# A COMPARATIVE STUDY ON DIFFERENT MARKET SAMPLES AND STANDARD SAMPLE OF SHALAPARNI THROUGH PHARMACOGNOSTIC PROFILE

**Parth Raval*[1], B.R.Patel2, Preeti Pandya[3,] Amit Makavana[4],**

[1] Ph.D (Ayu pharmcy) Scholar, IPGT&RA, Gujarat Ayurved University, Jamnagar

[2] Assistant professor, Department of Dravyaguna, IPGT&RA, Gujarat Ayurved University, Jamnagar

[3] Laboratory Assistant, Department of Dravyaguna, IPGT&RA, Gujarat Ayurved University, Jamnagar

[4] Ph.D. Scholar, Department of Dravyaguna, IPGT&RA, Gujarat Ayurved University, Jamnagar

## ABSTRACT

*Dashmoola* is one of the most important groups explained in *Mishraka gana.* One of which, *Shalaparni* is a potent drug used single as well as in various formulations mentioned in classics. Adulteration in *Dashmoola* plants is a very big issue now days and this is because of the lack of availability of the original drugs. In this study market samples of *Shalaparni* (*Desmodium gangeticum* DC.) collected from the different part of India; compared with the standard *Shalaparni* authenticated sample which was collected from the natural source; by using pharmacognostic profile (macroscopy and powder microscopy). Results were comparing in photographic manner. The results show that there is no similarity found out between the standard drug and market samples of *Shalaparni* which were collected from different regions of India. The market samples were observed for different adulterated material having poor quality.

**Key words-***Shalaparni* (*Desmodium gangeticum*DC.), Market Samples, Macroscopy, Powder microscopy,

## INTRODUCTION

In Ayurvedic literature, more than 700 plant drugs have been mentioned. The scientific descriptions about the plant drugs were found in *Brihattrayi* and *Laghutrayi. Dashmoola* is one of the most important groups, explained in *Mishrak gana[i]*. The drugs of *Dashmoola* are *Bilva, Agnimantha, Shyonak, Patala, Gambhari, Shalaparni, Prishniparni, Brihati, Kantakari* and *Gokshura.* One of which, *Shalaparni* is a potent drug used single as well as in various formulations mentioned in classics. Unlike in the olden days when physicians themselves used to collect the herbs, prepare and administer the medicine, but now a days the newer generation of *Ayurvedic* physicians are using prepared drugs available in the market[ii].As a result, professional plant collectors have taken over the floor and the industry is forced to accept the herbs they bring on their terms without questioning. Herb collectors, who are unable to meet

increasing demand on their part, adulterate the drugs with other plants & spurious substances[iii]. Crude drugs consist of definite parts of plants e.g. leaf, flower, fruit, seed, wood, bark, root etc. Systematic morphological or macroscopically description of these parts is undertaken with necked eye or with magnifying lens. Drug can be identified as above only if they are in entire condition. Sensory or organoleptic characters describe color, odour, taste, consistency etc. By the sensory characters often useful information is obtained[iv]. The diagnostic elements persist even when the drugs are in fine powdered condition and help further in identification of the drug. Sometime crude drugs are adulterated. Nature of adulteration can be determined by the study of pharmacognostic evaluation[v]. The present work had been carried out to compare the market samples of *Shalaparni* which were collected from different regional markets of all over India with standard collected samples of

- Standard sample (S-*Shalaparni* whole plant)[viii]
- Market sample 1 (M1-North India)

2. **Macroscopic and microscopic analysis:** The macroscopy and microscopy of both the plants were studied as per standard procedures. For the powder microscopic studies, cross sections were prepared and Stain with phloroglucinol and HCl as per the procedures. The powder study

*Shalaparni* (*Desmodium gangeticum* DC. – official botanical source as per API[vi]) by using physicochemical parameter and near infra-red spectroscopy. Root and whole plant of *Shalaparni* were taken separately as standards for this study.

**Material and method:**

1. **Collection and authentication of Sample:** Crude market samples were collected from various markets sold in the name of *Shalaparni* and standard sample as whole plant of *Shalaparni* were collected from its natural sources at the time of *Sharad ritu[vii]* on 5[th]October 2013. Whole plant of *Shalaparni* was authenticated in Pharmacognosy laboratory, IPGT & RA, GAU, and Jamnagar. Voucher specimen was also preserved for further references. The whole plant parts were separated washed under running tape water; air dried under shade, coarsely powdered and kept in airtight container for further use.

**Standard and market samples were as follows.**

- Market sample 2 (M2-East India)
- Market sample 3 (M3-South India)
- Market sample 4 (M4-West India) has done following the same method. [5]

3. **Histochemical tests:** The histo-chemical tests of powdered drugs were performed as per standard procedures given by Khandelwal K. R. [6] (Table: 1)

**Results and discussion:**

1. **Organoleptic study**

**Table 1 Organoleptic characters of Stem and root of all samples:**

| Characters | | Standard sample (S1) root | Standard sample (S2) stem | Market sample (M₁) stem | Market sample (M₂) stem | Market sample (M₃) stem | Market sample (M₄) stem |
|---|---|---|---|---|---|---|---|
| Texture | | Smooth | Slightly rough | Smooth | Rough | Smooth | Smooth |
| Colour | Externally | Dark brown | Yellowish brown | Oranges yellow | Brownish yellow | Dark Brown | Green |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Internally | Creamish white | Yellowish green | Creamish yellow | Creamish yellow | Yellow | White |
| Odour | | Characteristic | Characteristic | Characteristic | Characteristic | Characteristic | Characteristic |
| Taste | | Bitter | Bitter | Bitter | Sweet | Astringent | Bitter |

## Table 2 Organoleptic characters of Leaf of all samples:

| Characters | | Standard sample(S) | Market sample (M₁) | Market sample (M₂) | Market sample (M₃) | Market sample (M₄) |
|---|---|---|---|---|---|---|
| Texture | | Rough | Hairy | Hairy | Hairy | Hairy |
| Colour | Externally | Dark green | Light green | Light green | Light green | Light green |
| | Internally | Pale green | Pale green | Pale green | Pale green | Pale green |
| Odour | | Characteristic | Characteristic | Characteristic | Characteristic | Characteristic |
| Taste | | Bitter | Bitter | Bitter | Bitter | Bitter |

## 2. Macroscopic study (Fig. No. 1):

### Table 3 Macroscopic characters of all stem and root samples are below.

| Macroscopic characters | | Sample S R00t | Sample S Stem | Sample M₁ Stem | Sample M₂ Stem | Sample M₃ Stem | Sample M₄ Stem |
|---|---|---|---|---|---|---|---|
| Shape | | Cylindrical, somewhat tortuous | Cylindrical, somewhat tortuous | Cylindrical | Cylindrical | Cylindrical | Cylindrical |
| Size | Length | 5-10cm | 5- 8cm | 8-12cm | 6-8cm | 6-8cm | 3-5 cm |
| | Width | 0.5-1cm | 0.5-0.8cm | 0.1-0.2cm | 0.5-1cm | 0.5-1cm | 0.2-0.4cm |
| Fracture | | Fibrous | Short | Short | Short | Fibrous | Fibrous |
| Surface | | Longitudinal striated brownish spot | Longitudinal striated | Rough | Longitudinal striated | Rough | Smooth |
| Other characters | | Centrally Xylem hard | Centrally Hollow | Fully hollow | Centrally Hollow | Not hollow | Fully hollow stem |

### Table 4 Macroscopic characters of All Leaf samples are below.

| Macroscopic characters | | Sample S | Sample M₁ | Sample M₂ | Sample M₃ | Sample M₄ |
|---|---|---|---|---|---|---|
| Shape | | Oblong | Ovate | Ovate | Ovate | Obovate |
| Size | Length | 10-12cm, | 1-2cm | 7-9cm | 7-9cm | 3-5cm |
| | Width | 3-6cm | 0.5-1cm | 3-5cm | 3-5cm | 0.5-1cm |
| Surface | Upper | Glabrous | Rough | Rough | Rough | Glabrous |
| | Lower | Rough | Smooth | Hairy | Glabrous | Hairy |
| General characters | Apex | Acute, slightly Acuminate | Acute apex | Acute | Acute | Acute |
| | Margin | Entire, Some-what wavy | Entire | Entire | Entire | Entire |
| | Base | Straight equal | Equal | Equal | Equal | Unique unequal base |
| Other plant parts | | Legume of 1.5-2cm length | Dry dehiscent dark brown | | | Oranges |

| | | and 0.2-0.3cm width | legumes, 4-5cm length & 1mm width | | | brown, Sheathing stipules |
|---|---|---|---|---|---|---|

## 3. Powder microscopic study:

### Table 5 Powder Microscopic characters of All samples are below.

| Fig. No. | Powder characters | Sample S1,S2 | Sample $M_1$ | Sample $M_2$ | Sample $M_3$ | Sample $M_4$ |
|---|---|---|---|---|---|---|
| 2.1 | Cork cells in surface view | Present | Present | Present | Present | Present |
| 2.2 | Cork cells in tangential view | Present | Present | Present | Present | Present |
| 2.3 | Fragments of epidermis with stomata | Present | Present | Present | Present | Present |
| 2.4 | Parenchyma cell in surface view | Present | Present | Present | Present | Present |
| 2.5 | Pigmented parenchyma in surface view of flower | Present | **Absent** | **Absent** | **Absent** | **Absent** |
| 2.6 | Spongy parenchyma of pith | Present | **Absent** | **Absent** | **Absent** | **Absent** |
| 2.7 | Fragment of spool shaped palisade parenchyma | Present | **Absent** | Present | **Absent** | **Absent** |
| 2.8 | Starch grains simple and compound with centric hilum | Present | **Absent** | Present | **Absent** | **Absent** |
| 2.9 | Pitted vessel | Present | **Absent** | Present | Present | Present |
| 2.10 | Border pitted vessel | Present | **Absent** | Present | **Absent** | **Absent** |
| 2.11 | Spiral vessel | Present | Present | **Absent** | Present | Present |
| 2.12 | Reticulated vessels (Stain 1) | **Absent** | Absent | Absent | **Present** | Absent |
| 2.13 | Fiber | Present | Present | Present | Present | Present |
| 2.14 | Crystal fiber | Present | Present | Present | Present | Present |
| 2.15 | Simple hook shaped trichomes | Present | Present | Present | Present | Present |
| 2.16 | Simple unicellular trichomes | Present | Present | Present | Present | Present |
| 2.17 | Lignified trichomes (Stain 1) | **Absent** | Absent | Absent | **Present** | Absent |
| 2.18 | Simple multicellular trichomes | **Absent** | **Present** | Absent | Absent | **Present** |
| 2.19 | Pollen grains | **Absent** | **Present** | Absent | Absent | **Present** |
| 2.20 | Prismatic crystals of calcium oxalate | Present | Present | Present | Present | Present |
| 2.21 | Cluster crystals of Calcium oxalate | **Absent** | Absent | Absent | **Present** | Absent |
| 2.22 | Stone cell and sclereids | Present | Present | Present | Present | Present |
| 2.23 | Pitted thin walled sclereids | **Absent** | **Present** | Absent | Absent | Absent |
| 2.24 | Brownish color content | **Absent** | Absent | Absent | **Present** | Absent |
| 2.25 | Silica crystals | **Absent** | **Present** | **Present** | **Present** | **Present** |

## DISCUSSION

On the basis of pharmacognosy, the studied drug is discussed here in following ways:

a) **Organoleptic study:** On the basis of observation of organoleptic characters of all standard and market samples, it can be interpreted that market samples $M_2$, have similar characters like standard samples. While $M_1$, $M_3$, $M_4$ have differed from standard samples.

b) **Macroscopic study (Fig. No. 3):** The comparative macroscopic characters of standard and market samples are mentioned below.

1. **Market sample 1($M_1$):** Market sample 1 showed different characters when comparing fruits. They were clearly observed in (fig no.3.2&3.3) which showed clear difference between market sample 1 and standard samples.

2. **Market sample 2($M_2$):** Market sample 2 showed similar characters when comparing stems. They were clearly

observed in (fig no. 3.1&3.4) which showed similarity between market sample 2 and standard samples.

3. **Market sample 3($M_3$):** Market sample 3 showed different characters were not observed because leaf shows similar size and shape but when practically performed parameters like fracture & inner surface of stem showed marked difference between market sample 3 and standard samples mentioned in (fig no. 3.1&3.5).

4. **Market sample 4($M_4$):** Above differencing characters were clearly observed in stems (fig no. 3.1&3.6) which showed clear difference between market sample 4 and standard samples.

c) **Powder Microscopic study:** Hence, it was very difficult to compare all samples because all plants made of nearly similar tissues, cells and compounds. When powder microscopy of standard and market sample done only unique similar and different characters were considered for comparison.

1. **Powder microscopic characters of sample $M_1$.**

▪ Brownish color content(fig. 2.24)
▪ Cluster crystals(fig. 2. 21)

All above characters were unique and not found in standard samples which indicate plant material of market sample 3 and standard might be different material.

4. **Powder microscopic characters of sample $M_4$.**

Here different characters were as follows.

▪ Simple multicellular trichomes which were not present in any part of standard TS and powder microscopy (fig. 2.18).
▪ Silica crystals which indicate presence of mud may be due to poor collection,

Here different characters were as follows.

● Simple multicellular trichomes which were not present in any part of standard Sample's powder microscopy (fig. 2.18). All above characters were unique and not found in standard samples which indicate plant material of market sample 1 and standard might be different material.

2. **Powder microscopic characters of sample $M_2$.** Here similar characters were as follows.

▪ Simple and compound starch grains with centric hilum were unique character and found in standard samples clearly (fig. 2.9).
▪ Palisade and spool shaped parenchyma were unique character of leguminous fruit which found in standard samples indicates samples having same family and might be having same species (fig. 2.7).

All above characters were unique and also found in standard samples which indicate plant material of market sample 2 and standard might be similar material.

3. **Powder microscopic characters of sample $M_3$.**

Here different characters were as follows.

▪ Reticulated vessels(fig. 2.12)
▪ Lignified trichome(fig. 2.17)
  storage and preservation (fig. 2.25). All above characters were unique and not found in standard samples which indicate plant material of market sample 4 and standard might be different material.

**CONCLUSION:**

On the basis of organoleptic characters, macroscopic study and microscopic characters, the market sample $M_2$ showed resemblance in the characters of standard sample S while samples $M_1$, $M_3$ and $M_4$ did not show any resemblance

with the characters of standard sample S. All Market Samples $M_1$, $M_2$, $M_3$ and $M_4$ were not recognized accurately due to its spoilage condition, damaged by insects, fungus etc. Adulteration status was found in market sample $M_1$ & $M_4$.

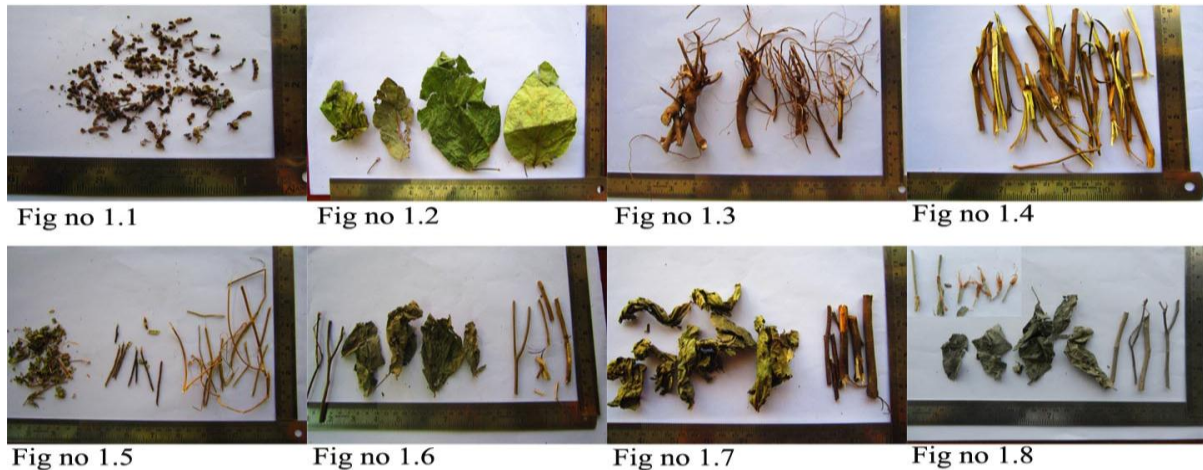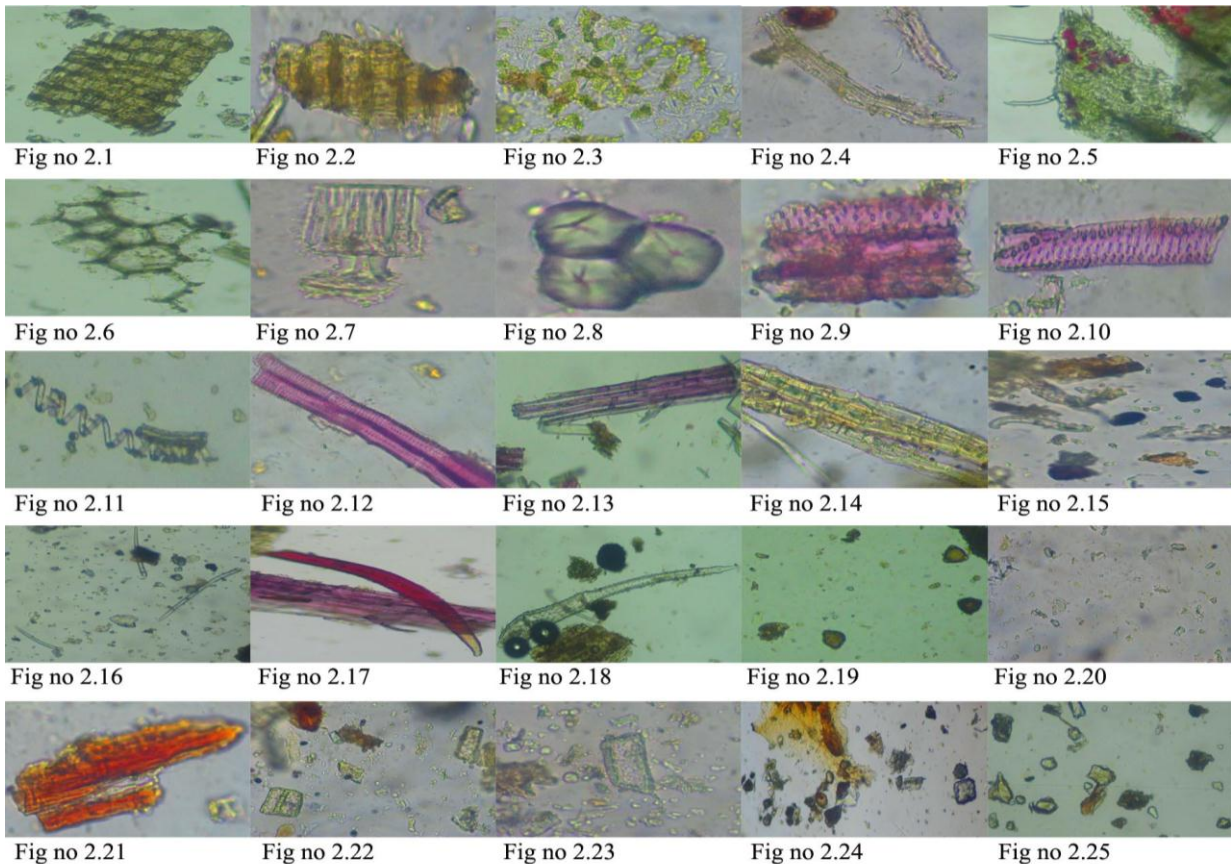**FIG 1 (Macroscopic characters of all samples)**



Fig no 1.1    Fig no 1.2    Fig no 1.3    Fig no 1.4

Fig no 1.5    Fig no 1.6    Fig no 1.7    Fig no 1.8

| | | | |
|---|---|---|---|
| FIG 1.1 | Standard sample S (Fruit). | FIG 1.5 | Market sample M1 (Whole plant). |
| FIG 1.2 | Standard sample S (Leaf). | FIG 1.6 | Market sample M2 (Whole plant). |
| FIG 1.3 | Standard sample S (Root). | FIG 1.7 | Market sample M3 (Whole plant). |
| FIG 1.4 | Standard sample S (Stem). | FIG 1.8 | Market sample M4 (Whole plant). |

**FIG. No. 2 (Powder microscopy characters of all samples) [Legends in Table 5**



Fig no 2.1    Fig no 2.2    Fig no 2.3    Fig no 2.4    Fig no 2.5

Fig no 2.6    Fig no 2.7    Fig no 2.8    Fig no 2.9    Fig no 2.10

Fig no 2.11    Fig no 2.12    Fig no 2.13    Fig no 2.14    Fig no 2.15

Fig no 2.16    Fig no 2.17    Fig no 2.18    Fig no 2.19    Fig no 2.20

Fig no 2.21    Fig no 2.22    Fig no 2.23    Fig no 2.24    Fig no 2.25

**FIG 3 (Comparative macroscopic characters of all samples)**



Fig no 3.1

Fig no 3.2

Fig no 3.3

Fig no 3.4

Fig no 3.5

Fig no 3.6

**FIG No. 3 CRUDE SAMPLE MACROSCOPIC PARAMETERS OF DISCUSSION**

| | | | |
|---|---|---|---|
| FIG 3.1 | Standard sample S (Stem). | FIG 3.4 | Market sample M2 (Stem). |
| FIG 3.2 | Standard sample S (Fruit). | FIG 3.5 | Market sample M3 (Stem). |
| FIG 3.3 | Market sample M1 (Fruit). | FIG 3.6 | Market sample M4 (Stem). |

**REFERENCES:**

[i]Anonymous, Dhanvantari Nighantu, edited by Prof. Priyavrat sharma,4th Edition, Chaukhambha Orientalia, Varanasi, 2005 ;264

[ii]Iqbal et all, Modern Phytomedicine Turning Medicinal Plants into Drugs, Herbal Medicines: Prospects and Constraints; 66.

[iii]Hivrajan and Indrabalchandran, Ayurvedic drugs and their plant sources, Oxford and I.B.H. publication co.pvt.Ltd. New Delhi, Reprint 1999;11

[iv]Shah and Qadry's Pharmacognocy, twelfth revised Edition, B.S.Shahprakashan, Ahmedabad, 2004-5, pg no.2.

[v]Ibidem(4), pg no.3

[vi]The Ayurved Pharmacopeia of India Part 1 Vol.3. Government of India Ministry of health and family welfare Department of ism & h, Department of Ayush New Delhi 2008;178:180

[vii]Sharangdhara, Sharangdhar Samhita; With Jivanprada commentary, edited pr.ch.1/59 by Dr. smt. Shailaja Srivastava, 4th Edition, Chaukhamnha Orientalia , Varanasi, 2005,13-14

[viii]The Ayurved Pharmacopiea of India Part 1Vol.6. Government of India Ministry of health and family welfare Department of ism & h, Department of Ayush New Delhi 2008;139:141

**CORRESPONDING AUTHOR**

**PARTH RAVAL**

Lab.Technician, RS&BK Dept.,

Shree Gulabkunvarba Ayurveda Mahavidhyalaya

M.Pharm (Ayu), Ph.D Scholar, IPGT & RA.

Gujarat Ayurved University, Jamnagar

**Emai**l: apparthraval@gmail.com

*Source of support: Nil*

*Conflict of interest: None Declared*