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Review Article

A Detailed Evaluation on External Morphology of Raw Drug Samples of "*Dasamoola*"-Ten Roots in Ayurveda

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ABSTRACT

Ayurveda-The ancient science of life, is a traditional system of medicine originated and evolved in Indian sub-continent. It majorly utilises plant derivatives for the accomplishment of its main aim "*Arogya*" (health). The 21st century witnessed a huge advancement quality of life in humans due to the revolutionary upliftment in technology. But still 80% of world's total population depends on herbal based medicines and therapies for primary health care. Owing to the high demand and rapid deforestation because of industrialisation, availability of authentic raw drugs for the herbal medicine industry is declining rapidly. "*Dasamoola*" is an important group of drugs in *Ayurveda*, in which root of ten drugs are collected and used together. Modern herbal industry utilises an array of physico-chemical techniques to ensure the authenticity, quality and purity of raw drugs. But still gross morphological examination plays a major role in drug identification. This study aims to collect and document authentic samples and to consolidate the important organoleptic features of "*Dasamoola*." This study will provide insight to some unique identification features of each drug like faint aromatic odour of *Agnimantha* root, extremely porous and light weight of *Patala* root etc.

Keywords: *Dasamoola*, Ten roots, *Ayurveda*, Raw drug, Organoleptic features.

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INTRODUCTION

Ayurveda-The Science of Life is one of the world's oldest medical systems originated in the Indian sub-continent and evolved over thousands of years. The main aim of this treatment modality is to integrate and balance the basic elements of human body. This traditional system of treatment is largely based on medicinal plants and products derived from it. The system attains huge relevance, popularity and acceptance in the current scenario with the evolvement of evidence-based medicine. The 21st century witnesses' great revolutionary acceptance of herbal medicines across the globe. As per the WHO statistics about 80% population of world depends on herbal medicines for primary health care.[1] Approximately 1500 botanicals are sold across the globe as dietary supplements.[2] The current global herbal medicine market size is valued approximately for 216.40 billion USD in 2023 and is projected to 233.08 billion USD by 2024.[3]

Dasamoola-literally translates to ten roots is an important category of medicine in the *misraka gana*. It is one among the most frequently prescribed medicine in *Ayurveda*. *Acharya Charaka* included it as "*Sophahara mahakashaya*" (the one which alleviates oedema). In *Vatarakta chikit*sa (Gouty arthritis), *Dasamoola ksheera kashaya* is considered as *sadyo soola hara*. It is a major ingredient in various *kashaya, arishta, ghruta, taila and leha* preparations. It is roughly estimated that Indian herbal industry requires more than 10,000 metric tonnes of *Dasamoola* per annum. It roughly contributes for more than 1000 crore annually to the health economy. The requirement for huge quantity of this raw drug will genuinely arise a question regarding the quality and purity of market sample. Modern herbal industry utilises a wide array of physical and chemical examinations to assure the quality and purity of raw drug. It includes gross morphological examination, detailed pharmacognostical techniques, detailed phytochemical investigations, HPTLC, LC-MS and GC-MS etc. But still, most of the above said methods are expensive and time consuming. Hence the gross morphological examination of crude drugs with the help of experienced persons in the field will provide an alternate in expensive method which requires less time and effort.

This scientific exploratory study aims to explore the gross morphological features of "*Dasamoola*"-an important group of drugs in Ayurveda medicine.

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AIM AND OBJECTIVES

Aim

Evaluation of gross morphology of drugs in the group "*Dasamoola*".

MATERIALS AND METHODS

Detailed evaluations of the external morphology of ten drugs were done using necessary physical examination. Original photos of authentic drug samples were collected from a GMP certified pharmacy. The organoleptic features of each sample were assessed and tabulated, based on shape, size, colour, external characters, characteristics of internal surface, fracture, odour and taste. The unique features of each drug sample were discussed separately and tabulated.

RESULTS

The detailed description of organoleptic features and authentic pictures of each drug sample are tabulated below (Figures 1-10 and Tables1-3).

Plate 1:

Figure 1: Root of *Vilwa*.

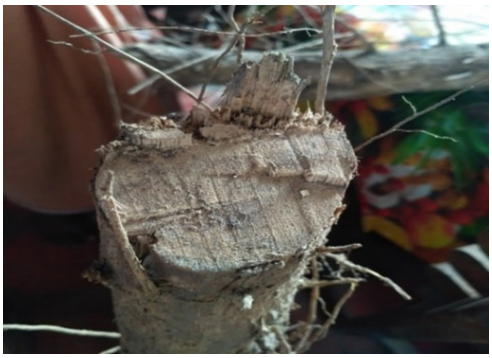

Figure 2: Root of *Gambhari*.

Figure 3: Root of *Agnimantha*.

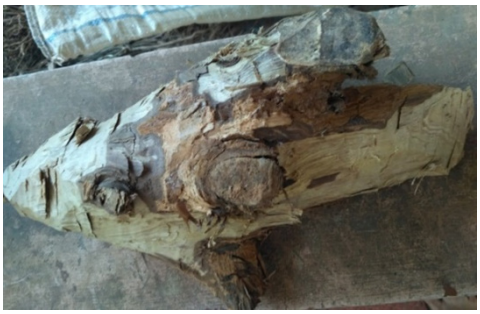

Figure 4: Root of *Patala*.

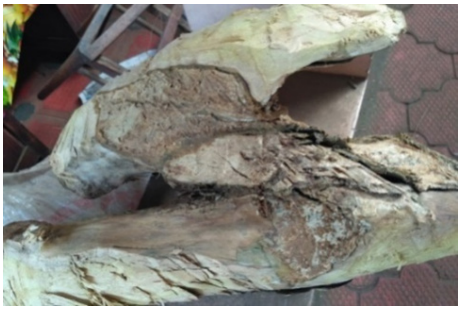

Figure 5: Root of *Syonaka*.

Table 1: Organoleptic features of root of *Vilwa*.[5]

Property	Root bark	Small root	Woody root
Shape	Irregular	Cylindrical	Cylindrical
Size	2-3cm breadth and 5-7 cm length.	½ an inch diameter.	More than 2" diameter.
Colour	Cream yellow/greyish/yellowish brown.	Skin-yellowish white to light brown; often with additional light purple or rose tint.	Pale yellowish brown, thick corky cream coloured flaring edges.
External characters	Surface: Profusely lenticulate, not warty or very tough, comparatively soft Surface skin: Thin, fairly tough, many layered and peels off as small irregular pieces.	Numerous lenticels in several close longitudinal series Surface skin: thin but tough, withstand peeling off, have slits here and there along the development of lenticels Surface of bark: homogeneous, leathery structure Wood: light, porous, creamy yellow in colour.	Longitudinal and transverse series of closely arranged prominent lenticels Gritty, rough and irregular surface Shallowly ridged Firm and leathery.
Internal surface	Smooth with longitudinal lines.	Central portion: Wood appears light yellowish and closely porous Peripheral portion: light coloured or whitish and more diffusely porous.	Rind: light brown strip Inner officinal part: very light brown tissue Wood: cream white to cream yellow in colour, hard, compact and homogenous, concentrically lamellated due to narrow annular strips of hard tissue alternating with bands of soft tissue.
Fracture	Splintery	Easily friable	Bark-Easily friable Wood-Splinter.
Odour	Characteristic aromatic for fresh root bark	Characteristic	Odour: Bark-Faintly aromatic Wood-Mildly fragrant.
Taste	Characteristic	Characteristic	Bark-Bitter slightly pungent Wood-Slightly sweetish.

Table 2: Organoleptic features of root of Gambhari, Agnimantha, Patala and Syonaka.

Property	Gambhari[6]	Agnimantha[7]	Patala[8]	Syonaka[9]
Shape	Easily separable from wood as sheets.	Cylindrical	Irregularly cylindrical.	Cylindrical
Size	¼-½ an inch or more in diameter.	1-2 cm in diameter.	4-5 cm in diameter.	5-6' diameter.
Colour	Dull greyish white or greyish brown.	Creamy white, when fresh on scratching shows a purple colour.	Dull brown	External-dull brownInternal-creamy white.
External characters	Slightly hard, brittle, crustaceous.	Thick, corky, easily friable.	Fissured surface, longitudinal and oblique furrows.	Rough, irregular.
Internal characters	Wood: evenly grained, porous.	Woody, close grained.	Woody	Woody
Fracture	Fibrous	Fibrous	Splintery	Short and slightly fibrous
Odour	Faintly aromatic, usually devoid of bitterness.	Characteristic aromatic	Non-characteristic	Non-characteristic
Taste	Initially mucilaginous sweetish later turns to bitter.	Bitter	Bitter	Initially sweat, later turns into bitter.

Plate 2:

Figure 6: Root of *Bruhati.*

Figure 8: Root of *Prisniparni.*

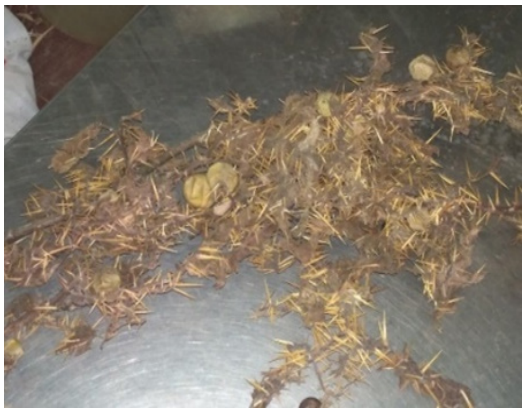

Figure 7: Sample of *Kantakari.*

Figure 9: Root of *Salaparni.*

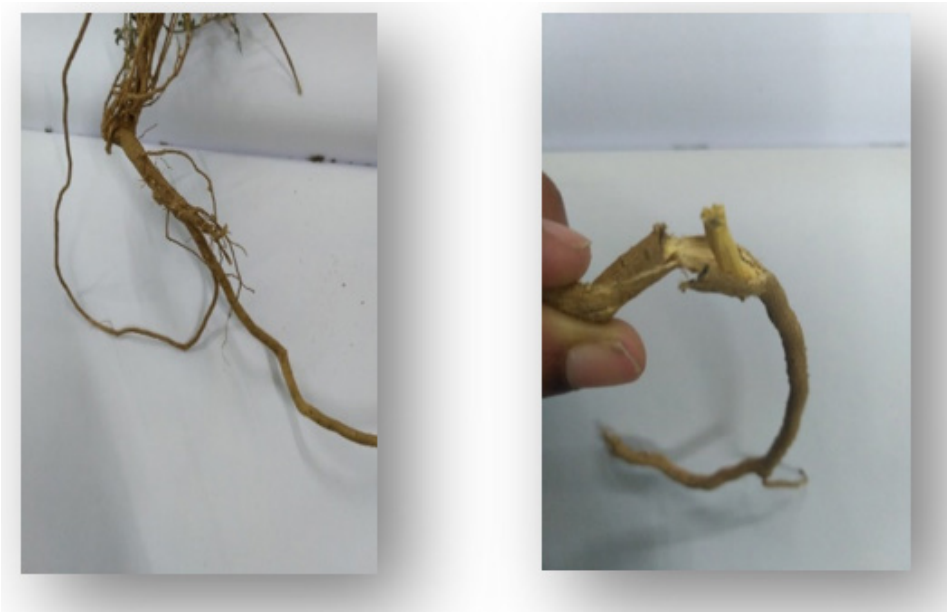

Figure 10: Root of *Gokshura.*

Table 3: Organoleptic features of raw drug samples of *Laghu Panchamoola*.

Property	Bruhati[10]	Kantakari[11]	Prisniparn[12]	Saalaparni[13]	Gokshur[14]
Shape	Cylindrical	Irregular	Cylindrical	Cylindrical	Cylindrical
Size	2-3 cm diameter.	Irregular	1-2 cm diameter.	1-2 cm diameter.	4-6 inches long.
Colour	Creamy white	Light brown	Dark brown	Dark brown	Dark creamy-yellowish.
External characters	Smooth	Rough due to spines.	Leathery texture	Crustaceous, peeling, rough bark; covered with lenticels.	Smooth devoid of any cracks.
Internal characters	Hard and woody.	-	Yellowish creamy, wood as a thick strand.	Light brown in colour	Cream coloured
Fracture	Fibrous	-	Fibrous	Splintery	Smooth
Odour	Non-characteristic	Non-characteristic	Non-characteristic	Non-characteristic	Faintly aromatic
Taste	Non-characteristic	astringent	Sweetish	Astringent	Sweetish astringent

Table 4: Unique features of raw drugs in *Dasamoola*.

Name of the drug	Root	Lenticel	Outer rind	Bark	Wood
Vilwa[5]	Light pinkish-grey to greyish-brown Cylindrical with profusely and prominently lenticellate surface.	Fairly large and closely arranged along longitudinal and transverse ridgesThick soft friable, corky, creamy white to yellow flaring ridges.	Thin, fairly tough and exfoliating Outside: brownish Inside: lighter coloured In older roots: found as small narrow strips adhering to depressions between the ridges.	Fresh-Whitish, on exposure turns greyish brownPossess firm tough structure Narrow whitish starchy granular peripheral portion and a bulkier tangentially lamellated fibrous inner region.	Hard, Light cream yellow colour, homogenous, close grained and minutely porous.
Gambhari[6]	Light grey to greyish brown, Nearly, cylindrical and woody, not heavy, Entire bark: Comparatively thick, When peeled off shows yellow colour.	Older-surface: lenticellate, shows shallow longitudinal cracks.	Slightly thick, compact and somewhat brittle, In fresh roots: can be easily separated as small pieces from rest of the bark.	In fresh: Whitish, juicy and non-fibrousOn drying: colour turns greyish and then dull brown.	Light, evenly grained, Porous.
Agnimanth[7]	Woody, strong, light yellowish brown to light brown, shallowly fissured surface.	-	-	Fairly thick, corky, soft, easily friable, On scraping soft tissue, strong aromatic oil gets exposed, Creamy white, juicy, homogenous, On exposure of tissue, bluish black/purple colour develops.	Whitish, Hard, Close grained, TS shows fine porous appearance.

Patala[8]	-	-	-	Whitish, on exposure becomes dull brown, Thin, Compact, Somewhat brittle, easily separable in fresh roots.	Concentrically striated, Numerous fine radiating medullary rays.
Syonaka[9]	-	-	-	Fresh bark: Greyish or light brown, Cylindrical, stout and woody, Smooth surface, Faintly fissuredDried bark: Shrunken surface, Longitudinally wrinkledBark: Thick, juicy, turgid, Dull white-turns green, On drying adheres to trunk.	Soft, Highly porous, Slightly fibrous.
Prisniparni[12]	Long, narrow, cylindrical with numerous lateral branches.	-	Thin, tough leathery, easily peelable in fresh samples.	-	Strong woody strand.
Salaparni[13]	Comparatively narrow, woody, dark brown in colourSurface skin: thin and exfoliatingInner surface: Light brown.	Surface: Profusely lenticellate, some-what warty, not so hard.	-	-	As a thin strand in the middle.

DISCUSSION

Unique features of *Dasamoola* are tabulated below,

CONCLUSION

This article summarises the external morphological characteristics of authentic samples of "*Dasamoola*". Nowadays the authentic samples of "*Dasamoola*" are very rare to find in pharmaceutical industry. This article will serve as an authentic guide for identification of "*Dasamoola*" samples for the research community in Ayurveda and contemporary science.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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