicine for its tonic, astringent, carminative, and antiseptic properties. Decoctions of its leaves and flowers are used to treat ailments such as tonsillitis, fever, cough, hypertension, nasal bleeding, menstrual disorders, and skin itching. Despite its extensive ethnomedicinal uses, detailed pharmacogenetic and microscopic data on this species remain limited. The present study aims to investigate the powder microscopy of *E. griffithii* to provide diagnostic characters useful for the authentication and standardization of the crude drug.

Keywords: Powder Microscopy; *E. griffithii*; Pharmacognosy; Lamiaceae, East India Mint

1 Introduction

The genus *Elsholtzia* (family Lamiaceae) is widely distributed across temperate and tropical regions of Asia, stretching from Siberia to China, northeastern India, Indonesia, and nearby areas [1]. Globally, around 48 species of this genus have been identified, with nearly 33 species occurring in China and a large number concentrated in Yunnan Province [2]. The genus was named in honor of the Prussian naturalist Johann Sigismund Elsholtz. Species of *Elsholtzia* are characterized by their strong aromatic properties due to the presence of abundant volatile oils and have been traditionally used in Chinese medicine for their antibacterial, anti-inflammatory, antioxidant, and analgesic activities [3]. Although primarily Asian in distribution, certain *Elsholtzia* species also occur in parts of Africa, North America, and Europe. In northeastern India—particularly in Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura—various species are cultivated under local names and valued for both culinary and medicinal purposes. Among them, *Elsholtzia griffithii* is a relatively less explored species in China but is commonly found in Manipur, India, where it is popularly known as East India mint [4]. This annual herb grows up to about 50 cm in height and is easily recognized by its pleasant lemon-like fragrance. Traditionally, members of the genus serve multiple roles in folk medicine: fresh leaves are consumed to help lower blood pressure, flower extracts are used as a gargle for treating tonsillitis, and leaf paste is applied to the forehead to relieve dizziness. Beyond therapeutic uses, *Elsholtzia* species are also employed as herbal teas, spices, and flavoring agents, and are valued in the production of honey, perfumes, cosmetics, and aromatherapy products. With a longstanding ethnomedicinal background in northeastern India, these plants continue to play a vital role in local healthcare systems for managing ailments such as cough, cold, skin inflammation, and menstrual disorders [5, 6].

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1.1 Regional names in India [7]

Hindi: East India Mint, Manipur: Manipuri Lomb, Mizoram: Lengser, Lengmaser

Hmar: LengmaserMaring: TiktaAngami: Nei hu, Runou, Neipfu

2 Material and methods

2.1 Collection, identification, and authentication of plants

The plant of *Elsholtzia griffithii* was collected from the Manipur region (East India) in May 2025 by a farmer. The plant was identified, confirmed, and authenticated by Dr. Pradeep Tiwari from the Botanical Department of H.S. Gour University, Sagar (MP), with the identification number BOT/H/05/123/15

The stem, root, fruit, Seed, and leaves were manually freed from adulterants, shade-dried, ground using a mechanical grinder, passed through 40-mesh sieves, and stored in a sealed container for microscopic powder studies. Photomicrographs were captured with the compound microscope.

2.2 Powder Microscopy

The powder microscopy of stem root, fruit, seeds and leaves was studied as per the standard procedures by capturing the images of different fragments of tissues and obtaining observations through a compound microscope [8-10].

3 Result

Powder macroscopy of different parts of *Elsholtzia griffithii* Hook - The powder macroscopic features of the different parts of *Elsholtzia griffithii* (Leaves, Stem, Seeds, Fruits, and Roots) were done separately and the observations are tabulated below.

Table 1 Powder macroscopy of different Parts of *Elsholtzia griffithii* Hook

Parameters	Parts of <i>Elsholtzia griffithii</i> Hook			
	Leaves	Seeds	Fruits	Stems& Roots
Colour	Dull green	Black	Brown	Brown
Odour	Aromatic	Aromatic	Aromatic	Aromatic
Texture	Fine	Smooth	Smooth	Rough

3.1 Powder Microscopy of leaves

Powder microscopic evaluation of *E. griffithii* leaf powder is pale green in color [figure 1(a)], smooth to the touch, smells Lemon like, and tastes Sharp aromatic and Multiple glandular trichome [figure 1(b)], Simple trichome [figure 1(c)], Epidermal cell [figure 1(d)], Lignified fiber [figure 1(e)], Prismatic crystal [figure 1(f)], Niddle-shaped crystal [figure 1(g)], Oil globules [figure 1(h)], Fragment of the epidermal layer [figure 1(i)], Lignified tissue [figure 1(j)], Stomata with epidermal cells[figure 1(k)], Sclerenchyma cell [figure 1(l)] are all visible in powder microscopy of Leaf powder. When treated with chloral hydrate, water, and safranin, the following different tissue fragments were observed under the compound microscope.

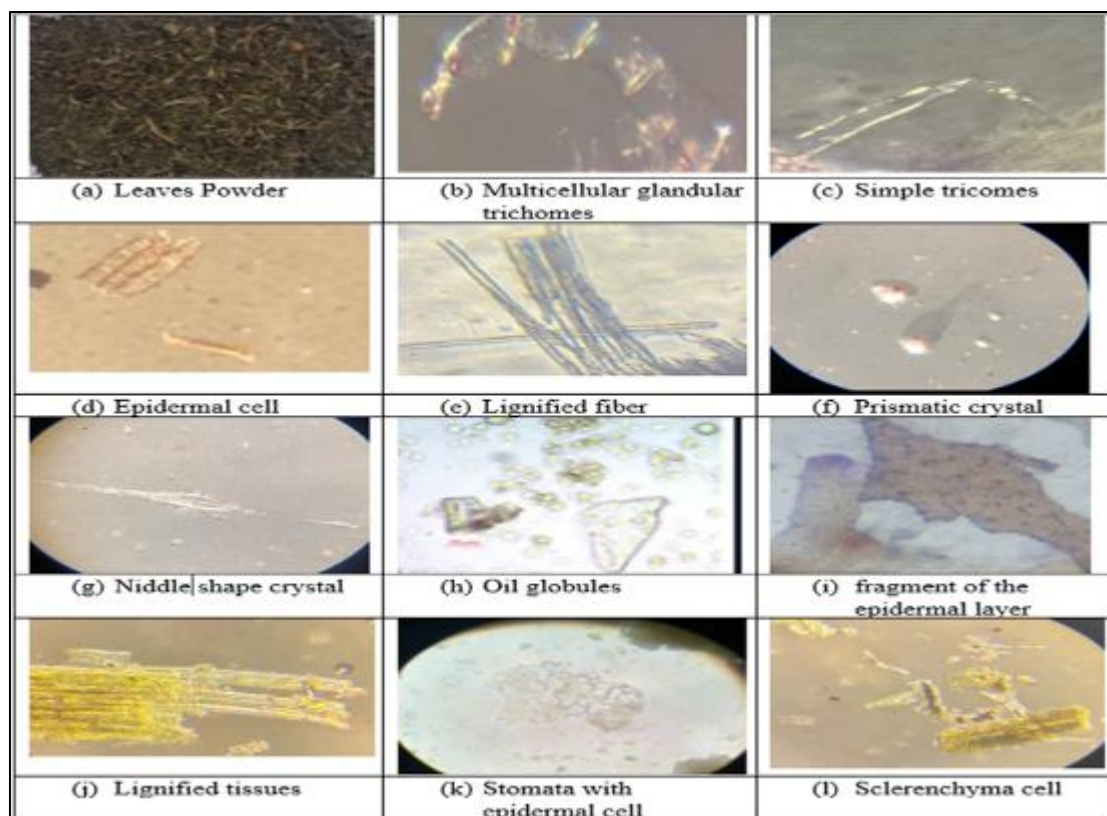


Figure 1 Powder Microscopy of *E. griffithii* Leaves

3.2 Powder Microscopy of stems

Powder microscopic evaluation of *E. griffithii* stem powder is brown in color [figure 2 (a)], rough to the touch, smells Lemon like, and tastes Sharp aromatic and Quadangular stem,[figure 2 (b)], Multicellular trichomes[figure 2(c)], Glandular trichome [figure 2(d)], Spiral vessels [figure 2(e)], Simple vessels[figure 2 (f)], Epidermis with trichomes [figure 2 (g)], Xylem and phloem [figure 2 (h)], Sclerenchymatus fibers [figure 2 (i)], are all visible in powder microscopy of stem powder. When treated with water, methylene blue, and safranin, the following different tissue fragments were observed under the compound microscope.

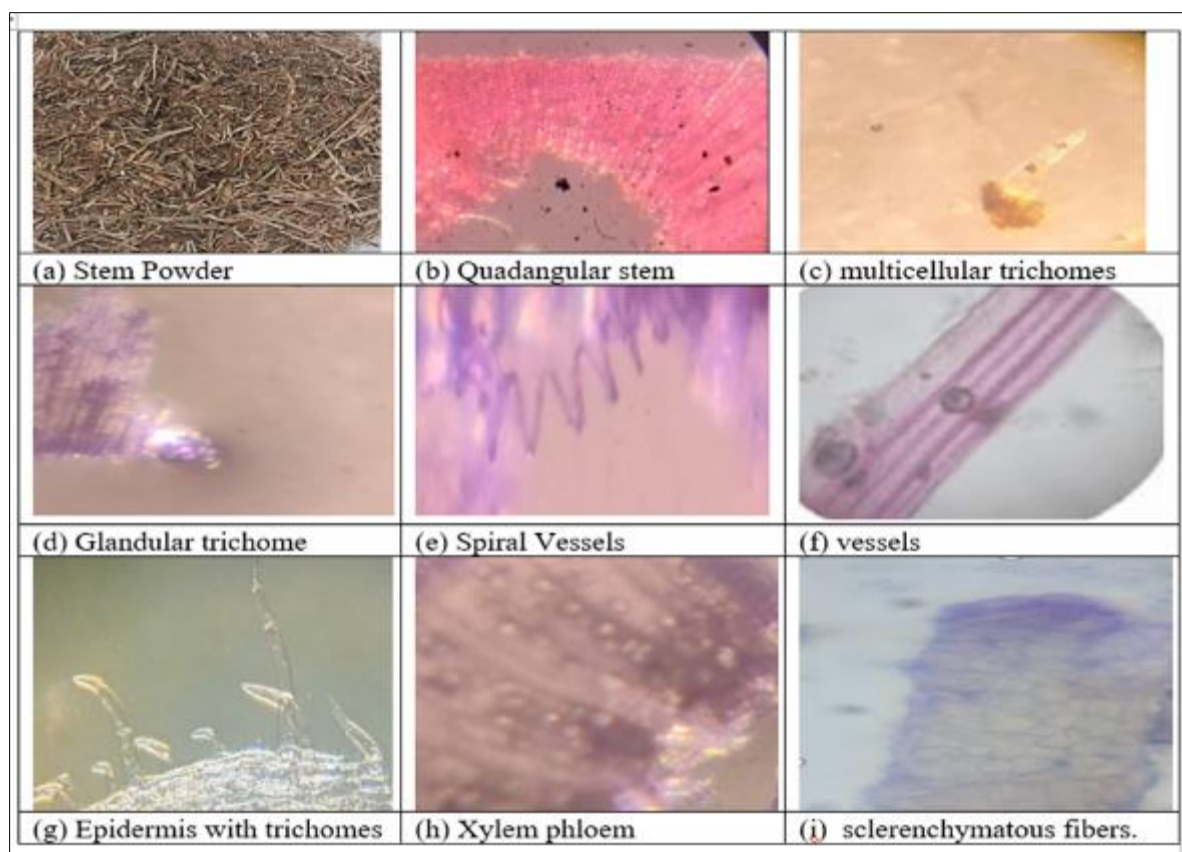


Figure 2 Powder Microscopy of *E. griffithii* Stem

3.3 Powder Microscopy of Seeds

Powder microscopic evaluation of *E. griffithii* seeds powder is black in color [figure 3 (a)], smooth to the touch, smells Lemon like, and tastes Sharp aromatic and, Seed coat [figure 3 (b)], Oil gland [figure 3(c)], Lignified tissue with Glandular trichome [figure 3(d)], Oil droplets [figure 3(e)], Calcium oxalate crystal [figure 3 (f)] When powder treated with Methyl blue, water, and safranin, following different fragments of tissues was observed under the compound microscope.

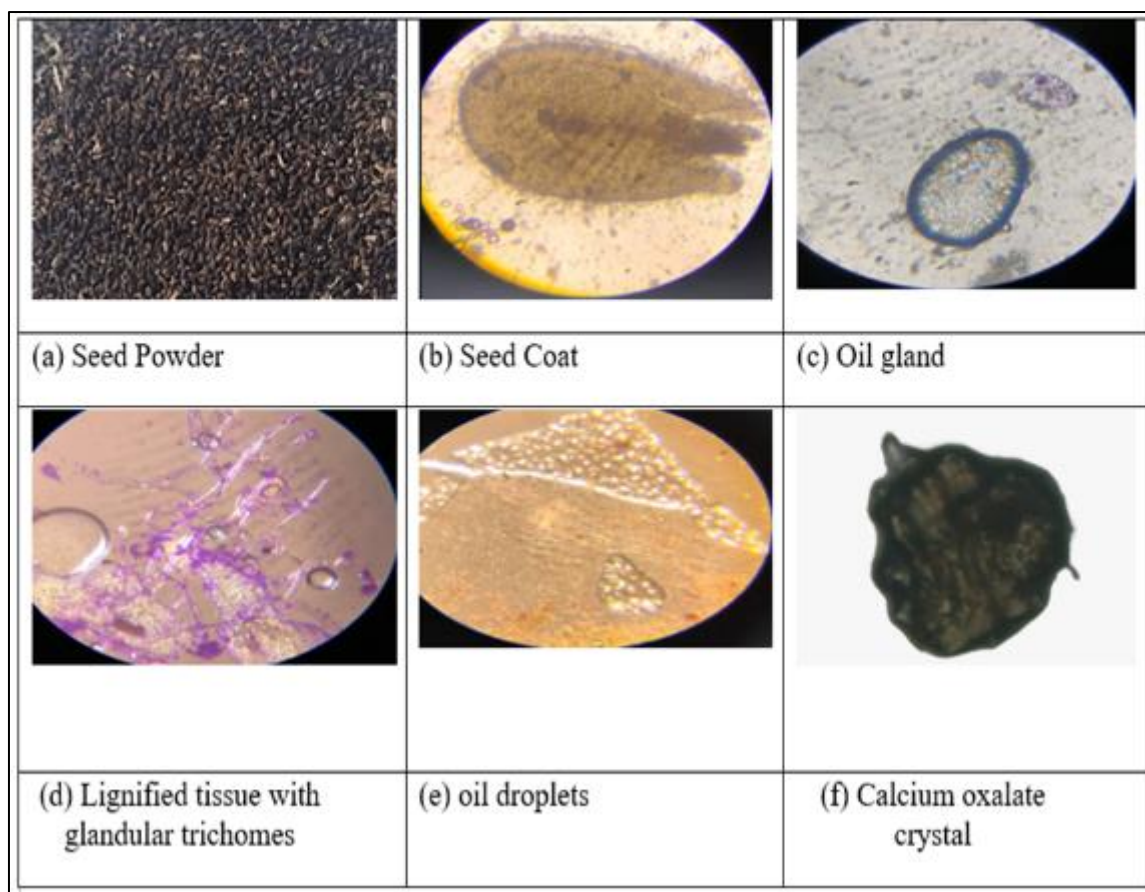


Figure 3 Powder Microscopy of *E. griffithii* Seeds

3.4 Powder Microscopy of Fruits

Powder microscopic evaluation of *E. griffithii* fruits powder is brown in color [figure 4 (a)], smooth to the touch, with a Lemon like fragrance, and tastes Sharp aromatic and, Phloem fiber[figure 4 (b)], xylem parenchyma [figure 4 (c)], Xylem with trichomes[figure 4 (d)], Endosperm cell[figure 4 (e)], Unlignified fiber [figure 4 (f)] When powder treated with Methyl blue, water, and safranin, following different fragments of tissues was observed under the compound microscope.

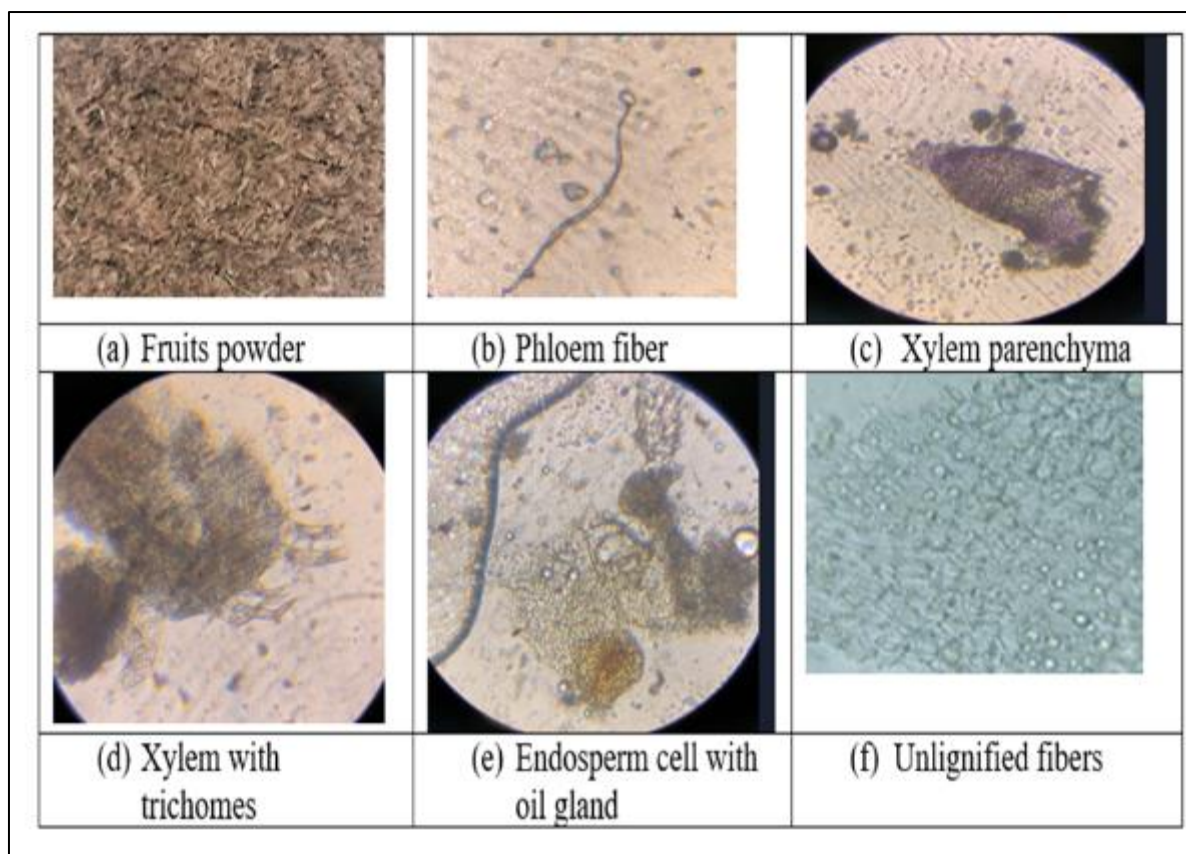


Figure 4 Powder Microscopy of *E. griffithii* fruits

3.5 Powder Microscopy of Roots

Powder microscopic evaluation of *E. griffithii* roots powder is brown in color [figure 5 (a)], rough to the touch, with a Lemon like fragrance, tastes aromatic and Lignified xylem vessels [figure 5 (b)], Paranchymatous cells with starch grain with oil globules [figure 5 (c)], Lignified xylem fiber [figure 5 (d)], Cork cell with xylem vessels [figure 5 (e)], Glandular and non-glandular trichomes and starch grain [figure 5 (f)] When powder treated with Methyl blue, water, and safranin, following different fragments of tissues was observed under the compound microscope.

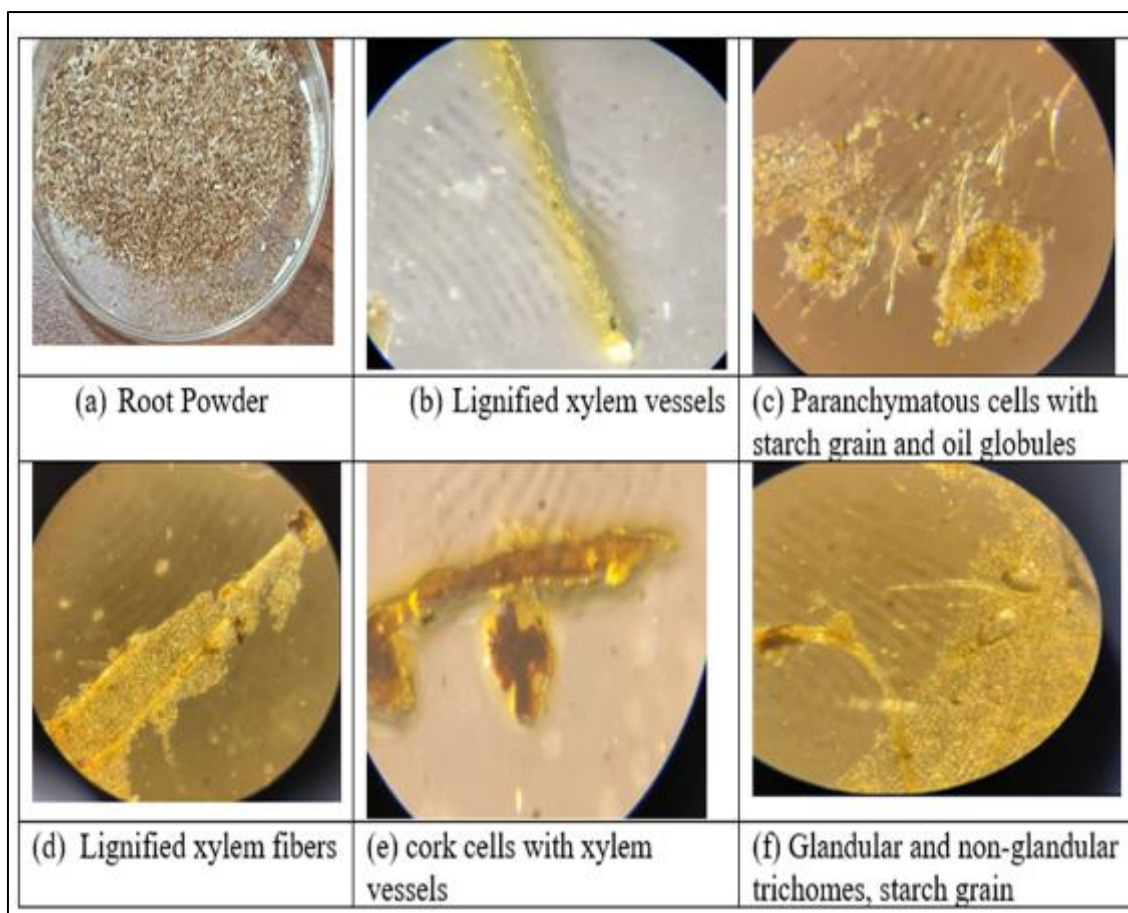


Figure 5 Powder Microscopy of *E. griffithii* Roots

4 Conclusion

Powder microscopy of *Elsholtzia griffithii* revealed distinctive diagnostic features including multicellular glandular and nonglandular trichomes, lignified and non-lignified fibers, parenchymatous fragments, calcium oxalate crystals, oil glands and globules, starch grains, cork and endosperm cells, spiral vessels, quadrangular stem fragments, sclerenchymatous fibers, prismatic and needle-shaped crystals, epidermal layers, and anisocytic as well as anomocytic stomata. The macroscopic assessment of the powdered samples displayed uniform organoleptic characteristics—an aromatic and lemon-like odor and taste—with the leaves showing a dull green hue, and the stems, roots, and fruits appearing brown, while the seeds were black. These findings establish valuable pharmacognostic standards for *E. griffithii*, which can be utilized for its accurate identification, prevention of adulteration, and assurance of the purity and therapeutic quality of herbal preparations.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

- [1] Chen S, Chen J, Xu Y, Wang X, Li J. *Elsholtzia*: A genus with antibacterial, antiviral, and anti-inflammatory advantages. *J Ethnopharmacol.* 2022;22:115549.
- [2] Pudziuvėlytė L. Chemical composition and anticancer activity of *Elsholtzia ciliata* essential oils and extracts prepared by different methods. *Ind Crops Prod.* 2017;107:90–96.

- [3] Loya B, Kumar R, Thongdok NJ, Kumar A. Effect of altitude, environment, and soil parameters on morphological characteristics and yield of essential oil in *Elsholtzia communis*. *Environ Ecol*. 2023;41(4B):2756–65.
- [4] Zhang Q, Porto NM, Guilhon CC, Giorno TB, Alviano DS, Agra MD, Fernandes PD, Boylan F. Pharmacognostic study on *Elsholtzia ciliata* (Thunb.) Hyl.: Anatomy, phytochemistry, and pharmacological activities. *Pharmaceuticals*. 2021;14(11):1152.
- [5] Guo Z, Liu Z, Wang X, Liu W, Jiang R, Cheng R, She G. *Elsholtzia*: Phytochemistry and biological activities. *Chem Cent J*. 2012;5(6):147.
- [6] Ai-Liu, Lee SMY, Wang YT, Du GH. *Elsholtzia*: A review of traditional uses, chemistry and pharmacology. *J Chin Pharm Sci*. 2007;1003–1057:2 073 06.
- [7] Flowers of India. *Elsholtzia griffithii* – Lomba. 2014 Oct 11 [cited 2025 Oct 5]. Available from: <https://www.flowersofindia.net>
- [8] Anonymous. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1998.
- [9] Evans WC and Trease D. *Pharmacognosy*, Edinburgh, Saunders Company, 2002, 519-20.
- [10] Wallis TE. *Textbook of Pharmacognosy*, New Delhi, CBS Publishers and Distributors, 1985, 572-575.