

# Pharmacognostical and Phytochemical Investigations on *Vernonia anthelmintica* Willd

Mital N Manvar<sup>1\*</sup>, T R Desai<sup>2</sup>

**Abstracts:** Medicinal plants play a vital role to preserve our health. They are the nature's gift to human being to have disease-free healthy life. *Vernonia anthelmintica* Willd. (Family- Asteraceae) is an annual plant commonly known as kalijiri in India. According to Ayurveda and Unani system of medicine, it has been used extensively for treatment of some diseases like asthma, kidney troubles, inflammatory swellings, leucoderma, worm infection and convulsion. In present investigation, the detailed pharmacognostic study of *Vernonia anthelmintica* Willd. fruit is carried out to lay down the standards which could be useful in future experimental studies. The study includes macroscopy, microscopy, preliminary phytochemical screening and physicochemical evaluation.

## INTRODUCTION

*Vernonia anthelmintica* Willd. (Family- Asteraceae) is an annual, erect and leafy plant. It is commonly known as kalijiri and found throughout India<sup>(1, 2)</sup>. Its medicinal usage has been reported in the traditional system of medicine such as Ayurveda and Unani. It has been used extensively for treatment of some diseases like asthma, kidney troubles, inflammatory swellings, leucoderma, worm infection and convulsion<sup>(2)</sup>. It has been found to possess various therapeutic activities, viz. anti-inflammatory<sup>(3)</sup>, anti-arthritis<sup>(4)</sup>, antidiabetic<sup>(5)</sup>, anthelmintic<sup>(6)</sup>, antioxidant<sup>(7)</sup>, antibacterial<sup>(8)</sup>, anticancer<sup>(9, 10, 11)</sup> and many more.

However, a key obstacle, which has hindered the acceptance of the alternative medicines in the world, is the lack of their documentation and quality control parameters. So it becomes extremely important to make an effort towards standardization of the plant material to be used as medicine. The objective of the present study is to evaluate various pharmacognostic standards like macroscopy and microscopy of fruit; microscopical characteristics of powdered fruit, physicochemical parameters and preliminary phytochemical analysis of *Vernonia anthelmintica* Willd. fruits.

## MATERIALS AND METHODS

The fruits of the plant *Vernonia anthelmintica* were collected from Rajkot district of Gujarat, India. The plant material was identified by Botany Dept., Kotak Science College, Rajkot and a voucher specimen (Voucher No. AIP/12/01) has been retained in Department of Pharmacognosy, Atmiya Institute of Pharmacy, Rajkot, Gujarat. Dried fruits used for macroscopical studies and after shocked in water used for microscopical studies. Coarse powder (# 60) of fruits was used to study microscopical characters of fruit, physicochemical parameters and phytochemical investigation. The detailed pharmacognostical studies of the plant fruits were carried out according to well known methods and procedures<sup>(12-16)</sup>. The preliminary phytochemical screening was done by successive solvent extraction of dried fruits powder using petroleum ether (60-80°C), toluene, chloroform, acetone, methanol and water by soxhlet extractor. Then perform identification

tests for various phytoconstituents and their results were again conformed by thin layer chromatography as per well known methods and procedures<sup>(15-18)</sup>. All the chemicals and solvents used in experiment were of analytical grade.

## RESULTS

### Macroscopic Characters

Fruits are oblong cylindrical with flatten hairy apex and cap like base; 4.5-6 mm in length and about 1 mm in diameter. Fruits consists 10 ridges and abundant small cream silky hairs on outer surface. Externally fruits are brownish-black with extremely bitter taste and characteristic odour (Figure 1).

### Microscopic Characters

Transverse section of fruit shows a well differentiated pericarp, testa and endosperm. Pericarp consists of an external single layer of epicarp, a large parenchymatous mesocarp and single layer of endocarp. Epicarp consists of single layer of parenchymatous cells with abundant unicellular pointed trichomes mainly on ridges and sessile glandular trichomes with reddish orange secretion. Mesocarp consists of transparent compactly pack parenchyma embedded with vascular bundles below each ridge, yellow colored bunch of collenchymatous cells and wavy band of thick walled sclereids. Endocarp consists of single layer of thick walled cells. Testa is represented by two layers, outer integument with beaker shaped cells and inner integument with thin wall transparent parenchymatous cells. Endosperm forms the bulk of the testa and lies within. Compactly pack polygonal endosperm cells contain abundant oil secretion, also presence of aleurone grains (Figure 2).

### Powder Microscopy

The fine powder was mounted in glycerin as well as stained (phlorogucinol + Concentrated HCL). Observation of microscope showed presence of unicellular pointed trichomes, sessile glandular trichomes, yellow collenchymatous cells, lignified fibres, abundant oil globules, brown testa cells, compact polygonal transparent endosperm cells, xylem vessels and so on (Figure 3, 4, 5 and 6).

### Physicochemical Parameters

Ash values of a drug give an idea of the earthy matter or the inorganic composition and other impurities present along with the drug. Extractive values are primarily useful for the determination of exhausted or adulterated drugs. The results of these parameters are shown in table 1.

<sup>1</sup>Department of Pharmacognosy, Atmiya Institute of Pharmacy, Yogidham Campus, Kalawad Road, Rajkot, Gujarat, India.

E-mail: mital\_manvar@rediffmail.com

\*Corresponding aauthor

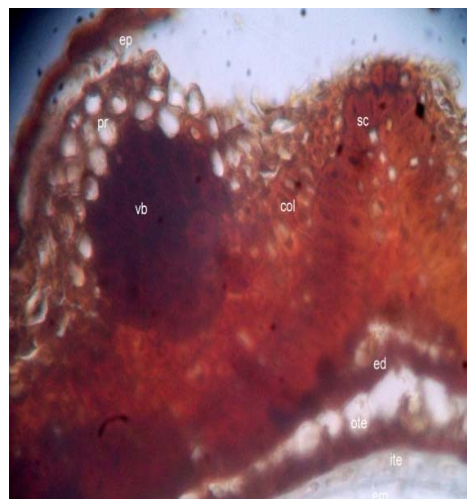
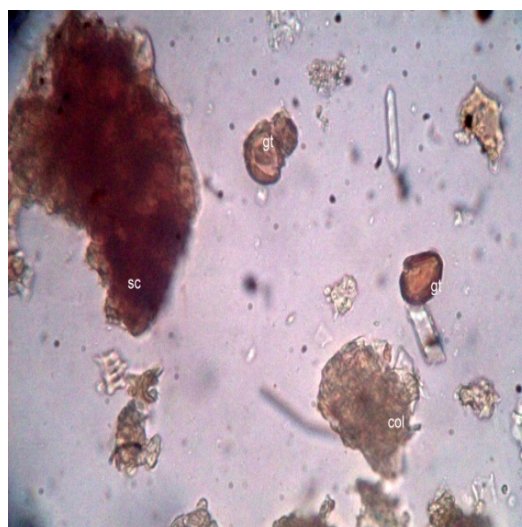
<sup>2</sup>R K University, Rajkot, Gujarat, India.

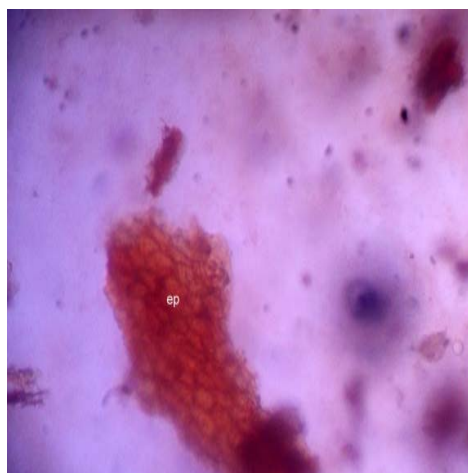
**Table 1: Physiochemical parameters of fruit**

Parameters	Value (% W/W)
Total ash	6.05
Acid-insoluble ash	0.50
Water-soluble ash	0.025
Alcohol soluble extractive	22.24
Water soluble extractive	9.68
Ether soluble extractive	17.86
Loss on drying	2.55

**Table 2: Results of successive solvent extraction**

Extracts	Color and Consistency	%W/W	Phytoconstituents
<i>Petroleum ether (60-80°C) extract</i>	Greenish brown, oily	17.86	Phytosterols, fix oil
<i>Toluene extract</i>	Reddish brown, semisolid	1.96	Phytosterols
<i>Chloroform extract</i>	Reddish brown, semisolid	1.01	Alkaloids
<i>Acetone extract</i>	Brownish red, semisolid	3.36	Phytosterols, alkaloids and phenolic compounds
<i>Methanol extract</i>	Brown, semisolid	7.73	Phenolic compounds and carbohydrates
<i>Water extract</i>	Brown, solid	1.12	Saponins, carbohydrates, phenolic compounds and proteins

**Figure 1:** *V. anthelmintica* fruits (4x)**Figure 2:** Transverse section of *V. anthelmintica* fruits (45x). col collenchymatous cells, ed endocarp, em endosperm, ep epicarp, ite inner integument of testa, ote outer integument of testa, sc sclereids, vb vascular bundle**Figure 3:** Powder study of *V. anthelmintica* fruits (45x). ut unicellular trichome, col collenchymatous cells**Figure 4:** Powder study of *V. anthelmintica* fruits (45x). col collenchymatous cells, gt glandular trichome and sc sclereids



**Figure 5:** powder study of *v. anthelmintica* fruits (45 xs). ep epicarp



**Figure 6:** Powder study of *V. anthelmintica* fruits (45x). fb fibres

### Preliminary Phytochemical Screening

Preliminary phytochemical screening mainly revealed the presence of phytosterols, alkaloids, saponins, phenolic compounds, fatty acids, carbohydrates and proteins. The different phytoconstituents are present in different extracts. The percentage yield, color, consistency and phytoconstituents present in different extracts of successive solvent extraction are given in table 2.

### DISCUSSION

In the present investigation, the detailed pharmacognostical as well as phytochemical analysis are given which includes macroscopic and microscopic characters, which will be helpful for the correct botanical identification of the drug. Fruits of *Vernonia anthelmintica* possess abundantly unicellular trichomes, sessile glandular trichomes and sclereids. Ash values and extractive values can be used as reliable aid for detecting adulteration. The information obtained from preliminary phytochemical screening will be useful in finding out the genuinity of the drug. Hence it was thought worth to investigate pharmacognostical profile along phytochemical analysis of the fruit will assist in standardization for quality, purity and sample identification.

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