



## PHARMACOGNOSTICAL EVALUATION OF SHATAVARI (ASPARAGUS RACEMOSUS WILLD.) ROOT COLLECTED IN DIFFERENT SEASONS – A COMPARATIVE STUDY

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### ABSTRACT

**Background:** In the current scenario, plant-based traditional medicines are providing a base for treating various diseases. It has been reported that 80% of the population of the world depends upon traditional medicine. It has been also shown that many factors like habitat, climate, temperature, season etc can affect the quality of medicinal plants. The study was conducted to explore such Ayurvedic documented literature with pharmacognostical study. **Aim:** To study macroscopic and microscopic characters of the drug samples collected in four different seasons according to Ayurveda classics. **Materials & Methods:** In the present study, four samples of *Asparagus racemosus* were collected in four different seasons- *Grishma*, *Pravrut*, *Sharad* and *Shishira Ritu* (May, June, October, and January) based on Ayurveda classics for comparing the pharmacognostic characters so that they can be distinguished from each other. **Results and Discussion:** The influence of seasons on four different samples was ob-

served in terms of the sizes of roots, xylem vessels, phloem, raphide bundles of calcium oxalate etc. **Conclusion:** The seasons on the roots of *Shatavari* exhibited an effect in macroscopical and microscopical characters. Thus, it can be said that the season for collection of the drug has an important role to validate the factors that influence the potency of the drug.

**Keywords:** Ayurveda, *Shatavari*, *Asparagus racemosus*, *Dravya Sangraha Kala*, Pharmacognostical study

## INTRODUCTION

India has the richest repository of traditional healthcare systems like Ayurveda, Unani, and Siddha with wide acceptance. There is a universal rise in the use of Ayurveda medicines since the Ayurveda systems of medicine is being largely plant-based and generally safe with a minimum side effect or no side effect. The increasing demand and multiple uses lead to substitution and adulteration. Pharmacognostical study is one of the solutions regarding the issues of substitutions and adulterations. Nature is an excellent source of drugs. The plant used in traditional medicine varies throughout the year in amount or quantity and the nature of active constituents has been reported different from season to season. For getting the highest quality, potentiality, and clinical efficacy of the drug, it should be collected during the appropriate season. Thus, it will be interesting to know in which season the part of the plant should be collected. In Ayurveda classics, there is a description regarding the collection of parts of the plants in a specific season (Table 1). With the help of pharmacognostical study, the variations like the morphological character of a drug, cell structure, tissue structure, specific features according to season can be differentiated. The purpose of collection in different seasons was to compare the pharmacognostic characters so that they can be distinguished from each other. The present work was a humble effort to observe the effect of seasonal variations of *Shatavari* roots pharmacognostically to validate the concept of “*Dravyasamgraha Kala*” which is one of the fundamental principles of Ayurveda.

## AIM AND OBJECTIVES

1. To study organoleptic characters of the samples of roots of *Asparagus racemosus* in different seasons.

2. To study macroscopic characters of the samples in different seasons.
3. To study microscopic characters of the samples in different seasons.
4. To study powder microscopy of the samples in different seasons.

## MATERIALS AND METHODS

In current research work, the samples of *Asparagus racemosus* were collected in different seasons- *Grishma*, *Pravrut*, *Sharad* and *Shishira* based on Ayurveda classics (Table 1). As per the reference in *Sushruta Samhita*, it is said that the drug should be used after one year<sup>6</sup>. So, the first sample was collected for the study after one year. The sample drug plant (*Asparagus racemosus*) was propagated in ten clay pots in May 2018. Then after one year, the first sample was collected in May 2019.

The fresh tuberous roots of *Shatavari* were collected and washed in the four seasons for study and root powders of four samples of *Asparagus racemosus* were also studied. The transverse and longitudinal sections were studied of the samples. The studies of all the samples were conducted at Dr Daniel's laboratory, Vadodara.

## PHARMACOGNOSTICAL STUDY

### 1. Organoleptic Study:

The samples of *Shatavari* roots in different seasons were studied by sense organs which refer to shape, size, specific features, touch, odour, taste etc. (Table 2)

### 2. Macroscopic Study

*Asparagus racemosus* Willd is an excessively branched (*Bahusuta*) scandent spiny twining under-shrub or occasionally climbing to great heights on tall trees. It has a short stout rootstock bearing numerous considerably long fusiform succulent tuberous roots.

The roots are arising from the rootstock. The four samples of roots were found creamish white and their surfaces were found rough which showed wrinkles longitudinally after the roots were dried. When the roots were transversely cut, they showed a yellow peripheral strip, a silvery-white fleshy soft middle region that formed the bulk part of the root and a slightly hard narrow central woody core. It was found that the size of roots varied according to their seasonal collection. They were found about 33-79 cm long in different seasons. The sizes of the roots were: first sample-33 cm, second sample- 56 cm, third sample-59 cm and fourth sample- 62 cm (Fig. 1).

### 3. Microscopic study

In the microscopic study, both transverse and longitudinal sections of the samples in different seasons were taken and powder microscopy was also done after proper mounting and staining with different reagents like safranin. Each common and distinguished character were noted down.

The common characteristics observed were cork, cortex, piliferous layer, xylem, phloem, pith, raphide bundles of calcium oxalate in transverse section (fig.2), while tracheids in longitudinal section (fig. 3) and cork cells, cortex, tracheids and parenchymatous cells in powder microscopy (fig.3).

There are some quantitative variations in the microscopic study of the samples. The xylem was found higher (30-35 xylem) and the metaxylem (2-3) were also present in the fourth sample. The raphide bundles of calcium oxalate (acicular crystals: 25-28) were also found higher in the fourth sample which was collected in *Shishira Ritu* (January 2020) with the reference of *Raj nighantu*, while xylem was observed less in the first and second sample collected in *Grishma* and *Pravrit Ritu* (fig.4) with the references of *Charaka Samhita* and *Sushruta Samhita*. The starch grains were not found in all the samples (Fig. 2).

### OBSERVATIONS & RESULTS

The samples of *Shatavari* roots were showed distinguished microscopic characters as collected in different seasons (Table 3 and Fig. 4).

## DISCUSSION AND CONCLUSION

In the recent era, it is very difficult to get the proper drug. A pharmacognostical study is an important tool for authentication of the genuine drug. The plants are showed quantitative variations from season to season. The season for collection of the drug has an important role to validate the factors that influence the potency of the drug. With the help of pharmacognostical study, it is possible to distinguish the variations of different samples collected in different seasons of the same plant. It was studied and reported here. The morphological features were found more similar except for the sizes of the roots of the samples. But the microscopic study was showed variations among the four different samples. The xylem and metaxylem which transport water from roots to stems, leaves and provides nutrition to the whole plant were found higher in *Shishira rutu* (30-35 xylem and metaxylem 2-3 in January 2020). The raphide bundles of calcium oxalate (acicular crystals) have a central role in a variety of functions including tissue calcium regulation, protection from herbivory, metal detoxification, supporting ascorbic acid as the primary precursor to oxalate biosynthesis. The raphide bundles were found higher in *Shishira Ritu* (25-28 in January) while the xylem and the raphide bundles of calcium oxalate (acicular crystals) were observed less in the first and second samples (*Grishma* and *Pravrut rutu*). Thus, the fourth sample is observed to be the best. The theory put on by *Raj nighantu* seems to be justified in the current study. It shows seasonal variations of plants and the importance of the study. With the results, it can be said that the roots of the plant should be collected in *Shishira rutu*. In the Classics, it is mentioned that the root of *Shatavari* should be used in *Aardravastha* (wet state) and mentioned that it should be used in dry powder form in formulations. Powder microscopy of the samples of *Shatavari* roots was also evaluated. The knowledge of plant-based traditional medicines is always required for Ayurveda physicians. For that, it is important to select good quality medicine, seasonal collection and to prevent substitution and adulteration.

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**Table 1:** The description of a collection of drug samples in different seasons according to classics:

Sr. No.	Sample and Season	Reference
1.	1 <sup>st</sup> sample- <i>Grishma</i> (May 2019)	<i>Charaka Samhita</i> <sup>1</sup>
2.	2 <sup>nd</sup> sample- <i>Pravrut</i> (June 2019)	<i>Sushruta Samhita</i> <sup>2</sup>
3.	3 <sup>rd</sup> sample- <i>Sharad</i> (October 2019)	<i>Sharangadhara samhita</i> <sup>3</sup> & <i>Bhavaprakasha samhita</i> <sup>4</sup>
4.	4 <sup>th</sup> sample- <i>Shishira</i> (January 2020)	<i>Raj Nighantu</i> <sup>5</sup>

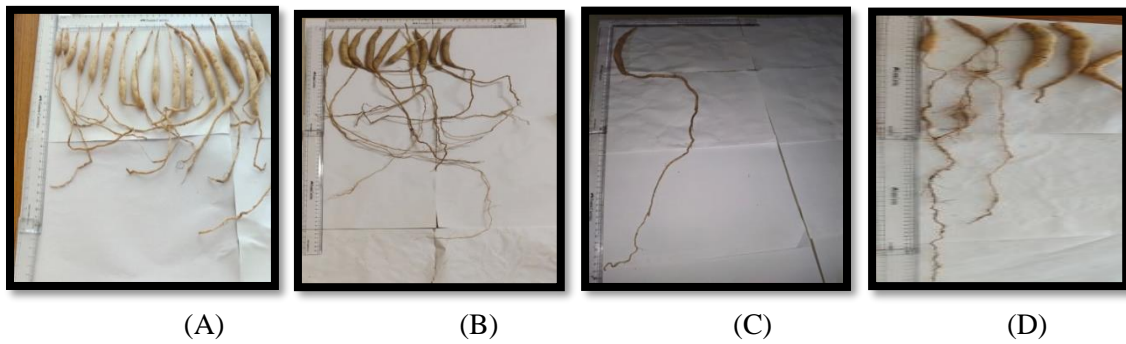
**Table 2:** Organoleptic characters of four samples of *Shatavari* root:

No.	Characters	1 <sup>st</sup> sample ( <i>Grishma</i> -May)	2 <sup>nd</sup> sample ( <i>Pravrut</i> -June)	3 <sup>rd</sup> sample ( <i>Sharad</i> - October)	4 <sup>th</sup> sample ( <i>Shishira</i> - January)
1.	Shape	Tuberous	Tuberous	Tuberous	Tuberous
2.	Surface	Rough	Rough	Rough	Rough
4.	Odour	Pleasant	Pleasant	Pleasant	Pleasant
5.	Taste	Bitter	Bitter	Slightly bitter	Sweetish Bitter
6.	Colour	Creamish white	Creamish white	Creamish white	Creamish white

**Table 3:** Comparative study of the samples of *Shatavari* root which are collected in different seasons is as follows:

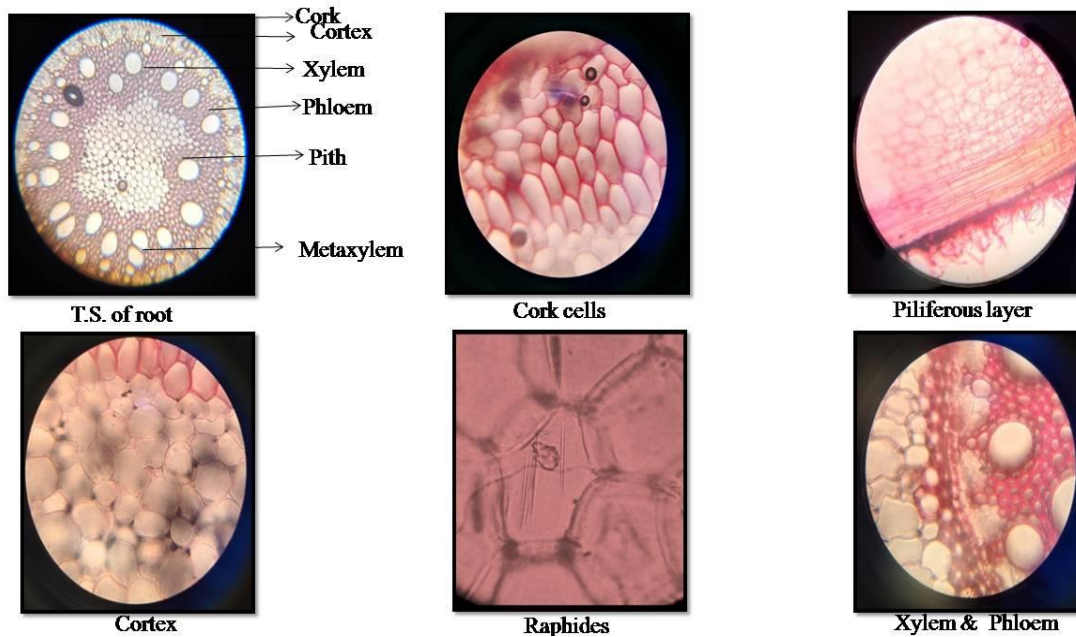
Sr. No.	Character	1 <sup>st</sup> sample ( <i>Grishma</i> )	2 <sup>nd</sup> sample ( <i>Pravrut</i> )	3 <sup>rd</sup> sample ( <i>Sharad</i> )	4 <sup>th</sup> sample ( <i>Shishira</i> )
1.	Xylem	8-10 xylem	10-12	18-20	30-35 xylem and 2-3 meta-xylem
2.	Raphide bundles of calcium oxalate (Acicular crystal)	5-6	01-02	20-25	28-30
3.	Tracheids	Present	Present	Present	Present
4.	Parenchyma cells	Present	Present	Present	Present
5.	Pith	Present	Present	Present	Present

**Figure 1:** External morphology of roots of *Asparagus racemosus* collected in different seasons:



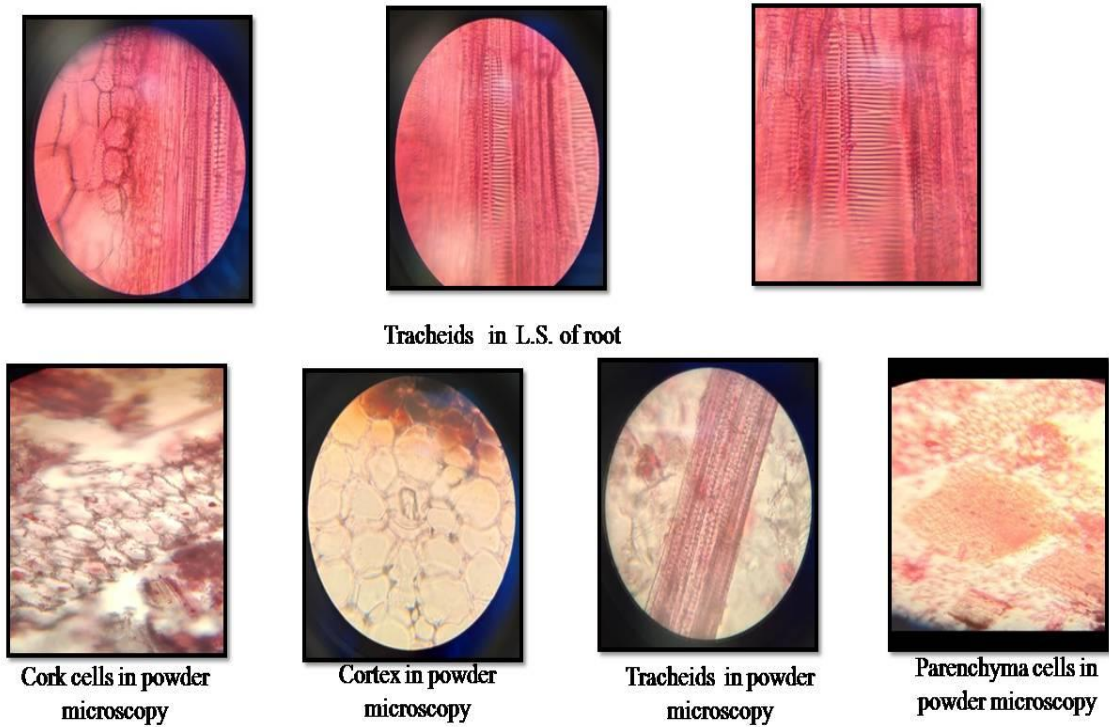
**Figure 1:** (A) - 1<sup>st</sup> sample (May, 2019); (B) - 2<sup>nd</sup> sample (June, 2019); (C) - 3<sup>rd</sup> sample (October, 2019); (D) - 4<sup>th</sup> sample (January, 2020)

**Figure 2:** The common microscopic characters in transverse section in different seasons

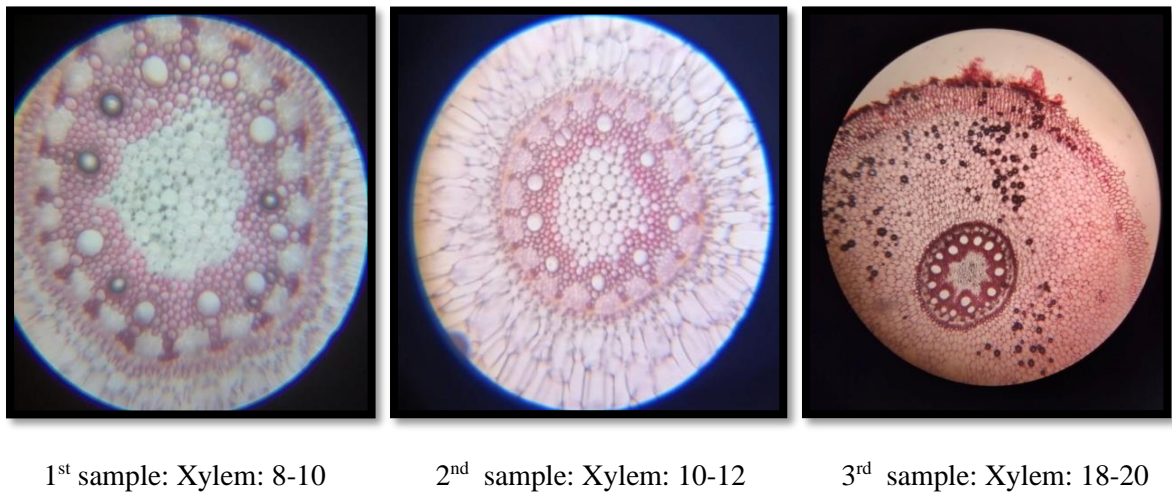


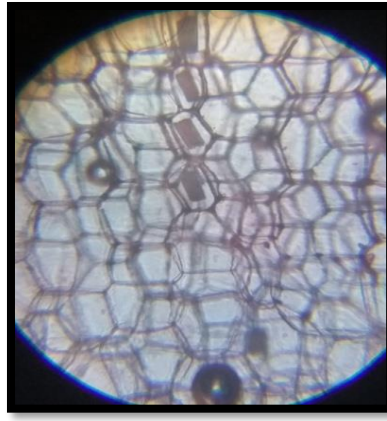
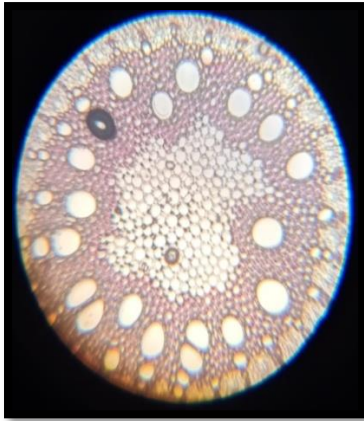


**Figure 3:** The common microscopic characters in longitudinal section and powder microscopy in different seasons



**Figure 4:** The distinguished microscopic characters in different seasons:



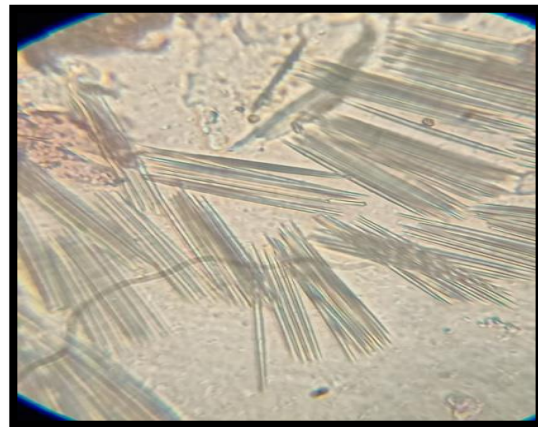


4<sup>th</sup> sample: Xylem: 30-35 & 1<sup>st</sup> sample: Raphides: 5-6  
metaxylem: 2-3

2<sup>nd</sup> sample: Raphides: 1-2



3<sup>rd</sup> sample: Raphides: 20-25



4<sup>th</sup> sample: Raphides: 28-30

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