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Research Article

PHARMACOGNOSTICAL AND PHYTOCHEMICAL EVALUATION OF THE DRUG *SAHADEVI* (*CYANTHILLIUM CINEREUM* (L.) H. ROB.)

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ABSTRACT

Sahadevi (*Cyanthillium cinereum* (L.) H.Rob.) (Family Asteraceae) commonly known as Purple Fleabane in English, Sahadei in Hindi and Poovankurunthila in Malayalam, an erect annual branched herb with pubescent cylindrical stem found as a weed throughout India is extensively used in folkore medicine. The present paper highlights the pharmacognostical and phytochemical characters of the plant to give clear standards for identification of the drug. Microscopic evaluation of root, stem and leaf as well powder microscopy of the plant were carried out. Physicochemical parameters like moisture content, total ash, water insoluble ash, acid insoluble ash, volatile oil content, sugar content, fibre content, alcohol soluble extractive and water soluble extractive were studied. Preliminary phytochemical analysis of the plant *Sahadevi* [*Cyanthillium cinereum* (L.) H.Rob.] showed the presence of steroid, flavonoid, glycoside, saponins and tannin. The present study signifies the use of TLC and HPTLC fingerprint profiles of aqueous and alcoholic extracts of the drug for determining the identity, purity of the drug and also for developing standards. The findings drawn from the study substantiates the genuineness of the drug *Sahadevi* [*Cyanthillium cinereum* (L.) H.Rob.], which is at par with the descriptions available in the authentic books.

KEYWORDS: Pharmacognostical, Phytochemical, *Sahadevi, Cyanthillium cinereum* (L.) H.Rob., TLC, HPTLC.

INTRODUCTION

Sahadevi [*Cyanthillium cinereum* (L.) H.Rob.] [1], formerly known as *Vernonia cinerea* Less. of asteraceae is extensively used in folklore medicine. It is an erect, rarely decumbent, branched herb, 12-75 cm high, found throughout India ascending to an altitude of 1800 m. It has more traditional significance in Kerala as its one among *Dasapushpam*. As per the Tradition of Kerala, the women wears Dasapushpam garland on the head for it was considered sacred plants. In front of the household shrine, the ten sacred plants of *Dasapushpam* were displayed in a gleaming brass plate in the Malayalam month of *Karkkidakam* (the monsoon season in Kerala) in the olden days. It was also prescribed by the *Rajavaidyas* (doctors for the king) to the ladies to wear these plants on their head, probably due to the medicinal value imparted by them.[1] In olden days, *Sahadevi* was widely used for the purpose of preparing collyrium. It is surprising that nowadays also eye salve is prepared out of the essence of this plant and it is considered as best drug to cure majority of eye diseases.[2] The plant is diaphoretic, antihelmenthic, alexipharmic, depurative, diuretic, lithotriptic, anodyne, anti- inflammatory, sudorific and stomachic. It is used as remedy for spasm of bladder and strangury. It posses anti-cancerous activities and is good for cancerous malformations.[3]

MATERIALS AND METHODS

Sample collection, identification and preparation

The whole plant of *Sahadevi* [*Cyanthillium cinereum* (L.) H.Rob.] were collected from natural habitat in and around Malappuram district, Kerala on January 2018. The plant was identified and authenticated by the Department of Dravyaguna Vijnana, VPSV Ayurveda College Kottakkal, Kerala, India (Voucher no. HT 2018/26). The whole plant were washed in clean water and shade dried. After drying, it was ground to yield fine powder for further analyses.

Preliminary pharmacognostical study

Microscopy

Transverse section of leaf, stem and root of the plant were taken and photographs were done after proper mounting and staining according to the standard procedure. The microscopic features of the

powder of whole plant were also done. For examining the cell structure in powder form, churna, stained with appropriate stain (safranin), mounted in glycerine and observed under Trinocular 'Leica DM 3000' microscope attached with 'Leica DFC 295' digital camera.

Physico-chemical analysis

Physicochemical parameters like moisture content, total ash, water insoluble ash, acid insoluble ash, volatile oil content, sugar content, fibre content, alcohol soluble extractive and water soluble extractive were determined according to the methods cited in the Ayurvedic Pharmacopoeia of India.[4]

Preliminary Phytochemical Analysis

For preliminary phytochemical tests, 2 g powdered material was successively extracted using Soxhlet apparatus with petroleum ether, cyclohexane, acetone and ethanol. The presence of different phytoconstituents viz., alkaloids, carbohydrates, steroids, saponins, tannins, flavonoids, phenol, anthraquinones and glycosides were determined following standard procedure.[5,6]

Thin Layer Chromatography and High Performance Thin Layer Chromatography

0.5 g each of *Sahadevi* extracts are weighed extracted with 10 ml of methanol separately and spotted as 20 microliter on a pre-coated silica gel 60 F_{254} 10x10cm aluminium plates to a band width of 8 mm using Merk TLC applicator. The plate was developed in Toluene: Ethyl acetate: Formic acid: Methanol 7:5:1:0.5. The developed plates were visualized in UV 254 nm, 366 nm, under white light and then derivatised with iodine vapor, analyzed using CAMAG Linomat 5, CAMAG TLC scanner –III with CAMAG Reprostar software and scanned under UV 254 nm and 366 nm. The R_f value of the resolved spots were recorded.

RESULTS AND DISCUSSION

Microscopic features

Leaf- Mid rib of the leaf have epidermis on both surfaces covered with striated cuticle and have both type of trichomes, followed by 2-3 layers of collenchymas on upper and lower side. Single vascular bundle located in center with xylem and phloem. Vascular bundles are conjoint and collateral. Lamina shows dorsivental structure. Epidermis is single layered on either surface, covered with striated cuticle. Trichomes are similar to those of stem. Palisade is single layered, spongy parenchyma 4-5 layered (Fig No.1A-C).

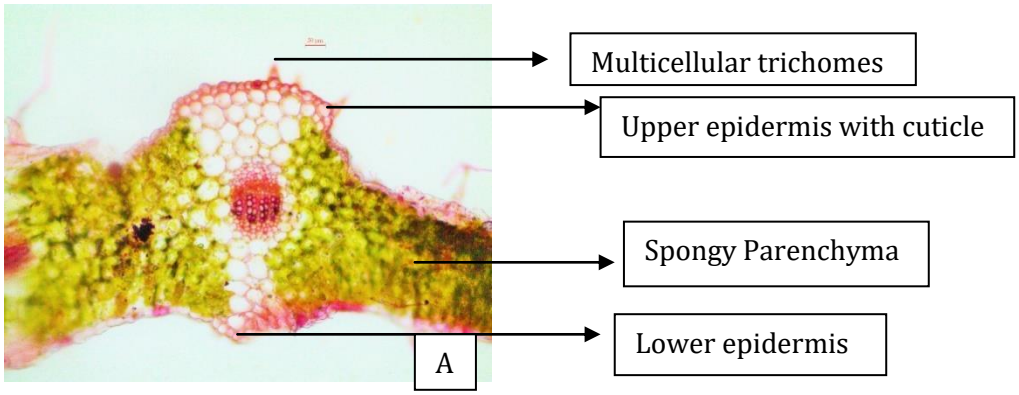
Stem-a single layered epidermis, covered with a striated cuticle, covering multicellular and T –shaped trichomes with 2-6 celled stalk, cortex 3-5 layers of thin walled, tangentially elongated parenchymatous cells, few layers of collenchymas between epidermis and parenchymatous cortex in the ribbed regions and a single layered endodermis. Inner to cortex single layer barrel shaped endodermis is seen. Pericycle is in the form of groups of pericyclic fibres. Vascular bundles are conjoint & collateral. Phloem consists of strands of sieve tubes, companion cells and phloem parenchyma. Xylem consists of vessels, parenchyma and fibres; xylem vessels show reticulate thickening. Medullary rays are present in between vascular bundles. Pith is composed of hexagonal to polygonal thin walled parenchymatous cells (Fig No.2A-C).

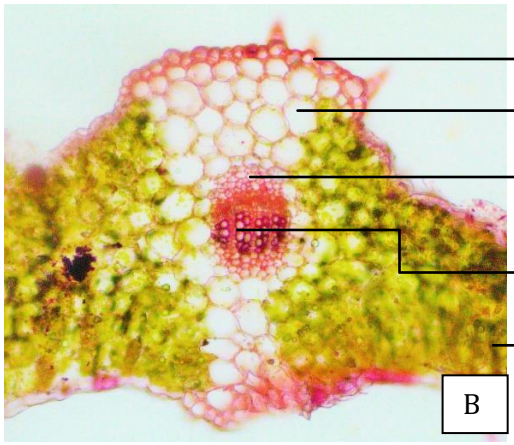
Root-4-5 layered cork, consisting of tabular, tangentially elongated, thick walled cells filled with reddish brown contents. Secondary cortex is wide and composed of thin walled, parenchymatous cells. Secondary phloem is composed of sieve elements and phloem parenchyma. Xylem consists of vessels, tracheids, fibres and xylem parenchyma, traversed by1-5 reticulate thickening & traversed by xylem rays (Fig No.3 A-C).

Powder Microscopy

Powder microscopic features of drug powder showed-Cortical cell fragments, Cork cells in sectional view, Epidermal cells of stem in section, Fibres and vessel fragments, Fragments of pappus hairs**,** Fragments of pitted vessels, Multicellular trichome, Starch grains, Stone cell, Calcium oxalate crystal (As shown in Fig No.4 a-l).

Fig No: 1- Transverse Sections of Leaf





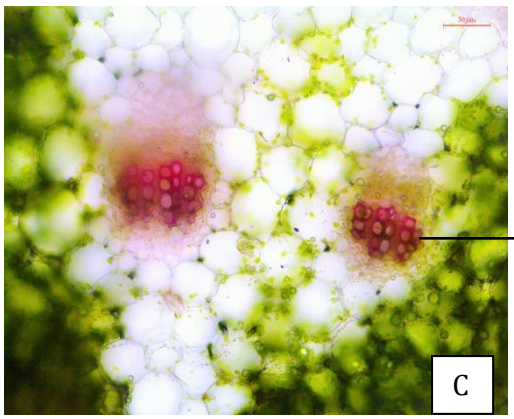
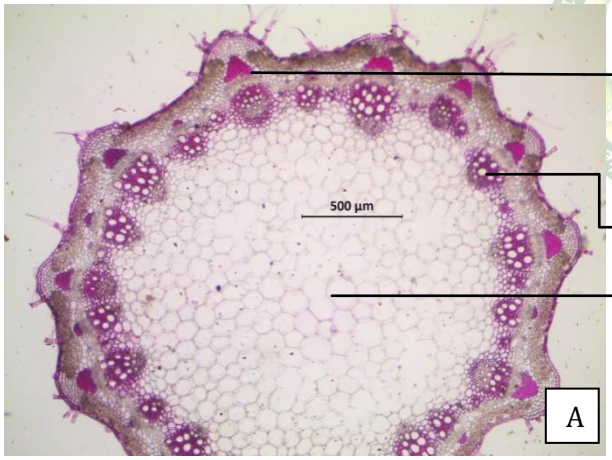
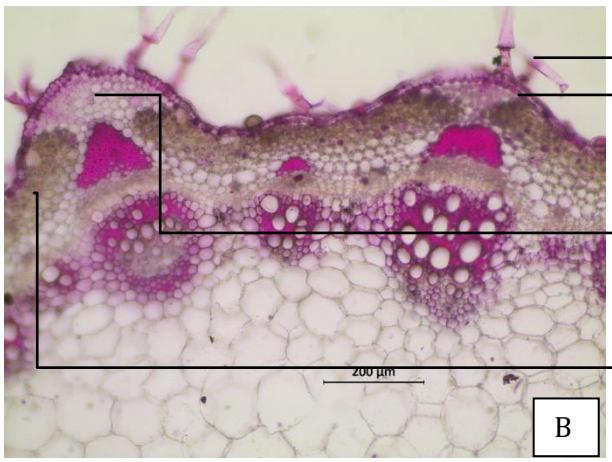


Fig No: 2-Transverse Sections of Stem





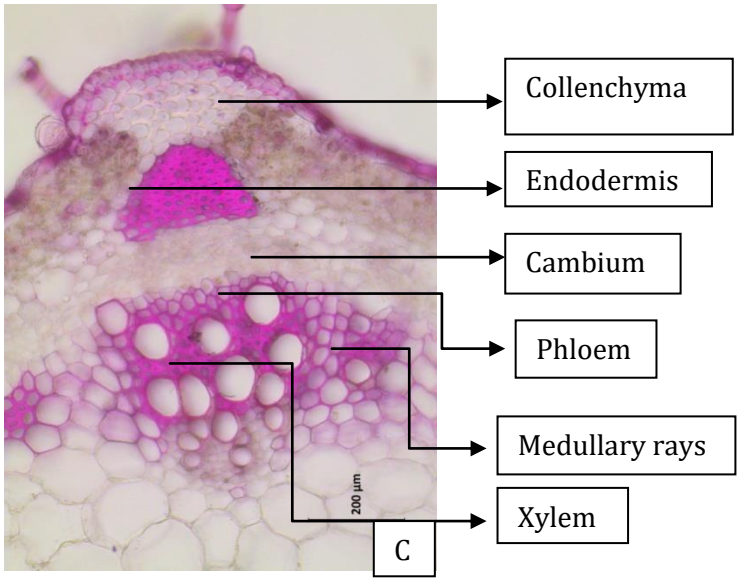
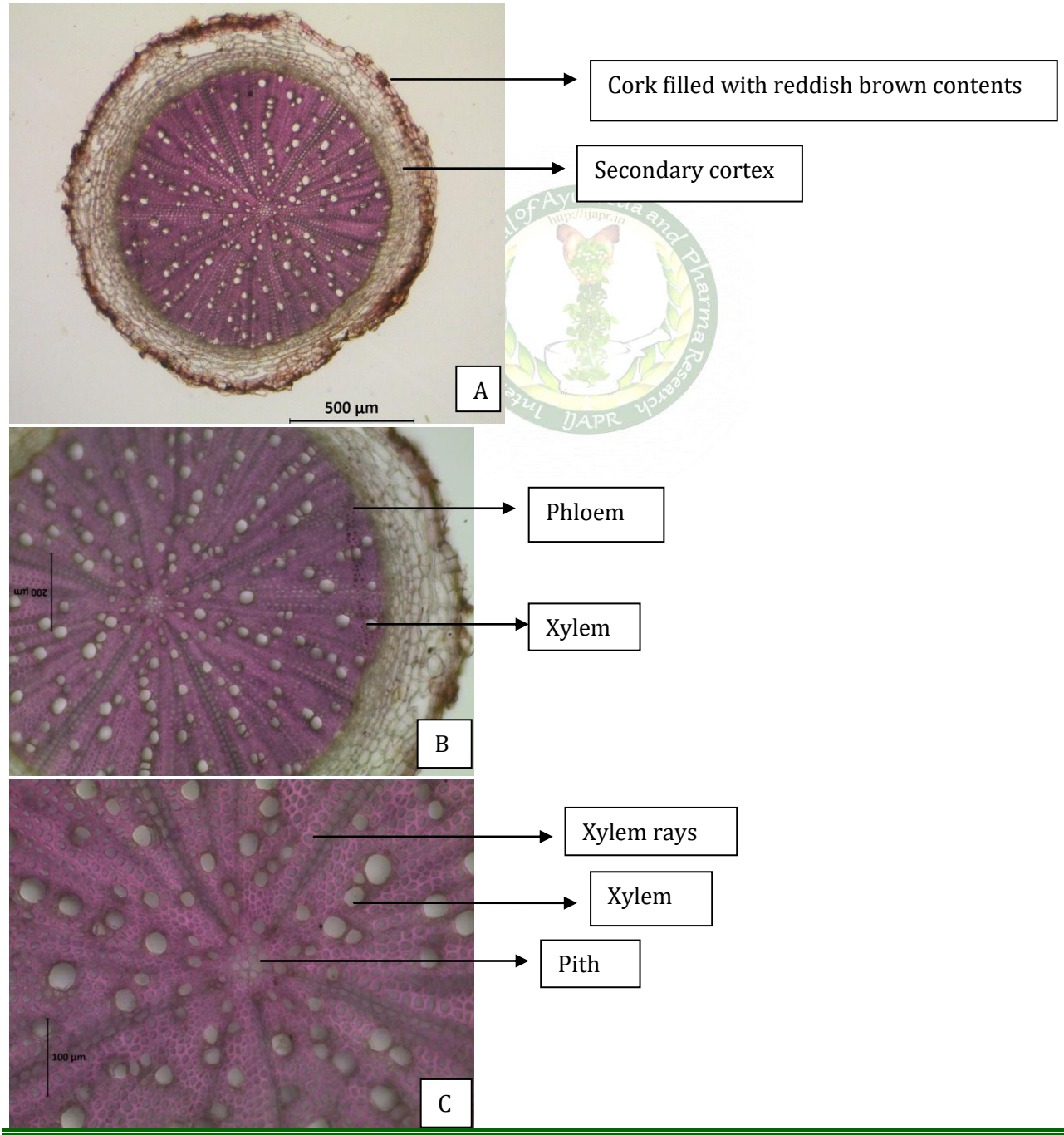


Fig No: 3-Transverse Sections of Root



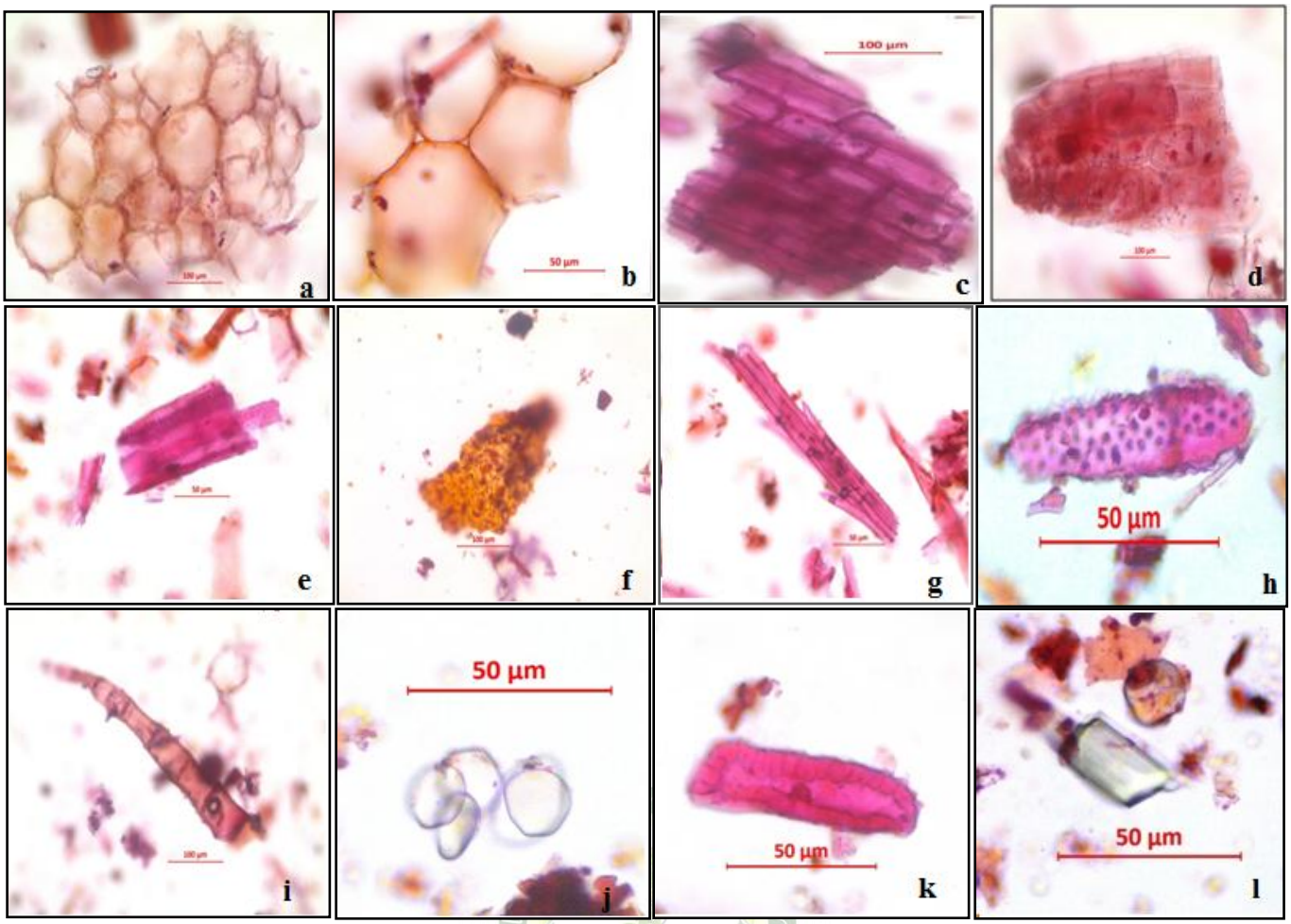


Fig No 4. Powder microscopic characteristics of drug. 1. Cortical cells 2. Cortical cell fragments 3. Cork cells in sectional view 4. Epidermal cells of stem in section 5. Fibres and vessel fragments 6. Fragments of leaf epidermis in surface view 7. Fragments of pappus hairs 8. Fragments of pitted vessels 9. Multicellular trichome 10.Starch grains 11.Stone cell 12. Calcium oxalate crystal

Physico-chemical analysis

Various physicochemical parameters of the plant were evaluated and results are presented in Table 1.

Table 1: Physico-chemical analysis

S. No	Experiments	Percentage (%w/w)
1	Total Ash	8%
2	Water insoluble ash	1.63%
3	Acid insoluble ash	0.55%
4	Moisture content	7%
5	Volatile oil content	-
6	Sugar content	34.75%
	Total sugar	
	Reducing sugar	31.1%
7	Fibre content	33.13%

Phytochemical analyses

Petroleum ether, Cyclohexane, Acetone, Ethanol and Aqueous extracts of the plant were subjected to quantitative and qualitative phytochemical screening for the identification of chemical constituents and the results are summarised in Table 2 and Table 3.

Table 2: Quantitative phytochemical analyses of the extractives

S.No	Name of Extract	Percentage of Extract (%w /w)
1	Hot water soluble	25.88%
2	Cold alcohol soluble	24.3%
3	Cold water soluble	14%
4	Hot alcohol soluble	13.38%
5	Petroleum ether	6%
6	Cyclo-hexane	7.79%
7	Acetone	9.5%
8	Ethanol	15.08%

Table 3: Qualitative phytochemical analyses of the extractives

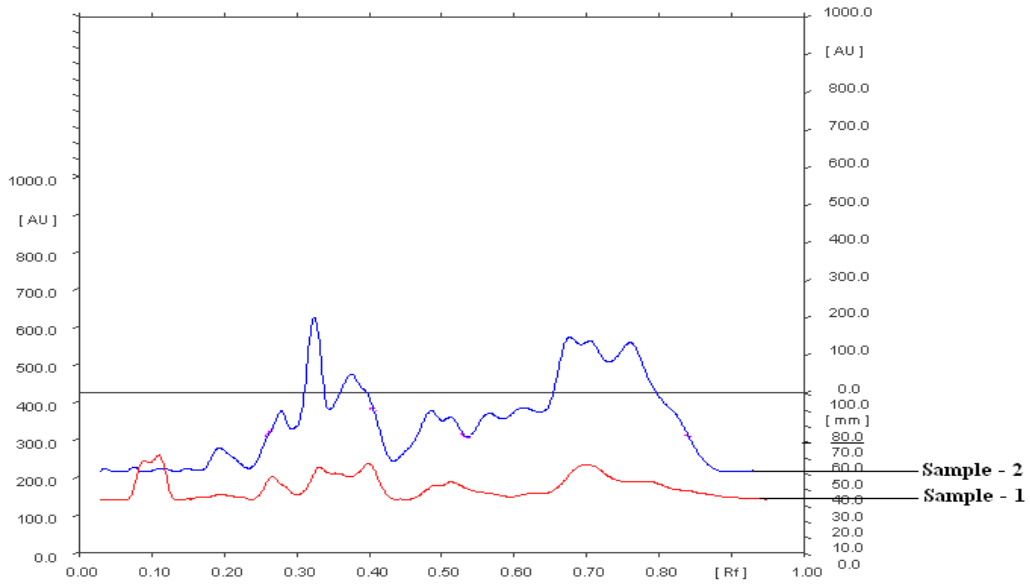
Extracts	Alkaloids	flavonoids	Phenol	Tannins	Saponins	Steroids	Anthraquinones	Glycosides
Petroleum ether	+	-	-	+	+	+	-	+
Cyclohexane	-	-	-	+	-	-	-	-
Acetone	-	-	-	-	+	+	-	-
Ethanol	+	+	+	+	+	-	-	+
Cold water	-	-	-	+	+	+	-	+
Hot water	-	+	-	+	+	+	-	-
Cold alcohol	+	+	-	+	+	+	-	+
Hot alcohol	-	+	-	+	-	+	-	-

'+' : present '-' : absent

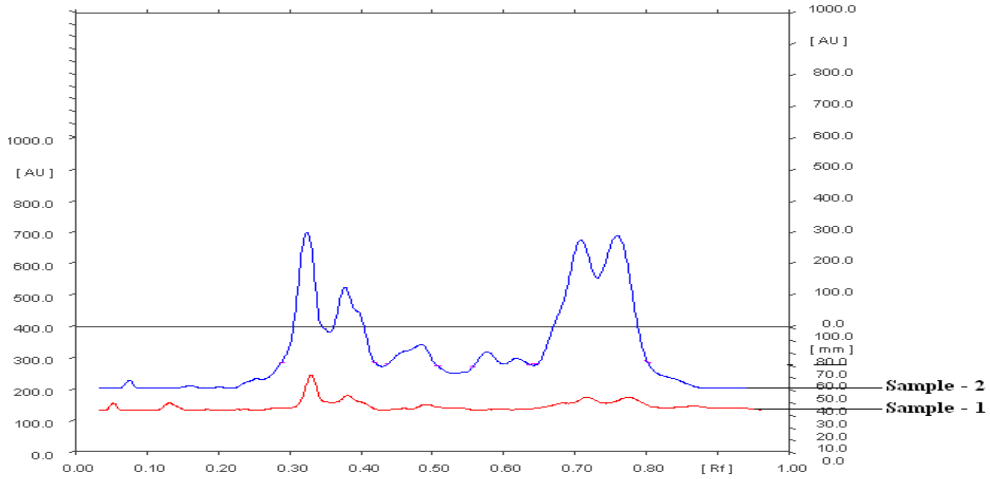
HPTLC and TLC Profile of Samples

TLC of the aqueous and alcohol extracts of *Sahadevi* was done under 254 nm, 366 nm and white light (Fig. 1-4). The area, number of peaks and R_f value of both extracts under 254nm were noted [Graph 1 and 2, Table 4]. Though number of peaks is same in both the extracts, area under the graph is more for alcoholic extract indicating the fact that concentration of phytoconstituents are more in the alcoholic sample 93141.3 (AU) (Table 4).

Graph 1: Overview Graph of *Sahadevi* Extracts At 254nm

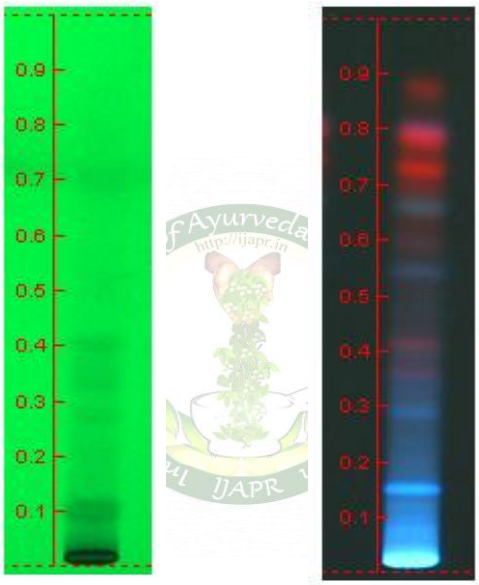


Graph 2: Overview Graph of *Sahadevi* Extracts at 366nm



Sample 1 – Aqueous extract; Sample 2 – Alcoholic extract

Figure 1: TLC Plate Views of *Sahadevi* Aqueous Extract Sample



AT 254nm AT 366nm

Figure 2: Derivatized TLC plate views of *Sahadevi* aqueous extract sample

AT 254nm AT 366nm AT WHITE LIGHT

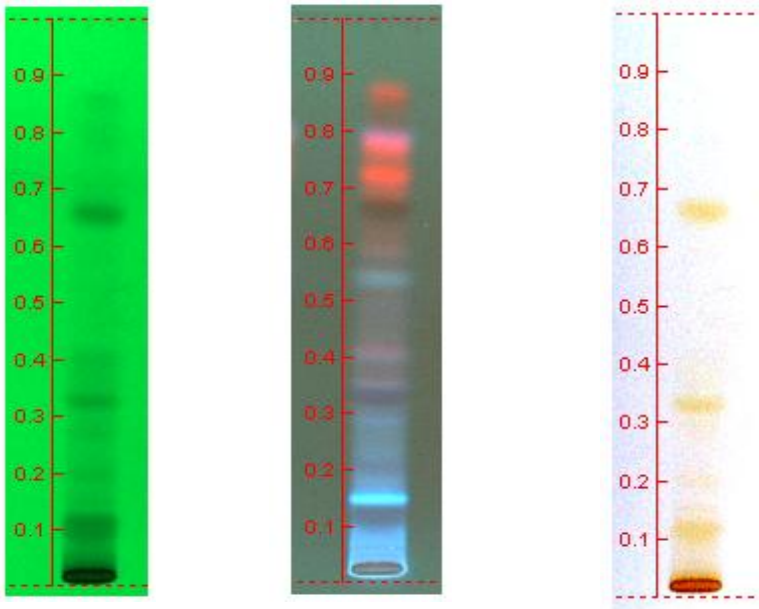


Figure 3: TLC Plate Views of *Sahadevi* Alcoholic Extract Sample

AT 254nm AT 366nm

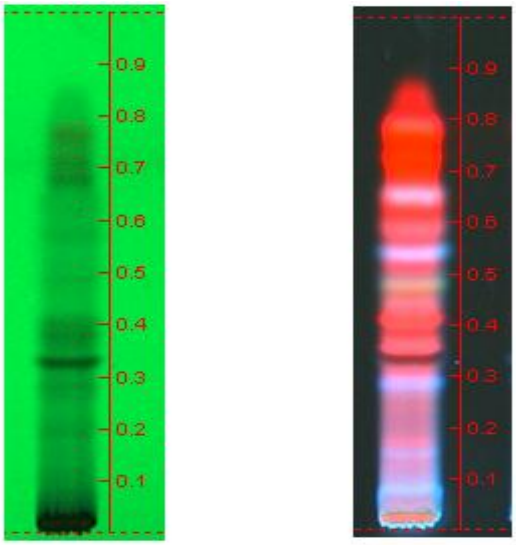


Figure 4: Derivatized TLC Plate Views of *Sahadevi* Alcoholic Extract

AT 254nm AT 366nm AT White Light

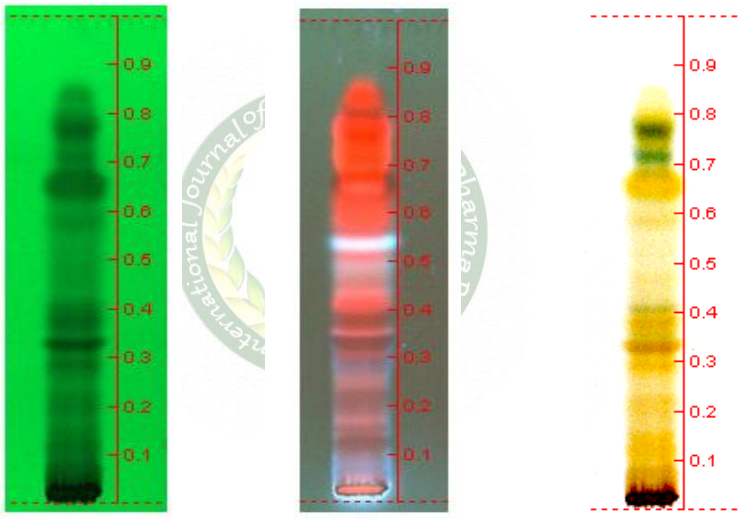


Table 4: Rf Value & % Area of *Sahadevi* Aqueous & Alcoholic Extract Samples at 254nm

Peak no	Rf Value		Area (AU)		% Area (AU)	
	Aqueous	Alcoholic	Aqueous	Alcoholic	Aqueous	Alcoholic
1	0.09	0.07	1630.0	106.3	7.14	0.11
2	0.11	0.19	1987.0	1779.6	8.70	1.91
3	0.19	0.28	405.9	4364.7	1.78	4.69
4	0.26	0.32	1529.0	10134.3	6.69	10.88
5	0.33	0.37	3338.1	12105.2	14.61	13.00
6	0.40	0.49	2761.1	5427.5	12.09	5.83
7	0.49	0.51	691.3	3495.6	3.03	3.75
8	0.51	0.57	1703.9	5199.1	7.46	5.58
9	0.63	0.61	381.4	6375.1	1.67	6.84
10	0.70	0.68	5683.0	12208.8	24.88	13.12
11	0.77	0.70	2040.3	10044.3	8.93	10.78
12	0.84	0.76	690.7	21900.8	3.02	23.51
			22841.7 (AU)	**93141.3 (AU)**		

CONCLUSION

The findings drawn from the study substantiates the genuineness of the drug *Sahadevi* [*Cyanthillium cinereum* (L.) H.Rob.], which is at par with the descriptions available in the authentic books. The data obtained add on to the existing details available so far. The microscopic characters of the plant and its powder revealed the presence of different diagnostic features, which will be helpful for the identification of the plant. The different physicochemical parameters of the plant were evaluated for future references. The preliminary phytochemical test for the aqueous and alcoholic extracts indicated the presence of different phytochemical constituents. The developed TLC/ HPTLC chromatogram of the aqueous and alcoholic extracts indicates the chemical profile of the plant. All these parameters could be useful in the proper identification and standardization of the drug.

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