



## Research Article

### PHARMACOGNOSTIC AND PHYTOCHEMICAL EVALUATION OF *TEPHROSIA PURPUREA* LINN PERS.

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#### ABSTRACT

Wild Indigo or Sharpunkha occurs throughout the India and most ancient part. It is widely used in the treatment of diabetes, rheumatism, asthma and liver disorders, diarrhea and wound healing. Pharmacognostic evaluation is important tool for standardization of this plant. Hence this study is carried out in *Tephrosia purpurea* stem and whole plant extracts. From these studies carried out pharmacognostic and phytochemical evaluation of both extracts. Physicochemical parameter evaluation suggests that Extractive value of the methanolic extractive value is higher than other solvent as the phytoconstituent, are soluble in methanol. Phytochemical screening indicates the presence of higher amount of carbohydrate, protein, alkaloid, flavonoid, saponin, phenolic compound, fatty acids. The values were also obtained in satisfactory way. All the data of plant profile is used for the identification of quality of plant parts.

**Keywords:** *Tephrosia purpurea*, Tephrosin, Transverse section, Ash Value, Phytochemical screening.

#### INTRODUCTION

Medicinal plants are serves as primary tool in the preservation of health as well as prevention management of disease is well known. Now day's medicinal plants are treated as subject of serious study and intense research. The world health organization WHO defines good health as a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity, which is in close approximate to the definition of good health mentioned in Ayurvedic classics.<sup>1</sup> The medicinal plants play a major role in revitalizing the local health tradition. Role of Ayurveda in the country's healthcare is delivery; regulatory mechanism to control and regulate manufacturing and utilization of the drugs. Medicinal plant-based drug has now advantageous over modern drugs. As such are long history of use and better patient tolerance as well as public acceptance, renewable source cultivation and processing environmentally friendly, local availability, plant may major source of lead generation. Several recent break through are gugulipid, taxol, artemisinin.<sup>2,3</sup>

Medicinal plant contains so many chemical compounds which are the major source of therapeutic agents to cure human disease.<sup>4</sup> All over the world at present there is great activity as scientists investigate plants, micro-organism, marine creatures and new other form of life for biological activity. It is very relevant to the discovery of new drugs for treating disease of human beings and other mammals.<sup>5</sup>

Traditionally *Tephrosia purpurea* has described 'sarva warnavishapak' means it has property to healing all types of wounds<sup>6</sup>. Botanical Source of *Tephrosia* is *Tephrosia pupurea* belonging to family Leguminosae (Fabaceae) It is an important component of some preparations such as *Tephrolol* and *Yakrifit* used for liver disorders<sup>7</sup>. Traditionally drug is used as liver tonic.

*Tephrosia purpurea* is commonly known in English as wild indigo and in Gujarati 'Ghodakan' *Tephrosia purpurea* is a self-generating erect or spreading perennial herb found throughout India. It can be found as an ingredient in traditional herbal formulations. Whole plant may be used for its rich flavonoids and polyphenol content<sup>8</sup>. *Tephrosia purpurea* traditionally used to cure several types of external wounds and gastro-duodenal disorders. Drug is used in cough, tightness of chest. Decoction of root is useful in enlargement and obstruction of liver, spleen and kidney<sup>9</sup>. Also used for dyspepsia and chronic diarrhea<sup>10</sup>. Gargle of *Tephrosia purpurea* is used to wash out mouth<sup>11</sup>. Root is also used in inflammation, skin disorders, elephantitis, flatulence, hemorrhoids, asthma, bronchitis, anemia, dysmenorrhea, chronic fever, boils, pimples; gingivitis.<sup>12</sup> *Tephrosia purpurea* contains Tephrosin A, Tephrosin B, Purpurine, Rotenone and Spinasterol<sup>13</sup>. Leaves of the plant are used in dyspepsia, pectoral disease, hemorrhoid, syphilis and gonorrhea<sup>14</sup>. Whole plant has been used to cure tumors, ulcers, leprosy, allergic and inflammatory condition such as rheumatism asthma and bronchitis an extract of pods is effective as analgesic, anti-inflammatory and their decoction is used in vomiting like symptoms.<sup>15,16</sup>

*Tephrosia Purpurea* is contains alkaloids, flavonoids, tannin, glycosides and sterol. The extract of *Tephrosia purpurea* whole plant contains (-)-Isolonchocarpin, Karanji, Purpurenone, (+)-Purpurin, (-)-Purpurin, Dehydroisoderricin, (-)-Maackiain<sup>17,18</sup>, Tephrosin, Pongaglabol, Semiglabrin, Purpuritenin, Purpureamethide, Pongamol, Lanceolatin B, (+)-Tephrosin A, (+)-Tephrosin B, (+)-Tephrosone, Pseudosemiglabrin, (-)-Semiglabrin, Tepurinflavone, Pongamol, 7,4-Dihydroxy-3',5'-Dimethoxy Isoflavone, (+)-Tephropurpurin, Medicarpin, 3'methoxydaidzein, Desmethoxyphyllin B, 3, 9-Dihydroxy -8-Methoxycoumestan, Isoglabratephrin, Quercetin, rutin. Extract

Contains Neoflavanoid Glycoside Serritin 7-O-[B-D-Glucopyranosyl]-O-β - D-Galactopyranoside. Extract Contains Ester Such As Stigmast-5, 22-Dien-34, 21 Diol-34, 21-Dihexadecanoate. Extract Contains Sterol Such As β-Sitosterol, Spinasterol –A, acids such as Ursolic Acid.<sup>19-21</sup>

**Table 1: Taxonomical Description**

<b>Scientific name</b>	<b><i>Tephrosia purpurea</i></b>
Common names	Sharpunkha, wild indigo
Kingdom	Plantae
Sub kingdom	Tracheobionta
Superdivision	Spermatophyta
Divison	Magnoliophyta
Class	Magnoliopsida
Sub class	Rosidae
Order	Fabales
Family	Leguminosae (Fabaceae)
Subfamily	Papilionaceae
Genus	Tephrosia Pers.
Species	<i>Tephrosia purpurea</i> (Linn) Pers.



**Figure 1: Whole Plant and Stem of *Tephrosia purpurea***

## MATERIAL AND METHODS

### Collection and authentication of Plant Material

Fresh whole plant and Stem of *Tephrosia purpurea* was procured from Nehru ayurvedic nursery, Gandhinagar. *Tephrosia purpurea* whole plant and stem were authenticated by department of genetics and plant breeding, B.A College of agriculture, Anand Agriculture University with the authentication no BACA/GPB/651/14. The collected parts of the plant were washed properly and dried in shed and powdered with mechanical grinder to make coarse powder. The resulting powder was used for extraction.

### Extraction of plant material

The method is based on extraction of active constituents present in the crude powder material. Powder of whole plant and stem were extracted by Soxhlet process using 100 ml of each of Methanol, Chloroform, Petroleum ether and water separately. Fresh stem and whole plants were collected, shed dried for 7 days and coarsely powdered with mechanical grinder passed through sieve 40#. 100 g of whole plant and stem powder packed into thimble of Soxhlet and was extracted with Methanol, Chloroform, Petroleum ether and water at 60 °C using Soxhlet apparatus. All the different extracts were filtered and concentrated under reduced pressure in rotary evaporator below 60 °C and stored in desiccators.<sup>22</sup>

### Pharmacognostical and phytochemical evaluation

#### Macroscopical, Microscopic and Powder evaluation

Macroscopical evaluation of the whole plant and stem of *Tephrosia purpurea* is performed by studying in different organoleptic characters such as shape, colour, size, surface characteristics, odor, texture and taste. For the microscopical evaluation of leaf and stem were washed properly clean with water and then thin and sharp transverse section was taken. The section was treated with chloral hydrate and stained with phloroglucinol and conc. hydrochloric acid and finally mounted with glycerin on slide and observed under microscope.

#### Physicochemical parameter Evaluation

All physicochemical parameter was performed as per WHO Guidelines.<sup>23</sup> Physicochemical parameters of whole plant and stem powder of *Tephrosia puprea* total ash value, Water soluble ash value, acid-insoluble ash value, Loss on Drying and extractive values were expressed in various solvent such as Methanol, Chloroform, Petroleum ether and water. Saponification value, foaming index and acid value were carried out methanol extracts.

#### Phytochemical Evaluation

Presence of various phytoconstituent such as alkaloid, glycoside, carbohydrate, terpenoids and saponin, flavonoid, phenolic and steroidal were analyzed in different extracts such as Methanol, Chloroform, Petroleum ether and water. All phytochemical constituent evaluation was carried out by standard preliminary test for phytochemicals.

**RESULT AND DISCUSSION**

**Morphological Evaluation**

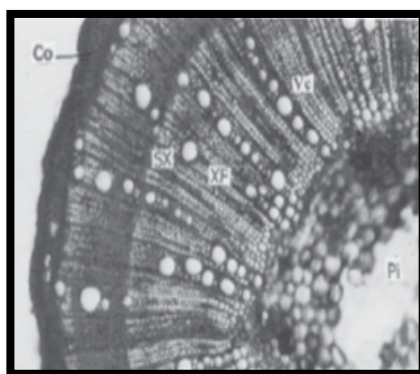
*Tephrosia purpurea* is a self-generating erect or spreading perennial herb. Shape of leaves stipule narrowly triangular, including the petiole of up to 1 cm. Leaflets were Obovate to narrowly elliptical, acute at base, apex rounded to emarginated, venation usually distinct on both surfaces. Leaflets are 8-10 attach at the base. Upper surface was dark greyish green, while lower surface was light in color than upper surface. Leaves have aromatic, characteristic odor and unpleasant bitter taste. Flowers are reddish purple on terminal or leaf opposed peduncles. Seeds were Rectangular to transversely ellipsoid; light to dark brown to black, sometimes mottled and dark brown spot was seen. The stem was branched cylindrical, woody, light brown color odor less, bitter taste having root hairs and also small branches were seen at the bottom of stem. Pods was slightly recurved, glabrous or softly pubescent, 5-6 seeded. Roots were Pale yellow-brown taproot systems, with secondary and tertiary branches. At places

bacterial nodules present. Scars present on old tap root 3 cm - 5 cm. In diameter powder of root powder is slight brown and unpleasent bitter taste.

**Microscopical Evaluation**

Microscopic investigation of stem was carried out. The pith is fairly wide with central cavity It has thick walled epidermal layer and narrow cortex with parenchymal cells. The vascular cylinder is thick dense and exhibits one or two growth rings. Xylem cylinder is wide, and it consists of xylem rays, fibers and vessels. The vessels circular is to oval in section. Medullary rays were uniseriate present with xylem. Central portion of the pith contains calcium oxalate crystal.<sup>23,24</sup>

Microscopical study of powder of whole plant showed that unligified covering trichomes, cork cells of root, also showed the xylem fibers, vessel. Calcium Oxalate crystal of root were seen.



**Figure 2: Transverse section of *Tephrosia purpurea***  
Pi: Pith, SX: Secondary xylem, XF: Xylem Fiber, Ve: Vessels, Co-Cortex

**Physicochemical parameter Evaluation**

Physicochemical standardization was performed as per WHO. Physicochemical parameter of *Tephrosia purpurea* stem were as below.<sup>17</sup>

**Table 2: Physicochemical Screening of Stem Extracts**

S. No.	Physicochemical Parameter	(w/w Percentage) of Stem Extract	(w/w Percentage) of Whole Plant Extract
	<b>Extractive Value</b>		
1	Water Extractive	16.34	15.21
2	Methanol Extractive	23.61	30.15
3	Chloroform Extractive	10.72	9.25
4	Petroleum ether Extractive	9.83	10.21
	<b>Ash Value</b>		
1	Loss on Drying	3.84	3.69
2	Total Ash	4.9	4.12
3	Water soluble ash	2.75	2.12
4	Acid-Insoluble ash	1.50	0.99

**Phytochemical Screening of Extract**

**Table 3: Phytochemical Screening of Stem Extracts**

S. No.	Type of test	Various Extract of <i>Tephrosia purpurea</i> Stem			
		Water	Methanol	Chloroform	Petroleum ether
1	<b>Test for carbohydrate</b>				
	1.Molisch's Test	-	++	-	-
	2.Fehling's Test	-	+	-	+
	3.Barfoed's Test	-	+++	+	-

2	<b>Test for protein and free amino acids</b>				
	1.Millon's Test	-	++	+	-
	2.Biurete Test	-	++	-	-
3	<b>Test for phenolic compounds</b>				
	1.Ferric Chloride Test	+	+++	-	+
	2.Lead Acetate Test	+	+++	+++	+
4	<b>Test for phytosterol</b>	-	-	-	-
5	<b>Test for glycoside</b>				
	1.Legal's Test	-	+	-	-
	2.Baljet Test	+	-	+	+
	3.Borntrager's Test	-	++	+	-
	4.Modified Borntrager's Test	-	++	-	-
6	<b>Test for alkaloids</b>				
	1.Mayer's Test	+++	+++	+	+++
	2.Dragendorff Test	+	+++	+++	++
	3.Wagner's Test	++	+++	+	-
7	<b>Test for flavonoids</b>				
	1.Shinoda's Test	+	+++	+++	++
	2.Ferric Chloride Test	+	+++	-	+
	3.Fluroscence Test	++	+++	+	+++
	4.Zinc Hydrochloride Reduction Test	-	+++	-	+
8	<b>Test For Fats And Oil</b>				
	1.Spot Test	+	++	-	-
9	<b>Test For Saponin</b>				
	2.Saponification Test	-	+	+	-
10	<b>Test For Coumarins</b>	-	-	-	-

(+), (++) , (+++) indicates Presence of constitute in Lower, Moderate and Higher amount respectively. (-) Absence of constitute<sup>25</sup>

**Table 4: Phytochemical Screening of Whole plant Extracts**

S. No.	Type of test	Various Extract of <i>Tephrosia purpurea</i> Stem			
		Water	Methanol	Chloroform	Petroleum ether
1	<b>Test for carbohydrate</b>				
	1.Molisch's Test	-	++	+	+
	2.Fehling's Test	+	+	-	+
2	<b>Test for protein and free amino acids</b>				
	1.Millon's Test	+	++	+	++
	2.Biurete Test	-	++	++	+
3	<b>Test for phenolic compounds</b>				
	1.Ferric Chloride Test		+++	+	++
	2.Lead Acetate Test	+	+++	-	++
4	<b>Test for phytosterol</b>	+	++	+	++
5	<b>Test for glycoside</b>				
	1.Legal's Test	++	+	++	-
	2.Baljet Test	+	++	+	+
	3.Borntrager's Test	+	++	+	-
6	<b>Test for alkaloids</b>				
	1.Mayer's Test	+	+++	+++	+
	2.Dragendorff Test	+	+	++	++
	3.Wagner's Test	+	+	+	+++
7	<b>Test for flavonoids</b>				
	1.Shinoda's Test	+	+++	+++	+++
	2.Ferric Chloride Test	-	+	-	+
	3.Fluroscence Test	+	++	++	+++
	4.Zinc Hydrochloride Reduction Test	+	++	-	+
8	<b>Test For Fats And Oil</b>				
	1.Spot Test	+	++	+	+
9	<b>Test For Saponin</b>				
	2.Saponification Test	+	+	+	++
10	<b>Test For Coumarins</b>	-	-	-	-

(+), (++) , (+++) indicates Presence of constitute in Lower, Moderate and Higher amount respectively. (-) Absence of constitute.

*Tephrosia purpurea* is ancient plant with therapeutically activities. Morphological and microscopical evaluation of leaf, stem, flower and roots are different characters and special reference to various types of cells. Physicochemical Parameter evaluation the total ash value was approximately 4 times more than acid insoluble ash indicating presence of inorganic component in stem extracts. Methanolic extractive value is higher than Water, chloroform and petroleum ether extractive value. From the phytochemical screening test shows that stem and whole plant extract contains alkaloid, glycoside, saponin, flavonoids and high amount of carbohydrate, protein and phenolic content in higher amount in methanolic extract. *T. purpurea* Plant is used therapeutically for various treatment so it is important to standardize plan.

## CONCLUSION

Standardization is the prime requirement for the quality of herbal drugs. These help in the establishment of quality and identify profile that can be used for the purpose of safety monitoring and overall quality assurance of herbal medicine. *Tephrosia purpurea* is known as ‘Sarawran Vishapaha’ in Ayurvedic literature which means it has the power to cure all kinds of wounds. Hence it is very essential to establish pharmacognostical standardization. From the present investigation encouraging and can be used for the standardization of *Tephrosia purpurea* stem and whole plant extract.

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