



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2019; 8(3): 604-607  
Received: 13-03-2019  
Accepted: 15-04-2019

**Suchita Patel**  
Department of Pharmacognosy,  
Shree Swaminarayan Sanskar  
Pharmacy College, At. & Post:  
Zundal, Gandhinagar, Gujarat,  
India

**Divyang K Patel**  
Department of Pharmacognosy,  
Pioneer Pharmacy Degree  
College, Ajwa Nimeta Road,  
Vadodara, Gujarat, India

**Dr. Bhavesh Nayak**  
Department of Pharmacognosy,  
Shree Swaminarayan Sanskar  
Pharmacy College, At. & Post:  
Zundal, Gandhinagar, Gujarat,  
India

## Pharmacognostical & physicochemical evaluation of *Parthenium hysterophorus* plant

Suchita Patel, Divyang K Patel and Dr. Bhavesh Nayak

### Abstract

**Background:** *Parthenium hysterophorus* is declared invasive weed belongs to family *Asteraceae* & it is threatening the biodiversity and human health in several areas of India. Until date no pharmacognostical & physicochemical evaluation has been reported for this plant.

**Aim:** The present study deals with the complete morphological, microscopic, physicochemical & phytochemical screening of whole plant of *Parthenium hysterophorus*.

**Materials and Methods:** Thin transverse sections of fresh root, stem & leaf were taken for the morphological & microscopical studies. Dried whole plant powder was used for physicochemical analysis. For preliminary phytochemical study aqueous extractives of plant were used.

**Results:** Detailed Pharmacognostic study of leaf, stem and root indicated the plant was dicotyledons type. In proximate analysis of plant, the value of loss on drying was found to be  $4.05 \pm 0.5\%$  w/v. The total ash, acid insoluble ash & water soluble ash were found to be  $14.28 \pm 0.72\%$  w/w,  $4.76 \pm 0.24\%$  w/w &  $9.52 \pm 0.48\%$  w/v respectively. The alcohol soluble extractive, water soluble extractive values were found to be  $32 \pm 1.0\%$  &  $16 \pm 0.95\%$  w/v respectively. Phytochemical screening of aqueous extract of *Parthenium hysterophorus* showed the presence of triterpenoids, alkaloids, flavonoids, steroids and glycosides.

**Keywords:** *Parthenium hysterophorus*, pharmacognostic study, proximate analysis, aqueous extracts

### 1. Introduction

*Parthenium hysterophorus* is a noxious & invasive alien weed plant belongs to family *Asteraceae*. This plant is commonly known as bitter weed, false ragweed congress weed, carrot weed or white top. This plant is majorly growing as a weed plant in Australia, South Africa, Mexico, India, Pakistan, Nepal, Vietnam and many other parts of the world. [1, 2] This plant was first introduced into India during 1950's & it was first appeared in Pune, Maharashtra. [3] This plant is traditionally used for the treatment of fevers, migraine headaches, rheumatoid arthritis, stomachaches, toothaches, insect bites, infertility, and problems with menstruation and labor during childbirth [4]. However, there are no reports on the pharmacognostical features of the plant. Hence, the present investigation is an attempt in this direction and includes morphological and microscopic evaluation, determination of physico-chemical constants and preliminary phytochemical screening of aqueous extracts of *Parthenium hysterophorus*.

### 2. Materials & Methods

#### 2.1 Collection and Authentication of Drug

The whole plant of *Parthenium hysterophorus* was collected from agriculture university of Jagudan, Mehsana, Gujarat, India and authenticated by Dr. Hitesh A. Solanki, Associate Professor, Department of Botany, University School of Sciences, Gujarat University, Ahmedabad, Gujarat, India. The specimens were deposited at Department of Pharmacognosy, Shree Swaminarayan Sanskar Pharmacy College, Zundal, Gandhinagar, Gujarat, India.

#### 2.2. Macroscopic evaluation

The samples were cleaned under running tap water, and macroscopic evaluation of whole plant was carried out. The leaf, stem, root & flowers were separated & individual macroscopic characters were studied according to methods given in Evans [5].

#### 2.3. Microscopic evaluation

Free hand transverse sections of leaf, stem & root were taken and cleared with chloral hydrate solution. All the sections were first observed in distilled water & then stained with Phloroglucinol and Conc. HCl. The slides were mounted using glycerin. Microphotographs were taken by using Carl-zeiss-trinocular microscope.

**Correspondence**  
**Divyang K Patel**  
Department of Pharmacognosy,  
Pioneer Pharmacy Degree  
College, Ajwa Nimeta Road,  
Vadodara, Gujarat, India

## 2.4. Powder microscopy

The shade dried whole plant of *Parthenium hysterophorus* was powdered well & powder was passed through sieve no 60. The prepared powder was examined for specific microscopic characters.

## 2.5. Physicochemical parameters

Physicochemical parameters like loss on drying, total ash, acid insoluble ash, water soluble ash, water soluble extractive & alcohol soluble extractive values of dried whole plant material were obtained as per standard protocol adopted by Ayurvedic Pharmacopoeia of India [6].

## 2.6. Extracts Preparation

The coarsely powdered sample drug of *Parthenium hysterophorus* was extracted with water by maceration method. The aqueous extract was filtered and concentrated to a dry mass using the oven.

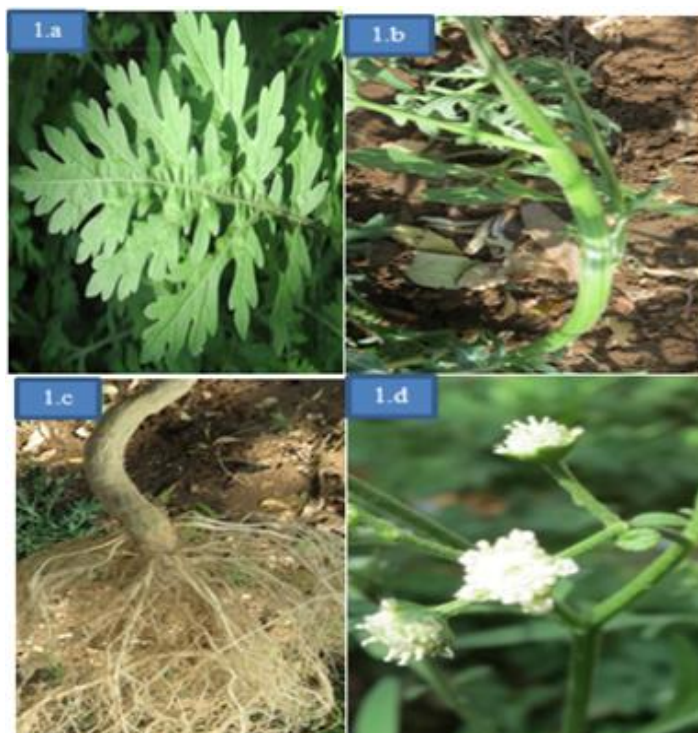
## 2.7. Phytochemical screening of Aqueous extracts

The extracts were subjected to various qualitative chemical tests to determine the presence of various phytoconstituents like alkaloids, glycosides, carbohydrates, phenolics and tannins, phytosterols, proteins, amino acids, flavonoids, saponins, volatile oils & triterpenoids etc. using reported methods [7, 8].

## 3. Results & Discussion

### 3.1. Macroscopic evaluation of different parts of plant

Leaf of *Parthenium hysterophorus* is green in colour & has aromatic odour, bitter taste, basal rosette, bipinnatifid or pinnatifid, 3-20 cm long, 2-10 cm wide [Fig 1a]. Stem of is light Green in colour & has aromatic odour, bitter taste, unbranched in lower part & branched in upper part, longitudinally striated, 1.5-2 m long [Fig 1b]. Root has greyish brown to grey colour & is odourless, astringent & bitter taste, branched & contain root tips 7-8 [Fig 1c]. Flowers are whitish cream in colour, with sweet odour & astringent taste, heads small, numerous in open panicles; rays- 0.6 mm long; disk corollas cream colored, 1 mm long [Fig 1d].



**Fig 1:** Morphology of leaf [1.a], stem [1.b], root [1.c], flower [1.d]

## 3.2. Microscopic evaluation

### 3.2.1. T.S of leaf

Epidermis was single layered, wavy in shape and made up of parenchymatous cells. It bare, multicellular covering trichomes on both the surface. Trichomes were 3 to 6 cells, curved often with pointed apex & warty. Some cells were normal & some were collapsed in it. The last cell of the covering trichomes were almost knee shape. Hypodermis was made up of 1 to 2 layers of thick walled parenchymatous cells. Underneath both the epidermis of the midrib, there was well developed 3 to 4 layers of collenchyma were seen. The remaining ground tissue of the midrib was parenchymatous, which contained 3 to 4 vascular bundles. It consisted of xylem, phloem & group of pericyclic fibres. Vascular bundles were bicollateral types in which phloems were present at both the side of xylems. Xylems were lignified & contained 5 to 6 rays [Figure 2a].

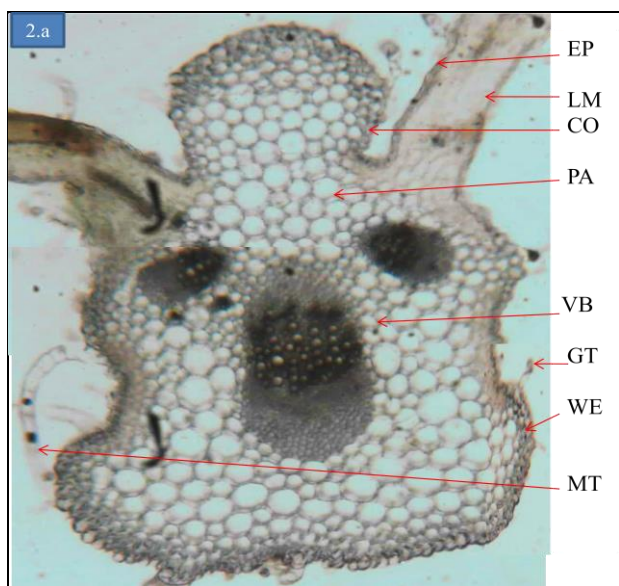
### 3.2.2. T.S of stem

Epidermis was made up of single layer of thick walled parenchymatous cells containing multicellular covering trichomes. Hypodermis was made up of 8 to 10 layer of collenchymatous cells. Below thick walled parenchyma, there are two ridges. In between two ridges outer part of the cortex contained thick walled cells and inner layer consist of bigger parenchyma. Endodermis was seen clearly on pericyclic as a single layer. Pericyclic fibres were lignified, polygonal & thick walled. Vascular bundle was bicollateral type & arranged in the form of ring. Upper part of it consisted of phloem in which two types of cells were present. Upper portion was made up of polygonal cells & lower portion was radially arranged & rectangular to polygonal in cells. Xylem was present below the phloem. Metaxylem lying towarded the epidermis & Protoxylem lying towarded the center part. Surrounding the xylem vessel xylem fibres were seen. They

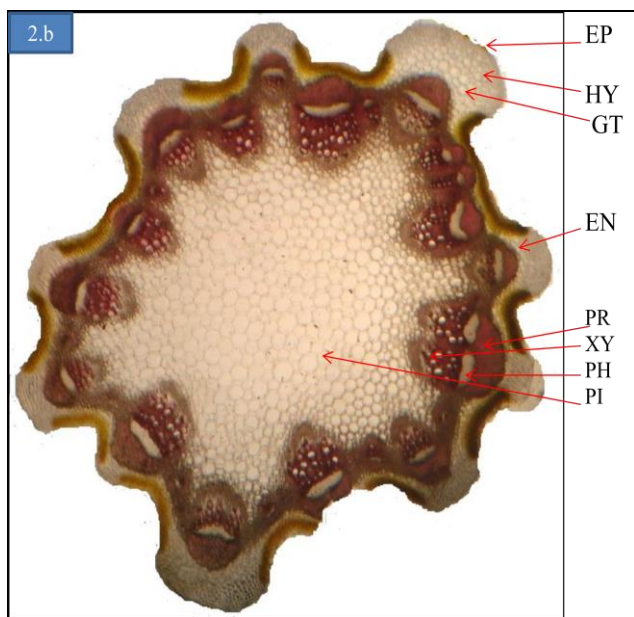
were thick walled & non-lignified. Below it thick walled lignified xylem vessels were seen. Pith was seen at the center part of the T.S. which consisted of round shape parenchymatous cells. About one half portion of the T.S was occupied by parenchyma of pith [Figure 2b].

**3.2.3. T.S of root**

On the outer part of the T.S. the cork were present which is made up of 3 to 4 layer of polygonal cells. Cortex was made up of 7 to 8 layers of parenchymatous cells. On cortex region the scattered stone cells were present which were lignified & very few in numbers. Phloem was made up of 7 to 8 layers. Xylem vessels were radially arranged & 3 to 4 in group. It was present in the form of ring. Primary xylems were present at the center. Xylem fibres were non lignified, polygonal & thick walled. Calcium oxalate prisms were found in it [Figure 2c].



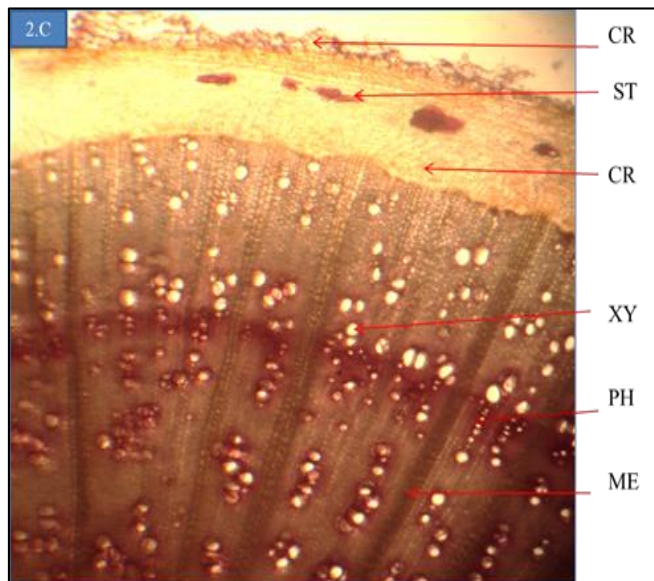
**Fig 2a:** T.S of Leaf



**Fig 2.b:** T.S of stem

**Fig 2.a:** EP-Epidermis, LM-Lamina, CO-Cortex, PA- Parenchyma cells, VB- Vascular bundle, GT-Glandular Trichome, MT- Multicellular covering trichome

**Fig 2.b:** EP-Epidermis, HY-hypodermis, GT-Ground tissue, EN-Endodermis, PR-Pericycle, XY- Xylem, PH- Phloem, PI-Pith

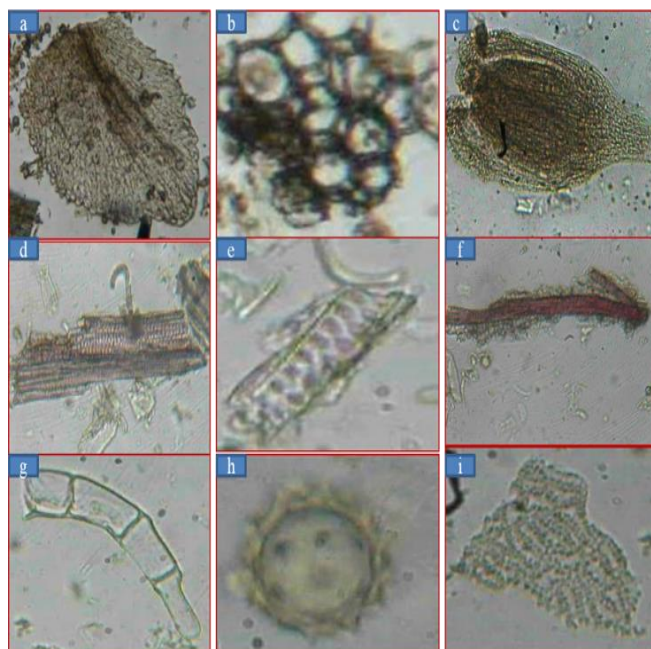


**Fig 2.c:** T.S of root

**Fig 2.c:** CR- Cork, ST-Stone cells, XY- Xylem, PH- Phloem, ME- Medullary rays

**3.2.4. Powder microscopy**

Powder microscopy of dried whole plant *Parthenium hysterophorus* showed flowering characters like corolla, anther, pollen and pollen sac. Other powder characters such as cork, lignified vessels, pitted vessel, lignified fibre, multicellular covering trichomes were also observed. [Figure 3]



**Fig 3:** Powder microscopic characters of whole dried plant (a) corolla (b) cork cells (c) anther (d) vessels (e) pitted vessel (f) lignified fiber (g) trichome (h) pollen (i) pollen sac

**3.3. Physicochemical parameters**

Results for various physicochemical parameters are given in table no 1.

**Table 1:** Results of Physicochemical Parameters

Parameter	Result obtained (% w/w)
Loss on drying	4.05±0.50
Total ash	14.28±0.72
Acid insoluble ash	4.76±0.24
Water soluble ash	9.52±0.48
Alcohol soluble extractive	32.00±1.0
Water soluble extractive	16.00±0.9

### 3.4. Phytochemical screening of Aqueous extracts

Results of phytochemical screening of aqueous extract of *Parthenium hysterophorus* are given in Table no.2.

**Table 2:** Preliminary Phytochemical screening of aqueous extracts of *P. hysterophorus*

Class of Phytoconstituents	Result
Carbohydrates	Absent
Alkaloids	Present
Flavonoids	Present
Phenolics/Tannins	Absent
Proteins	Absent
Amino acids	Absent
Steroids	Present
Glycosides	Present
Saponins	Absent
Volatile oils	Absent
Triterpenoids	Present

### 4. Conclusion

Different pharmacognostical parameters such as morphology, microscopy study, powder studies, physicochemical analysis & preliminary phytochemical studies of plant *Parthenium hysterophorus* were carried out to obtain the information which can be useful for correct identification of crude drugs as well as standardization and quality assessment of the plant. Furthermore, it may be useful to establish monograph details on the Plant which is not available in any of the literature.

### 5. Acknowledgement

Authors are greatly thankful for the laboratory facility and support provided by department of Pharmacognosy, Shree Swaminarayan Sankar Pharmacy College, Zundal, Gandhinagar, Gujarat.

### 6. References

1. Ratikanta H, Shahidar R, Nazmul H. A review on *Parthenium hysterophorus* L. a noxious alien weed. Global advanced research journal of plant science. 2016; 2(1):1-10.
2. Lalitha P, Shivani K, Rama Rao R. *Parthenium hysterophorus* – an economical tool to increase agricultural productivity. International Journal of Life Sciences Biotechnology & Pharma Research. 2012; 1(1):113-127.
3. Khare CP, Indian Medicinal Plants. Springer. New York, 2007; 464.
4. Roy DC, Shaik M. Toxicology, Phytochemistry, Bioactive compounds and Pharmacology of *Parthenium hysterophorus* Journal of Medicinal Plant Studies. 2013; 1(3):126-141.
5. Evans WC. Trease and Evans Pharmacognosy. London: WB Saunders Company Ltd. 15<sup>th</sup> edition, 2002; 519-521.
6. The Ayurvedic Pharmacopeia of India. Ministry of Health and Family Welfare, Department of Indian

Systems of Medicine and Homoeopathy; New Delhi. 3 (Part 1) 1<sup>st</sup> edition, 2001, 234-35.

7. Shah B.N. and Nayak B.S. Experimental Pharmacognosy. 1<sup>st</sup> Edition. S. Vikas & Company, 2008; 190-200.
8. Khandelwal K.R. Practical Pharmacognosy Techniques and Experiments. 11<sup>th</sup> edition. Nirali Prakashan, Pune, 2004, 149-152.