

Sarpagandha (*Rauwolfia serpentina* (L.) Benth. ex Kurz) and its prevalent adulterants and substitutes: An investigation of cardinal identifying characteristics.

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ABSTRACT:

Due to exponential increase in demand of herbal medicines and extensive industrialization and urbanization all over the world, the traders have created serious malpractice of adulteration and selling of substandard medicinal plant raw materials in the market. So it is quite difficult to get and identify an authentic drug in market. In the present study such a commonly used and adulterated drug, Sarpagandha has been studied. During the study, it was observed that mostly in market, the root of *Rauwolfia tetraphylla*, *Rauwolfia beddomei*, *Rauwolfia densiflora*, *Rauwolfia micrantha*, *Rauwolfia perakensis* are sold in the name of Sarpagandha. Among the major adulterants in commercial samples, are the thin roots of *Tabernaemontana divericata* i.e. Tagarchandani.

The root was discovered to have a snake-like shape, have a yellowish brown outer surface, and have thick, corky, friable bark that is easily removed in small pieces to reveal the pale yellow wood. After breaking, many slender lines can be observed extending forth from the centre. It tastes bitter. Hence, the current study provides a useful manual for identifying Sarpagandha based on organoleptic, macroscopic, and microscopic properties.

Keywords- Authentic drug, adulteration, Sarpagandha, Market sample, organoleptic & microscopic identification.

I. INTRODUCTION

Ayurveda the science of life aimed both at protection of health and eradication of the diseases. To achieve this target Dravya or the drug is employed as the main tool.

In Samhita period, the Rishis gave much importance to knowledge of medicinal plants and advocated to consult forest dwelling peoples like tribals, Tapaswis, shepards, hunters etc to obtain exact knowledge of drugs by name and morphology¹.

In the past, Vaidyas would frequently travel to the forest to gather medicinal plants and make their own medications. Unfortunately, because of widespread industrialization and urbanisation, it is now practically impossible for a doctor to obtain genuine medications on their own. As a result, they are completely reliant on raw medicine vendors and middlemen to obtain the raw ingredients from medicinal plants. This exclusive dependence on traders has created serious malpractice of adulteration and selling of substandard medicinal plant raw materials in the market. Excessive deforestation, disappearance of many medicinal plant species from the flora due to indiscriminate use, exponential increase in demand of herbal medicine all over the world has led to building up of pressure on demand side there by leading to unethical and dangerous practice of adulteration that has compromised the reliability of Ayurvedic treatment to serious proportions. It is well known fact that today in the open market bark of *Kastadaru* is sold under the name of *Ashoka* and like this so many other drugs are being adulterated and as such used by both physicians and pharmaceutical industries.

NEED FOR STUDY:-

There is vast document available with regard to morphology of green drugs. However for physicians who are totally dependent on market for the procurement of medicinal plant raw materials it is not of much relevance even if he has sound

knowledge of identification of green drug. Different parts of medicinal plant raw materials in dry form show different features most of which are being common to many drugs thus creating lot of confusion and controversy in identification of the crude drug.

Therefore there is an urgent need to evolve exclusive identifying features of raw drugs by organoleptic methods so as to serve as a readymade reference for all physicians in identification of genuine medicinal plant raw materials. Thus present study has been undertaken to solve the problem regarding identification of crude drugs Sarpagandha.

AIMS AND OBJECTIVES:-

1. To collect, compile and analyze the currently available literature with regard to Sarpagandha.
2. To identify cardinal features of Sarpagandha.
3. To make a market and field survey for collection, comparison and for organoleptic analysis to identify genuine sample of Sarpagandha.

II. MATERIAL & METHODS:-

1. All the literary materials about the drug Sarpagandha that have been taken for study with its adulterant/ substitute were collected from different ancient and contemporary modern books from all types of sources – print, electronic, folklore, etc. and was studied & analyzed thoroughly.
2. The genuine as well as adulterant/substitute samples of Sarpagandha were collected from their original source and photographed.
3. The market samples of Sarpagandha were also collected from eight main raw drug selling markets of India. Namely, Mumbai, Chennai, Kolkata, Amritsar, Bangalore, Doda, Jaipur & Delhi.
4. All the collected genuine as well as Substitute/adulterant Samples of Sarpagandha has been studied organoleptically in dried condition, and compared it with the authentic and its adulterant/ substitutes drugs.
5. Study has been carried out on the ground of size, shape, colour, odour, taste and fracture in organoleptic examination.

III. REVIEW OF WORK:-

The Biological source of Sarpagandha is (*Rauwolfia serpentina* (L.) Benth. ex kurz) belonging to family Apocynaceae. *Rauwolfia* refers

to the name of scientist Dr. Rauwolf and *serpentina* refers to the snake like structure of root.

Sarpagandha is well known to Indian System of Medicine since many centuries. Because of snake like shape of the drug, it has been known as “Sarpagandha”. It has found its place as an important drug in treatment of insanity and snake bite since traditional times. But the drug came into limelight only after the isolation of reserpine. It is the most significant alkaloid used in hypertension isolated by Mueller in 1952. Since then a large interest has been generated regarding the activity of this drug². In Priya Nighantu, from the following words author described the colour of flower, Flowering period, Fruiting period, Macroscopic features as “Eshadanihaaruna sumadala” (flower is slightly blue and reddish in colour), “Pushpita Grishmakale” (Flowering period is April-May), “Varshakale phalaparichitinarakta dadhati” (Fruiting period is June-July, Fruits is Blue-reddish in colour) “Mula harinakapisha”(Roots yellowish in colour), “Sthula”(Thick), “Antasyachakra”(After breaking, circular structure is seen)³.

DISTRIBUTION:-

It is widely distributed in sub-Himalayan tract from Punjab eastwards to Nepal, Sikkim, Bhutan, Assam, lower hills of the Gangetic plains, eastern to western Ghats, Konkan, Central India, Southern India and Andamans.

BOTANICAL DESCRIPTION:-

It is a small erect, evergreen shrub reaching upto 30-40 cm. in height.

- **Leaves:** - Simple in whorls of 3 in number. 7.5-17.5 by 2.5- 6.3 cm. lanceolate, acute, or acuminate, glabrous, bright green above, pale beneath, base tapering ; main nerves 8-10 pairs, slender; petiole 8 mm. long, somewhat obscure owing to the blade running down into the petiole.
- **Flower:** - Bisexual, white, often tinged with violet, in 5-10 cm. long peduncled corymbose cymes; pedicels stout, bright red.
- **Fruits:** - Drupe, slightly connate, obliquely ovoid, purplish black; pyrenes slightly rugose.
- **Root:** - Tap - root tuberous, soft, sometimes irregularly nodular, root-bark pale-brown, corky with irregular longitudinal fissures.

Flowering And Fruiting time: Throughout the year (February to May)⁴.

IV. OBSERVATIONS & RESULTS

★ **ORGANOLEPTIC IDENTIFICATION FEATURES OF SARPAGANDHA:-**

Sarpagandha i.e. root of Rauwolfia serpentina Benth. Ex kurz, can be identified organoleptically by following some points:-

- It official part i.e. root has snake like shape as interpreted from its synonym Sarpangi.
- The outer surface of root is yellowish brown in colour & the root bark is thick, corky and friable and easily removes in small patches exposing the pale yellow wood.
- After breaking, numerous faint lines are seen radiating from the centre.
- It has bitter taste.

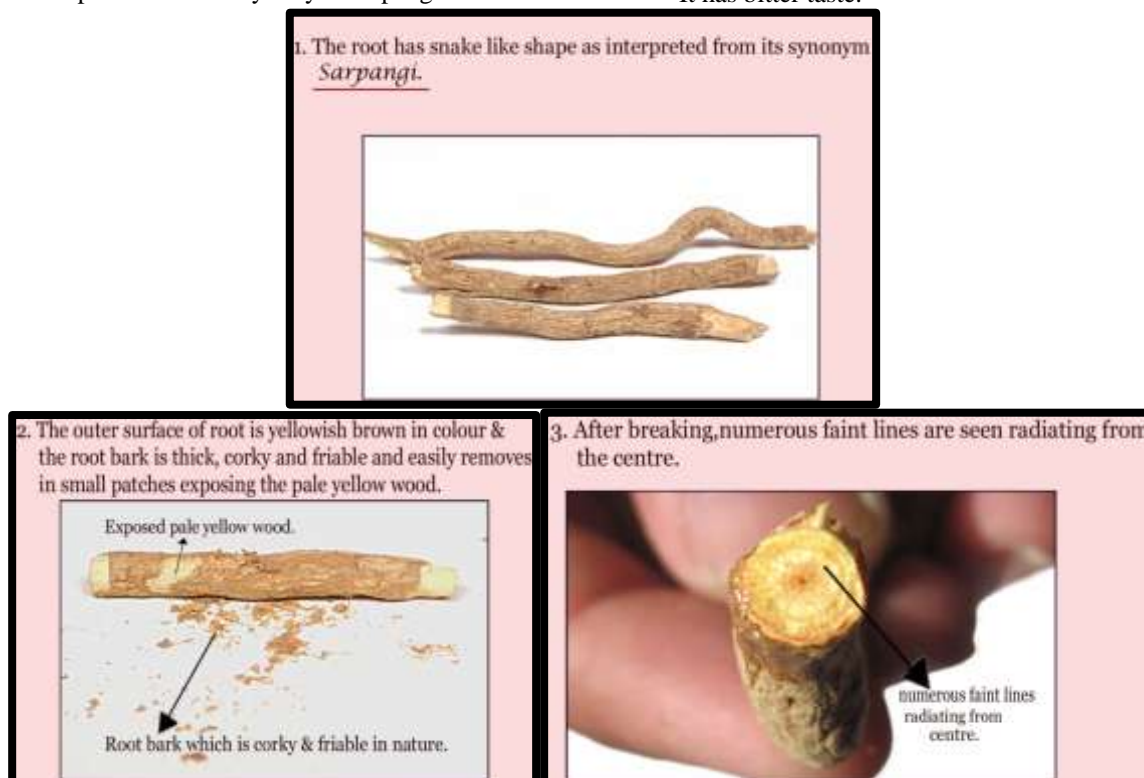


Fig.3 Showing Identification Features of Sarpagandha

★ **PHARMACOGNOSTICAL IDENTIFICATION FEATURES OF SARPAGANDHA:-**

A. Macroscopic Examinations:-

Mature roots are cylindrical, slightly tapering, and tortuous in shape, 10-18 cm. long, and 1-3 cm in diameter. The external surface of the root is rough and wrinkled shows longitudinally fissured and yellowish brown in colour. It bears circular scars of rootlets. The longitudinal ridges are not straight but they are mixed to with each other and displaying a reticulate appearance. The bark becomes thick, corky and friable and easily removes in small patches exposing the pale yellow wood. The cutting end of the root shows a pale brown cork showing ridges and furrows on the outside, a pale yellow white middle portion and a

central pale yellow woody portion. The root is odourless and has bitter in taste. Fracture is short and irregular.

B. Microscopic Examinations:-

T.S. of mature root shows stratified well developed cork composed of tangentially elongated cells which are suberized, unligified. Below the cork tissue, secondary cortex is well developed consist of parenchyma cells. Secondary xylem is well developed and is traversed by well developed lignified medullary rays but uniseriate rays are more prominent. Prominent round vessels are clearly seen in secondary xylem. Just outside the secondary xylem, a small zone of secondary phloem tissue consists of sieve cells, companion cells, parenchymatous cells.

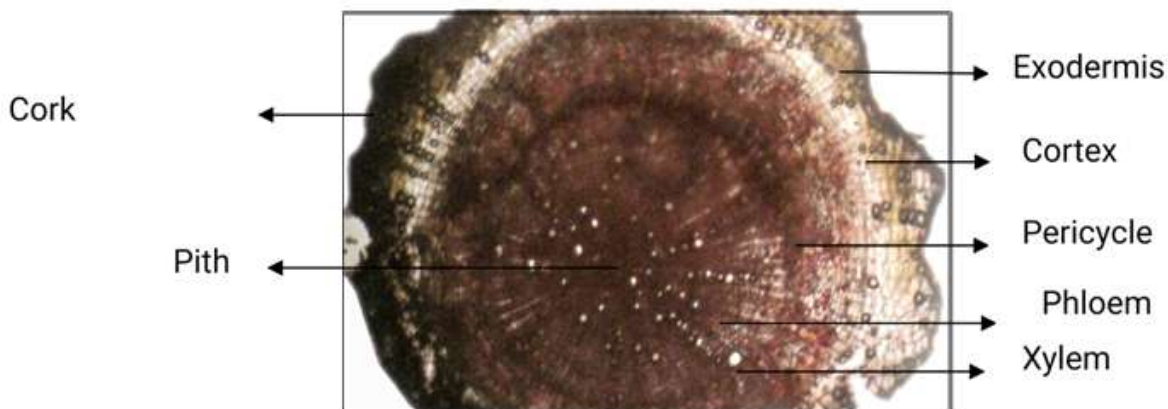


Fig. 1 T.S. of root of *Rauwolfia serpentina* (L.) Benth. ex kurz showing Exodermis , Cortex, Pericycle, Cork cambium, Xylem, Phloem, Pith.

COLLECTION OF GENUINE SAMPLES OF SARPAGANDHA AND ITS SUBSTITUTES/ADULTERANTS

1. *Rauwolfia serpentina* (Root): -The genuine sample of Sarpagandha i.e. roots of *Rauwolfia serpentina* was collected from garden of “Arogyadhama”, Chitrakut, Dist; - Satana, Madhyapradesh.

2. *Rauwolfia tetraphylla* (Root): - Roots sample of *Rauwolfia tetraphylla* was collected from the garden of “Gopabandhu Ayurveda Mahavidhyalaya” Puri, State: - Orissa.

3. *Tabernaemontana divericata* (Root): - Root sample of *Tabernaemontana divericata* has been collected from N.I.A. hospital garden, Jaipur, State: - Rajsthan.



Fig 2 Showing genuine sample of Sarpagandha & its Substitute/Adulterants.

Table No. 1. Showing Distinguished features of Sarpagandha with its Adulterants/substitutes

Sr. No	Appearance	Rauwolfia serpentina (Root)	Rauwolfia tetraphylla (Root)	Tabernaemontana divericata (Root)
1.	Size	Upto 10-18 cm. long and 1-3 cm in diameter	Upto 9-15 cm in long and 1-3 cm in diameter	Upto 8 to 20 cm long and 5 to 15 mm. In diameter
2.	Shape	Cylindrical, slightly tapering, and tortuous in shape. External surface is rough and wrinkled shows longitudinally fissured. The root bark is thick, corky and friable and easily removes in small patches exposing the pale yellow wood.	Cylindrical, stout in shape, Some of them are tortuous in shape. External surface is rough, less wrinkled showing longitudinal ridges which are not straight but they are interlocked to one another. Root bark not easily removable and firmly fixed with woody portion of root. Bark of root is not fragile. It bears scars of rootlets.	Thin, cylindrical, slightly tapering, some of them are tortuous in shape. On the outer surface longitudinal ridges or furrowed are seen which are not straight but they are interlocked to one another exhibiting a reticulate appearance. It bears rootlet scars. Some bark of root becomes thin, corky, fragile and easily removable in small patches exposing a pale-yellow woody portion.
3.	Colour	Yellowish brown in colour	Dull-yellowish brown in colour. Bark of root is dull-yellow in colour.	Pale-yellowish in colour.
4.	Taste	Bitter	Bitter	Bitter
5.	Odour	Odourless	Odourless	Odourless
6.	Fracture	Short, irregular. Cutting portion is pale- yellow in colour; numerous faint lines i.e. xylem are seen radiating from the centre towards the cortex.	Short and irregular. The cutting end of the root shows a pale brown cork showing ridges and furrows on the outside, a pale yellow white middle portion and a central pale yellow woody portion.	Short.

STUDY OF DIFFERENT MARKET SAMPLE OF SARPAGANDHA:-

The market samples of Sarpagandha were collected from eight main raw drug selling markets of India namely, Mumbai, Chennai, Kolkata, Amritsar, Bangalore, Doda, Jaipur & Delhi and were examined organoleptically and compared it with the authentic and its adulterant/ substitutes drugs.

After studying of above market samples of Sarpagandha, it has been observed that, sample taken from Mumbai, Kolkata, Chennai, Bangalore, Doda, Jaipur & Delhi are having similar characters to that of root of Rauwolfia tetraphylla. So, the

samples of above mentioned markets may be the root of Rauwolfia tetraphylla which is sold under the name of Sarpagandha.

The sample collected from the market of Amritsar is having the characters which are similar to that of root of Rauwolfia serpentina belongs to an authentic source of Sarpagandha. So, the sample collected from Amritsar market may be the root of Rauwolfia serpentina. Although there are some another root pieces found mixed along with the sample of Rauwolfia serpentina, which is having the characters that coincided with the features of Rauwolfia tetraphylla.



Market sample of Mumbai



Market sample of Kokatta



Market sample of Chennai



Market sample of Amritsar



Market sample of Bangalore



Market sample of Doda



Market sample of Jaipur



Market sample of Delhi

Fig. no. 3 Showing Market samples of Sarpagandha collected from different source.

V. CONCLUSION:-

The root of *Rauwolfia serpentina* (L.) Benth. ex kurz is the authentic source of Sarpagandha. Because of snake like shape of the

drug, it has been known as “Sarpagandha”. Although, the plant *Rauwolfia serpentina* is widely cultivated all over India, some allied species of *Rauwolfia* such as *Rauwolfia beddomei*, *Rauwolfia*



densiflora, Rauwolfia micrantha, Rauwolfia perakensis, and Rauwolfia tetraphylla have been used as an adulterants/substitute and also sold under the name of Sarpagandha. Among the major adulterants in commercial samples are thin roots of Tabernaemontana divericata i.e. Tagarchandani. In Kerala and Western India, roots of Rauwolfia densiflora and Rauwolfia micrantha are sometimes found mixed. But in market mostly the root of Rauwolfia tetraphylla is available. The most common adulterant, Rauwolfia tetraphylla is recognized organoleptically by its root bark which is firmly fixed with woody part of root, not easily removable, non-fragile and its non-stratified cork. The market samples revealed that, in all markets root of Rauwolfia tetraphylla is sold in the name of Sarpagandha, except in Amritsar market, where

root of Rauwolfia serpentina is sold which is an authentic sample of Sarpagandha.

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