

PHARMACOGNOSTIC EVALUATION OF *PIMPINELLA STEWARTII* (NASIR.) APIACEAE: LEAVES

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Abstract: *Pimpinella stewartii* Nasir. Is can be either annual or perennial. Mostly scented flowering plants belonging to the Apiaceae or Umbelliferae family are also referred to as umbellifers, celery, carrots, or parsley. The plant is been used for the treatment of gastrointestinal diseases such as gas, indigestion, tooth ache, and griping discomfort, which are in agreement with what has already been described, using shade-dried leaves of *Pimpinella stewartii*. The leaf extract is also in ethanol. For standardization of this herbal plant, Pharmacognosy is carried out. The leaves of the said plant are studied for the parameters like macroscopy, microscopy and powder study. It was also investigated for the phytochemical analysis. The powder study revealed the presence of powder drug's flavour, consistency, aroma and colour were macroscopically examined and noted using the organoleptic approach. *Pimpinella stewartii* organoleptic results have been identified. The leaf powder has a fragrant fragrance, a little bitter flavor, and a fine texture. These results go concurrent with microscopy of leaves. The phytochemical parameters also showed significant results. The phytochemical analysis showed the presence the crude extract of *Pimpinella stewartii* included many different types of compounds such as phenolic, glycosides, flavonoids, alkaloids, quinones, carbohydrates, amino acids, terpenoids and coumarins was change in colour. However, the Tannins, Saponins and sterols test results for the crude extract showed no change in colour.

Key words: *Pimpinella stewartii*, Leaves, Pharmacognosy, Phytochemical analysis.

1. INTRODUCTION

Herbal medications have unique recommendations and a long history of respectability. Herbal medicine, which was once used to treat heart conditions like heart failure, plays a vital part in the management and treatment of disorders like digitalis, which contains cardiac glycosides [1]. Even in this cutting-edge, technological age, doctors still recommend a variety of medications with botanical origins. Up to 10% of local communities around the world employ

medicinal plants to treat various illnesses, yet only 1% of these plants have been identified by scientists. In plants with antibacterial characteristics, such as alkaloids, tannins, and flavonoids, secondary metabolites are widely distributed. The use of medicinal plants to treat various diseases is made possible by their low toxicity and adverse effects [2]. In the current study, *Pimpinella stewartii* was examined for its ethanol fraction and a preliminary phytochemical examination of the plant, as well as an assessment of its antibacterial, antifungal, and cytotoxic actions against oral pathogens [3]. The oral illnesses (dental caries, periodontitis, bleeding gums, toothaches, sores, bad breath, tooth sensitivity, tooth loss, and oral cancer) continue to be a serious global health issue despite advances in dentistry [4, 5]. There are estimates that 2.3 billion people worldwide have permanent tooth decay, and 530 million children worldwide have primary tooth decay [6]. There is ample evidence connecting oral disease to risk for colorectal cancer, bleeding gums, toothaches, preterm birth in expectant moms, chronic renal disease, myocardial infarction, and strokes [7, 8, 9, 10]. *Pimpinella stewartii* can be either annual or perennial. Simple or complex leaves plants that range in height from 50cm to 1m. long tap root Upper leaves are shorter and have linear segments, while lower leaves are heavily split and bipinnate, with pinnae that are three-lobed and pinnatisect. many tiny umbels, five linear, pubescent bracts make up the involucre. Rays 3–12, pubescent, 1–1.5 cm long. The involucre is composed of five linear to lanceolate, hairy, white-margined, and ciliate-edged bractlets. Petal colour: white and pubescent. Styles are around 1 mm long; stylopodium is highly pubescent. Fruit is round, 2-3-vittate, 1.5-mm diameter, pubescent, and has no discernible ridges [11]. It is used to treat gastrointestinal diseases such as gas, indigestion, tooth ache, and griping discomfort, which are in agreement with what has already been described, using shade-dried leaves of *Pimpinella stewartii*. Often used as a flavouring element in curries and vegetables are the fresh leaves and aerial parts of this plant. The taxon's mean cultural value index (mCI) was 0.793 based on use reports, suggesting that rural populations in the mountainous areas of Haripur, Abbottabad, and Murree in particular are aware of *P. stewartii* as a species utilised in ethnomedicine. A significant interaction between nearby natural flora and local communities was also revealed by the current research [12].

2. MATERIALS AND METHODS

Procurement of Materials

The leaves of *Pimpinella stewartii* (Nasir.), was collected from district (Abbottabad) during session august 2021 and Identified by Prof. Dr Ghulam Mujtaba Shah, Chairman, Department of Botany, Hazara University Mansehra KP, Pakistan. After identification the voucher Number (15062) was assigned to the plant species and specimen were deposited in the Herbarium of Hazara University (HUP) for permanent record. The fresh as well as preserved leaves were used for evaluation. Few leaves were preserved in F.A.A (formaldehyde: acetic acid: alcohol). The remaining leaves were shade dried and then grounded to moderately coarse powder for further pharmacognostic analysis [13].

Pharmacognostic Study

Macroscopy of leaf

The fresh leaves were used to study macroscopic characters using stereo Zoom microscope [14]. Photographs were taken for evidence.

Microscopy of leaf

The fresh hand cut sections were prepared for microscopic studies [15]. A few dried and fresh leaf samples were sent to Sophisticated Analytical Instrument Facility (SAIF), Pharmacognosy lab, Department of Botany HU, Morphological observations of the stem leaves and flowers of both the plants were examined by digital microscope. The sections were observed under the magnification of 25 X to 20,000X. The cell contents were measured using stage and ocular micrometer [16]. The leaf constants such as stomatal type, stomatal index, vein-islet termination number, vein termination number, palisade ratio and trichome density were studied [17].

Powder analysis

The dried leaf powder was treated with aqueous chloral hydrate solution, mounted in 50% glycerin and then observed under microscope. The measurements were taken with the help of stage and ocular meter using standard procedure [18]. Photographs were taken for evidence.

Preliminary Phytochemical analysis:

The dry leaf powder was extracted with solvents like in ethanol. The extracts were filtered and used for the analysis as per the standard procedure [19, 20].

3. RESULTS

Organoleptic and Macroscopy of Leaves

The leaves of *Pimpinella stewartii* (Nasir.), organoleptic approach were used to macroscopically observe and record the powder drug's flavour, consistency, aroma, and colour. It has been determined that *Pimpinella Stewartii* produces organoleptic outcomes as described in. The leaf powder appears to be green in colour, has a gritty texture, a bitter flavour, and a potent minty aroma. It can be either annual or perennial. Simple or complex leaves plants that range in height from 50cm to 1m. Long tap root Upper leaves are shorter and have linear segments, while lower leaves are heavily split and bipinnate, with pinnae that are three-lobed and pinnatisect. many tiny umbels, five linear, pubescent bracts make up the involucre. Organoleptic approach was used to macroscopically observe and record the powder drug's flavour, consistency, aroma, and colour. It has been determined that *Pimpinella Stewartii* produces organoleptic outcomes as described in the leaf powder appears to be green in colour, has a gritty texture, a bitter flavour, and a potent minty aroma (Figures 1 & 2).



Fig 1: Habit of *Pimpinella stewartii* (Nasir.)



Fig. 2 Powder of leaves of *Pampillina Stewartii*

Table.1 Macroscopic characters of powder drug of Leaf

S. No	Characters	Observations
1	Odor	Strong minty smell
2	Color	Green
3	Texture	Rough
4	Taste	Bitter

Microscopic study of leaves

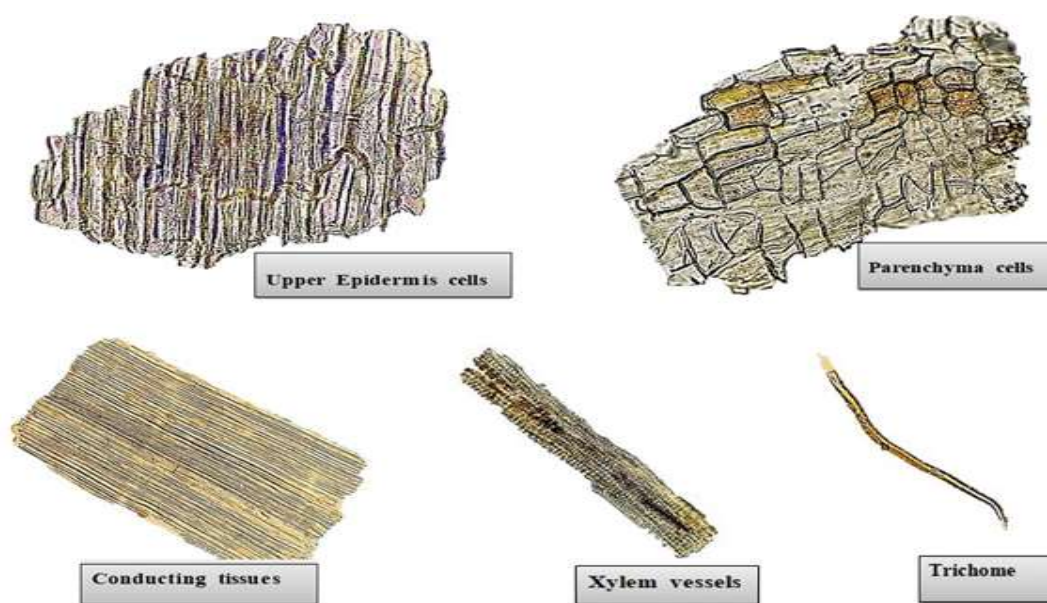
T.S. of fresh matured leaf passing through midrib, shows following layers:

Microscopical Characters

Using a microscope with a 40X magnification, powder medication from *Pampillina Stewartii* leaves was examined. The findings demonstrated that almost every form of cell, including stomata, trichome, epidermis, several types of tracheids, fibres, parenchymatous cells, etc., were recorded. Microscopy was performed on each cell after it had been captured.

Table.2 Microscopical Characters of *Pampillina Stewartii* Leaf

Sr. No	Cell Types	Length (μm)	Width (μm)
1.	Epidermal Cell	55	75
2.	Trichome	75	25
3.	Parenchymatous cell	85	112
4.	Xylem vessels	80	30
5.	Conducting element	120	65

Fig.3 Powdered drug anatomy of leaves *Pampillina Stewartii*

Epidermal anatomy

The epidermis of a *P. Stewartii* leaf's upper (abaxial) and lower (adaxial) surfaces were investigated.

Quantitative Characters

The epidermal cells on either side have a wavy or polygonal form. Square or spherical shapes are typically found in epidermal cells. Guard cells that resemble beans can be found in anomocytic stomata.

Quantitative Characters

Using a microscope with a 10X magnification, a leaf of *P. Stewartii* was seen. The findings support the existence of two layers of epidermal cells in plants. The breadth and length, shapes and size presence of stomata are been noted (Table 3).

Table.3 Quantitative character of *Pampillina Stewartii* Leaf

S. No.	Features	Observation(μm)
1	Total epidermal cells present in the area	19-21
2	Length of epidermal cell	19 μm
3	Width of epidermal cell	13 μm
4	Total stomata in the area	7
5	Length of stomata	14 μm
6	Width of stomata	16 μm

Stomatal Number (SN) and Stomatal index (SI) analysis

Pampillina Stewartii leaves have seven stomata and between 19 and 21 epidermal cells in the research region. Stomatal index is therefore 25. (Table No 3).

Stomatal Index

Stomatal index	
Stomatal index	25 μm
Number of epidermal cells in the area	21 μm
Number of stomata in the area	07 μm

$$\text{Stomatal index (SI)} = \frac{S \times 100}{S + E}$$

- SI = Stomatal index
- E = Number of epidermal cells per unit area
- S = Number of stomata per unit area

Section cutting of *Pampillina Stewartii* leaf

A *Pampillina Stewartii* leaf section's upper epidermis shows that the outermost layer is composed of one layer of uneven cells with fibres and trichomes. Stomata are found on the leaf's two surfaces. The vascular packs that contain xylem and phloem are found in the leaf's core. It contains trichomes. There are some parenchyma and sclerenchyma cells in the mesophyll area. They serve the purpose of mechanical support (Figure 4).

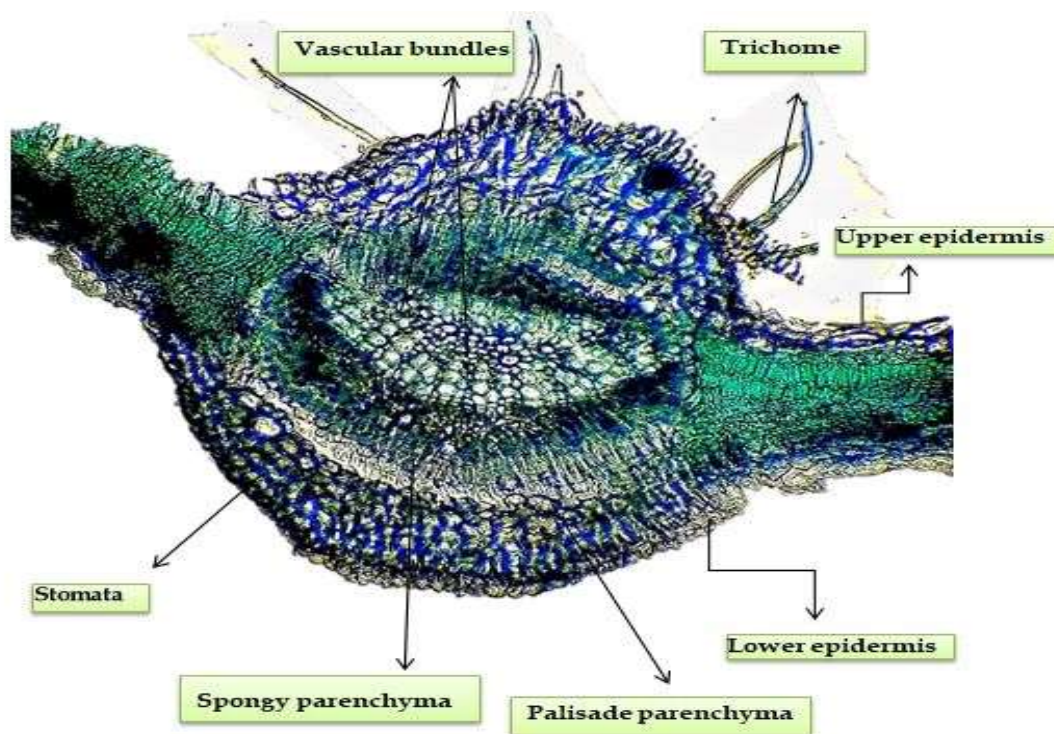


Fig.4 Transverse sections of *Pampillina Stewartii* Leaf

Preliminary phytochemical analysis

The qualitative phytochemical analysis of powder drugs revealed the presence of various primary and secondary metabolites. The results are displayed in (Table 5).

Qualitative phytochemical analysis of *Pimpinella stewartii*

Phytochemical analysis revealed that the crude extract of *Pimpinella stewartii* included many different types of compounds such as phenolic, glycosides, flavonoids, alkaloids, quinones, carbohydrates, amino acids, terpenoids and coumarins was change in colour. However, the Tannins, Saponins and sterols test results for the crude extract showed no change in colour (Table No 4).

Table No.4 Qualitative phytochemical analysis of ethanolic extract of *P. stewartii*

S.No	Constituents	Present (+)	Absent (-)
1	Phenols	+	
2	Glycosides	+	
3	Tannins		-
4	Flavonoids	+	
5	Alkaloids	+	
6	Saponins		-
7	Quinones	+	
8	Sterols		-
9	Carbohydrates	+	
10	Amino acids	+	
11	Terpenoids	+	
12	Coumarins	+	

Negative sign (-) indicate absence, **positive sign (+)** indicate presence

Discussion

The plant *Pimpinella stewartii* (Nasir.), is a common species growing in dry, sometimes rocky places from 700 to 2500 m. For the identification of crude drugs, pharmacognostic study constitutes unique importance. In the current work pharmacognostic study of *Pimpinella stewartii* was carried out to document the macroscopic study of leaf of selected plants, microscopic study that is anatomy of leaves (Transverse sections of leaf), epidermal anatomy, stomatal index, powdered drug and phytochemical analysis of leaf of selected research plants was studied for, while the different extracts of the various parts studied plants were analyzed for bioassays and ethanolic extract of the aerial parts of the *Pimpinella stewartii*. Powdered drug study of *Pimpinella stewartii* along with microscopy, transverse section of leaf as well as leaf constant values such as stomatal index, vein islet number and vein termination number was analyzed. Transverse section of leaf of selected research plants is Abaxial and adaxial surface of the leaves are composed of closely packed epidermal cells, a waxy cuticle covers the outer walls of the epidermal cells which is thicker on adaxial surface as compare to abaxial surface. Schizogenous canal glands are also prominent which is the characteristics feature of the members of family rutaceae for secretion of essential oils. Schizogenous gland sac on leaves is

the characteristics for the members of Rutaceae family [21]. The powder drug's flavour, consistency, aroma, and colour were macroscopically examined and noted using the organoleptic approach. *Pampillina Stewartii* organoleptic results have been identified and described in (Table No 2 and fig. No 3). The leaf powder has a fragrant fragrance, a little bitter flavor, and a fine texture. The color appears to be green. The crude extract of *Pimpinella stewartii* contained numerous different types of chemicals, including polyphenols, glycosides, flavonoids, alkaloids, quinones, carbohydrates, amino acids, terpenoids, and coumarins, according to a phytochemical examination. However, the results of the tests for tannins, saponins, and sterols for the crude extract revealed no alteration in colour (Table No 4.). The presence of these 89 components is necessary for advanced research on plant extract. Previous investigations using different *Datura metel* L and *Salix mucronata* extracts produced consistent findings [22, 23, 24]. The roots are scented. It is used by the aboriginals for curing various illnesses. Due to this, it becomes one of the important crude drugs. In order to prove its efficacy as hair growth promoter the first step is the standardization of the crude drug. For the correct identification, the gross macroscopical study is of great value. The microscopical studies along with powder study are useful in authenticating the crude drugs in fragments or in powder form. The elements such as warty trichomes, simple trichome and glandular trichomes play a vital role. The anisocytic stomata and the cell inclusions like starch grains, calcium oxalate crystals are also of significance. The data obtained from preliminary phytochemical profiling of the said plants parts with histochemical analysis have revealed the presence of secondary metabolites of therapeutic importance. The said investigations will be of useful in bringing these less known crude drugs to manifold. The detail phytochemistry and pharmacological studies are in progress.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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