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Pharmacognostical Standardization of leaves of *Asparagus racemosus* wild

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Abstract
Asparagus racemosus (Liliaceae) is traditionally used in the treatment of dysentery, epilepsy, inflammation, leprosy, night blindness, tuberculosis, snake bite, cancer, anti-spasmodic, gonorrhea, piles, diabetes, rheumatism, cough, diarrhoea, gastric troubles, head ache and it increases the lactation. The aerial parts are used as spasmolytic, anticancer, anti-arrhythmic, antibacterial and anti-fungal. The present study highlights the pharmacognostical standardization of leaves which includes macroscopy, microscopy as well as WHO recommended physico- chemical studies. The results of this standardization may be helpful for the identification and judging the authenticity of the plant which will be useful to differentiate the plant from its adulterants and other species.

Keywords: *Asparagus racemosus*, Leaves, Pharmacognostical standardization, Authenticity

1. Introduction
Asparagus racemosus (Liliaceae) commonly known as Shatavari, is an amazing herb known as the "Queen of herbs", because it promotes love and devotion**.** The name Shatavari means "curer of a hundred diseases" (shat: "hundred"; variety: "curer") [1]. Asparagus is the Greek word for "stalk" or "shoot". About 300 species of Asparagus are known to occur in the world in many countries out of which 22 species are recorded in India, in both; hemispheres and throughout temperate and tropical regions. Several species of '*Asparagus'* are grown in India, *A. racemosus*, *A. gonaclades* and *A. adsendens* are most commonly used in Indigenous medicine [2]. *A. racemosus* is commonly mentioned as a rasayana in the Ayurveda. Rasayanas are those plant drugs, which promote general well-being of an individual by increasing cellular vitality or resistance [3].
Asparagus racemosus roots are tradionally used as dysentery, epilepsy, inflammation, leprosy, night blindness, tuberculosis, snake bite cancer, diuretic, aphrodisiac, anti-spasmodic, gonorrhea, piles, diabetes, rheumatism, cough, diarrhoea, dysentery, gastric troubles, head ache and it increases the lactation [4, 5]. The aerial parts are used as spasmolytic, anticancer, antiarrhythmic, antibacterial and anti-fungal. Since, no pharmacognotical work was carried on the leaves of this plant, the present study is aimed to carry out the pharmacognostical standardization on the leaves of *A. racemosus*

2. Materials and Methods
2.1 Collection
The fresh leaves of *Asparagus racemosus* Wild, was collected from Kanchipuram district in Tamil Nadu and authenticated by Prof. Jayaraman, Botanist, Director, Plant Anatomy Research Centre, Thambaram.

2.2 Macroscopic and Microscopic analysis
The macroscopic characters such as colour, odour, taste, nature, texture were studied. For anatomical investigation, customary techniques of microtomy was followed [6]. Paraffin embedded sections of 10 µm thick were stained with safranin – fast green. Photomicrographs were taken with NIKON lab photo – Microscopic unit [7]. The powder analysis has been carried out according to the method of Brain and Turner [8].

2.3 Physicochemical studies
The ash values, extractive values, crude fibre content, loss on drying and foaming index were performed according to the official methods prescribed in Indian Pharmacopoeia and WHO Guidelines on quality control methods for medicinal plant materials [9, 10].

2.4 Preliminary Phytochemical screening
The preliminary phytochemical tests were carried out for the powdered leaves according to that standard procedure described by Kokate [11].

3. Results and Discussion
3.1 Macroscopy
The leaves (cladodes) are like pine needles, small and uniform and flowers are white and have small spikes.
Leaf blade - triangular in transverse section
Margin – not visible.
Taste- Sweet and bitter.
Odour- Characteristic

Fig 1.1: Whole plant of *Asparagus racemosus*

Fig 1.2: Macroscopy of leaves

4. Microscopy: [12-17]
The plant bears thin cylindrical climbing stem which bears thin membranous scaly leaves and a cluster of curved finger like greenish photosynthetic organs called cladodes or phyllodades.

In cross section view the phyllodades appear 4 angled or 3 angled with lateral projection (Fig 2.1). The rectangular phyllodade is about 400 µm thick. It consists of thick and wide radially oblong epidermal cells with fairly prominent cuticle. The epidermal cell are 40 µm thick. Inner to the epidermis is 2 or 3 layer of circular, chlorophyllous palisade cells. Inner to the palisade zone occurs 1 or 2 layer of thin walled parenchyma cells. The vascular system consist of a thick circular cylinder of fibres enclosing two small vascular elements (Fig 2.2 & 2.4). The vascular strands have small cluster of 2 or more wide, angular xylem elements and a thick mass of phloem elements (Fig 2.4). The bundle sheath fibres are heavily thick walled and lignified with narrow lumen. The xylem elements are 30 µm in diameter. The fibro vascular system is 220 µm in diameter.
The stomata are sunken in the epidermis in section. There are 2 conical stomatal ledges on the outer and inner side of the stoma (Fig 2.3)

5. Scale Leaf
The scale leaf is thick and spindle shaped in the middle measuring 70 µm thick. It consist of 3 layer of cell with central core of some 7-8 thick walled cells. The marginal part of the scale is uniseriate; the cell being spindle shaped.

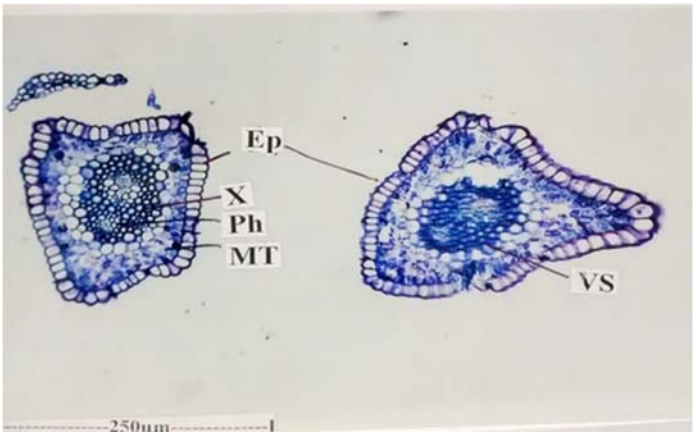

Fig 2.1: T.S of Phyllodades entire view.

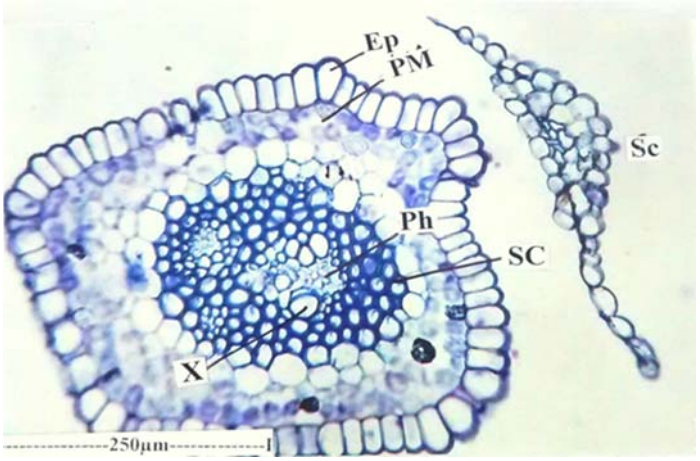

Fig 2.2: T.S of a Phyllodade and scale leaf

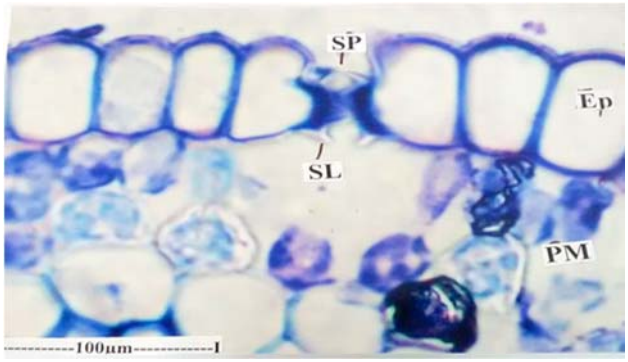

Fig 2.3: T.S of Epidermis of the phyllodade showing sunken stoma and stomatal ledges.

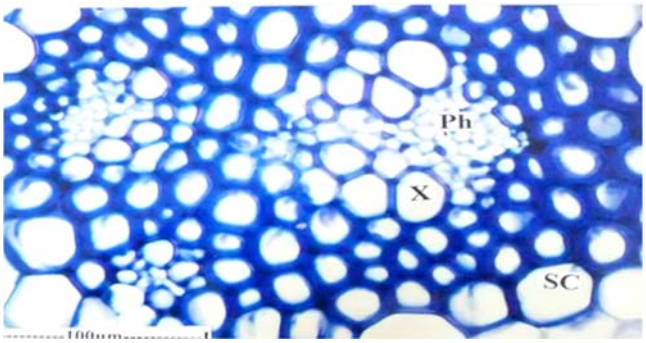

Fig 2.4: T.S of a fibro vascular system with two masses of phloem and xylem.

(Ep-Epidermis, MT-Mesophyll tissues, Ph-Phloem, PM-Palisade mesophyll, SC-Sclerenchyma, Sc-Scale, SL-Stomatal ledge, SP-Stomatal pore, VS- Vascular stand, X-Xylem)

6. Powder Microscopy

Color- Light greenish colour
Odour- Characteristic
Taste- Sweet and bitter

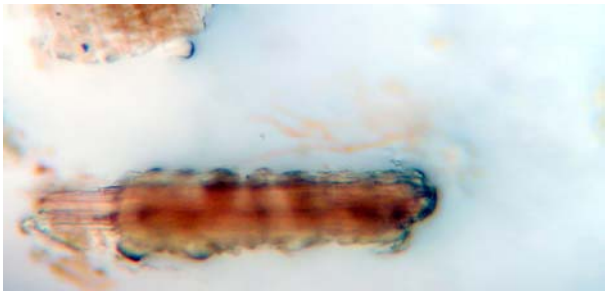

Fig 3.1: Lignified Fibre

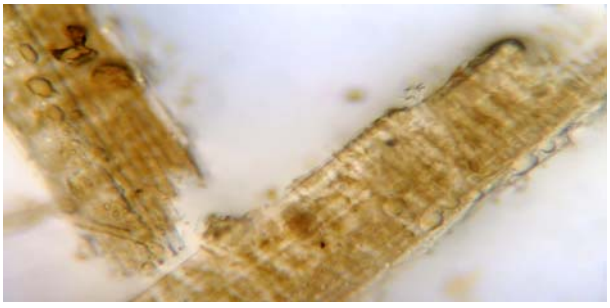

Fig 3.2: Epidermis with palisade cells

Fig 3.3: Epidermis with Stomata

7. Physico-Chemical Parameters

Physico-chemical parameters are mainly used is judging the purity and quality of the powdered drug (T.No.1). Ash values of a drug given an idea of the earthy matter or inorganic composition and other impurities present along with the drug.

The extractive values gives an idea about the chemical constituents present in the drug as well useful in the determination of exhausted drug.

LOD of the powdered drug was carried out to find out the percentage of moisture present in the drug since moisture facilitates the enzyme hydrolysis or growth of microbes lead to deterioration Crude fibre content so obtained can be implied to determine the nutritive value.

Table I: Physicochemical Constants of the leaves of *Asparagus racemosus*, Wild

S. No.	Parameters	Percentage w/w
I.	**ASH VALUES**	
1.	Total ash	10.47±1.12
2.	Water soluble ash	05.20±0.45
3.	Acid soluble ash	01.34±0.38
4.	Sulphated ash	06.62±0.51
II.	**Extractive values**	
1.	Ethanol soluble extractive	11.42±0.27
2.	Water soluble extractive	38.86±0.47
3.	Ether insoluble non-volatile	21.74±0.35
4.	Ether insoluble volatile	11.23±0.73
III.	Loss on Drying	04.68±0.44
IV.	Crude Fibre Content	51.32±1.42
V.	Swelling Index	03.62±0.76
VI.	Foaming Index	Less than 100

8. Preliminary Phyto-Chemical Screening

The preliminary phyto-chemical screening was carried out for the leaf powder and it showed be the presence of Carbohydrates, Flavanoids, Phenolic compounds, Saponins, Steroids, Tannins and Terpenoid.

Table II: Preliminary phyto-chemical screening of leaves of *Asparagus racemosus*, Wild

S.NO	Test	Powdered Leaf
1	Alkaloids	-
2	Carbohydrates	+
3	Flavanoids	+
4	Glycosides	-
5	Phenolic compounds	+
6	Proteins	-
7	Qinones	-
8	Saponins	+
9	Steroids	+
10	Tannins	+
11	Terpenoids	+
12	Volatile oils	-

Note: + ve indicates positive result, whereas – ve indicates negative result

9. Conclusion

In order to select the genuine plant species of the drug pharmacognostical identity of the plant is necessary through a taxonomical and anatomical screening. The majority of information on the identity, purity and quality of the plant can be obtained from macroscopy, microscopy and physico-chemical parameters. As there is no pharmacognostical work was done in the leave of *Asparagus racemosus* the present work is under taken to produce some pharmacognostical standards which can very useful in the identification of the plant in whole and fragmentary form.

The above studies provide information in respect of the identification for this plant that could be made use of those who deal with the species in future and also in the quality assurance of the plant species.

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