

Pharmacognosy of *Pepomia Tetraphylla* (G.Forst) Hook & Arn [Piperaceae]

Poonam Sethi^{1*}, Selavraju A¹ and Siva Prakash S²

¹Assistant Professor Department of Plant Biology and Plant Biotechnology, Guru Nanak College Chennai, Tamil Nadu, India

²Research Scholar, Department of Plant Biology and Plant Biotechnology, Guru Nanak College Chennai, Tamil Nadu, India

*Corresponding author: Poonam Sethi, Assistant Professor Department of Plant Biology and Plant Biotechnology, Guru Nanak College Chennai, Tamil Nadu, India.

Received: October 03, 2025; Accepted: October 08, 2025; Published: October 17, 2025

Citation: Poonam Sethi, Selavraju A, Siva Prakash S (2025) Pharmacognosy of *Pepomia Tetraphylla* (G.Forst) Hook & Arn [Piperaceae]. *Ken Joul Pharcol*, 8(1): 1-3.

Abstract

Peperomia tetraphylla a succulent herb prominent spike inflorescence of minute, perianthless flowers. The stem outline being undulate with cutinized single layered epidermis having glandular trichomes. Scattered collateral vascular bundles arranged in crescent shaped manner present in the parenchymatous ground tissue. Foliar anatomy shows an isobilateral outline, hypodermis with sclerenchymatous cells. Mesophyll distinctive with upper palisade and lower spongy layer. Polygonal xylem and phloem collateral xylem, cambium prominent. Oil canal or ducts prominent. Histochemical analysis shown the presence of alkaloids, tannins, starch, cutin, lignin, resin and crystals in various zone of leaf and stem of *Peperomia tetraphylla*. These features are essential since it portrays the physical and anatomical characteristic features of the plants which helps to regulate the genuineness of the drug.

Keywords: Anatomy, Histochemistry, Foliar Anatomy, *Peperomia*, Phytochemical, Succulent Herb

Introduction

The bridge between man and the search for drugs in nature dates long back but there is ample evidence from various sources: written documents, preserved monuments, and even original plant medicines. Hence the medicinal plants usage against illnesses due to which man learned to pursue drugs in barks, seeds, fruit bodies, and other parts of the plants. Contemporary science has acknowledged their active action, and it has included in modern pharmacotherapy a range of drugs of plant origin, known by ancient civilizations and used throughout the millennia [1]. Since time immemorial the advanced civilizations, the healing properties of certain medicinal plants were identified, noted, and conveyed to the successive generations [2].

Most contemporary research on medicinal plants is during the 20th-century where the focus was mainly on the biochemical characterization, pharmacological activity, and synthesis of Phyto molecules with potential medicinal utility [3]. A central challenge is the identification of the key traits that rendered these plants appealing and 'pre-adapted' them for human use, approaches such as genetic and phylogenetic have been applied recently to important crop species, such as maize and grape but are largely lacking for medicinal plants.

Anatomical and histochemical characterization of some highly medicinal plants serves as an important tool for quality control and drug identification in addition to its medicinal uses.

Macroscopic and microscopic evaluation help to disclosed the potential of the plant in the field of medicine. Microscopy is the backbone of plant standardization process. Current study helped in correct identification and quality assurance of the plant materials.

Materials and Method

The fresh plant was collected from Kolli Hills, Tamil Nadu [3] and identified by botanist of GNC centre for consultancy and outreach, Guru Nanak College Chennai, Tamil Nadu. A voucher number GNC/ PBPB 118 was maintained.

Morphological Studies

The stem and leaves were studied for their external features: size, color, surface, appearance, taste and odour.

Microscopical Studies

Hand sections were taken and treated with chloral hydrate and phloroglucinol and HCl. Microscopical characters were studied. Sections were stained in saffranin and then mounted in glycerine. Diagrams were drawn using camera lucida fixed to the compound microscope [4].

Phytochemical Screening

Different extracts such as aqueous and ethanol were screened for the presence of phenols, flavonoids, tannin, saponin, alkaloids, glycosides, phytosterols by using standard protocols [5,6]. Extract preparation was done by dissolving 10 gms of the fresh leaf extract in 100 ml of the solvents respectively. Vacuum dried and used for further screening.



Plate I: Foliage Of The Experimental Plant

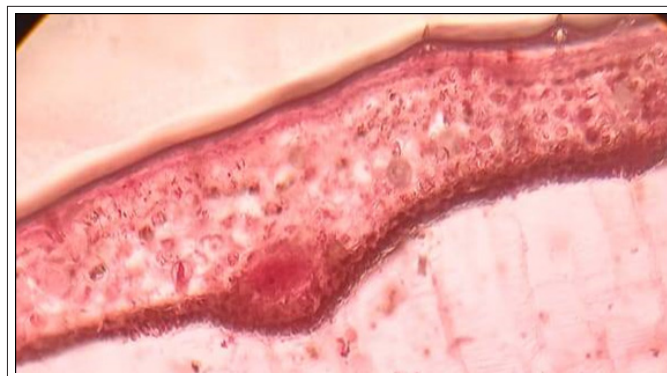


Plate IV: Foliar Anatomy Of Peperomia Tetraphylla Under The Microscope At 10x Magnification

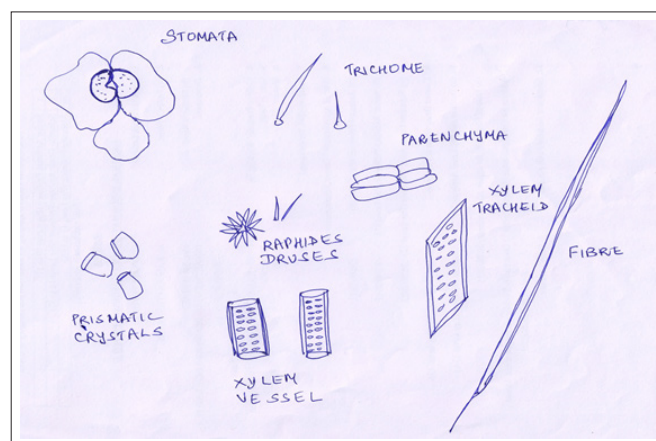


Plate V: Diagrammatic Representation -Powder Microscopy Of Peperomia Tetraphylla Under The Microscope At 10x Magnification

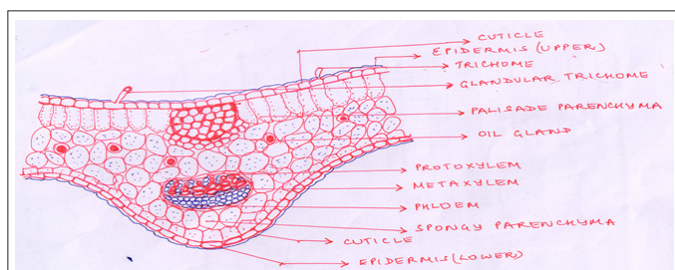


Plate II: Diagrammatic Representation- Foliar Anatomy Of Peperomia Tetraphylla Under The Microscope At 40x Magnification

Organoleptic Evaluation

The organoleptic investigation of the aerial parts of Peperomia tetraphylla was studied.

Results

Macroscopic Evaluation

Herbs perennial, succulent, forming clumps, usually glabrous. Stems many branched, 10-30 cm, internodes thickly ridged. Leaves dense uniform in size; petiole glabrous or pubescent; leaf blade broadly elliptic or suborbicular, 0.9-1.2 cm × 5-9 mm, fleshy, pale and usually wrinkled when dried, pellucid dotted, glabrous or sparsely pubescent, rarely densely pubescent, base and apex rounded, slightly revolute; veins 3, slender, usually inconspicuous. Spike terminal and axillary, solitary, 2- 4.5 cm; peduncle sparsely pubescent, bracts suborbicular, stalk short. Filaments short, thecae rounded-"D"-shaped. Ovary ovoid, inserted within excavations of rachis; stigmas capitate, pubescent. Fruit a nutlet [7-10].

Microscopic Evaluation

T.S. of Stem

The epidermis is single layered well protected by a thick cuticle. Epidermis extends to form unicellular trichomes. The cortex with a hypodermis and a parenchymatous ground tissue. Parenchyma cells with intercellular spaces of varying dimensions. Starch grains and tannin inclusions present interspersed in the ground tissue. Scattered vascular bundles, collateral with endarch xylem, cambium prominent.

T.S. of Leaf

A transverse section of the leaf shows a isobilateral outline, upper epidermis with trichome lower epidermis with stomata and a sub

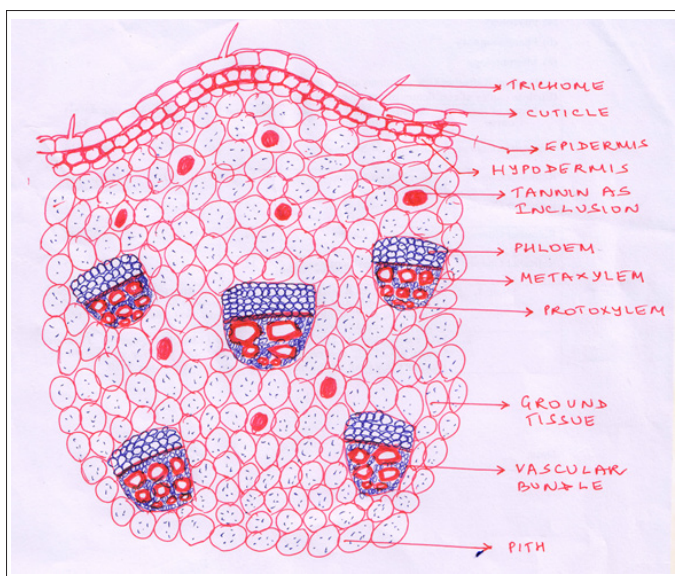


Plate III: Diagrammatic Representation -Stem Anatomy Of Peperomia Tetraphylla Under The Microscope At 40x Magnification

stomatal cavity. Hypodermis with sclerenchymatous cells. Mesophyll distinctive with upper palisade and lower spongy layer. Polygonal xylem and phloem collateral xylem, cambium prominent. Oil canal or ducts seen

Powder Microscopy

Powder microscopy of the stem and leaf displayed the presence of fragments of xylem vessel, trichome 20µm in thickness Paracytic stomata, Palisade layer cluster and prismatic crystals and tannin inclusions.

Phytochemical Constituents

The characters are listed in Table I.

Table 1: Qualitative phytochemical properties of the experimental plant

S.No.	Compound	Test	Aqueous extract	Ethanol extract
1	Alkaloids	Dragendorff's test	+	+
2	Carbohydrate	Benedict test	+	+
3	Coumarins	NaOH test	-	+
4	Phenolic compounds	Gelatin test	-	+
5	Terpenoids and Steroids	Salkowski test	-	+
6	Saponins	Frothing test	+	+
7	Flavonoids	Shinoda test	+	+
8	Tannins	FeCl ₃ test	+	+

(+) presence and (-) absence

Organoleptic Evaluation

Organoleptic investigation of the aerial parts of *Peperomia tetraphylla* revealed that the colour was pale green, with acrid taste and characteristic smell Table II

Table 2: Organoleptic Characters of the Experimental Plant

Serial Number	Character	Stem	Leaf
1	Colour	Reddish brown later pale yellow	Pale yellow
2	Size	9-18 cm long	1-2.5 cm
3	Shape	Round	Obovate
4	Texture	Smooth	Glabrous
5	Taste	Acrid	Pale watery

Discussion

The Plant *Peperomia tetraphylla* (G.Forst) Hook & Arn. belonging to family (Piperaceae) is an important plant in ayurveda it has various medicinal properties like the juice of the whole plant is employed in treatment of convulsions, skin diseases, cough, asthma-like symptoms and kidney disorders. This plant is used for treatment of a number of ailments like urinary disorders and cardiac problems. Preliminary investigation revealed the presence of alkaloids, steroids, flavonoids, terpenoids, glycosides, & carbohydrates. The aqueous and ethanolic extracts were studied for phytochemical compounds [11-13].

The aim of the present study was focused on the pharmacognostical, physicochemical and phytochemical properties were carried out, which would facilitate quick identification and selection of the drug from various adulterates to prove the authenticity of the plant as a drug.

Conclusion

The above parameters help in identifying the species and to establish the authenticity of this plant and can possibly help to differentiate the plant from its other adulterants. Even today, the World Health Organisation serves it as alternate medicine of immortality and the medicinal plant with qualities for thousands of years to come A further work on the plant would be an eye opener to its other medicinal properties

References

1. Tilburt JC, Kaptchuk TJ (2008) Herbal medicine research and global health: an ethical analysis. *Bull World Health Organ* 86: 594-599.
2. Wichtl M (2004) Herbal drugs and phytopharmaceuticals: a handbook for practice on a scientific basis. Boca Raton: CRC press. <https://www.cabidigitallibrary.org/doi/full/10.5555/20043109836>.
3. Firenzuoli F, Gori L (2007) Herbal medicine today: clinical and research issues. *Evid Based Complement Alternat Med* 4: 37-40.
4. Dey PM, Harborne JB (1987) *Methods in Plant Biochemistry*, Academic Press, London. https://api.pageplace.de/preview/DT0400.9780080984186_A30397569/preview-9780080984186_A30397569.pdf
5. Evans WC (1996) *Trease and Evans Pharmacognosy*, W.B. Saunders Company Ltd, London. 14th ed 545-546.
6. Harborne JB (1998) *Phytochemical Methods*, Chapman and Hall, Madras, 3rd ed. <https://books.google.co.in/books?id=vCWHUU6iobwC&printsec=frontcover#v=onepage&q&f=false>
7. *Indian Pharmacopoeia*, Government of India, Ministry of Health, Controller of Publications, New Delhi, India. Vol.II, 3rd ed, Vol. II, 1985, 74. <https://www.scirp.org/reference/referencespapers?referenceid=2017368>
8. Kirtikars KR, Basu BD (1995) *Indian Medicinal Plants*, International Book Distributors, Dehradun, India. 1: 641-643.
9. Kokate CK (1994) *Practical Pharmacognosy*, Vallabh Prakashan, New Delhi, India. 4th ed, 112-120.
10. Silva da RM, De Medeiros GC, Costa SP, Gell JA, Júnio JO, et al. (2014) Anatomical characterization and microchemistry of *Peperomia pellucida* (L.) HBK (Piperaceae). *Int J Pharm Sci Res* 5: 805.
11. Samain MS, Vanderschaeve L, Chaerle P, Goetghebeur P, Neinhuis C, et al. (2009) Is morphology telling the truth about the evolution of the species rich genus *Peperomia* (Piperaceae). *Plant Syst Evol* 278: 1-21.
12. Samain MS, Mathieu G, Vanderschaeve L, Wanke S, Neinhuis C, et al. (2007) Nomenclature and typification of subdivisional names in the genus *Peperomia* (Piperaceae). *Taxon* 56: 229-236.
13. (2024) The international plant names index and world checklist of vascular plants; 2024. Published on the Internet. Available from: <http://www.ipni.org> and <https://cited Oct24 2024>. Available from: <http://powo.science.kew.org/>, date last accessed).

Copyright: ©2025 Poonam Sethi, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.