PHARMACOGNOSTICAL PROFILING ON WHOLE PLANT TEPHROSIA PURPUREA (L.) PERS (SARPUNKHA)
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ABSTRACT
Background: Wild Indigo or Purple Tephrosia occurs throughout the India. It is widely used in diseased conditions like asthma, diabetes, diarrhoea, inflammation, rheumatism and many other diseases. The different parts of plant reported to contain flavonoids like rutin, quercetin, retinoids, deguelin, elliptone, rotenone, tephrosin and steroids such as sitosterol. Aim: But so far the pharmacognostic standardization of whole plant has not been reported for its proper identification. Hence the present study was carried out for the establishment of Pharmacognostical standardization of whole plant. Methods: Macroscopy, powder analysis (Organoleptic and powder microscopy), physiochemical properties like ash values, extractive values and HPTLC Profile of whole plant was done. Results and conclusion: In powder microscopy unicellular trichomes of different sizes, vessels with annular thickening were observed. Water soluble and alcohol soluble extractives were found to be 12.5% and 8.3% respectively. By observing morphological, powder microscopical, physicochemical and HPTLC characters the given crude drug is confirmed as whole plant of Tephrosia purpurea.

Keywords: Tephrosia purpurea, Pharmacognosy, Phytochemistry, HPTLC, Sarpunkha

INTRODUCTION
Tephrosia purpurea Linn. commonly known in Sanskrit as Sarapunkha, in English as Wild indigo belongs to family Leguminosae. The genus Tephrosia comprises between 300 to 400 species of annual and perennial woody herb, distributed in tropical and subtropical regions of the world. The Sanskrit word Sarapunkha generally means Sara, an arrow and punkha, the wings; i.e. if both the ends of its leaf are held and pulled, edges like that of an arrow are formed. It is also called plihashatr, meaning an enemy of the spleen (splenic diseases). In Ayurvedic literature this plant has also given the name of “Sarva vramvishapaha” which means that it has healing property in all types of wounds 1. The plant has high economic value due to the presence of phytochemicals like flavonoids, alkaloids, carbohydrates, tannins and phenols, gums and mucilage, fixed oils and fats and saponins and lipids. Flavonoids have antioxidants and they have strong antimicrobial activity 2. It is also used in the treatment of bronchitis, bilious febrile attack, boils, pimples and bleeding piles 2. Flower is used in the treatment of bronchitis, asthma, liver and spleen disorders 3. Root is also effective in inflammation, skin disorders, elephantitis, flatulence, hemorrhoids, asthma, bronchitis, anaemia, dysmenorrhea, chronic fever, boils, pimples, gingivitis 4. Infusion of seed is used as anthelmintic oil. Also used in skin disorders like scabies and leucoderma 5. Whole plant is effective as digestive, anthelmintic, antipyretic, laxative, liver and spleen disorders, heart, tumors, ulcers, leprosy, asthma, bronchitis, piles, carries teeth 6. Seeds are used for poisoning due to rat bite. Leaves are used for diseases of lungs and chest, intestinal problems, gonorrhea, piles and syphilis 7. Sarapunkha is generally used in splenic diseases, tumors, enlargement of liver and spleen, diabetes and skin diseases 8. In Ceylon, used as anthelmintic for children. In Punjab, infusion of seeds considered cooling. In Sri Lanka, decoction of roots used as nematicide for treatment of Toxocara canis larvae which causes lung disease. Also used for colic, diarrhoea and dyspepsia, and as anthelmintic. Fresh root-barks are ground and made into a pill, mixed with a little black pepper powder, used for obstinate colic. In Indian medicine, a common ingredient of formulations for liver ailments. Also, used for bilious febrile attacks, liver, spleen infections, cirrhosis and hepatitis 8.

Previous photochemical investigations on materials of roots showed the presence of coumarins, flavonoids rotenoids, flavanones, isoflavonanes and quercetin (1:1:1). Recently invented constituents are an isoflavone, 4- dihydroyx-3, 5 dimethoxysilavone, chalcone, tephropurpurin, purpurin, pongamol, lanceolatin B, Different cell structures were studied and measured maackiaain, 3-hydroxy-4-methoxy-8, 9-methylene-Three novel flavonoids, (+)-tephorins A and B and (+)- tephrosone, were isolated.

MATERIALS AND METHODS
The plant specimen for the proposed study was collected from Contai West Bengal. It was identified and authenticated by a
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Taxonomist of Botany Department, P.K.College Contai. A specimen sample of whole plant kept in Pharmacy Dept of CARIDD, Kolkata. The pharmacognostical and phytochemical work carried out in Department of Pharmacognosy and chemistry of CARIDD, Kolkata.

Sarpunkha

Plant part: Whole plant
Botanical name: Tephrosia purpurea (L.) Pers.
Family: Fabaceae

Macroscopy

Macroscopical evaluation was done by observing the leaf, stem and root under simple microscope and with the naked eyes and taking note of the colour, size, odour and other diagnostic parameters. Different macroscopic parameters of the leaves, stem and root were noted. Evaluation of the leaves included the observation of type of leaf, shape, arrangement, apex, margin, venation, base, texture etc.

Powder microscopy

The coarsely powdered whole plant of T. purpurea was studied under the microscope. The powder was macerated in chloral hydrate reagent. The macerated powder was then stained with phloroglucinol, iodine reagents separately. Small quantities of the various stained powders were mounted on a slide with glycerine. Photomicrographs of the different cellular structures and inclusions were taken.

HPTLC PROFILE

Sample preparation: The dried plant powder 10 gm was subjected to hot extraction with methanol for 1 hour and extract was filtered using filter paper (Whatman-41). Whole extract was concentrated and taken for the following HPTLC profile.

Chromatography experimental

Stationary Phase: Precoated (support on Aluminum Sheets) Silica Gel Plate. Silica Gel 60F254 Mfg. by Merck

Mobile Phase: Hexane: Ethyl Acetate: Methanol, 6.0:3.0:1.0 (v/v) [G R grade solvent used, mfg. by MERCK, India]
Sample application: Applied volume 20 µL as 10 mm band and applied at 10 mm from the base of the plate. Plate size was 5x10 cm.

Development: Developed up to 80 mm in CAMAG Twin trough chamber, (temp 27°C and relative average humidity was 48%)

Derivatising Reagent: Dipped in 20% aq. Sulphuric acid and charred at 105°C for 10 minutes.

RESULTS AND DISCUSSIONS

Macroscopy:

Macroscopic investigation showed that leaflets having silky-hairy beneath. Pods 1.5-3.8 cm long, flat, linear, straight or slightly curved, at length glabrous. Seeds 4-8, blackish-brown, oblong, somewhat compressed, smooth, and glabrous. Roots having rough surface, curved, blackish gray in color. Stems are light yellow in color with 0.2-0.5mm diameter width.

Powder Analysis: The following characters are observed.

Organoleptic study: Powder creamish green in colour; texture-rough; odour- tobacco like odour, taste- Slightly bitter;

Microscopy: Powder sample shows that unicellular, simple horn shaped trichomes of various sizes, prismatic crystals of calcium oxalate, lignified border pitted, annular vessels, brown content, cork, simple, compound starch grains, xylem fibers and bundle of phloem fibers.
Fig. 2: Powder microscopy of whole plant of Tephrosia purpurea (L.) Pers. A, B. Unicellular trichomes of different sizes; C. Vessels with pitted thickening; D. Vessels with annular thickening; E. Brownish matter; F. Epidermis; G. Simple starch grains; H. calcium oxalate crystals and compound starch grains; I. Group of stone cells; J. Xylem fibres; K. Bundle of phloem fibres; L. Cork cells

Physicochemical Properties

Table 1: Physico chemical parameters of Sharapunkha

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Parameters</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Ash</td>
<td>2.3%</td>
</tr>
<tr>
<td>2</td>
<td>Acid insoluble ash</td>
<td>0.25%</td>
</tr>
<tr>
<td>3</td>
<td>Alcohol soluble extractive</td>
<td>8.3%</td>
</tr>
<tr>
<td>4</td>
<td>Water soluble extractive</td>
<td>12.5%</td>
</tr>
<tr>
<td>5</td>
<td>Loss on Drying</td>
<td>9.75%</td>
</tr>
</tbody>
</table>
HPTLC Result

$R_f$ values Observed at 366 nm: (0.04, 0.06, 0.09, 0.12, 0.24, 0.28, 0.39, 0.44, 0.48, 0.54, 0.59, 0.63, 0.69, 0.74)

$R_f$ values Observed at white light after derivatisation: (0.06, 0.09, 0.17, 0.21, 0.31)

Photography of HPTLC Plate of *Tephrosia purpurea* observed at 366 nm and white light after derivatisation

![Image of HPTLC Plate](image_url)

**Physicochemical Parameters**

Physicochemical parameters of Sarpunkha revealed that Total Ash (2.3%), Acid Insoluble Ash (0.25%), Alcohol soluble extractive (8.3%), Water soluble extractive (12.3%) and Loss on Drying (9.75%). [Table 1]

**CONCLUSION**

By observing morphological, organoleptic and powder microscopical characters the given crude drug is confirmed as whole plant of *Tephrosia purpurea* (L.) Pers (Sarpunkha).

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