# Pharmacognostical and Phytochemical Evaluation of Root of *Tephrosia villosa* Pers.

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Present study deals with the macroscopical and microscopical studies of root of *Tephrosia villosa* Pers. Some distinct and different characters were observed with section of young thin roots. The anatomy of the root was studied by taking transverse section. Secondary Xylem and secondary Phloem were observed. Secondary Phloem is broad and occurs all around the Xylem cylinder. Secondary Xylem zone has thick discontinued masses of gelatinous fibres in the outer part and intact phloem elements and inner part (Fig. 2). Secondary Xylem is divided into three wide fan shaped wings due to formation of wide Xylem rays. Powder microscopical examination showed the presence of Xylem parenchyma cells, Xylem fibres and vessel elements. Physiochemical parameter and Preliminary Phytochemical studies of the root powder were also carried out. The present study on Pharmacognostical investigation of *Tephrosia villosa* Pers. root might be useful to supplement information in regard to its identification parameters assumed significantly towards the acceptability of herbal drugs in present scenario lacking regulatory laws to control quality of herbal drugs.

**Keywords:** *Tephrosia villosa* Pers., Roots.

## Introduction

*Tephrosia villosa* Pers. (Fabaceae) is a much-branched, perennial herb, upto 90 cm high, densely clothed with white, silky hair, found in Punjab, Rajasthan, Gujarat, Tamilnadu, Madhya Pradesh, Uttar Pradesh, Bihar and West Bengal. It is well known as *Punaikkaivettali* (Tamil), *Nooguvempali* (Telugu), *Sroetokolothiya* (Oriya) *Runchhalisarpankho* (Gujarat). Its root is used as hypoglycemic agent and in dropsy[1, 2]. The plant contains rotenoids, prenylated flavonone[3]. The objective of present study is to focus on Pharmacognostical and Phytochemical characteristics of root of *Tephrosia villosa* Pers. (Fig. 1).

## Material and Method

### *Plant Material*

The plant specimens for the proposed study were collected from Salem district (T.N.) in the month of June 2006, care was taken to select healthy plants and for normal organs. The plant was authenticated by Dr. R. Marimuthu, Department of Botany, Principal, Government Arts College, Attur, Tamilnadu. The required samples of different organs were cut and removed from the plant and fixed in FAA (Formalin – 5 ml + Acetic acid – 5 ml + 70% Ethyl alcohol – 90 ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary – butyl alcohol as per method[4]. Infiltration of the specimens were carried out by gradual addition of paraffin wax (melting point 58-60°C) until TBA solution attained super-saturation. The specimens were cast into paraffin blocks.

**Fig. 1**
**Root of *Tephrosia villosa* Pers.**

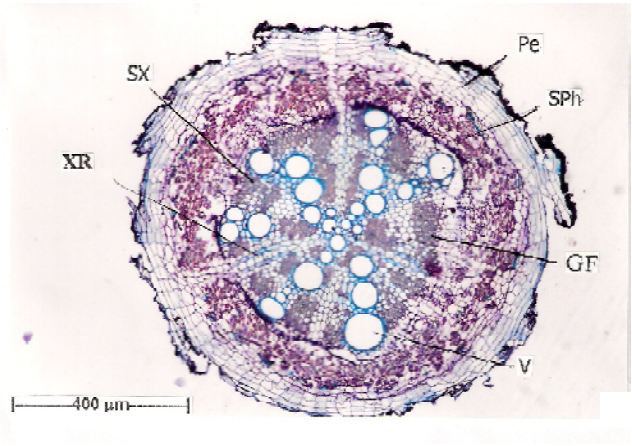


**Fig. 2**
T.S of root of *Tephrosia villosa* Pers.

Pe = Periderm, Sph = Secondary Phloem, GF = Gelatinous Fibres, V = Vessel, XR = Xylem ray, SX = Secondary Xyl

### *Sectioning*

The paraffin embedded specimens were sectioned with the help of rotary Microtome. The thickness of the sections were 10-12 mm. Dewaxing of the sections was done by customary procedure[5]. The sections were stained with Toluidine blue as per the method[6]. Since Toluidine blue is a polychromatic stain, the staining results were remarkably good and some cytochemical reactions were also observed. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, blue to the protein bodies etc. Wherever necessary, sections were also stained with safranin and Fast-green and IKI (for Starch).

### *Photomicrographs*

Microscopic description of tissues were supplemented with micrographs wherever necessary. Photographs of different magnifications were taken with Nikon Lab Photo 2 Microscopic Unit. For normal observations, bright field was used. For the study of crystals, starch grains and lignified cells, polarized light was employed. Since these structures have birefringent property, under polarized light they appear bright against dark background. Magnification of the figures is indicated by the scale-bars[7].

### *Physicochemical Parameters*

Physicochemical parameters of roots of *Tephrosia villosa* Pers. were determined such as Total ash, Acid insoluble ash, Water soluble ash, Sulphated ash, moisture content etc.[8, 9].

### *Preliminary Phytochemical Parameters*

Preliminary phytochemical test of *Tephrosia villosa* Pers. was performed and the chemical constituents were detected[10, 11].

## Results and Discussion

### *Macroscopy*

The root system consists of thin, long, hard, deeply penetrating tap root and profusely branched thin wiry lateral roots. The root surface is smooth and reddish brown. The root measuring about 1 cm in diameter was studied. It is roughly circular in outline with shallow fissures and thin flakes (Fig. 1).

### *Microscopy Study*

The root has broad distinct periderm which has replaced epidermis and a part of the cortex. The periderm is 70-80 µm thick consisting of 4 or 5 thin walled tabular phloem cells. It is uniform in thickness and continues all around the root. Cortical tissue is very narrow comprising three or four oblong cells. Secondary Phloem is broad and occurs all around the Xylem cylinder. Secondary Xylem zone has thick discontinued masses of gelatinous fibres in the outer part and intact phloem elements in the inner part (Fig. 2). Secondary Xylem is divided into three wide fan shaped wings due to formation of wide Xylem rays. Primary Xylem is tri arch and occurs intact in the center of the Xylem cylinder. The secondary Xylem segment has limited number of vessels which are narrow in the center, wide towards periphery.

The vessels occur in five or six radial rows. Vessels are circular, thick walled and solitary. The widest secondary Xylem vessel is about 50 µm in diameter. The ground tissue of the secondary Xylem consists of thick irregular masses of gelatinous fibers and thin walled wide lignified fibers. The gelatinous fibers have cellulose in inner walls which stained purple in toluidine blue stain. When the secondary Xylem is viewed under polarized light microscope, lignified vessels and fibres appear bright. In the Xylem rays dense accumulation of starch grains is seen. A few prismatic crystals are also seen in the outer part of the Phloem (Fig. 3).

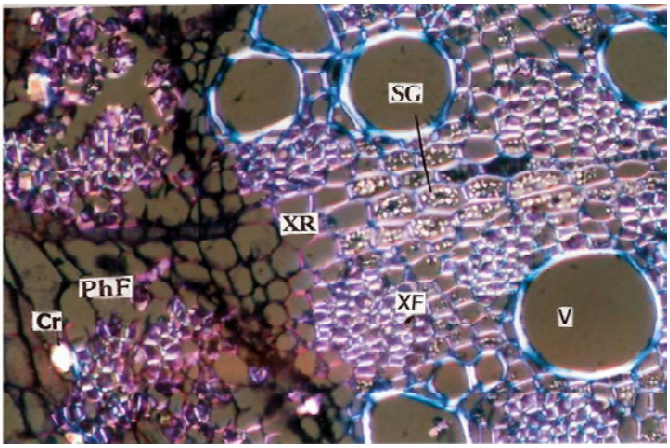


**Fig. 3**
T.S. of root of *Tephrosia villosa* Pers. (sector enlarged)

Cr = Crystal, PhF = Phloem Fibres, XR = Xylem Ray,
SG = Starch Grain, V = Vessel, XF = Xylem Fibres

## Powder Microscopy

### *Powder of the Root Showing Three Elements*

1. Xylem fibres: They are long, narrow, thin walled and pointed at the ends, they are 800-900 µm long
2. Parenchyma: They are also long, narrow parenchyma cells with simple pits

3. Vessel elements: The vessel elements are wide, cylindrical and short. Most of them have thin, narrow tails at one end. Some of the vessels are tailless. The tailed vessels are 200-230 µm long.

The tailless vessel elements are 150 µm long. The lateral walls of the vessels have wide, elliptical dense boarded pits. The perforation plates are wide, circular and horizontal (Figs. 4-5).

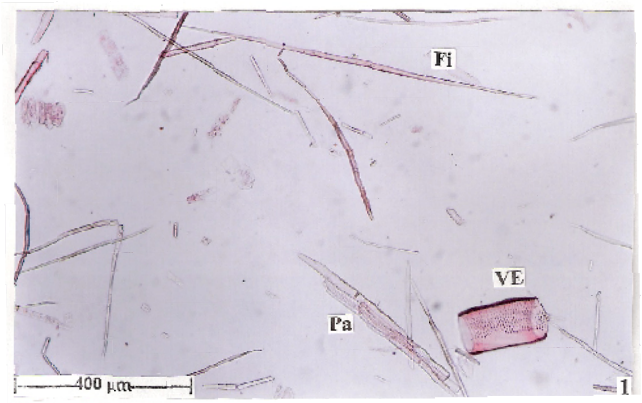


**Fig. 4**
Powder microscopy of *Tephrosia villosa* Pers.

Fi = Fibers, VE = Vessel Element, Pa = Parenchyma cell

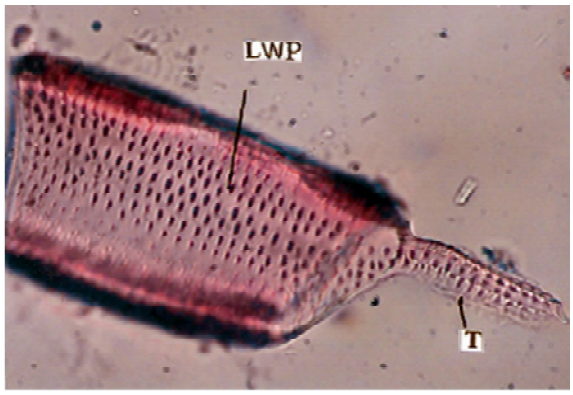


**Fig. 5**
Powder microscopy (Tailed vessel element)

T = Tail, LWP = Lateral Wall Pits

## Physicochemical Parameters

Roots of *Tephrosia villosa* Pers. powder showed the presence of total ash 4.0% w/w, acid insoluble ash 1.2722% w/w, water soluble ash 2.0624% w/w, sulphated ash 6.0% w/w, alcohol soluble extractive 0.2424% w/w water soluble extractive –1.0408% w/w and moisture content 7.204% w/w.

## Preliminary Phytochemical Studies

Ethanolic extract of roots of *Tephrosia villosa* Pers. showed the presence of various Phytoconstituents such as glycosides, saponins, triterpenoids, tannins and flavonoids.

## Conclusion

The present Pharmacognostical studies of roots of *Tephrosia villosa* Pers. might be useful to supplement information in regard to its identification parameters assumed significantly towards acceptability of herbal drugs in present scenario that lack regulatory laws to control quality of herbal drugs.

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