

Research Article

Pharmacognostic, phytochemical and fluorescence analysis of *Asparagus setaceus* Kunth.Adeel Usman¹, Muhammad Uzair², Muhammad Asif Wazir¹ and Asad Saleem Sial*¹¹Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, University of Karachi, Karachi, Pakistan.²Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Bahauddin Zakariya University, Multan, Pakistan.**Abstract**

Since the creation of the planet earth, human beings are curious about the nature and obtain benefits from nature including the treatment of many diseases. *Asparagus setaceus* Kunth is commonly available plant belongs to family Asparagaceae, commonly used as diuretic, antiepileptic, applied topically in skin diseases, treat urination, gynaecology and andrology problems, orally for dysentery and diarrhea treatment and treat pulmonary infections. The aim of present study is to standardize the plant material. For this purpose, leaves and roots of the *Asparagus setaceus* Kunth were collected, identified, dried and extraction was performed. Macroscopic, microscopic analysis, phytochemical screening and fluorescence analysis were also performed. The macroscopic studies revealed different plant structures. The microscopic studies showed different cells and their arrangement within the plant. The phyto-chemical screening reveals presence of different primary and secondary metabolites. Whereas the fluorescence analysis revealed different colors both in visible and ultra violet (254nm and 366nm). Biological and toxicological studies are needed to be performed to establish the plant monograph for safety profile.

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Man has acquired knowledge about animals and plants having food and poisonous values, precarious animals and several natural products often used for treating special diseases. From generation after generation his observations were transferred verbally, kept preserved and new experiences were further added by upcoming generation (Balandrin and Klocke 1988, Morris 2002).

Asparagus setaceus Kunth is a perennial herb. It belongs to family Asparagaceae and contains steroidal saponins, Asparagine, Kaempferol, Racemosol, folic acid, ascorbic acid, vitamin A, B₁, B₂ and E with Mg, Ca, P and Fe as (Csurhes and Markula 2009). *Asparagus* species are used traditionally to treat various diseases like diarrhoea, dysentery (Murad, Ahmad et al. 2012), epilepsy, leucorrhoea and skin diseases.

It has Aphrodisiac, antiseptic, antimicrobial, antifungal (Esezah, Godwin et al. 2015), abortifacient, antispasmodic, cytotoxic and molluscicidal activity, antioxidant, cardiovascular, hepatotoxic, antiulcer, antineoplastic, tyrosine inhibition, immunomodulatory, antidiarrhoeal and respiratory effects have been reported (Ali 2008).

Material and method**Collection, authentication and extraction of plant material**

Plant collection was done from Faiz-e-Aam nursery in 2016 and was authenticated as *Asparagus setaceus* Kunth (Fam. Asparagaceae), by the botanist of Bahauddin Zakariya University, Dr Zaffar Ullah Zaffar. Voucher No. "Stewart F.W. Pak. 49(10)" was deposited to Institute of Pure and Applied Biology, Bahauddin Zakariya University Multan, Pakistan.

Leaves and roots were separated, shade dried and grinded both to coarse and fine powder. After passing through mesh No 80/120 powder microscopy and fluorescence

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was performed and extraction was carried out on the remaining powder. For transverse microscopic study fresh plant collected was used (Johansen 1940).

Preparation of Extracts

Extraction of accurately weighed 150g powder of each plant parts i.e. leaves and root was carried out by macerating in methanol and dichloromethane using air tight containers for a period of 7 days. For maximum extraction the macerated powder was shaken occasionally and filtration was done after 24 hours. After repeating the procedure for 3 times, Rotavapor (Buchi R-200) was used to convert the filtrate into semi solid mass.

Macroscopic analysis

Macroscopic characters such as size, color, taste, fracture, texture and shape of *Asparagus setaceus* Kunth leaves and roots were studied according to the standards protocol (Evans 2002).

Microscopic studies

These studies of *Asparagus setaceus* Kunth was performed according to the standard protocol enlisted by World Health Organization (Organization 2011).

Fluorescence analysis

Florescence analysis of leaves of the plant was performed according to the protocol described in literature (Chase Jr and Pratt 1949).

Phytochemical screening

Phytochemical screening was performed according to the standard procedure described earlier by Brain and Turner (Brain and Turner 1975).

Results and discussions

Macroscopic evaluation of *Asparagus setaceus* Kunth

Evaluated morphological and organoleptic characters of the leaves and root of *Asparagus setaceus* are given below:

Table 1: Macroscopic characters of Leaves and roots of *Asparagus setaceus*

Sr. No.	Features	Leaves	Roots
1.	Shape	Lanceolate	Circular and cylindrical
2.	Size	1mm-4mm	3-4 cm
3.	Texture	Thick and fleshy	Thick and fleshy
4.	Taste	Characteristic not acid.	Characteristic
5.	Odour	Characteristic	Characteristic pungent
6.	Color	Green	Brown
7.	Surface	Smooth surface	Rough



Fig 1: Macroscopic analysis of *Asparagus setaceus* Kunth: A (Fresh leaves), B (Dried leaves), C (Fresh root), D (Dried root).

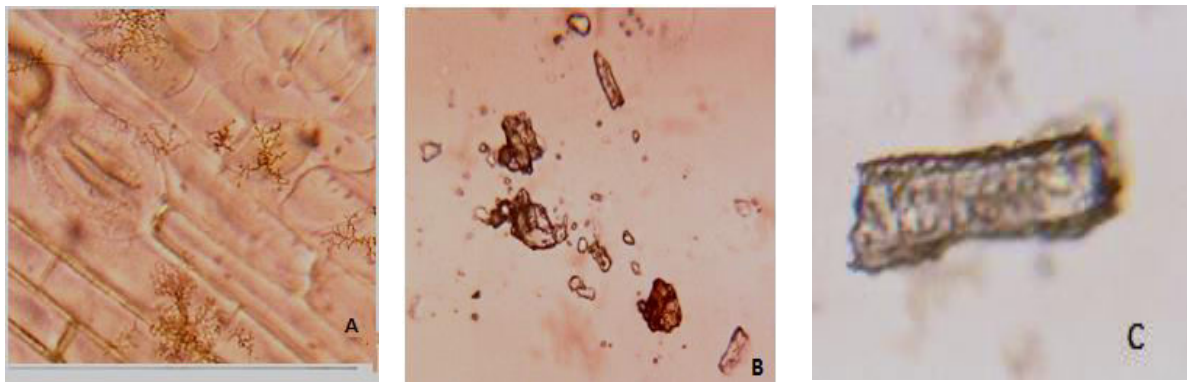


Fig 2: Powder microscopy of leaves: A (Epidermis with stomata), B (calcium oxalate crystals), C (Pitted vessels).

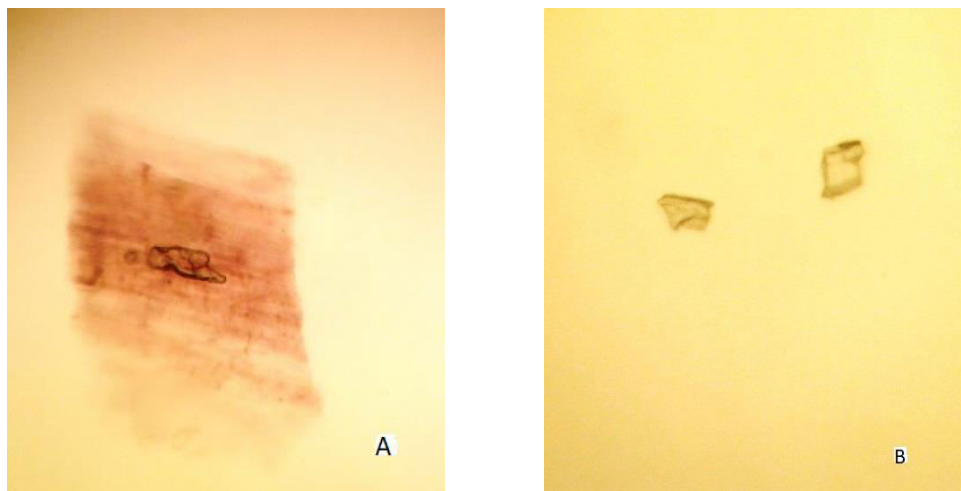


Fig 3: Powder microscopy of root: A (Epidermis cell), B (Calcium oxalate crystal).

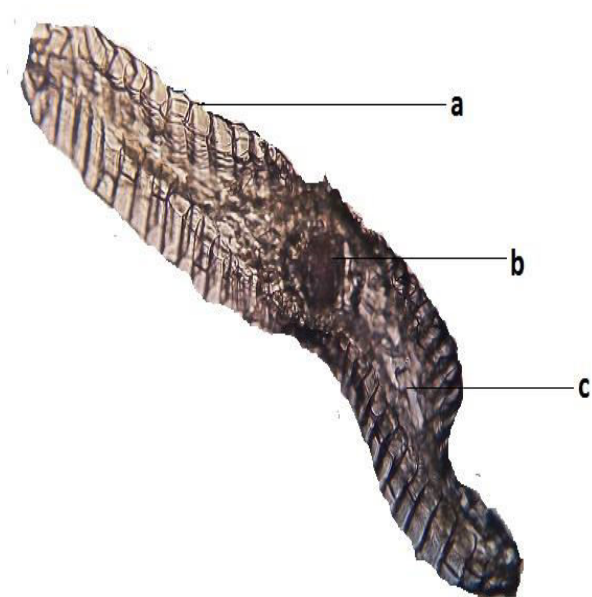


Fig 4: Transverse section of leaves: a) Epidermis b) vascular bundles c) mesophyll.

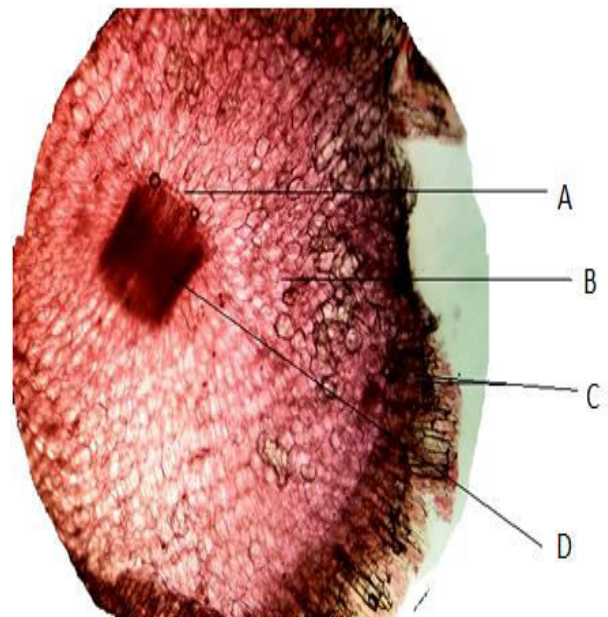


Fig 5: Transverse section of root: a) endodermis b) cortex c) epidermis d) vascular bundle.

Table 2: Fluorescence analysis of Leaves and Roots of *Asparagus setaceus* (Kunth)

Sr. No.	Treatment	Leaves			Roots		
		Visible (Day light)	Ultra Violet		Visible (Day light)	Ultra Violet	
			254nm	366nm		254nm	366nm
1.	Powder as such	Green	Blue	White	Brown	Dark green	White
2.	Drug + H ₂ O	Green	Green	Light green	Brown	Blue	White
3.	Drug + NH ₃	Green	Green	Light green	Brown	Blue	Light blue
4.	Drug + CCl ₄	Green	Red	Orange	Light brown	Green	Blue
5.	Drug + conc. H ₂ SO ₄	Black	Green	Light green	Dark black	Black	Black
6.	Drug + 1M H ₂ SO ₄	Green	Green	Light green	Brown	Green	White
7.	Drug + acetic acid	Light green	Green	Light green	Brown	Green	White
8.	Drug + conc. HNO ₃	Orange	Dark brown	Green	Brown	Green	Green
9.	Drug + 10% NaOH	Light green	Green	Light green	Brown	Light green	Creamy
10.	Drug + 1M NaOH	Green	Green	Green	Brown	Blue	Dark green
11.	Drug + conc. HCl	Green	Green	Green	Brown	Blue	Blue
12.	Drug + 1M HCl	Green	Dark green	Blue	Brown	Green	Blue
13.	Drug + methanol	Green	Orange	Orange	Brown	Blue	Blue
14.	Drug + toluene	Green	Dark brown	Red	Brown	Dark green	Green
15.	Drug +5% Iodine	Green	Green	Green	Brown	Blue	White
16.	Drug +5% FeCl ₃	Green	Black	White	Brown	Black	Brown

Table 3: Phytochemical screening of Leaves and Roots of *Asparagus setaceus* (Kunth)

Sr. #	Tests	Reagent used	Results	
			Roots	Leaves
1	Alkaloids	Mayer's	+ve	+ve
		Hager's	+ve	+ve
		Dragendorff's	+ve	+ve
		Wagner's	+ve	+ve
		Tannic acid	+ve	+ve
2	Flavonoids	Sodium hydroxide	+ve	+ve
		Sulphuric acid	+ve	+ve
		Lead sub acetate	+ve	+ve
3	Tannins	FeCl ₃	+ve	-ve
4	Phenols	FeCl ₃	+ve	-ve
5	Quinones	Hydrochloric acid	-ve	-ve
6	Triterpenoids	CCl ₄ test	+ve	+ve
7	Sterols	Leibermann burchard	+ve	+ve
8	Anthraquinones	Potassium hydroxide	-ve	-ve
9	Proteins	HNO ₃	-ve	-ve
10	Cardiac glycoside	Killer killani test	-ve	-ve

Discussions

Plants play equally advantageous and noxious role in human life. Investigational work is under progression by the botanists of the world to find out the undiscovered characteristics such as nutritional and medicinal to assist the humanity by validating the therapeutic use of the plants either for safety purposes or toxicity for mankind (De Pasquale 1984). *Asparagus setaceus* Kunth belongs to the family Asparagaceae with wide distribution all over the world especially in Africa and Australia. This plant is grown as an ornamental plant in Pakistan. *Asparagus setaceus* Kunth previously has been used in the folk medicine for the cure of different disease states.

This research study verifies and authenticates *Asparagus setaceus* Kunth various features which are supportive to establish pharmacopoeial monograph of this plant. Each part has its own characteristic features, but in dried powdered form only rhizome can be differentiated due to its different texture and colour from that of leaf in dried powder. But in general, these powdered forms have no such characteristic microscopic features to identify any type of adulteration of other crude drugs, excluding its characteristic odour which may be used to check its authenticity (Table 1).

Morphological study of leaves and rhizome reveals the distinctive features like rhizome is circular and cylindrical, leaves are sessile (Fig 1). Microscopy of powder and staining process indicates various structure such as epidermis cell, epidermal stomata, calcium oxalate clusters, starch granules, pitted vessels etc. (Fig 2 & 3). Fluorescence analysis of leaf and rhizome powder were examined under UV light at 254nm and

366nm and in the visible day light after treating with various chemicals and the results are shown (Table 2). Phytochemical screening of extract shows presence of flavonoid, alkaloids, steroidal glycosides and triterpenoids in the parts studied i.e., leaves and rhizome (Table 3).

A great deal of work is still required to be done on this plant; as elaboration of different other therapeutic values for which it has been used in the past and search for different new phytochemicals which may be used medicinally for the cure of different diseases is still needed.

Conclusion

Asparagus setaceus Kunth. possess prominent phytoconstituents both primary and secondary. However, further studies are required to perform detailed phytochemical examination of *Asparagus setaceus* Kunth extract to identify the principle constituents responsible for its worldwide uses against different conditions and to elucidate their exact mechanism of action.

Conflict of interest

Authors have no conflict of interest.

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