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Phytochemical Variations in Different Species of Sida Found in Kerala

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Abstract: *Sida famous as 'Bala' in ayurveda is one of the important medicinal plants found in Kerala . Sida root is the major component in many ayurvedic preparations like Bala taila, Balarishtam, Balgulichyadi thailam, Ksheerabala , Baladi kvatha, Baladhyam gritham etc. Root is the medicinally important plant part and it is reported to have thermogenic, antioxidant, anti inflammatory, antiseptic, hypotensive and tonic potentials. In Malayalam it is known as Kurunthotti and is famous as anti-rheumatic and antipyretic agent in the Ayurvedic system of medicine and is also used against many other ailments . The drug is useful to treat vitiated conditions of kapha and vata, inflammations, wounds, ulcers, jaundice, burns, skin diseases, abdominal disorders, diabetes, fever and general debility. Roots and seeds contain alkaloid ephedrine, vasicinol and vasicinone. High demand for this raw drug has led to its widespread adulteration. It is widely adulterated with similarly looking roots also. Sida is a large genus with about 200 species distributed throughout the world and 17 are reported to occur in India. In Kerala four different species (one with two subspecies) we can find namely Sida cordata, Sida cordifolia, Sida acuta, Sida rhombifolia ssp retusa and Sida rombifolia ssp rhombifolia. Of these in Kerala vaidyas prefer Sida rhombifolia ssp retusa as medicinally more effective. This paper discuss the results of our study with an objective to find out the variation in the phytochemical compostion of these four different species. The information generated help to differentiate species as well as help in quality assessment in sida.*

Keywords: *Sida sps, Bala , Thin layer chromatography (TLC).*

INTRODUCTION

Plants resemble full time functional factories synthesizing medicinally as well as economically important chemical compounds. The genus Sida commonly called as Bala, belongs to the family Malvaceae. Sida root is extensively used in the treatment of rheumatism in ayurveda. It is also effectively utilized for heart diseases, urinary bladder disorders, malaria etc. According to Ayurveda 'Bala' balances tri doshas – *vata, pitta, kapha*. It has more effect on vata dosha. There are about 200 species of sida found all over the world . Four different species (one with two subspecies) are commonly found in Kerala. They are *Sida cordifolia, Sida acuta, Sida cordata, Sida rhombifolia ssp retusa* and *ssp rhombiflia.* Of these *S. cordifolia* Linn. is considered as the source of raw drug bala in North India while in South India vaidyas prefer *S. rhombifolia Linn Ssp retusa* (Linn.) Borss. (Syn. *Sida rhombifolia* var. *retusa* (Linn.) Mast. In markets the drug is commonly adulterated with *Sida acuta* widely seen as a weed in the barren lands and roadsides of Kerala.

The availability of *S. retusa* is decreasing day by day and cultivation is meagre. Scarcity of genuine materials from wild and practically no cultivation as in the case of many other medicinal plants, has led to adulteration. Detection of adulteration and authentication is a major problem faced by the herbal drug industry today [1,2].

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Table 1
Phytochemicals study on sida roots

Compound	*Test done*	*S. cordifolia*	*S. acuta*	*S. cordata*	*S. retusa*	*S. rhombifolia*
Sugar	Molischs test	Positive	Positive	Positive	Positive	Positive
Starch	Iodine test	Positive	Positive	Positive	Positive	Positive
Polyphenols	Neutral FeCl3 test	Positive	Positive	Positive	Positive	Positive
Saponins	Foaming test	Negative	Negative	Negative	Negative	Negative
Mucilage	Swelling test	Positive	Positive	Positive	Positive	Positive
Steroid	Liebermanns test	Positive	Positive	Positive	Positive	Positive
Alkaloid	Mayers test	Positive	Positive	Positive	Positive	Positive
Flavonoid	Shinoda test	Positive	Positive	Positive	Positive	Positive

In this context an attempt was made to find out the phyto chemical variations/phyto equivalence existing in four different species of sida found in Kerala and results are discussed. The information generated may help to differentiate species as well as help in quality assessment also.

MATERIALS AND METHODS

The genuine plant samples of *Sida cordifolia, Sida acuta, Sida cordata, Sida rhombifolia Ssp retusa* and *Sida rhombifolia Ssp rhombiflia* were cultivated in College of Horticulture, Kerala Agricultural University, Thrissur campus and authenticated by botanists. The roots as well as shoot portions were collected separately on maturity, cleaned, shade dried and powdered. Five gram fine powder of each of the samples was refluxed with 50 ml methanol overnight. These extracts were cooled to room temperature, filtered, concentrated by evaporation under vaccum and was used for phytochemical analysis and for developing chemical fingerprint by TLC.

Phytochemical Screening

In order to examine the presence of different natural products in plant characteristic phytochemical tests for sugar, protein, tannin, flavonoid, steroid, starch, alakaloid, polyphenols and saponins were performed using methanol extract following standard procedures[3].

Flourescence Characters

The fluorescence charater of the plant methanol extracts were noted in visible short UV and long UV light following standard procedures [4].

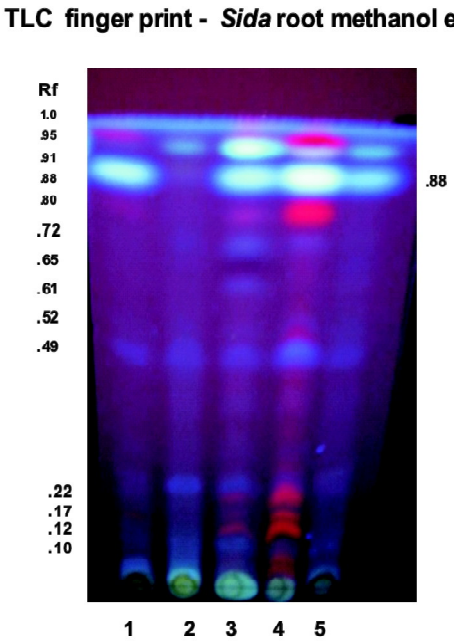
TLC Profiling

Pre-coated flourescent silica gel 60 F_{254} plates were used as the stationary phase and Toluene: ethylacetate (9.3:0.7) as mobile phase for shoot portions and Chloroform: methanol (19:1) for root portion TLC. The plates were developed up to a length of 8 cm in a CAMAG glass twin trough chamber (10 x 10 cm), previously saturated with the solvent systems for 15 minutes. Solvent systems suitable for separation of components were standardized by trying different combinations of organic solvents in varying proportions. After removal from the mobile phase, the plates were left to dry and viewed under UV-366 nm. The nature of spots and their R_f values were recorded and compared to asess the phyto chemical variation.

RESULTS AND DISCUSSION

Phytochemical study revealed the presence of sugar, starch,polyphenols,mucilages, steroids,alkaloids and flavaonoids in all sps of sida as recorded in Table 1. But saponins were absent. The chromatographic profiles developed for different species of sida shoot (Figure 1) as well as root portion (Figure 2) were very clear and effectively distinguished one species from the other .Bands varied from 3 to 13 in case of sida roots. Presence and absence of specific bands differentiated one from the other.

A specific blue band (Rf 0.10) distinguished S*ida retusa* shoot from others and presence of only two blue bands (Rf 0.88 and 0.91) along with absence of other bands distinguished *Sida retusa* root from



Chloroform: methanol 19:1,UV-365nm	Bands	Rf
1.S.cordifolia	6	.95, ,.88,.80,.49,.22,.12
2.S.acuta	3	.91, .49,.22
3.S.cordata	13	1.0, .95,.91,.88,.80,.72,65, .61,.52, .49, . 22,.17,.12,.10,.07,
4.S.rhombifolia	12	1.0, ,.91,.88,.80,.72,.65,. 61,.49, .22,.17,.12,.10
5.S.retusa	4	.91,.88,.49, .22

Figure 1: TLC profile of sida root

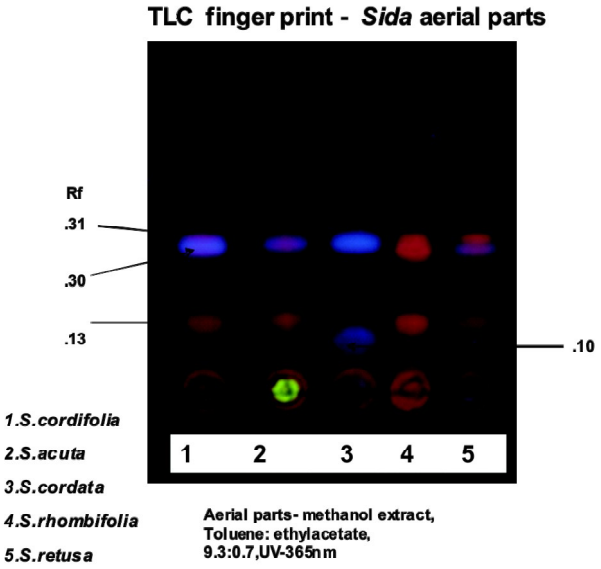


Figure 2: TLC profile of sida shoot

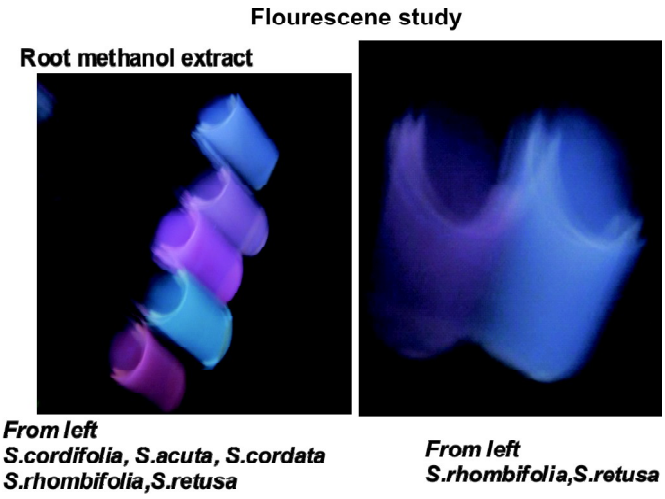


Figure 3: Fluorescence of sida root

others. *Sida retusa* is the most preferred species in ayurvedic medicine in Kerala. The specific bands present in one species and absence in the other or *vice versa* can be of the compound/compounds which can be taken as markers for distinguishing true samples from spurious samples, eventhough the chemistry of that compound is unknown.

This study also threw light on fluorescence behviour of methanol extract of different species of sida . It showed colour difference which obviously reflect the variation in the chemical make up of four different sps of sida. (Figure 3).

It was observed that through specific TLC finger prints developed, we can differentiate each species of *Sida* from the other. This specific profile will definitely help to study the quality of sida samples and possible adulteration. Even the subspecies showed difference in chemical profiles. The findings of Sayyada Khatoon *et al.* (2005) agrees with our findings. They have developed HPTLC profiles for different species of sida [5].

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