

Research Article

Anatomical and Phytochemical Evaluation of *Sansevieria roxburghiana* Schult. & Schult. F. (Rhizome).

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Abstract: In the present study, rhizome of *Sansevieria roxburghiana* Schult. & Schult. f. (Agavaceae), was evaluated for the preliminary phytochemicals and anatomical characteristics. Petroleum ether, chloroform, methanol and water were selected as solvents according to increasing order of their polarity. Qualitative analysis of the selected parts confirmed the presence of various primary and secondary plant metabolites such as alkaloids, terpenoids, flavonoids, steroids, phenols, tannins, fixed oil and quinone. Anatomical studies include cross section and powder of the dried plant material. This study provided referential botanical and phytochemical information for correct identification of the plant.

Keywords: rhizome, anatomy, *Sansevieria*, camera lucida, phytochemical, plant metabolites, powder microscopy.

INTRODUCTION

Herbal medicine has been used in India for thousands of years worldwide, during last few decades as evidenced by rapidly growing global and national market of herbal drugs. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. A search for eternal health, longevity and seeking remedy to relieve discomfort prompted man to develop diverse ways and means of health care. The early man explored the natural surroundings, and explored plants, animals, minerals and developed a variety of therapeutic agents [1]. Plants have an almost limitless ability to synthesize aromatic substances mainly secondary metabolites, in many cases, these substances serve as the molecules of plant defense against predation by microorganisms, insects, and herbivores. Further, some of them may involve in plant odour (terpenoids), pigmentation (tannins and quinines), and flavour (capsaicin). However, several of these molecules possess medicinal properties [2]. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds. *Sansevieria roxburghiana* Schult. & Schult. f. (Agavaceae), called *Marul* in Tamil Indian bowstring hemp in English is a herbaceous perennial plant with short fleshy stem and stout rootstock, occurring in eastern coastal region of India, also in Sri Lanka, Indonesia and tropical Africa. In India, this plant has been traditionally used for several medicinal purposes. The whole plant is traditionally used as a cardiogenic, expectorant, febrifuge, purgative, tonic, in glandular enlargement and rheumatism [3]. The rhizomes are mucilaginous

and used in consumptive complaints, long lasting chronic persistent coughs, for quick relief of common cough and cold. The objective of the study is to identify the secondary plant metabolites present in the plant and to know the anatomical peculiarities of the parts for the identification.

MATERIALS AND METHOD

Fresh stem parts were collected from Chennai and identified with the help of botanist of Regional Research Institute of Unani Medicine (RRIUM), Chennai. Various qualitative tests were carried out for the detection of primary and secondary plant metabolites such as alkaloids, terpenoids, flavonoids, steroids, phenols, tannins, fixed oil and quinone. Mineral analysis or elemental analysis of the shade dried powdered sample of the experimental plant was carried out following the procedures outlined in PERKIN-ELMER'S Atomic absorption spectrophotometry [4]. PERKIN-ELMER Atomic Absorption spectrophotometer model No. 2380, USA was used for the analysis.

The macromorphology of the rhizome was studied according to the standard methods [5]. Material processing slide preparation and powder microscopy were carried out as per the Indian Pharmacopoeia standard methods [6]. Diagrams were drawn with the help of camera lucida.

RESULTS AND DISCUSSION

Preliminary phytochemical screening of the extracts revealed the presence of alkaloids, terpenoids,

flavonoids, steroids, phenols, tannins, fixed oil and quinones (Table 1).

The mineral content shows that it is a rich source of calcium and sodium (Table 2) which are main constituents of the watery mucilage apart from these , minerals like magnesium and potassium were present.

Table 1: Preliminary phytochemical analysis of *Sansevieria roxburgiana* Schult. & Schult. f. rhizome.

| Extracts used | Alkaloids | Flavonoids | Fixed oil | Phenols | Steroids | Tannin | Terpenoids | Quinones |
|-----------------|-----------|------------|-----------|---------|----------|--------|------------|----------|
| Petroleum ether | ++ | + | + | - | - | + | - | - |
| Chloroform | ++ | - | ++ | + | ++ | + | + | + |
| Methanol | +++ | - | + | - | - | ++ | - | ++ |
| Water | + | - | + | + | - | - | - | - |

Key: +- slightly present; ++- moderately present; +++- highly present

Table 2: Mineral content of the rhizome of *Sansevieria roxburgiana* Schult. & Schult. f.

| Mineral | Dry weight (mg) |
|-----------|-----------------|
| Calcium | 294.19±1.72 |
| Copper | 0.02±0.00 |
| Iron | 1.77±0.01 |
| Magnesium | 74.20±0.45 |
| Manganese | 0.22±0.01 |
| Potassium | 21.50±0.13 |
| Sodium | 644.67±4.01 |

Each above mentioned secondary metabolites protects against cancer, cataract and radiation damage, boosts the immune system [7] as they are precursors of vitamin A[8]. The phytate content in this plant is greater than those reported for *Piper purpureum* [9], Phytic acid binds calcium, iron, zinc and other minerals, thereby reducing their availability in the body [10]. It also inhibits protein digestion by forming complexes with them. Thus the nutraceutical value of the rhizome was studied.

The anatomical features observed were a poorly developed cork, ground tissue wide and parenchymatous, laterally elongated cells with reddish

orange oil globules, vascular bundles scattered with a thick bundle cap, sclerenchymatous, prominent bundle of raphides and large mucilage canals. Large mucilage canals and bundles of raphides are characteristic features of this species which are not prominent in *Sansevieria trifasciata* and *Sansevieria liberica* [11]. Powder of the dried plant material shows brownish orange cork cells in surface view, large parenchyma cells, fibres with thin and thick walls, vessels with spiral and reticulate thickenings and numerous raphides. Since there are no reports available exclusively on *Sansevieria roxburghiana* the present study was comparable with the available literature on phytochemical content of related species [12].

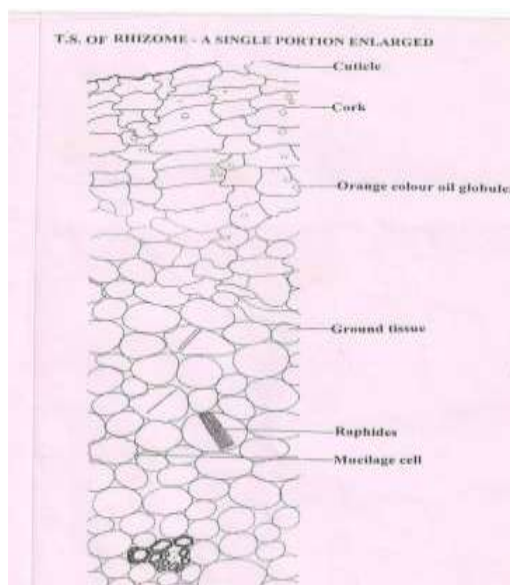


Fig-1: Anatomy of Rhizome of *Sansevieria roxburgiana* Schult. & Schult. f.

Thus the preliminary phytochemical and anatomical evaluation provided basic information for the identification of the plant. The results of phytochemical analysis and anatomical studies of the selected plant-parts confirmed its therapeutic usage as depicted in the literature [13-14]. The active plant extract may be further subjected to biological and pharmacological investigations.

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