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PHARMACOGNOSTICAL AND PRELIMINARY PHYTOCHEMICAL EVALUATION OF STEM OF S*IDA RHOMBIFOLIA* LINN

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ABSTRACT

The objective of present studies deals with the macroscopical and microscopical studies of stems of *Sida rhombifolia* Linn. Some distinct and different characters were observed with section of young thin stems. The microscoy shows the cork, cortex, vascular bundle, medullary rays, pith, xylem element are few and phloem elements. Physiochemical parameter and Preliminary phytochemical studies of the stems powder were also carried out. The present study on Pharmacognostical investigation of stems of *Sida rhombifolia* L. might be useful to supplement information in regard to its identification parameters assumed significantly in the way of acceptability of herbal drugs in present scenario lacking regulatory laws to control quality of herbal drugs.

Keywords: Pharmacognostical, Physiochemical, *Sida rhombifolia* L, Stems, methanolic extract

INTRODUCTION

A medicinal plant is any plant which, in one or more of it contains substance that can be used for therapeutic purpose or which is a precursor for synthesis of useful drugs. The plants posses therapeutic properties or exert Beneficial Pharmacological effects on the animal body are generally designated as

"Medicinal Plant". In current scenario of medical and pharmaceutical advancement, microbes involve in the change of their metabolism and genetic structure to acquire resistant against the drugs used in the treatment of common infection disease **[1-2]**. The continued emergence or persistence of drug resistant organisms and the increasing evolutionary adaptation by pathogenic organisms to commonly used antimicrobials have reduced the efficacy of antimicrobial agent currently in use **[3]**. Plants have the capacity to produce a large number of organic chemicals called as phytochemicals. The accumulation of phytochemicals in the plant cell cultures had been studied for than thirty years and the generated knowledge had helped in realization of using cell culture for the production of desired phytochemicals **[4]**.

Medicinal plants are widely used in Brazilian folk medicine for treating human illnesses, mainly as infusions or decoctions (teas). However, their uncontrolled use may cause more damages than benefits to public health **[5]**. According to the use of medicinal plants is a particularly common practice in developing countries, and reported that medicinal plants may contain toxic substances or cause mutagenic effects; on the other hand, the consumption of teas can suppress the effects of mutagenic agents which are acting upon humans **[6]**.

Sida rhombifolia L. (known as guanxuma or broom) is native to the American continent and is found throughout Brazil. It may be considered as a pest for agriculture, but its teas are popularly used in Brazilian folk medicine. Leaves are used for its mucilage and pleasant taste as a remedy for diarrhea. Australian aborigines also use a root decoction for similar purposes, and eat the raw roots to relieve 'indigestion'. In India, a root infusion is used for treating rheumatism. Also, several other uses are mentioned. However, neither the efficacy nor the safeties of these uses have been tested in the laboratory **[7-8]**.

The present study on Pharmacognostical investigation of *Sida rhombifolia* L. stems might be useful to supplement information in regard to its identification parameters assumed significantly in the way of acceptability of herbal drugs in present scenario lacking regulatory laws to control quality of herbal drugs.

MATERIAL AND METHOD

Plant material

The plant *Sida rhombifolia L.* is widely found throughout India. For my work the plant was collected from in the deep forest of Satpuda hills with the help of forest officers

of Chopda Tahsil, Dist. Jalgaon, Maharashtra (India) and authenticated by Prof. (Dr.) Priyanka A. Ingle, scientist, BSI (Botanical Survey of India), Pune (M.S.). (Specimen No.PBR MG02).The stems of the plant were dried under shade and then coarsely powdered with help of mechanical grinder. The powder was passed through sieve no. 40 and stored in an airtight container for further studies. Extraction was carried out by continuous soxhlet extraction process for 72 hr.

The required samples of different organs were cut and removed from the plant and fixed in FAA (Formalin – 5 ml + Acetic acid – 5ml + 70% Ethyl alcohol – 90ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary – butyl alcohol as per method **[9]**. Infiltrations of the specimens were carried out by gradual addition of paraffin wax (melting point 58-60^{0}C) until TBA solution attained super-saturation. The specimens were casted into paraffin blocks.

Sectioning

The paraffin embedded specimens were sectioned with the help of rotary Microtome. The thicknesses of the sections were 10-12 µm. Dewaxing of the sections were done by customary procedure **[10]**. The sections were stained with Toluidine blueas per the method **[11]**. Since Toluidine blue is a polychromatic stain, the staining results were remarkably good; and some Cytochemical reactions were also obtained. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, blue to the protein bodies etc.

Photomicrographs

Microscopic descriptions of tissues are supplemented with micrographs wherever necessary. Photographs of different magnifications were taken with Nikon Lab photo 2Microscopic 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 **[12]**.

Physicochemical Parameters

Physicochemical parameter of stems of *Sida rhombifolia* L. were determined such as Total ash, Acid insoluble ash, Water soluble ash, Sulphated ash, moisture content **(Table 1) [13-14]**.

Preliminary Phytochemical Parameters:

Preliminary phytochemical test of *Sida rhombifolia* Linn. were performed and the

chemical constituents were detected **(Table 2) [15-17]**.

RESULTS AND DISCUSSION

Morphology of *Sida rhombifolia* Linn

Sida rhombifolia, Arrow leaf sida, is a perennial or sometimes annual plant in the family Malvaceae, native to the New World tropics and subtropics. Other common names include Paddy's lucerne, Jelly leaf, and also somewhat confusingly as Cuban jute, Queensland hemp, and Indian hemp (although *S. rhombifolia* is not related to either jute or hemp). It is used in Ayurvedic medicine, where it is known as kurumthotti. The stems are erect to sprawling and branched, growing 50 to 120 centimeters in height, with the lower sections being woody. The dark green, diamond-shaped leaves are arranged alternately along the stem, 4 to 8 centimeters long, with petioles that are less than a third of the length of the leaves. They are paler below, with short, grayish hairs. The apical halves of the leaves have toothed or serrated margins while the remainders of the leaves are entire (untoothed). The petioles have small spiny stipules at their bases. The moderately delicate flowers occur singly on flower stalks that arise from the area between the stems and leaf petioles. They consist of five petals that are 4 to 8 millimeters long, creamy to orange-yellow in color, and may be somewhat reddish in the center. Each of the five overlapping petals is asymmetric, having a long lobe on one side **(Figure 1)**. The stamens unite in a short column. The fruit is a ribbed capsule, which breaks up into 8 to 10 segments. The plant blooms throughout the year. This species is usually confined to waste ground, such as roadsides and rocky areas, stock camps or rabbit warrens, but can be competitive in pasture, due to its unpalatability to livestock.

Anatomy of the stem (Microscopy)

The microscopic studies of stem showed following tissue systems:

Cork: The cork comprises of an outer zone of thick walled brownish compressed cells and an inner zone of thin walled colourless, tangentially arranged cells. The cork tissue is broken at some places due to lenticels.

Cortex: Cortex is wide. The outer zone of cortex consists of 3 to 5 rows of irregularly arranged tangentially elongated chloren-chymatous cells and the cells situated towards the inner side are polygonal in shape filled with abundant starch grains. The starch grains are simple, ovoid; several secretory cells found scattered in the cortex. Pericyclic fibres lignified are associated with a large number of crystal

fibres containing a single prism in each chamber.

Vascular bundle: Vascular zone is composed of discrete vascular strands with 10 to 12 or more wedge shaped strips of xylem, externally surrounded by semi circular strips of phloem alternating with wide medullary rays; phloem parenchyma contain calcium oxalate crystals; cambium is of 1-2 layers; xylem consists of vessel elements, tracheids, parenchyma and fibres. Vessel elements cylindrical in shape bearing bordered pits. Medullary rays 15 to 20 cells wide. Pith mostly made up of large thin walled cells containing starch grains. The presence of discrete vascular strands in the mature stem of *Sida rhombifolia* is one of the anomalous secondary structures found **Figure 2 and 3**.

Powder Microscopy

Creamish brown, starch grains, tracheids, fibres, crystal fibres containing prisms of calcium and vessel elements with bordered pits. The crude powder of *Sida rhombifolia* was creamish brown in color, odourless and slightly bitter in taste. Microscopy study of powder showed the presence of fibres which are lignified, along with blunt ends. Tracheids with bordered pits and horizontal perforations. Pericylicfibres are longer than tracheids. Xylem vessels cylindrical and bear bordered pits. Starch grains are present in parenchymatous cells **(Figure 4)**.

Figure 1: ***Sida rhombifolia*** **Linn**

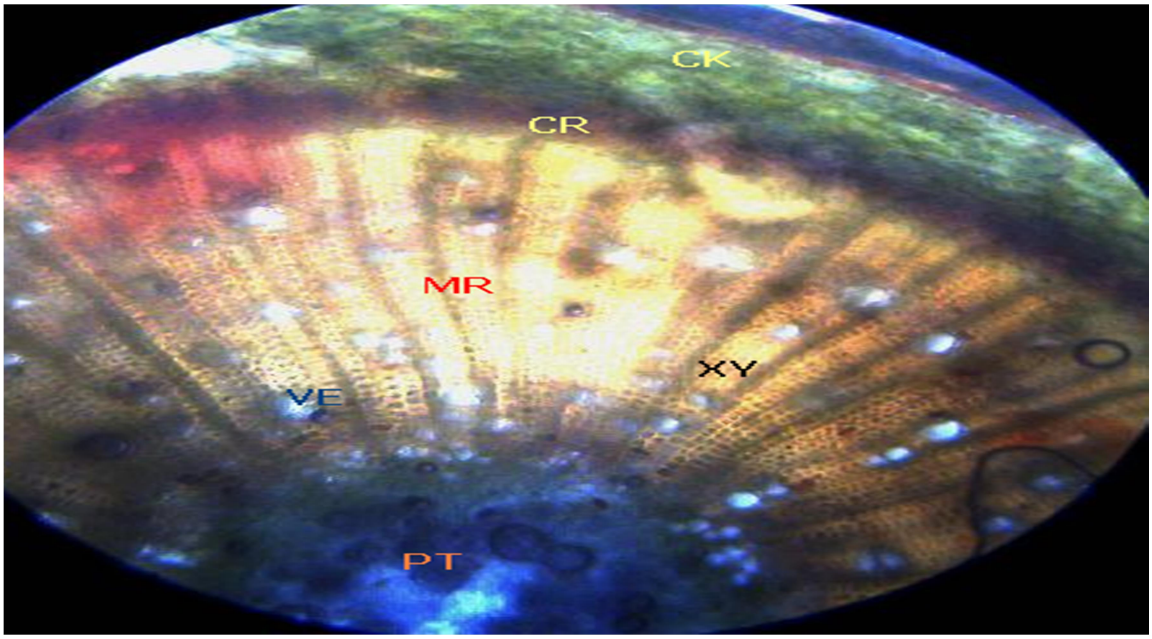


Figure 2: Microscopical study on stem of *Sidarhombifolia*
CR - Cortex, CK - Cork, XY - Xylem, VE - Vessel,
MR - Medulary rays, PT- Pith

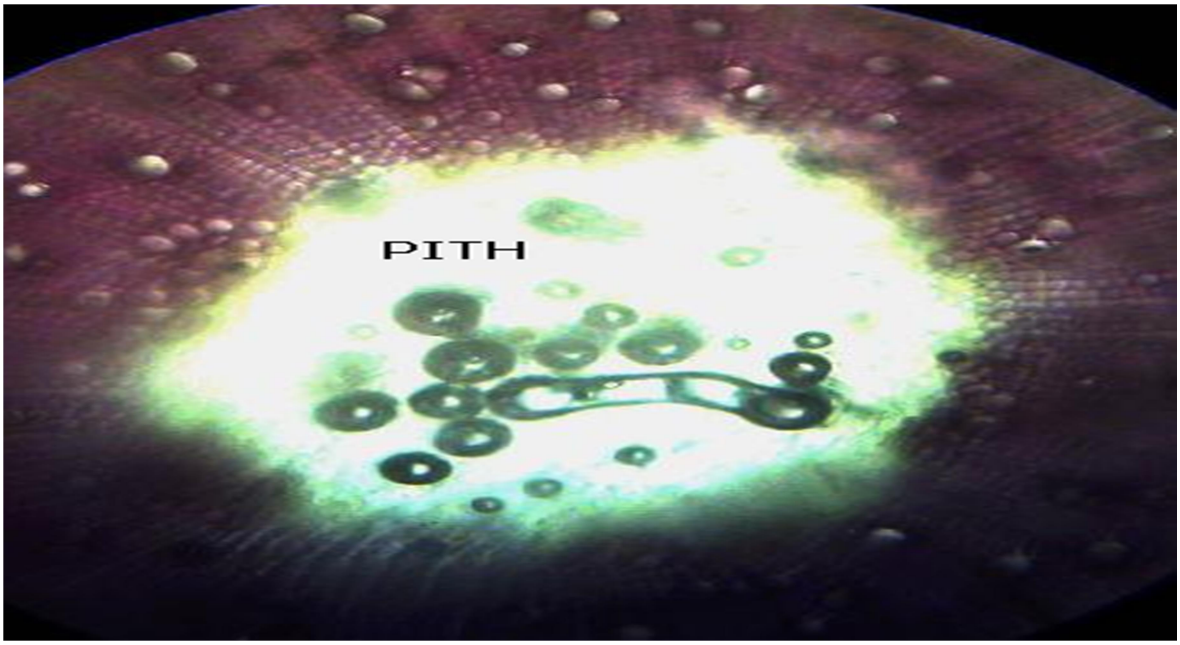
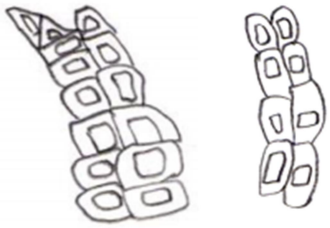
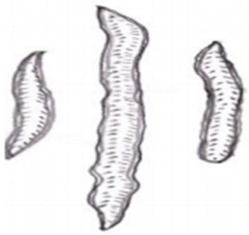


Figure 3: T.S. of stem showing central pith
UEP- Upper epidermis, LEP- Lower epidermis, XY- Xylem
PH- Phloem, MP- Mesophyll, MD- Midrib, CH- Cholenchyma

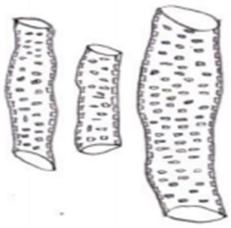


Crystal fibres

Starch grains



Tracheids



Vessel elements

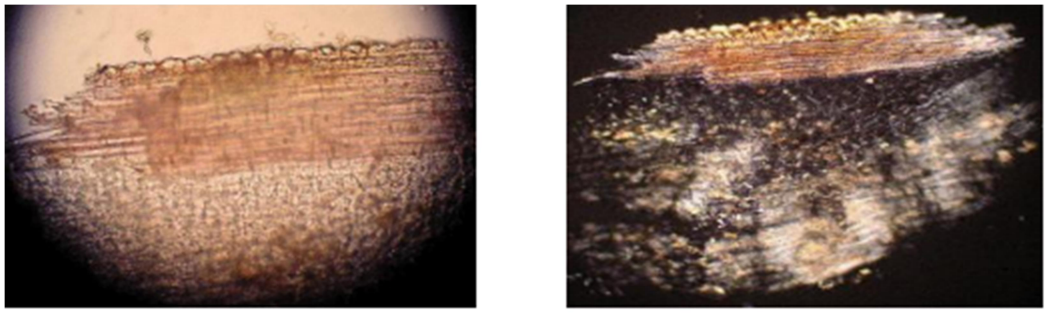


Figure 4: Powder microscopy of stem of *Sida rhombifolia*

Physicochemical Parameters

Table 1: Determination of quantitative standards of dry powder of stem of *Sida rhombifolia*

Sr. No.	Parameter	Values obtained in air dried basis (% w/w)
1.	Ash value	
	Total ash	10.16 % w/w
	Acid soluble ash	5.82 % w/w
	Water soluble ash	7.68 % w/w
2.	Extractive value	
	Alcohol soluble extractive	13.58 % w/w
	Water soluble extractive	18.96 % w/w
3.	Moisture content	12.36 %

Table 2: Preliminary phytochemical screening of various extracts of stem of *Sida rhombifolia*

Sr. No.	Constituents	Tests	methanol	Aqueous
1.	Alkaloids	Mayer's test	-	-
		Dragordraff's test	-	-
		Hager's test	-	-
		Wagner's test	-	-
2.	Sterols	Libermann's Burchard test	+	+
		Salkowski's	+	+
3.	Carbohydrates and Glycoisdes	Molisch's test	+	+
		Fehling's test	+	+
		Benedict's test	+	+
		Borntrager's test	+	+
4.	Fixed oils and fats	Spot test	-	-
		Saponification test	-	-
5.	Phenolic compound	$FeCl_3$ test	-	+
6.	Protein and aminoacids	Biuret test	-	-
		Ninhydrin test	-	-
		Xanthoprotein test	-	-
		Millon's test	-	-
7.	Triterpinoid and saponins	Foam test	+	+
		Haemolysis test	+	+
8.	Tannins	Gelatin test	-	-
		$FeCl_3$ test	-	-
9.	Gums and mucilage	Precipitation with 90% alcohol	-	-
10.	Flavonoids	Aqueous NaOH	+	+
		Conc. H_2SO_4	+	+

CONCLUSION

The present Pharmacognostical studies of stem of *Sida rhombifolia* Linn. might be useful to supplement assumed significantly in the way of acceptability of herbal drugs in present scenario that lacks regulatory laws to control quality of herbal drugs.

CONFLICT OF INTEREST

Authors have no conflicts of interest to declare.

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