

**PHARMACOGNOSTICAL AND ANATOMICAL EVALUATION OF
THE SELECTED PARTS OF *Strychnos potatorum* L.f.****T.V.BINU¹ AND B.VIJAYAKUMARI*²**

*1. Research Scholar, 2. Professor
Department of Botany, Avinashilingam University, Coimbatore-43, T.N. (India)*

ABSTRACT

In the present study, selected parts (stem, bark, leaf and seed) of *Strychnos potatorum* L.f. belonging to the family Loganiaceae were 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, cellulose, starch, tannins, fixed oil and quinone. Anatomical studies include cross sections of the selected parts. This study provided referential botanical and phytochemical information for correct identification of the plant.

Key words: *Strychnos potatorum* L.f, Phytochemicals, anatomical characteristics, cross sections, identification.



*Corresponding author

**B.VIJAYAKUMARI**

Professor Department of Botany, Avinashilingam University, Coimbatore-43, T.N. (India)

INTRODUCTION

Search for eternal health and longevity in addition to seeking remedy to relieve discomfort prompted man to develop diverse ways and means of health care. The early man explored his immediate natural surroundings, and explored plants, animals, minerals and developed a variety of therapeutic agents¹. Plants have an almost limitless ability to synthesize aromatic substances mainly secondary metabolites, of which at least 12,000 have been isolated, a number estimated to be less than 10% of the total. 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^{2,3}. *S. potatorum* is a medium sized deciduous tree

growing to a height up to 12 meters. Bark is cracked and black. Trunk is irregularly fluted. Leaves are simple, opposite, elliptic acute, 15x6.25 cm, glabrous, shining, flowers are white fragrant, axillary cymes, fruits are ovoid or globose, glabrous berries, black when ripe. Seeds are one or two, yellow, circular, not much compressed. Traditional Medicinal Uses: According to Ayurveda, seeds are acrid, alexipharmic, lithotriptic and cure strangury, urinary discharges, head diseases etc. Roots cure Leucoderma whereas fruits are useful in eye diseases, thirst, poisoning and hallucinations. The fruits are emetic, diaphoretic etc. According to Unani system of medicine, seeds are bitter, astringent to bowels, aphrodisiac, tonic, diuretic and good for liver, kidney complaints, gonorrhoea, colic etc. Seeds are used to purify water. Seeds are rich source of polysaccharide gum suitable for paper and textile industries^{4,5}.



Figure 1
Habit of Strychnos potatorum L.f.

The objective of the study is to identify the secondary plant metabolites present in the plant parts and to know the anatomical peculiarities of the parts for the identification.

MATERIALS AND METHODS

Plant Material

The fresh plant materials viz., stem leaves, bark and seeds of *S. potatorum* L.f. were collected from Vattaparai, Palakkade district,

Kerala state, South India. The plant material was identified by Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore and voucher specimen (F.NO.14928) has been retained in Fischer Herbarium of IFGTB for future reference. The coarse powders of the selected parts were extracted with petroleum ether, chloroform, methanol and water using soxhlet apparatus according to their increasing order of polarity.

Preliminary Phytochemical Screening

Various qualitative tests were carried out for the detection of primary and secondary plant metabolites such as alkaloids, terpenoids, flavonoids, steroids, phenols, cellulose, starch, tannins, fixed oil and quinone⁶.

Macroscopic and Microscopic Studies

The macromorphology of the selected plant parts were studied according to the standard methods⁷. Material processing and slide preparation were carried out as per the Indian Pharmacopoeia standard methods⁸. For anatomical studies hand sections were prepared and histological and histochemical staining was carried out as per standard methods^{9,10}. The sections were stained with

safranin for general studies and Sudan black for oil, Iodine for starch, Ferric chloride for tannin and Phloroglucinol and Hydrochloric acid for lignin. Representative diagrams were taken with the help of inverted microscope for documentation (LEICA DM 1000 LED).

RESULTS AND DISCUSSION

Preliminary Phytochemical Screening

Preliminary phytochemical screening of the extracts revealed the presence of alkaloids, terpenoids, flavonoids, steroids, phenols, cellulose, starch, tannins, fixed oil and quinines (Table 1).

Table 1
Preliminary phytochemical analysis of selected parts of *Strychnos potatorum* L.f.

S.No	Sample	Extracts used	alkaloids	flavonoids	tannin	phenols	steroids	terpenoids	quinones	starch	cellulose	Fixed oil
1	Stem	Petroleum ether	+	-	-	+	+	-	-	-	-	+
		Chloroform	+	-	-	+	-	-	-	-	-	+
		Methanol	+	+	+	+	-	-	-	+	-	-
		Water	-	+	-	-	-	-	-	-	-	-
2	Bark	Petroleum ether	-	-	-	+	-	-	-	-	-	+
		chloroform	+	-	-	+	-	-	-	-	-	+
		Methanol	+	+	-	-	-	-	-	-	-	+
		Water	+	-	-	+	-	-	-	-	-	-

S. No	Sample	Extract	Alkaloids	Flavonoids	Tannin	Phenols	Steroids	Terpenoids	Quinones	Starch	Cellulose	Fixed oil
3	Leaf	Petroleum ether	-	+	-	+	-	+	+	-	-	+
		chloroform	+	+	-	-	+	-	+	+	-	+
		methanol	+	+	-	+	-	+	-	+	-	+
		water	+	-	-	-	-	-	+	-	-	+
4	seed	Petroleum ether	+	+	-	+	-	+	-	-	-	-
		chloroform	+	+	-	-	-	+	-	-	-	-
		methanol	+	+	-	+	-	+	-	-	-	+
		water	-	-	-	+	+	+	-	-	-	-

+ Indicates presence
- Indicates absence

**Macroscopic and Microscopic Characteristics
Leaf**

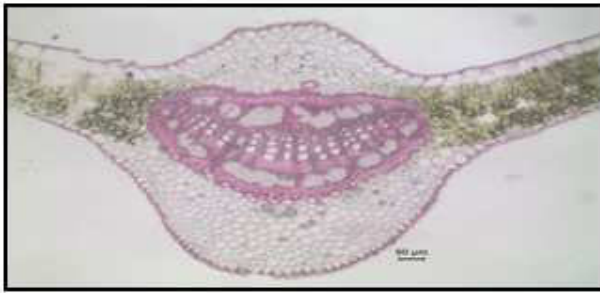


Figure – 1
T.S. of leaf anatomy

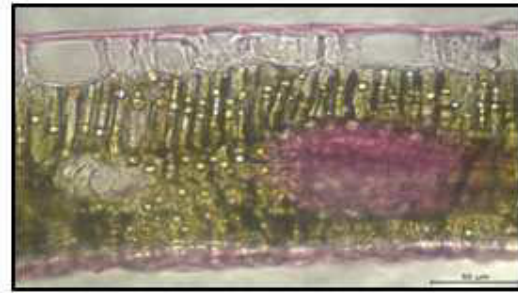


Figure – 1 (a)
**Leaf anatomy showing
palisade and spongy tissue**



Figure.1 (b)
C.S. of leaf showing the presence of Starch

The macroscopic and microscopic studies of leaves showed that leaves are simple and petiolated, exarch vascular bundles which are surrounded by sclereids on all sides Figure 1. Presence of paracytic stomata in upper epidermis. There is less stomata in upper epidermis when compared to lower side. The mesophyll between upper and lower epidermis is differentiated into palisade and spongy

parenchyma (Figure1 (a)). The cells inner to both epidermal layers are dense with chlorenchyma cells. Parallel vascular bundles are distributed. Almost all the cells are fully fixed with starch grains (Figure 1(b)). Oil globules are distributed throughout the lamina (Figure 1 (c)). Lignin is present in the lamina region and tannin is entirely absent in leaf (Figure1 (d)).



Figure.1 (c)
C.S. of lamina showing presence of oil globules

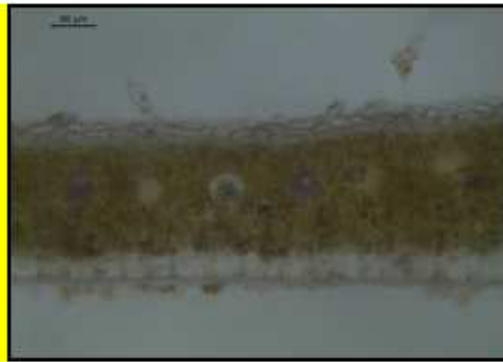


Figure.1 (d)
C.S. of lamina showing the presence of lignin

Stem and bark

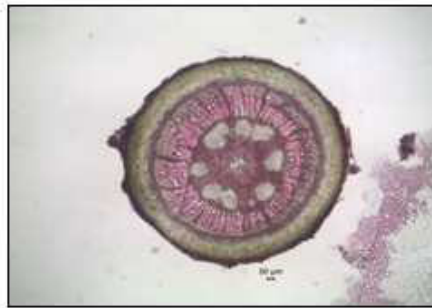


Figure – 2
T.S. of Stem

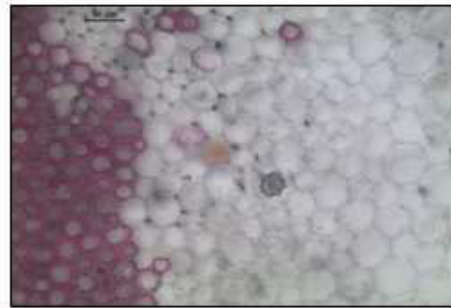


Figure – 2 (a)
Hypodermis shows the presence of prismatic crystals



Figure – 2 (b)
Xylem elements showing lignifications

T.S. of Stem

Transverse section of stem appeared as a complete circle (Figure 2). The outer region of the bark is covered with suberin and tannins. The epidermis consists of a single layer, followed by hypodermis which consisted of one row of large cells. Inner to hypodermis is the cortex that showed presence of prismatic

of crystals and stone cells (Figure 2 (a)). Stone cells and crystal cells are found to be distributed throughout the cortex. Xylem elements are lignified (Figure 2 (b)). There were no starch granules in cortical zone. Oil globules are entirely absent in stem. Tannin cells are present in the phloem region (Figure 2 (c)).

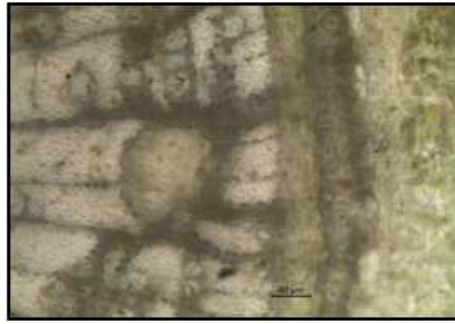


Figure – 2 (c)
Phloem regions shows the presence of tannin

Seed

Seed up to 8 mm diameter, circular, bluntly lenticular, shiny with short, appressed, silky hairs, cream-white in colour with a slightly prominent ridge round the border, no bitterness, shows testa, consisting of 2 or 3 layers, thick-walled, elongated, lignified sclerenchymatous cells covered with numerous, cylindrical, unicellular, lignified,

trichomes having basal portion ramified, outer endosperm composed of 3 to 8 layers of thick-walled, elongated palisade-like cells arranged in rows, an inner endosperm composed of thin-walled, oval to polygonal (Figure 3). C.S. of seed shows the presence of lignin in the outer most layers (Figure 3 (b)). Oil globules are present in the seed (Figure 3 (a)).



Figure – 3
C.S of Seed

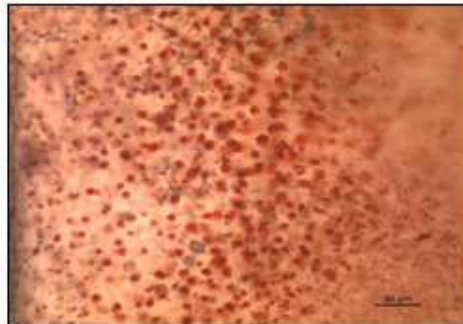


Figure – 3 (a)
C.S of Seed Shows the presence of oil globules



Figure – 3 (b)
C.S of Seed showing the presence of lignin

CONCLUSION

The phytochemical and anatomical evaluation of selected parts of *Strychnos potatorum* L.f. (Loganiaceae) 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. The active plant extract may be further subjected to biological and pharmacological investigations.

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