

PHARMACOGNOSTICAL STUDY ON THE FRUITS OF *SCINDAPSUS OFFICINALIS* (ROXB.) SCHOTT. (ARACEAE)

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ABSTRACT

In the present communication, physicochemical analysis, powder microscopy of fruit, fruits preliminary phytochemical screening, inorganic elemental study, metal study, preliminary phytochemical screening and fluorescence analysis have been described. The powder microscopical study reveals the presence of endosperm cells with starch grains inside, lignified sclereids and fragmented perienth. The total ash, acid insoluble ash, water soluble ash and chloroform soluble ash was found to be 6.29%, 1.797%, 2.218% and 4.65% respectively. The alcohol soluble extractive, water soluble extractive and chloroform soluble extractive values were found to be 6.844%, 9.766% and 7.12% respectively. The loss on drying, crude fiber content and foaming index was found to be 3.524%, 6.661% and 110.52 correspondingly. Preliminary phytochemical screening of successive extracts of fruit reveals the presence of various secondary metabolites such as flavonoids, phenolics (ethyl acetate & 50% ethanolic extract), Alkaloids (ethyl acetate extract), saponins, tannins (50% ethanolic extract), glycosides, terpenoids, steroids (chloroform extract) and fat and oils (hexane extract). Total flavonoid and tannins content was estimated about 1.27 and 4.12 % w/w respectively. Inorganic elemental analysis on ash of the fruit showed the presence of calcium, iron, magnesium, phosphate, potassium, sodium and sulphate. Metal analysis on the air-dried powder of the fruit showed the presence of calcium, chloride, chromium, copper, iron, lead, magnesium, manganese, phosphorous, potassium, selenium, sodium and zinc. Fluorescence analysis of drug powder and successive extracts with different reagents showed the different colours under UV light (254 nm and 366 nm) and day light. By the study we are sure that this work will be helpful to further standardization of the drug.

Keywords: Metal analysis, Elemental analysis, Fluorescence analysis, Physicochemical analysis, *Scindapsus officinalis* (Roxb.) Schott.

INTRODUCTION

Scindapsus officinalis [Roxb.] Schott (Aracea) is a monocotyledonous medicinal climber which has endowed with curative properties against a variety of illness. The folk lore claim of *Scindapsus officinalis* fruits are antidiabetic, anthelmintic, aphrodisiac, galactagogue, stimulant, diaphoretic, antiarrhoeal, carminative, expectorant, tonic, antiprotozoal, anticancer, sharpening hearing, aphrodisiac, cardio tonic and regulating the bowel and appetite. It is also used in dysentery, asthma, troubles of the throat, rheumatism, asthma, worm infestations, pharyngopathy, helminthiasis and bronchitis¹.

Various pharmacological activities on fruit part of plant (like antioxidant, antidiabetic, anti inflammatory, analgesic, antihistaminic, antibacterial) have been scientifically reported [1,2]. The anatomical study has been also reported on fruits [3].

To the best of our knowledge, the fruits of the plant were not studied for powder macroscopy, physicochemical parameters, inorganic elemental analysis, metal analysis, preliminary phytochemical evaluation on successive extracts and fluorescence behavior of powder as well as successive extracts. These facts justify our interest in this study.

MATERIALS AND METHODS

Plant Material

The fruits specimens of the plant *Scindapsus officinalis* [Roxb.] Schott for the proposed study were collected from the market [K. Ramaswamy Chetty (KRC), Country Drugs dealer, whole sale and retail, Shop No. 117, Rasappa Chetty Street, Park Town, Chennai, India] during the month of August 2009 and authenticated by Dr. P. Jayaraman (Director, Plant Anatomy Research Centre, Chennai-6000445). A voucher specimen (No.- PARC/2009/363) has been deposited for further reference.

Powder microscopy of fruits

Photomicrographs

In order to supplement the descriptive part the photomicrographs in different magnifications of all necessary cells and tissues were taken

with NIKON Cool Pix 8400 digital camera and Nikon lab photo 2 microscopic Unit. For normal observations bright field was used. For the study of crystals, starch grains and lignified cells, polarized light was employed. Since these structures have birefringent property under polarized light they appear bright against dark background. Magnifications of the figures are indicated by the scale-bars. Descriptive terms of the anatomical features are given as in the standard anatomy books.

Physicochemical Analysis [4-6]

Physical standards are rarely constant for crude drugs but should be determined for drugs wherever necessary as they may help in evaluation. Air-dried coarsely powdered fruit of *Scindapsus officinalis* was subjected to determination of ash value, extractive value, loss on drying, foaming index and crude fibre content by Dutch method.

Inorganic Elemental Analysis [7]

Inorganic elements present in *Scindapsus officinalis* (Roxb.) Schott. were evaluated according to the procedure given by Khandelwal (2005). Ash of powdered was prepared and 50% v/v hydrochloric acid or 50% v/v nitric acid was added to ash, kept for 1 h or longer and filtered. The filtrate was used to determine the presence or absence of calcium, carbonate, chloride, iron, magnesium, nitrates, phosphate, potassium, sodium and sulphate by means of various chemical tests.

Metal analysis on powder of *scindapsus officinalis* (roxb.) Schott. Fruit [8,9]

Metal content of *Scindapsus officinalis* (Roxb.) Schott. fruit was determined by following standard procedure using Atomic Absorption Spectrophotometer Varian, model No VS 00141 (2004).

Preliminary Phytochemical Screening [10-14]

The fruit were shade dried and coarsely powdered. About 300 gm powdered drug was extracted successively by cold maceration method with different solvents of increasing polarity i.e. hexane, chloroform, ethyl acetate and 50% ethanol. After 72 hrs of

maceration it was filtered. The marc was dried each time before extraction with next solvent. After complete extraction, the extracts were concentrated by distilling off the solvent and then evaporated to dryness on water bath. Colour of the extracts was observed and percentage yield was calculated on the air-dried basis.

The extracts were subjected to qualitative preliminary phytochemical screening for identification of phytochemical constituents. Total Flavonoids [55] and tannin content [55] were also determined.

Fluorescence Analysis [15,16]

Fluorescence characteristics of the powdered fruit with different chemicals and the difference were observed in daylight and ultraviolet light. The powder was treated with neutral solvents like water and acids like 1M hydrochloric acid, 80% sulphuric acid, 50% nitric acid, 50% FeCl₃, alkaline solution like 1N aqueous sodium hydroxide, concentrated sodium hydroxide and alcoholic 1N sodium hydroxide. Various solvent extracts were also subjected to daylight and ultraviolet light for its fluorescence characteristics.

RESULT AND DISCUSSION

The present work encloses detailed studies on powder microscopy, physicochemical analysis, inorganic elemental analysis in dried &

powdered fruit's ash, metal analysis, preliminary phytochemical screening on successive extracts and fluorescence analysis.

Powder Microscopy

The powder of the spadix exhibits three main types of inclusions: (1) Endosperm cells, (2) Sclereids in small groups and (3) Broken fragments of perienth.

Endosperm cells

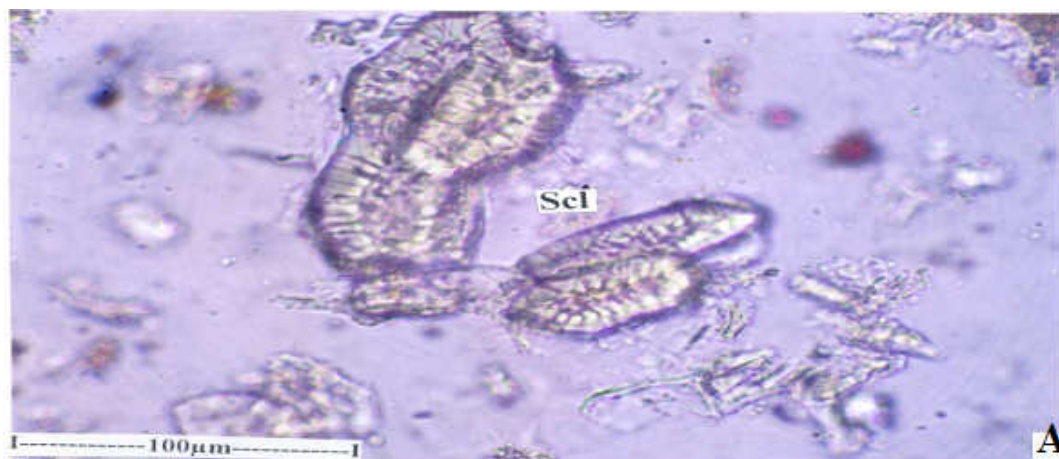
The broken endosperm consists of scattered cells which are elongated and rectangular or square shaped. These cells have thin walls and large quantum of starch grains. When stained with IKI (Iodine Potassium Iodide), the cells turn dark violet indicating that the cell content is starch. The starch grains are minute and granular; they are circular and simple type (figure.1 A,B,C).

Sclereids

Sclereids are abundant as the endosperm cells. They are brachy sclereids. They are rectangular to square shaped and have thick lignified walls. The cells appear lignified under the polarized light indicating the presence of lignin in the cell walls. The cell walls have narrow canal like pits and wide lumen which are about 200- 250 μm long and about 70-100 μm wide (Figure.2 A,B,C).



Fig. 1: (A) Isolated endosperm cells (10X) [EnC- Endosperm cells] (B) Endosperm cells stained with IKI in (40X) (C) Enlarged view of two endosperm cells (40X) [CW-Cell wall, SG-starch grains]



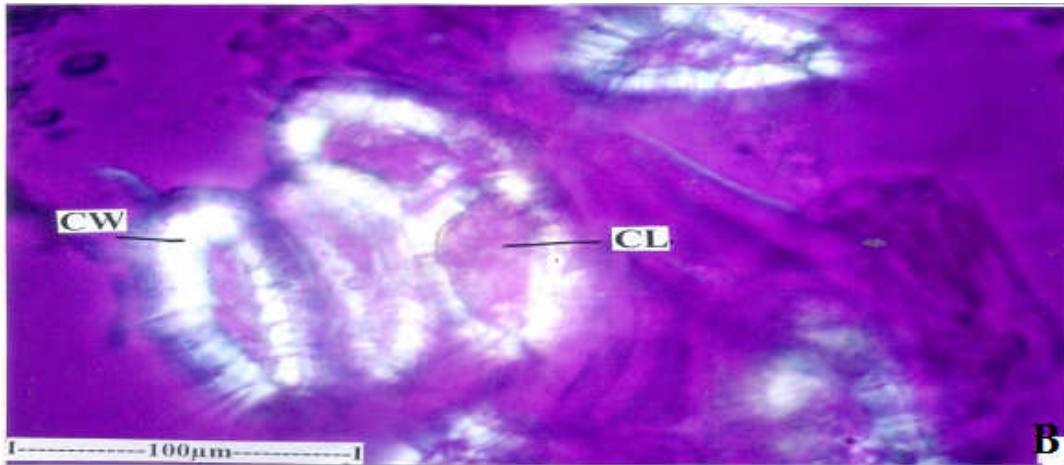


Fig. 2: (A) Enlarged view of sclerenchyma in the powder (B) View of sclereids under light microscope (40X) [Scl-Sclereids]

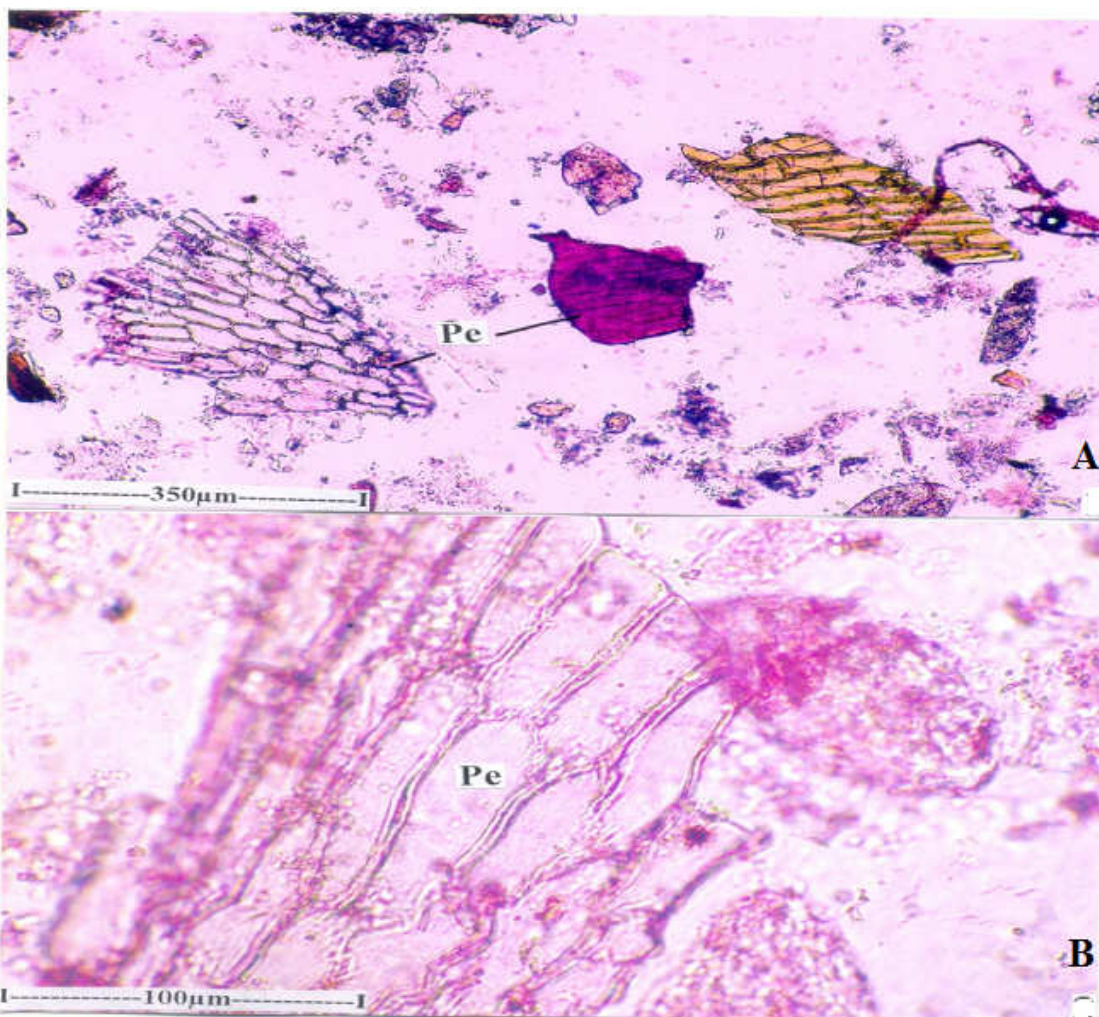


Fig. 3: (A) Three fragments of the perianth (10X) (B) Enlarged view of perianth cells (40X) [Pe-Perianth]

Fragments of perianth

The perianth is a modified petal and not differentiated into petal or sepal. Broken pieces of the perianth are frequently seen in the powder. The fragments have vertically oblong compact cells with thick walls. The cells are parallel to each other and longitudinally arranged. The cells are 100 µm long and 30 µm wide (figure 3 A, B).

Physicochemical Analysis

The ash value was found to be 6.29% of total ash, 1.797% of acid insoluble ash, 2.218% of water soluble ash and 4.65% of chloroform soluble ash. The extractive values were found to be 6.844% of alcohol soluble extractives, 9.766% of water soluble extractives and 7.12% of chloroform soluble extractives. The loss on drying (LOD)

was found 3.524% and crude fibre content was 6.661%. The foaming index was found to be 110.52. All the results were mentioned in Table 1.

Inorganic Elemental Analysis

Inorganic elemental analysis on ash of the fruit showed the presence of calcium, iron, magnesium, phosphate, potassium, sodium and sulphate Table 2.

Metal Analysis

metal analysis on the air-dried powder of the fruit showed the presence of calcium, chloride, chromium, copper, iron, lead, magnesium, manganese, phosphorous, potassium, selenium, sodium and zinc Table 3. These metals play key role in human beings.

Preliminary Phytochemical Screening

The cold maceration process was followed for extraction of fruits by using solvent of low polarity to higher polarity i.e. hexane, chloroform, ethyl acetate and 50% ethanol and The percentage yield was calculated as 1.323, 2.26, 0.38 and 2.256 respectively Table 4. The preliminary phytochemical tests were carried out for the identification of chemical constituents present in the various successive extracts. The finding showed the presence of flavonoids, phenolics (ethyl acetate & 50% ethanolic extract), Alkaloids (ethyl acetate extract), saponins, tannins (50% ethanolic extract), glycosides, terpenoids, steroids (chloroform extract) and fat and oils (hexane extract) Table 5. Total flavonoids and tannins content was estimated about 1.27 and 4.12 % w/w Table 6.

Table 1: Physicochemical standards of *S. officinalis* (Roxb.) Schott fruit

Parameters	Values (%w/w)
Ash Values	
Total ash	6.29±0.303
Acid insoluble ash	1.797±0.267
Water soluble ash	2.218±0.252
Chloroform soluble ash	4.65±0.312
Extractive Values	
Alcohol soluble extractive value	6.844±0.607
Water soluble extractive value	9.766±1.044
Chloroform soluble extractive	7.12±0.524
Loss on drying	3.524±0.389
Crude fiber content	6.661±0.281
Foaming index	110.52

The results are expressed in mean ± SD of three independent values.

Table 2: Inorganic elemental studies on powdered fruit of *Scindapsus officinalis* (Roxb.) Schott fruit

S. No.	Element	Result
1.	Calcium	+
2.	Carbonates	-
3.	Chlorides	+
4.	Iron	+
5.	Magnesium	+
6.	Nitrates	-
7.	Phosphate	+
8.	Potassium	+
9.	Sodium	+
10.	Sulphate	-

(+) indicates for presence, (-) indicates for absence

Table 3: Metal analysis in powder of *Scindapsus officinalis* (Roxb.) Schott. fruit

S. No.	Metal Name	Concentration/100g sample
1.	Arsenic	NIL
2.	Cadmium	NIL
3.	Calcium	57.8 mg
4.	Chloride	41.8 mg
5.	Chromium	0.2101 mcg
6.	Copper	0.343 mcg
7.	Iodine	NIL
8.	Iron	12.12 mg
9.	Lead	0.2088 mg
10.	Magnesium	18.11 mg
11.	Manganese	0.891 mcg
12.	Mercury	NIL
13.	Nickel	NIL
14.	Phosphorus	0.1211 mg
15.	Potassium	8.012 mg
16.	Selenium	0.0891 mg
17.	Sodium	23.21 mg
18.	Sulphur	NIL
19.	Tin	NIL
20.	Vanadium	NIL
21.	Zinc	0.1021mg

Table 4: Percentage yield of successive extracts of *Scindapsus officinalis* fruit

S. No.	Solvent extract	Colour	% yield
1.	Hexane	Brown	1.323
2.	Chloroform	Brown	2.260
3.	Ethyl acetate	Brown	0.380
4.	50% alcoholic	Brown	2.256

Table 5: Preliminary Phytochemical screening of various extracts of *Scindapsus officinalis* fruit.

Chemical Test	Successive extracts			
	Hexane extract	Chloroform extract	Ethyl Acetate extract	50% ethanol extract
Alkaloids	-	-	+	+
Carbohydrates	-	-	-	-
Glycosides	-	+	-	-
Proteins	-	-	-	-
Amino acids	-	-	-	-
Saponins	-	-	-	+
Flavonoid	-	-	+	+
Phenolic compounds	-	-	+	+
Tannins	-	-	-	+
Terpenoids	-	+	-	-
Oil and fat	+	-	-	-
Steroids	-	+	-	-

(+) indicates presence; (-) indicates absence

Table 6: Estimated quantity of phytoconstituents from powdered fruit of *Scindapsus officinalis*

S.No.	Parameter	Value% w/w
1	Total flavonoids content	1.27 % w/w
2	Tannin content	4.12% w/w

Table 7: Fluorescence characteristics of powder and various successive extracts of *Scindapsus officinalis* (Roxb.) Schott fruit.

S. No.	Reagents	Day light	UV Light	
			At 254 nm	At 254 nm
1.	Powder as such	Pale yellow	Pale yellow	Yellow
2.	Drug powder + Methanol	Pale yellow	Pale yellow	Pale yellow
3.	Drug Powder + 50 % nitric acid	Yellow	Dark brown	Green
4.	Drug Powder + 1N aqueous sodium hydroxide	Pale yellow	Pale yellow	Greenish yellow
5.	Drug powder + Concentrated Sulphuric acid	Brownish black	Greenish yellow	Greenish black
6.	Drug powder + 50% Sulphuric acid	Greenish yellow	Yellow	Yellowish green
7.	Drug powder + 80% Sulphuric acid	Greenish yellow	Yellow	Green
8.	Drug powder + Water	Pale yellow	Pale yellow	Pale yellow
9.	Solvent extracts			
	Hexane	Brown	Brown	Brown
	Chloroform	Brown	Pale Brown	Brown
	Ethyl acetate	Brown	Brown	Brown
	50% alcoholic	Brown	Brown	Brown

Fluorescence Analysis

Fluorescence analysis of drug powder and successive extracts showed the different colours under UV light (254 nm and 366 nm) and day light which was reported in Table 7.

CONCLUSION

The climber *Scindapsus officinalis* (Roxb.) belongs to family Araceae which is known as Anaittipilli in Tamil and Gajapeepal in Hindi. In the present communication, physicochemical analysis, powder microscopy of fruit, fruits preliminary phytochemical screening, inorganic elemental study, metal study, preliminary phytochemical screening and fluorescence analysis have been described. The powder microscopical study provides the basis for further identification and authentication of fruit. The outcomes of physicochemical and fluorescence studies on fruit may play a significant role in setting the standards for fruit. The plant has both

organic and inorganic constituents. The inorganic part of the medicinal plant contains mainly mineral elements viz. calcium, chloride, chromium, copper, iron, lead magnesium, manganese, phosphorous, potassium, selenium, sodium and zinc. These mineral elements may be associated with the various vital processes in the body. Preliminary phytochemical screening of successive extracts of fruit reveals the presence of secondary metabolites which may be responsible for a variety of pharmacological activities of fruit. By the study we are sure that this work will be helpful to further standardization of the drug in future.

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