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Pharmacognostic and Phytochemical Studies for the Establishment of Quality Parameters of Leaves, Stem and Root of *Spermadictyon suaveolens* Roxb

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ABSTRACT

The current work was undertaken to standardize the different parts of the plant SpermadictyonsuaveolensRoxb. belonging to Rubiaceae family by pharmacognostic and phytochemical studies in order to establish quality control parameters. Different Pharmacognostic introspective techniques were conducted suchlight microscopy,SEM analysis, organoleptic studies, stomatal studies and physicochemical studies. Physicochemical studies included percentage of total ash value, acid-insoluble ash, water-soluble ash value, extractive values, foreign organic matter, loss on drying and fluorescence studies.Phytochemical analysis included the HPTLC fingerprinting of the different extracts of the different plant parts. SEM micrographs of leaves, stem and root revealed many interesting structures like xylem fibres, crystals and stomata. Fluorescence powder studies showed the many characteristic colours under long, short and visible light. Physicochemical studies and HPTLC fingerprints were established for the different plant parts.The pharmacognostic studies provide scientifically procured data so as to authenticate and establish standards for the medicinal applications as well as to detect adulteration of the herbal formulations.

Keywords: SpermadictyonsuaveolensRoxb, pharmacognostic parameters, physiochemical parameters, phytochemical studies, morphology, Microscopy, Stomatal studies, SEM, Fluorescence Powder studies, HPTLC.

I. INTRODUCTION

Developing countries to a great extent, depend on natural alternatives for treatment of diseases [1]. Ensuring the right identification and adulteration free natural products is a must in order to retain the core pharmacological properties as well as efficacy and reproducibility of the plant products [2]. Pharmacognostic studies include physicochemical, morphology, microscopy, SEM, stomatal evaluation

and organoleptic studies. Organoleptic study evaluates the odour, colour, size and texture of the whole as well as powdered drug. Physiochemical studies includepercentage of total ash value, acid-insoluble ash, water-soluble ash value, extractive values, foreign organic matter, loss on dryness and fluorescence powder study. Phytochemical studies include HPTLC fingerprinting with various chemical extracts of the different plant parts.

*Spermadictyonsuaveolens*Roxb. commonly known as 'Forest Champa,' 'Van-Champa', 'Gidesa,' 'Jitsaya' etc. It's particularly called 'Padera' or 'Padhgandhi' in rural districts of Maharashtra as the plant emits a foul smell when cut or bruised. It's distributed in tropical dry or moist deciduous forests across the southeast Asian continent. *Hamiltoniasuaveolens* is used as a synonym for this plant [3]. This plant is known for its medicinal properties and used for the treatment of different ailments in humans. Bark and leaves show antioxidant and antimicrobial effects and the wood is expended as fuel during cold climate[4].The roots of this plant has been used as a wound healer, treatment of diabetes, rheumatoid arthritis and bloody dysentery in veterinary medicine, while the stem and root have been used in healing diseases concerning with the bones as well as Herpes virus[5].

SEM (Scanning Electron Microscope) studies and HPTLC (High Performance Thin Layer Chromatography) fingerprinting studies have not been reported for this plant as of now and hence the work was undertaken to establish the quality control parameters in *Spermadictyonsuaveolens*Roxb. Thus, standardization of the plant drug was attempted usingpharmacognosticstudies and phytochemical studies.Different parts of the plant ware analysed in different solvents to procure an appreciable amount of information that would help in formulation of drugs and future research.

II. MATERIALS AND METHODS

Collection of plant material

The whole plant of *Spermadictyonsuaveolens*Roxb. was collected from, Karnala near the 'Karnala Bird Sanctuary', Panvel. Plant parts were first washed thoroughly with water and then shade dried for 10 days. The plant was further authenticated at Blatter Herbarium, St. Xavier's college, Mumbai, where it was compared to the Specimen Herbarium with Ref. 23598 of H. Santapau. The plant parts after shade drying were pulverised then stored in airtight containers separately.

After confirmation of its botanical identity the plant, the leaves, stem and root (and powder) weresubjected for phytochemical, and pharmacognostic studies.

Pharmacognostic Study

Physicochemical parameterssuch as the different types of ash values and solvent extractive values were determinedaccording to the methods described in the tests for assessing quality of medicinal plants have been described by WHO which are tailor made for the use of national drug quality control laboratories. These tests are also in alignment with the international pharmacopoeia for the quality specifications of few plants[6, 7]. Fluorescence analysis was also caried out asper accepted norms and specifications[8].

Light Microscopy was used for the anatomical analysis.Thin hand sections of the fresh leaf, stem and root were prepared by conventional micro techniques[9].The sections were then fixed, dehydrated and stained and observed under 10X and then 40X of the light microscope.

SEM studies of the leaves, stem and root of *Spermadictyonsuaveolens*Roxb. were studied under the JOEL JSM-7600F with a SEI resolution of 1.0 nm at 15 kV and a magnification of Low: 25X to 10,000X and High: 100X to 1,000,000X. The electron column and a field emission gun techniques are combinedly used by this machine.

The material was completely dried in the oven at 40°C for 10 to 12 hours. It was then mounted on the

stubs with the help of double-sided tapes, a very thin single layer was spread on it.The powdered samples were coated with a thin layer (10 nm) of Iridium before the SEM Analysis due to its non-metallic nature[10].

Leaf constantsDetermination like vein islet number, the Palisade ratio, the number of stomata (stomatal index), and the vein termination number were studied in the leaves of *Spermadictyonsuaveolens*Roxb. This was observed at more than one location or fields of the leaf under the microscope so as to get better average results. Palisade Ratio was observed as the average number of palisade cells found just beneath each of the epidermal cell. The 'Vein Termination Number' is the number of veinlets that terminates in the region of square milli meter of the surface of the leaf while the 'Vein Islet Number' is the number of islets, i.e. minimum area of photosynthetic tissue found per sq.mm of the leaf surface[11, 12].

Stomatal Index was calculated by using the following equation,

$S.I = (S/E+S) \times 100$

here,

S.I = Stomatal Index

S= Number of stomata per unit area

E= Number of epidermal cells in unit area

Fluorescence powder study of plant was carried out by mixing the leaf, stem and root powders with suitable chemical reagents like 50% HNO_3, conc. HNO_3, $K_2Cr_2O_7$, 25% ammonia, 25% ammonia + Dil. HNO_3, IN HCI, IM H_2SO $FeCl_3$, lodine, in different test tubes. These test tubes were then observed under the Short UV, Long UV and normal white light radiation.

Phytochemical Study

HPTLC fingerprinting: 1 gm of each powdered leaf, stem and root powder of *Spermadictyonsuaveolens*Roxb. was separately kept overnight and then sonicated with 10 ml solvents of Petroleum Ether, Chloroform, Ethanol and EthylAcetate and then filtered with Whatman filter paper No.1. The leaf, stem and root powder were soxhlated in Methanol and Isopropyl Alcohol for 4-5 reflux cycles as used as Methanol and Isopropyl Alcohol extracts.

The HPTLC Fingerprint analysis wasperformed on aluminium plate pre-coated with silica gel60F_{254} (Merk, Germany). 5µl of each extract was loaded with automated TLC Sampler ATS 4 (Serial no. 070618) with the help of the Hamilton micro-syringe (Switzerland). It's air flow administered a delivery speed of 150 nl/s at ambient temperature. The mobile phase Toluene: Chloroform: Ethanol (4:4:1) was used with a chamber saturation time of 20 min. Plate was developed upto 7 cm and thereafter dried. The derivatization agent Sulphuric Acid was then used for derivatization in the dipping chamber. The plate was then heated on the heating plate and dried. It was thereafter scanned using the TLC scanner 4 (Serial no.170422) at 540 nm, 366 nm and 254 nm. Vision CATS software (version 3.2.22308.1) was used for sequential programming and the Images at each step of the process were captured inside the TLC Visualizer (serial no:150503). The chromatography conditions are given in Table No. 1.

Table 1: Chromatography Conditions for the HPTLC fingerprinting of *Spermadictyonsuaveolens*Roxb

Chromatographic parameters	Description
Stationary Phase	Merck Silica gel 60F254 pre-coated on aluminum sheet
Mobile Phase	Toluene: Chloroform: Ethanol (4:4:1) (v/v/v)
Chamber saturation time	20 mins
Band Length	8 mm
Developing Distance	70 mm
Derivatizing reagent	ASA-Anisaldehyde

	SulphuricAcid
Plate drying	2-4 min (after development)
5-7 min (after derivatization)	
Heating at 110 ºC for 1-3 min	
Scanning Wavelength	540 nm

III. RESULTS & DISCUSSION

Pharmacognostic Study

Fluorescence was seen clearly in Ammonia reagent in all three powders. The results of the fluorescence observations have been tabulated in the Table No.1. Organoleptic study of the leaf of *Spermadictyonsuaveolens*Roxb. revealed that it is dark green in colour, with characteristic taste and odour. The stem is woody, erect and brown with secondary growth. The roots are extremely tough and ash brown in colour. The organoleptic characteristics of the whole plant part and powder have been tabulated in Table. No.2.

Table No.1 The Florescence Powder studies for *Spermadictyonsuaveolens*Roxb.

Sr. No	Reagent	Wave Number	Fluorescence Powder Study		
			Leaf	Stem	Root
1	Conc. HNO_3	254nm	Dark yellow	Light yellow	Dark yellow
		366nm	Brown	Dark green	Brown
		Visible Light	Greenish brown	Greenish yellow	Greenish brown
2	$K_2Cr_2O_7$	254nm	Dark yellow	Dark yellow	Dark yellow
		366nm	Brownish yellow	Brownish yellow	Brownish yellow
		Visible Light	Greenish yellow	Greenish yellow	Greenish yellow
3	25% Ammonia+ Dil.HNO_3	254nm	Light brown	Brown	Light brown
		366nm	Greenish brown	Greenish brown	Dark green
		Visible Light	Light greenish	Dull brown	Light brown
4	25% Ammonia	254nm	Brown	Brown	Brown
		366nm	Greenish brown	Fluorescent green	Fluorescent green
		Visible Light	Greenish yellow	Greenish brown	Dark brown
5	Ammonia	254nm	Light yellow	Light brown	Light brown
		366nm	Fluorescent green	Fluorescent green	Fluorescent green
		Visible Light	Dull green	Dull green	Dull green
6	50% HNO_3	254nm	Brown	Yellowish brown	Brown
		366nm	Brownish green	Greenish brown	Brownish green
		Visible Light	Greenish yellow	Yellowish green	Yellowish green
7	1N HCL	254nm	Light brown	Light brown	Light brown
		366nm	Light green	Light green	Light green
		Visible Light	Greenish yellow	Yellowish green	Yellowish
8	1M H_2SO_4	254nm	Brown	Brown	Brown

		366nm	Greenish brown	Greenish brown	Greenish brown
		Visible Light	Greenish yellow	Greenish yellow	Greenish yellow
9	**$FeCl_3$**	254nm	Dark yellow	Dark yellow	Dark yellow
		366nm	Brown	Brownish green	Greenish brown
		Visible Light	Greenish yellow	Greenish yellow	Greenish yellow
10	**Iodine**	254nm	Reddish brown	Dark brown	Dark brown
		366nm	Brownish red	Brownish green	Brownish red
		Visible Light	Brownish green	Yellowish green	Brownish green

Table No.2 Powder drug organoleptic study of the different parts and powdered drug of *Spermadictyonsuaveolens*Roxb.

Sr. No	Parameter	Leaves	Stem	Root
	Dry Powder Drug			
1	**Texture**	Smooth	Rough	Soft and smooth
2	**Colour**	Dark green	Brownish green	Greyish brown
3	**Odour**	Pleasant Aromatic	Slightly unpleasant	Earthy
4	**Taste**	Bitter	Bitter	Bitter
	Plant Whole Part			
1	**Colour**	Green	Brown	Greyish brown
2	**Shape**	Lanceolate, acuminate, simple petiolate	woody cylindrical with nodal bulges	Thicker woody, cylindrical.
3	**Size**	Small 3-10 cm, large 5-30 cm	Variable	Variable
4	**Odour**	Fresh pleasant	Woody herbaceous	Earthy

The physicochemical study of different parts of the plant drug such as the total ash, water-soluble ash, acid insoluble ash, alcohol soluble matter and water-soluble matter as well as optimised extractive values were estimated [13] and are tabulated in Table No.3 & 4. Previous studies involving the same parameters in stem of the plant *Spermadictyonsuaveolens*Roxb. showed lower ash values [3, 14], this could be because of the seasonal, climatic or regional variations occurring in nature [15].The ash values may be used to find the adulteration in a crude drug.

Table 3: Optimized extraction conditions for leaves, stem and root of *Spermadictyonsuaveolens*Roxb

Conditions	Leaves	Stem	Root
Solvent	Distilled Water	Distilled Water	Distilled Water
Amount of Solvent (ml)	50	50	75
Time of Extractions (mins)	60	60	90
Times of Extraction	4	3	4

Table 4: Percentage of total physicochemical parameters in different parts of *Spermadictyonsuaveolens*Roxb given as average values along with their coefficient of correlation values (C.V).

Sr. No	Parameters	% content in Leaf	C.V	% content in Stem	C.V	% content in Root	C.V
1	Foreign organic matter	0.468	0.022	0.262	0.031	0.693	0.021
2	Total ash	15.51	0.001	9.17	0.002	12.73	0.004
3	Acid insoluble ash	0.67	0.001	0.55	0.001	0.85	0.001
4	Water soluble ash	2.475	0.109	1.91	0.308	1.346	0.387
5	Sulphated ash	16.23	0.001	11.33	0.002	14.46	0.002
6	Loss on drying	16.94	0.014	15.26	0.003	14.23	0.016
7	Crude fibre content	29.79	1.17	39.85	0.30	32.69	0.93
8	Alcohol Extractives	3.27	0.30	2.48	1.67	1.78	0.67
9	Water Extractives	13.21	0.15	7.44	0.25	7.11	1.49

Macroscopy studies revealed thatit is a 1-2 m in height moderately branched shrub which show divaricate structure (Fig.1a). The plant has deep coloured elliptic leaves which are lanceolate shaped and narrows down at the base showing opposite decussate arrangement. It has tiny, white flowers (Fig.1b)with peculiar fragrance. Triquetrous seeds, not many are surrounded by teeth like structuresCapsules having 5 valves. This has also been observed in previous studies[14].

Fig.1.a) Whole plant b)Flowers of *SpermadictyonsuaveolensRoxb*

Light microscopyclarified the anatomy of the different parts under study.The transverse section of leaf which is passing through midrib region exhibits a single layered epidermis. The leaf lamina transverse section shows the palisade cells right below the epidermal cells. It shows distinct epidermis, mesophyll cells and vascular regions. The xylem is encircled by the phloem. The calcium oxalate crystals are scattered all across the leaf section (Fig No.2 to4).

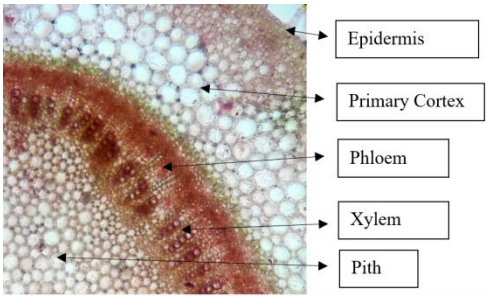

Fig. No.2 T.S of young Stem of *SpermadictyonsuaveolensRoxbshowing the cortex and primary vascular bundles under 10X*

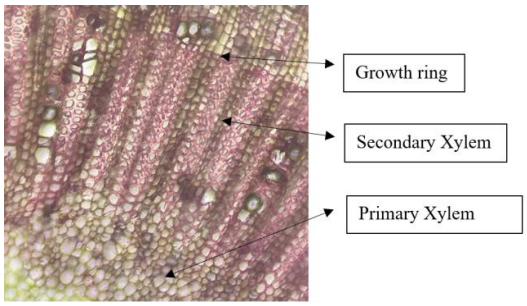

Fig.No.3 T.S of Stem of *SpermadictyonsuaveolensRoxb showing Secondary Xylem Strips under 10X*

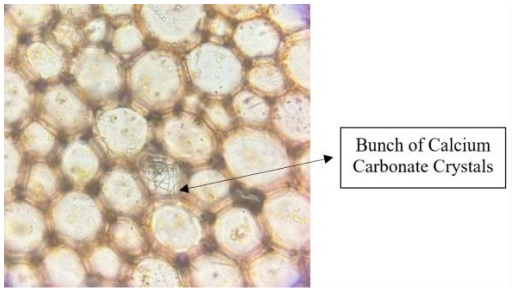

Fig No.4 T.S of Stem of *Spermadictyonsuaveolens*Roxb showing pith with Calcium oxalate crystals under 45X

Transverse section of the matured stem shows secondary growth. The vascular bundles are endarch condition. The secondary growth region shows the presence of secondary xylem which includes the axial and the ray parenchyma cells. The periderm has replaced the epidermis and now consists of the periderm, cambium and the cork cells. The cortex shows two to three layers of cells outside the phloem. Needle shaped calcium oxalate crystals are seen as bundles with-in the cells of the pith (FigNo.5& 6).

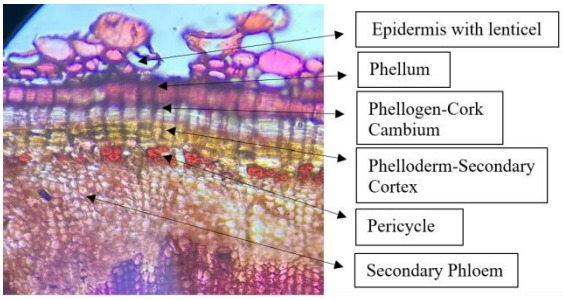

Fig. No.5 Transverse Section of Stem of *Spermadictyonsuaveolens*Roxb.showing the Secondary cortex and Secondary vascular bundles under 10X

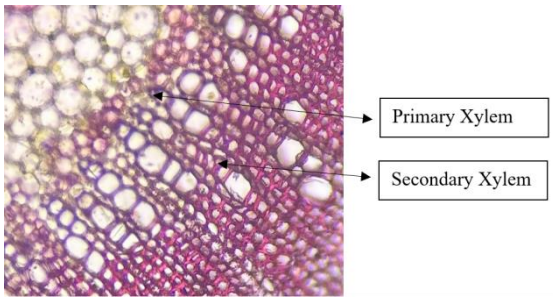

Fig. No.6 Transverse Section of Stem of *Spermadictyonsuaveolens*Roxb. showing Secondary Xylem

The root section shows a distinct thick periderm, cortex and vascular regions. Xylem shows exarch vascular bundles (Fig. No.7) withthe phloem surrounding the xylem. There is secondary growth present and the cortex cells shows presence of starch granules (Fig. No.8).

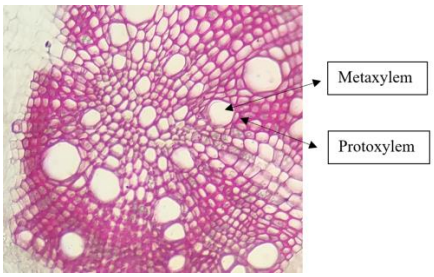

Fig No. 7 Transverse Section of Root of *Spermadictyonsuaveolens*Roxb showing secondary Xylem

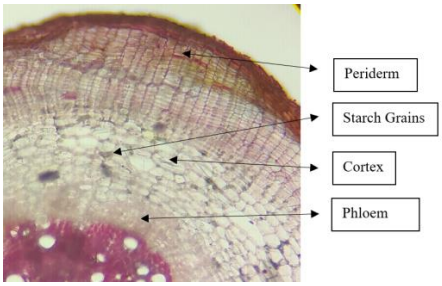

Fig. No.8 T.S of Root of *Spermadictyonsuaveolens*Roxb.

showing Cortex region Stomatal Study results have been tabulated in Table No.5. Paracytic stomata were observed (Fig.9b) showing single set of parallel accessory cells surrounding the guard cells. The average Vein-Islet number of the leaf surface of *Spermadictyonsuaveolens*Roxb is 27 per sq.mm. (Fig No.9a). The average Vein Termination number of the leaf surface of *Spermadictyonsuaveolens*Roxb is 12 per sq.mm. (Fig No.9a). The palisade ratio in the leaf of*Spermadictyonsuaveolens*Roxb.was found to be 1.46 $\pm$ 0.23.The upper surface of the leaf (Fig No.9c) showed no presence of stomata. However, the lower surface showed few within square millimetre area of the leaf (Fig No.9b).

Table 5: Stomatal studies on the leaves of *Spermadictyonsuaveolens*Roxb. (all average values)

Sr. No	Stomatal study	UPPER LEAF SURFACE	LOWER LEAF SURFACE
1	Average stomatal No.	0	7.3
2	Stomatal index	0	16.63%
3	Vein-Islet No	27 per sq.mm	
4	Vein Termination No	12 per sq.mm	
5	Palisade Ratio	1.46 ± 0.23.	

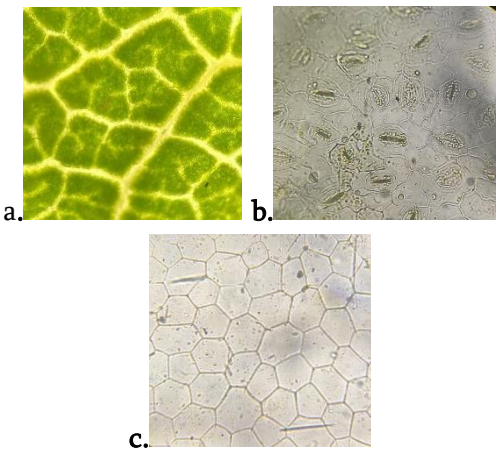

Fig. No. 9 (a) Vein Islets in leaf. (b) Stomata and Epidermal cells on lowerSurface of leaf (c) Stomata and Epidermal cells onupper Surface leaf of *Spermadictyonsuaveolens*Roxb

The quality standards must be necessarily establishedfor correct identification and usage of a crude drug. This also must be done before its inclusion in the different pharmacopoeia. Morphological, microscopical as well as physicochemical parameters gives the adequate information for the authentication, quality and identification of the crude drug.

SEM analysis of leaves, stem and root ofthe herbal drug*Spermadictyonsuaveolens*Roxb.showed the following characteristics:

The leaf powder shows group of prismatic crystals of calcium oxalate (Plate No.1to6). Along with the presence of trichomes, stomata, elongated xylem fibres and thin-walled epidermal cells.

Stem powder also shows presence of calcium crystals in prismatic form as well as scattered around. The periderm and epidermal cells can be observed. Vascular xylary fibres are seen to be abundant (Plate No.7 to 12)*:*

SEM micrographs of root powder reveals the evident presence of xylem fibres along with starch grains (Plate No.13 to 18). The epidermal and periderm cells are also observed.

SEM technique showcases the advantage over the range of magnification, as it is relatively extensive, allowing the investigator easy focus on a particular area of interest. It produces a higher resolution image that can play a crucial role in the authentication plant crude drug as whole or in powder form. The SEM studies have been established for the very first time for this plant.

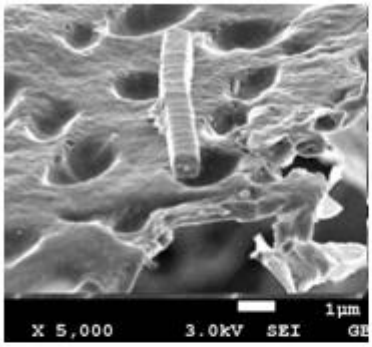

Plate No.1 Xylem Fibre with pits

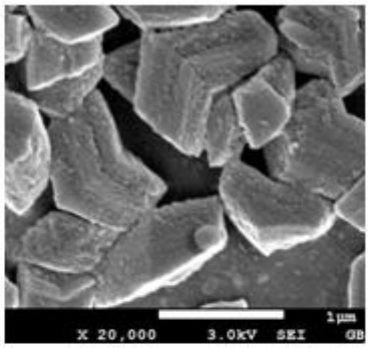

Plate No.2 Calcium Oxalate Crystals

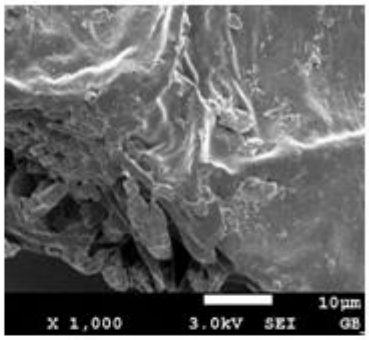

Plate No.3 Surface of leaf

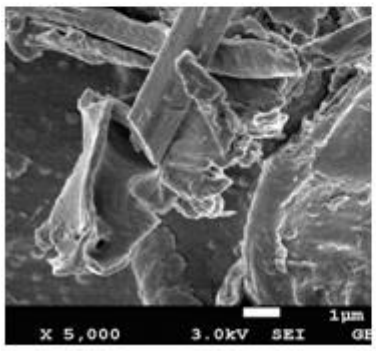

Plate No.4 Xylary elements

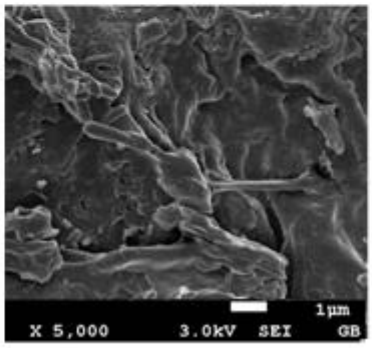

Plate No.5 Trichome like structure

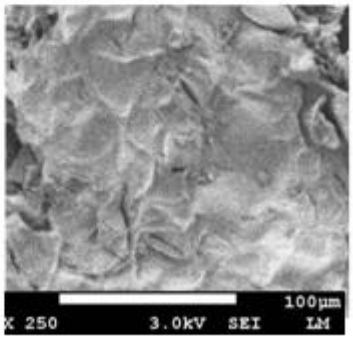

Plate No.6 Leaf surface showing Stomata

Plate No. 1 to 6: SEM micrographs of the leaf powder of *Spermadictyonsuaveolens*Roxb.

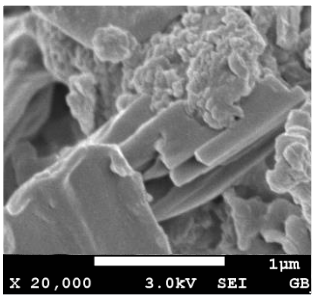

Plate No.7Calcium Oxalate Crystals

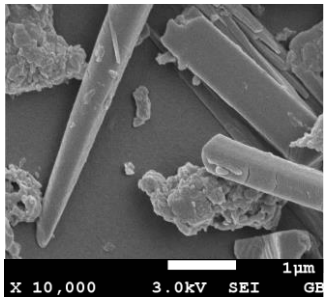

Plate No.8 Calcium Oxalate Crystals

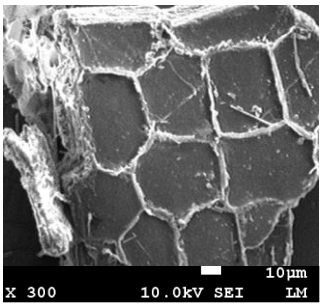

Plate No.9Epidermal Tissue

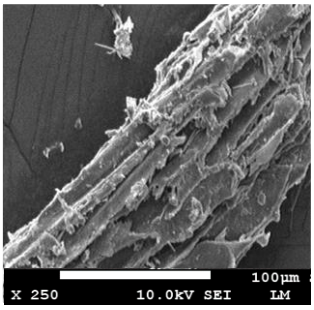

Plate No.10 Xylary elements

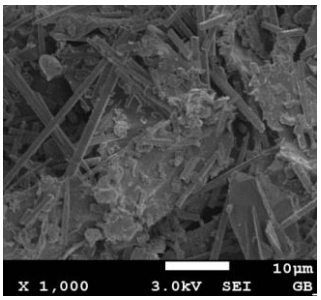

Plate No.11 Xylary Elements

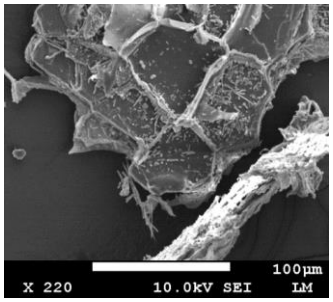

Plate No.12 Epidermal Tissue

Plate No.6 to 12: SEM micrographs of the stem powder of *Spermadictyonsuaveolens*Roxb.

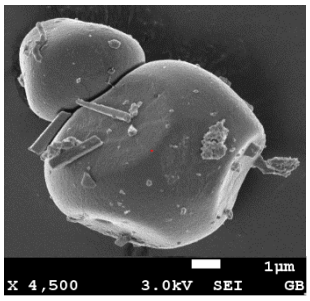

Plate No.13 Starch Granules

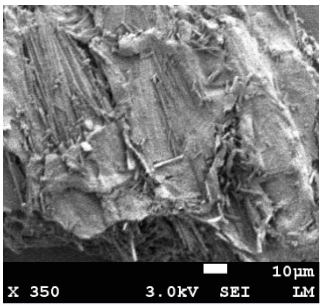

Plate No.14 Xylary fibres

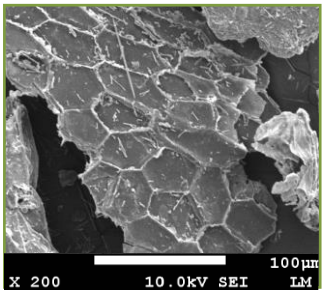

Plate No.15PeridermTissue

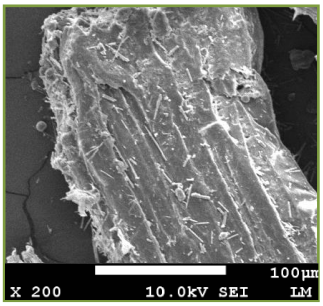

Plate No.16 Xylary elements

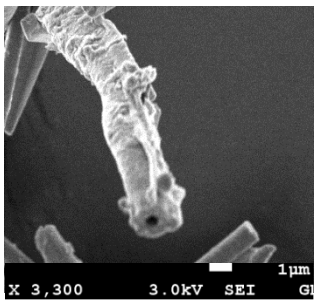

Plate No.17 Xylary Element with pits

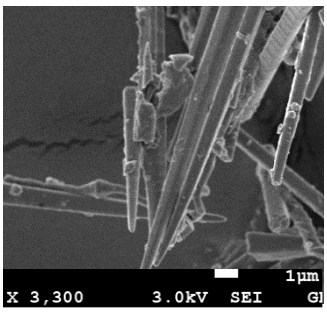

Plate No.18Calcium Oxalate Crystals

Plate No.13 to 18: SEM micrographs of the root powder of *Spermadictyonsuaveolens*Roxb.

Phytochemical Study

HPTLC micrograph reveals the component with Rf 0.04 found to be present in both leaf and root of the methanolic extract and component with Rf 0.41 was found to be present in leaf and stem only. Components with Rf 0.51 and 0.86 was found to be present in both stem and root of the methanolic extracts.

The Isopropyl Alcohol extract fingerprint of leaf, stem and root of *Spermadictyonsuaveolens*Roxb showed the presence of component with Rf 0.56 to be common in three extracts of the plant. The components with Rf 0.89 and 0.59 was found to be

present in both the stem and root Isopropyl Alcohol extract of the plant.

Petroleum ether leaf extracts revealed 2 components with Rf 0.58 and 0.85 with percentage area of 28.71% and 71.29% respectively. The component with Rf value of 0.58 was commonly found in the stem as well as root petroleum ether extract of the plant.

The Chloroform extract fingerprint of leaf, stem and root of *Spermadictyonsuaveolens*Roxb. showed the components with Rf 0.35 in the leaf and the root. The component with Rf 0.58 is found in both stem and root while component with Rf 0.89 is found in both the leaf and stem of the plant chloroform extracts.

Ethanol leaf extracts showed the component with Rf 0.12 present in the stem as well as leafof the plant andthe Ethyl acetate extract fingerprint of leaf, stem and root of *Spermadictyonsuaveolens*Roxb showed that no components were common to the leaf, stem and root extract of the plant (Table No. 7 & 8).

The component with Rf 0.56 have been seen to be recurrently present in almost all the plant chemical extracts and so this component may be isolated and characterised to confer this component as the biomarker for the plant authentication.

An HPTLC fingerprint is an extremely precise and sensitive technique which is fast and simple and can be used for authentication. This may serve as a supplement chromatographic data and the information thus generated may be explored further as a tool for standardization. The HPTLC fingerprints have been established for the different solvent extracts for the very first time for this plant.

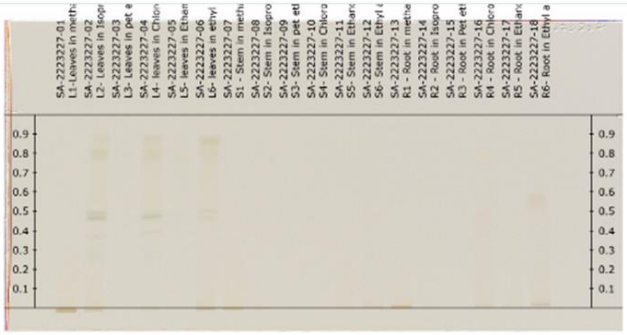

Plate No.14 Chromatogram showing HPTLC Fingerprint of leaves, stem and root of*Spermadictyonsuaveolens*Roxb in White light before derivatisation.

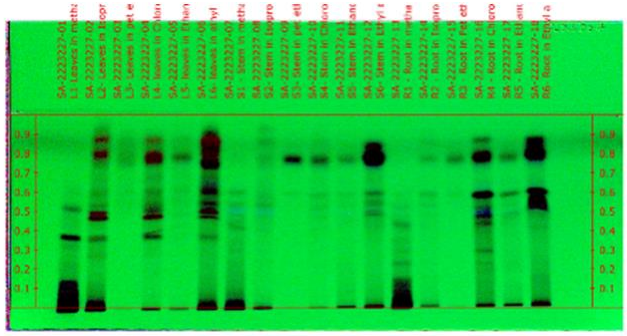

Plate No.15 Chromatogram showing HPTLC Fingerprint of leaves, stem and root of*Spermadictyonsuaveolens*Roxb in White light after derivatisation.

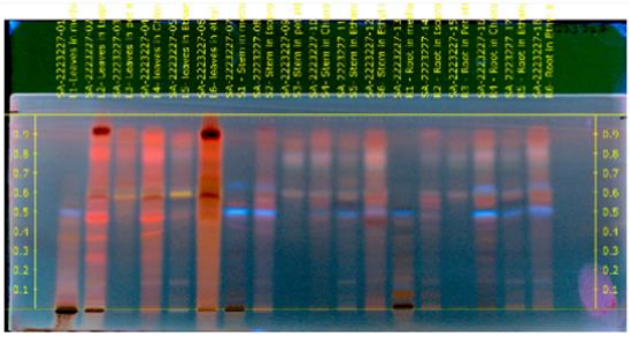

Plate No.16 Chromatogram showing HPTLC Fingerprint of leaves, stem and root of *Spermadictyonsuaveolens*Roxb at 254 nm before derivatisation.

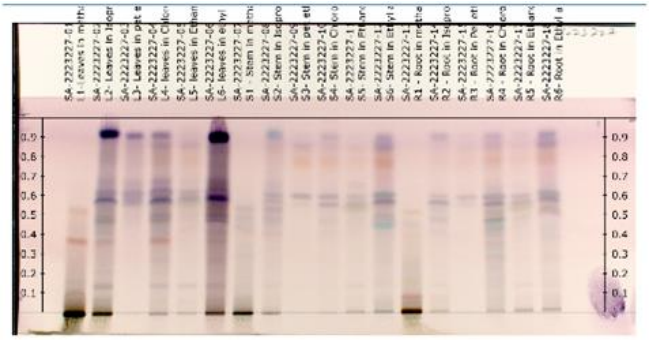

Plate No.17 Chromatogram showing HPTLC Fingerprint of leaves, stem and root of*Spermadictyonsuaveolens*Roxb at 366 nm after derivatisation.

Sr No.	Methanolic Extracts			Isopropyl Alcohol Extracts			Petroleum Ether Extracts		
Plant Part	Leaf	Stem	Root	Leaf	Stem	Root	Leaf	Stem	Root
1	0.04	0.27	0.01	0.04	0.12	0.003	0.89	0.54	0.58
2	0.07	0.41	0.04	0.11	0.39	0.05		0.58	0.85
3	0.13	0.47	0.15	0.19	0.46	0.13		0.76	
4	0.34	0.51	0.24	0.34	0.51	0.40		0.84	
5	0.41	0.86	0.43	0.45	0.56	0.56			
6	0.50		0.51	0.56	0.59	0.59			
7	0.87		0.86	0.90	0.89	0.89			

Table No.7 Rf Values of Leaf, Stem and root Methanol, Isopropyl alcohol and Petroleum Ether extracts of Chemical Fingerprint of *Spermadictyonsuaveolens*Roxb at 540 nm.

Sr No.	Chloroform Extracts			Ethanol Extracts			Ethyl Acetate Extracts		
Plant part	Leaf	Stem	Root	Leaf	Stem	Root	Leaf	Stem	Root
1	0.04	0.46	0.003	0.03	0.12	0.008	0.12	0.05	0.01
2	0.11	0.54	0.06	0.12	0.47	0.14	0.57	0.49	0.14
3	0.25	0.58	0.28	0.57	0.55	0.56	0.88	0.56	0.29
4	0.35	0.89	0.35	0.84	0.58	0.86		0.59	0.38
5	0.48		0.47		0.64			0.68	0.52
6	0.56		0.51		0.83			0.76	0.58
7	0.61		0.55					0.84	0.86
8	0.65		0.58						
9	0.84		0.86						
10	0.89								

Table No. 8 Rf Values of Leaf, Stem and root Chloroform, Ethanol and Ethyl acetate extracts of Chemical Fingerprint of *Spermadictyonsuaveolens*Roxb at 540 nm

III.CONCLUSION

The present worksummarizes some importantpharmacognostic characteristics mainly powder studies,microscopic, physiochemical and organoleptic characters of the leaf, stem and root parts of herbal drug.*Spermadictyonsuaveolens*Roxb. These quality standards maybe explored in preparation of quality control monographs that provide an excellent tool forestablishing the correct identity and quality of the crudedrug.

HPTLC fingerprint analysis reveals a good separation of the individual phytocomponents(secondary metabolites) in the plant parts. Thus, it can be used to discover novel bioactive components that may serve as leads in the future for thedevelopment of the new nutraceutical medications that ministers to the therapeutic needs of the people. Due to the exploitation of medicinal herbal plants in developing countries and the issue of fake or adulterated crude drug production, the need for strict quality control parameters is extremely crucial. The pharmacognostic and phytochemical standards derived from this study may be used as powerful tool for the detection of adulteration and authentication of the raw drug. Further explorative research is mandatory to discover

new arenas of possibilities of the plant in the nutraceutical industry.

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