

STANDARDIZATION OF SHIMSHAPA (*Dalbergia sissoo* Roxb.) STEM BARK W.S.R TO PHYSICOCHEMICAL AND PHYTOCHEMICAL EVALUATION

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ABSTRACT

India has a glorious traditional healthcare system based on plants. The usage of plants as food and medicine started earlier, later developed and systemized. In the present trend, plants are extensively used by man for maintenance of health and the treatment of myriad of illnesses. Plants are major source of medicinal and economical value all over the world. Due to the increasing demand of the herbal drugs worldwide, it became necessary to concentrate on the quality of the raw material used for herbal preparations. The quality that decides the efficacy of herbal drug. The quality standards are essential parameters that decide the safety and efficacy of herbal drugs. The tree *Shimshapa* (*Dalbergia sissoo* Roxb.), having great medicinal value is mentioned in various Ayurvedic Classics. The present article is informative and need of the hour as the *Ayurvedic* drugs are to be standardized for the statutory purposes as per standard testing protocol. The official standards considered are Identification, Physico-chemical parameters and phytochemical analysis, HPTLC and Rf values. The standards can be used for the identification and quality control of the product. This article aims at standardization of *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark powder for evaluation of pharmacognostical, physicochemical and phytochemical analysis. The pharmacognostical, physicochemical and phytochemical results were found to be as per the standards of Ayurvedic pharmacopeia of India. HPTLC was carried out and results found to be near the reference of analysis.

Keywords: *Shimshapa* (*Dalbergia sissoo* Roxb.), standardization, physicochemical.

INTRODUCTION

The usage of plants for food and medicine is existing since Vedic era. In Rigveda and Atharvaveda there is an elaborate description of medicinal plants. Medicinal plants are a major source of great economic value all

over the world. Nature has given us a very rich botanical wealth and large number of diverse types of plants in the world. According to World Health Organization more than 80% of the world's population relies on the

traditional medicine for their primary health care needs, which possess important therapeutic properties, that can be utilized in the treatment of diseases.

Though usage of plants changed from age to age, the central motive will always be prevention of health and cure of diseases. Due to the growing demand for the herbal drugs worldwide, there is a major concern regarding the quality of herbal drugs.

The quality of herbal drug is an essential factor that decides the safety and efficacy. The quality standards are the parameters that denote safety and efficacy. So, it becomes necessary for standardization of herbal drugs.

***Shimshapa* (*Dalbergia sissoo* Roxb.):**

Shimshapa (*Dalbergia sissoo* Roxb.) is a perennial tree that is economically important for its value in forestry, agro forestry and horticulture. It has great medicinal value and provides timber, fuel wood and fodder. It is useful for shading, erosion control, increasing soil fertility and as an ornamental tree.

It is native to the Indian sub-continent and known as Indian rosewood. It is a member of Papilionaceae and hence can be used for nitrogen fixation. The tree has many medicinal properties and has been used culturally for a variety of ailments including diabetes, fevers, eye-disorders, skin diseases and inflammatory disorders. It also possesses insecticidal and larvicidal properties.

It is a large deciduous tree with crooked trunk, reticulately longitudinally furrowed thick grey bark, exfoliating in narrow strips, young parts grey, downy; wood dark-brown, durable. Tree attains a height of about 100 ft., a girth upto 8 ft. and a clear bole upto 35 feet. Heartwood yellowish-brown.

Leaves alternate, with leaflets. Leaflets 3-5 in number, arranged alternate order; 2.5-7.5 cm. diam., broad-ovate or rhomboid, tough, acuminate, glabrescent, rachis 5-10 cm. zigzag, pubescent when young. Flowers yellowish white or pale white; racemes 2.5-3.8 cm. long, arranged in short axillary panicles.

Pods are oblong, flat, thin, strap-like 4-8 cm long, 1 cm wide and light brown. They contain 1-5 flat bean-shaped seeds 8-10 mm long.

Vernacular names:

Sanskrit: *Krishna Saara, Pingala, Mandala Patrika, Kapila.* **English:** Indian Rosewood, Malabar black

wood. **Hindi:** *Shisham, Shissu.* **Bengal:** *Shishu, Sisu.* **Gujarati:** *Sisam, Tanach.* **Kannada:** *Beete, Sissoo.* **Marathi:** *Kalarukh, Sisau.* **Malayalam:** *Karivittti, Iitti.* **Punjabi:** *Tali, Shisham.* **Tamil:** *Gette, Itti.* **Telugu:** *Iruguduchettu, Errasissu.* **Arab:** *Sasam, Sasim.* **Persia:** *Sisam.* **Urdu:** *Shisham.* **Konkan:** *Siso.* **French:** *Ebenier Juane.* **German:** *Ostindisches Rosenholz.*

Shimshapa (*Dalbergia sissoo* Roxb.) possesses *Kashaya, Katu, Tikta Rasas, UshnaVeerya, Laghu Ruksha Guna* and *Katu Vipaka*. It pacifies *Vata* and *Kapha*, promotes vitality, useful in *Kushtha, Prameha, Krimi, Jwara* and *Vata* disorders.

Aim & Objectives:

- 1) To standardize *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark powder
- 2) To carry out the pharmacognostical, physicochemical and phytochemical analysis of *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark powder.

Materials and Methods:

Shimshapa (*Dalbergia sissoo* Roxb.) bark was collected from Maheshawaram village, Mahbubnagar District. Genuine, good quality material which are free from any worm infection were collected, washed, dried in shade and stored in airtight dried container. Powder of enough quantity prepared, packed in a zip lock Polythene bag and labeled. This powder was used for clinical and Pharmacognostical study.

Pharmacognostical evaluation of *Shimshapa* (*Dalbergia sissoo* Roxb.) including Organoleptic, Transverse sections and Powder Microscopy tests were carried out. Transverse sections were made by free hand sections, powder microscopy of *Shimshapa* (*Dalbergia sissoo* Roxb.) was carried out with and without staining. Photomicrographs were taken using Binocular Microscope (10×40) attached with camera. Physicochemical and phytochemical analysis including HPTLC were carried out at Dept of Dravyaguna, Dr. B. R. K. R. Govt Ayurvedic College and Telangana State level Drug Testing Laboratory, Hyderabad as per the guidelines of Ayurvedic Pharmacopoeia of India.

RESULTS AND DISCUSSIONS

Organoleptic characters:

Smooth thin small fragments, astringent in taste, light brown in colour and indistinct odour.

Macroscopic description:

Colour: Grey or light brown, young parts, grey downy, inside light brown, soon turning to dark brown. Thickness: 0.1 to 3-5 cm. Nature: Reticulately longitudinally furrowed, exfoliating in narrow irregular woody strips & scales, fibrous. Odour: Indistinct.

Shimshapa (Dalbergia sissoo Roxb.) Bark



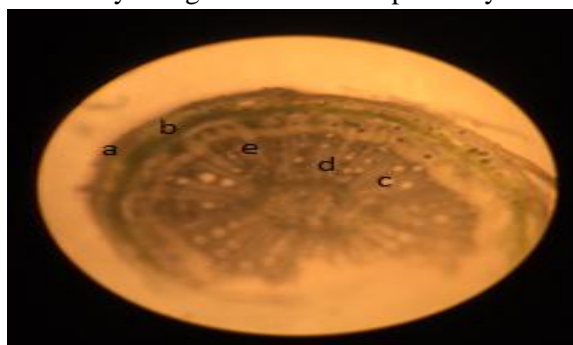
Shimshapa (Dalbergia sissoo Roxb.) Bark Powder



Microscopic description:

Transverse section of bark showed 6 - 25 or more rows

of rectangular thin walled, radially arranged cork cells, a few outer layers, exfoliating, secondary cortex wide consisting of round or oval, thin walled, parenchymatous cells, found scattered throughout secondary cortex, a few cortical cells contain prismatic crystals of calcium oxalate, secondary phloem very wide consisting of usual elements of thin walled cells and tangential strips of phloem fibres, collapsed, thin walled, parenchymatous cells present in tangential strips throughout secondary phloem, most of the phloem fibres and parenchyma cells contain prismatic crystals of calcium oxalate, phloem rays short, uni to triseriate, consisting of radially elongated thin walled parenchymatous cells.



a - Cork, b - Secondary cortex, c - Calcium oxalate crystals, d - Medullary ray, e - Phloem fibres

Powder microscopy:

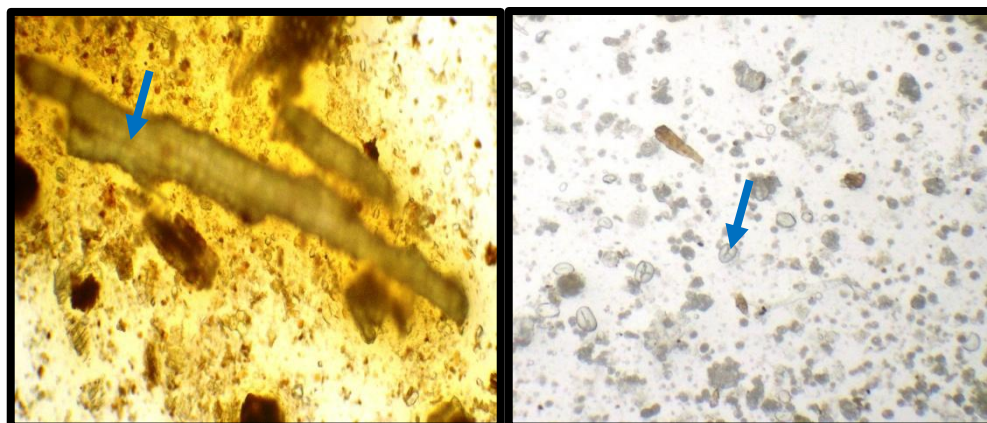
Light brown in colour, presence of trichomes, cork cells, xylem fibres, tracheids and starch grains. Shows thin walled parenchymatous cells, phloem fibres, fragments of cork cells and prismatic cells of calcium oxalate.

Powder Microscopy Of *Shimshapa*(*Dalbergia sissoo* Roxb.) Bark



Trichomes

Xylem fibres



Tracheids

Starch grains



Cork cells

Physico Chemical analysis of *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark powder

S.No	Characteristics	Values	API Values
1	Total Ash	12.79%	Not more than 14%
2	Moisture content	7.4%	-
3	Acid insoluble ash	0.09%	Not more than 2%
4	Water soluble extract	13.18%	Not less than 7%
5	Alcohol soluble extract	6.39%	Not less than 5%
6	pH value	6.54	-

All the physicochemical parameters are as per the standards of the Ayurvedic Pharmacopoeia of India.

Phytochemical analysis:

The preliminary Phyto chemical Analysis of

Shimshapa (*Dalbergia sissoo* Roxb.) stem bark powder shows the presence of Saponins in Aqueous extract, Glycosides in Chloroform extract. Phenols are present in both Ethanol and Methanol extracts.

Preliminary Phytochemical Analysis of *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark powder

Chemical Constituents	<i>Shimshapa</i>				
	Aqueous extract	Ethanol extract	Methanol extract	Chloroform extract	Ether extract
Steroids	-	-	-	-	-
Carbohydrates	+	+	+	+	-
Glycosides	-	-	-	+	-

Tannins	+	+	+	+	-
Saponins	+	-	-	-	-
Phenols	-	+	+	-	-
Proteins	-	-	-	-	-
Alkaloids	+	+	+	+	+

+ indicates presence, - indicates absence

HPTLC results: HPTLC study of Alcoholic extract of *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark powder is carried out in Telangana State Level Drug Testing Laboratory, Hyderabad.

The procedure is carried out with mobile phase Toluene: Ethyl acetate and obtained peaks at Rf 0.28 in Track – 1 and Track – 3 are as per reference and in Track - 2 it is in close proximity of powder sample of *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark as per the reference of analysis.

CONCLUSION

The present study involves pharmacognostical, physicochemical & phytochemical analysis of *Shimshapa* (*Dalbergia sissoo* Roxb.) stem bark powder towards its standardization. The pharmacognostical, physicochemical & phytochemical results were found to be as per

the standards of Ayurvedic pharmacopeia of India.

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winCATS Planar Chromatography Manager
State level Drug Testing Laboratory
Hyderabad

AR 31/12/18-

Analysis Report

Method
Created by: E:IPG Simsapa.cmc
State Level Drug Testing Laboratory Thursday, January 01, 2004 1:33:51 AM

Last modified by: State Level Drug Testing Laboratory Thursday, January 01, 2004 1:35:25 AM

SOP document
Validated
Description: Design

Analysis
Created/used by: E:IPG Simsapa.cmc
State Level Drug Testing Laboratory Thursday, January 01, 2004 3:19:55 AM

Current user: State Level Drug Testing Laboratory

Stationary phase

Executed by: State Level Drug Testing Laboratory Thursday, January 01, 2004 1:35:25 AM

Plate size (X x Y): 10.0 x 10.0 cm

Material: HPTLC plates silica gel 60 F 254

Manufacturer: E. MERCK KGaA

Batch: No

GLP code: No

Pre-washing: No

Medication: No

Definitions - Screening

Executed by: State Level Drug Testing Laboratory Thursday, January 01, 2004 1:35:25 AM

Samples

PG Simsapa

Sample application - CAMAG Linomat 5

Instrument
Executed by: CAMAG Linomat 5 "Linomat5_101017" SN 101017 (1.00.12)
State Level Drug Testing Laboratory Thursday, January 01, 2004 2:57:53 AM

Linomat 5 application parameters

Spray gas: Inert gas

Sample solvent type: Ethanol

Dosage speed: 100 nl/s

Predosage volume: 0.2 µl

Sequence

Syringe size: 100 µl

Number of tracks: 3

Application position Y: 10.0 mm

Band length: 6.0 mm

User: State Level Drug Testing Laboratory Thursday, January 01, 2004 3:19:59 AM

Approved:

Report ID: 010401010503133A

SN ANCHROM2, V1.4.3
Page 1 of 4

winCATS Planar Chromatography Manager

Sl#	Spot position	Spot volume	Vol #	Sample ID	Active
>1	19.0 mm	0.0 µl	1		Yes
>2	33.0 mm	0.0 µl	1		Yes
>3	38.0 mm	0.0 µl	1		Yes

Detection - CAMAG TLC Scanner 3

Information

Application position: 10.0 mm
 Solvent front position: 28.0 mm

Instrument

Executed by: CAMAG TLC Scanner 3 "Scanner3_101110" SW 101110 (1.14.20)
 State Level Drug Testing Laboratory Thursday, January 01, 2004 3:01:24 AM

Number of tracks: 3
 Position of Spot track X: 10.0 mm
 Distance between tracks: 13.0 mm
 Scan start pos. Y: 10.0 mm
 Scan end pos. Y: 28.0 mm
 slit dimensions: 4.00 x 3.30 mm, tilted
 Optimize optical system: Light
 Scanning speed: 20 mm/s
 Data resolution: 100 pixels

Measurement Table

Wavelength: 380
 Lamp: G2 & W
 Measurement Mode: Transmission
 Measurement Mode: Absorption
 Optical filter: Second order
 Detector mode: Automatic
 Pelt high voltage: 212 V

Detector properties

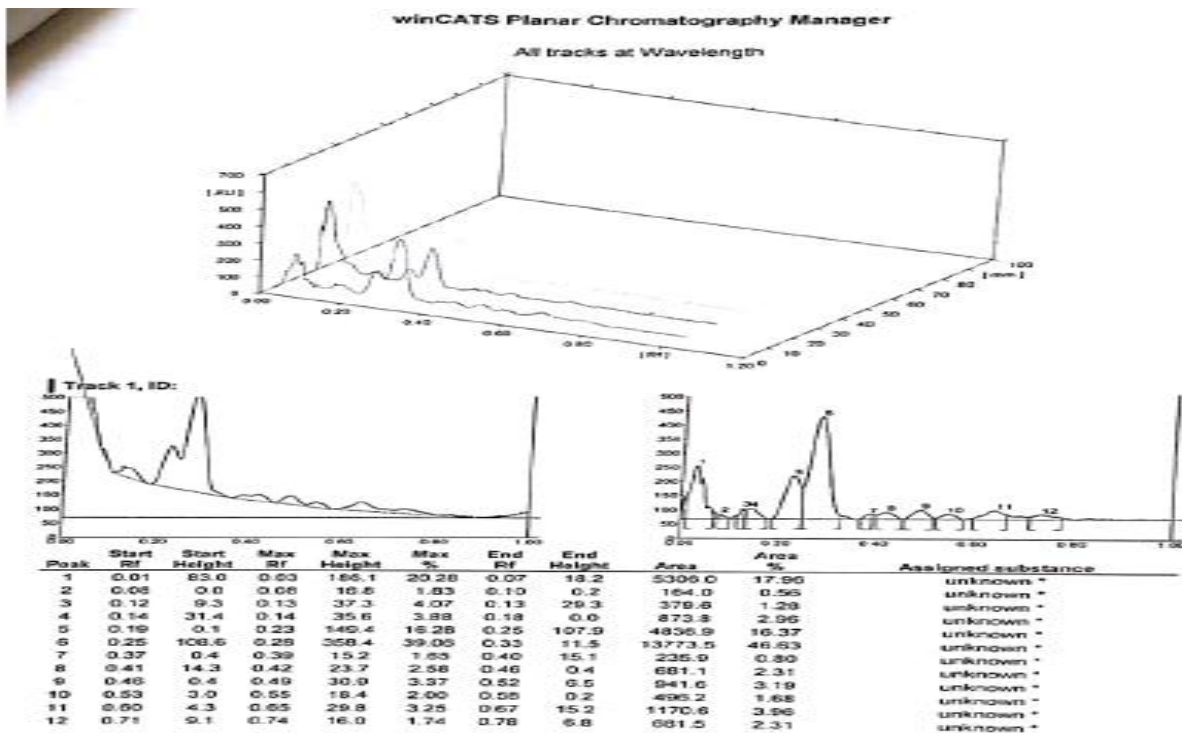
Y position for 0 adjust: 10.0 mm
 Track # for 0 adjust: 0
 Analog Offset: 12%
 Sensitivity: Automatic 140

Integration

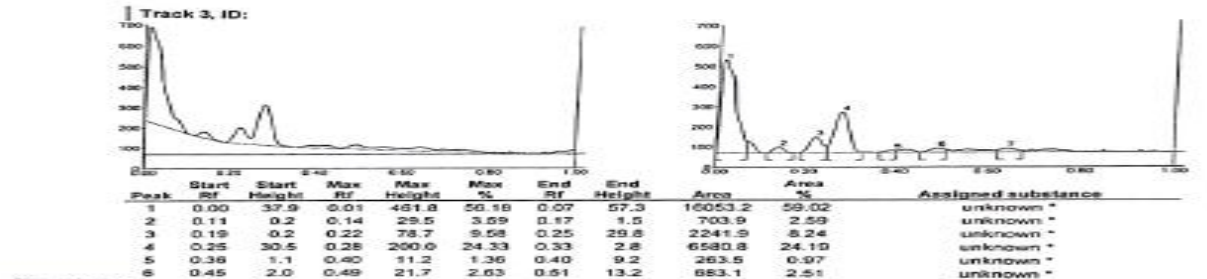
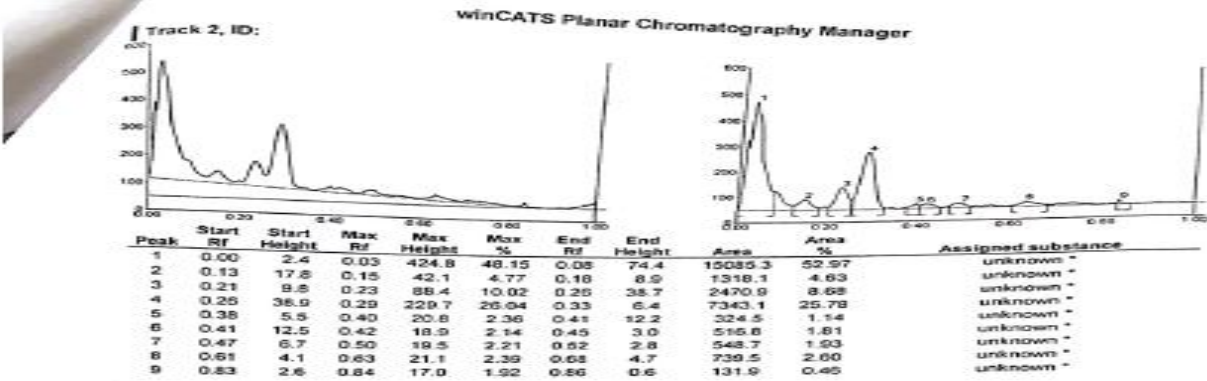
Properties

Data saving: Scitable Delay T
 Baseline correction: Lowest Slope
 Peak threshold min. slope: 5
 Peak threshold min. height: 10 AU
 Peak threshold min. area: 50
 Peak threshold max. height: 990 AU
 Track start position: 10.0 mm
 Track end position: 28.0 mm
 Display scaling: Automatic

User: State Level Drug Testing Laboratory Thursday, January 01, 2004 3:10:55 AM Approved: Report ID: 07D401010503133A SN ANCHROM1, V1.4.3 Page 2 of 4



User: State Level Drug Testing Laboratory Thursday, January 01, 2004 3:10:59 AM Approved: Report ID: 07D401010503133A SN ANCHROM2, V1.4.3 Page 3 of 4



Results
 HPTLC chromatogram shows peak at Rf 0.28 in Track-1 and Track-3 are so per reference and in Track-2 it is closely proximity of powder sample of Samsupa (Dalbergia sissoo) as per reference of analysis.

A. Vijaya Lakshmi
 I/C DIRECTOR
 STATE LEVEL DRUG TESTING LABORATORY

User : State Level Drug Testing Laboratory
 Thursday, January 01, 2004 3:15:59 AM

Approved :
 Report ID : 07D401010503133A

DRUG TESTING LABORATORY Page 4 of 4
 DEPT OF AYUSH, GOVT OF
 ERRAJADDA, HYDRABAD



GOVERNMENT OF TELANGANA
 DEPARTMENT OF AYUSH
STATE LEVEL DRUG TESTING LABORATORY
 In the premises of Dr B R K R GOVT AYURVEDIC COLLEGE
 Errajadda, Hyderabad - 500 035.
 Tel: 040-23801240, e-mail: drdc dtl-ts@gov.in & tsldtl@gmail.com



CERTIFICATE OF ANALYSIS

Reference of sample : Memo No 157/SLDTL/2018, Dt. 07-1-2018 of Director, SLDTL, Errajadda, Hyderabad, T.S

Analysis Report No : 210019.18

Work Sheet No : ① Ayu-2913 ② ch-4480 ③ PCR-1880.

Name of Sample : SIMSUPA

Type of the Drug : Single / Formulation / Intermediate

Reference of Analysis : API part -I, vol -III

Ingredients / Composition / Ref. of Formulation : -

Detail of Analysis
 1. Description : Brown coloured powder, with cream coloured thin, small fragments are packed in a transparent poly-thene ziplock cover and closed. A hand written small label comprising of name is enclosed in the cover along with the powder.

2. Organoleptic Properties
 a. Texture : Smooth
 b. Odour : Indistinct.
 c. Color : Brown with cream coloured thin small fragments. (see: light brown)
 d. Taste : -

3. Identification,
 a. Macroscopic Characters :
 ✓ Microscopic Characters : Based on the observed microscopic powder characteristics the sample is identified as stem bark of Samsupa (Dalbergia sissoo Roxb) as per reference of analysis.

Chemical Constituents	Control	Sample	Reference	Control	Sample	Reference
1. Chloride	-	-	-	-	-	-
2. Sulphate	+	+	+	+	+	+
3. Phosphate	-	-	-	-	-	-
4. Iron	+	+	+	+	+	+
5. Calcium	+	+	+	+	+	+
6. Magnesium	-	-	-	-	-	-
7. Potassium	-	-	-	-	-	-
8. Sodium	+	+	+	+	+	+

1. Total Ash: 12.44% [Limit 12%]
 2. Acid Insoluble Ash: 0.09% [Limit 0.1%]
 3. Swellable / Collapse: pH value 6.54 @ 25°C
 4. Carbon dioxide extract: 12.18% [Limit 12%]
 5. Graft / Liquid: Alcohol soluble extract: 8.24% [Limit 8%]
 6. Methanol soluble extract: 8.74%
 7. Soluble Extract: Chloroform soluble extract: 0.24%
 8. Other Soluble Extract: Nil
 9. Determination of Inorganic / Organic: Nil

Sample is light brown colored fine powder having no distinct odour. Sample is identified as stem bark of Shimshapa (Dalbergia sissoo) with respect to microscopic powder analysis as per reference. Sample complies with Total ash and insoluble ash, water soluble and alcohol soluble extract values as carried out and reported above as per reference. Phytochemical test of different solvent extract of sample is carried out and reported above.

A. Vijayalakshmi
 IIC DIRECTOR
 STATE LEVEL
 ICMR INDIAN MEDICAL JOURNAL
 CHENNAI, INDIA

Source Of Support: Nil
Conflict Of Interest: None Declared

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