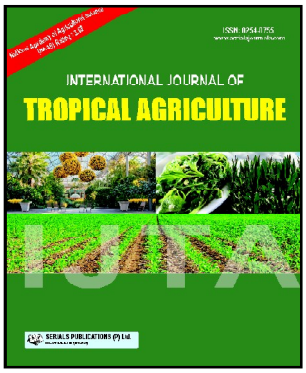

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Evaluation of Phenol content and *in vitro* Antioxidant Activity of the Roots of Different sida Species found in Kerala

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Abstract: In this study the objective was to evaluate the total phenol content and *in vitro* antioxidant activity of the roots of five different species of sida found in Kerala which possess one or other therapeutic effect and used in traditional systems of medicine. The antioxidant activity of the root extracts were examined using phosphomolybdenum method and total phenol content by Folin- Ciocalteu method. All the roots were found having good quantity of phenolic compounds. *In vitro* antioxidant activity of the extracts were found positively associated with the total phenolic content.

Keywords: Antioxidant, phenol, Sida cordifolia, Sida acuta, Sida rhombifolia, Sida retusa, Sida cordata,

INTRODUCTION

Sida famous in in Ayurveda as 'Bala' is highly important in the Indian traditional system of medicine. Sida is a major component of many Ayurvedic formulations like ksheerabala. Root is the officinal part. In Malayalam its common name is s Kurunthotti and is well known as an anti-rheumatic and antipyretic herbal medicine. It is also reported to possess anti-tumor, anti-HIV, hepatoprotective, abortifacient, antimicrobial and immune stimulant properties. Sida is a large genus with about 200 species distributed throughout and usually we find five different species of sida namely *Sida cordifolia, Sida acuta, Sida rhombifolia ssp retusa, Sida rombifolia ssp rhombifolia and Sida cordata* in Kerala. *S.cordifolia* is preferred as Bala in northern region of India while *S.retusa* is more acceptable in South India. *S.acuta* is a profusely branching annual herbaceaous weed. It is found as a major weed throughout the hotter parts of India and Srilanka. Though considered as a road side weed , the plant is used to treat asthma, renal inflammation, cold, fever, headache, ulcers and worms in some part of world [1]-[3]. *S.rhombifolia* has two sub species *rhombifolia* as well as *retusa.* Found

as weeds of marshy places throughout India. In some areas the local tribal groups use this plant as a very important medicinal herb to treat a wide array of inflammatory conditions [4]- [5]. *Sida cordata* is another species. The present study is an attempt to assess the total phenolic content as well as the antioxidant activity in vitro of the roots of these five different sps of sida to document the same.

MATERIALS AND METHODS

Five different species of sida were grown in pots by sowing seeds, irrigated regularly and applied with FYM as per Package of Practice recommendations. The plants were harvested at same time at maturity and roots were collected, cleaned and subjected to shade drying for about 2 weeks. The shade dried plant material was further crushed to fine powder and the powder was passed through the mesh 22 and used for phenol analysis. Five percentage methanolic extract was used for antioxidant assay.

Plant extract preparation

0.5 gram of the dried herbal powder was taken and dissolved in 10 ml of water. The solution was heated using a water bath maintained at 90 degree Centigrade for 15 minutes. The mixture was cooled at room temperature and centrifuged at 6000 rpm for 10 minutes. The supernatant solution was filtered and the filtrate was collected and used for analysis.

Estimation of total phenolic content

The total phenols were determined by method as referred in Harbone(1973) [6] with slight modifications. 10 mg of gallic acid monohydrate was dissolved in 100 mL of methanol to give a concentration of 100 µg/mL and used as the standard. Different aliquots of 0.1 to 1.0 mL from the stock solution were taken in 10 graduated tubes. To each tube 2.5 ml of 1:1 mixture of Folin-Ciocalteu reagent and distilled water and 2 mL of 7.5% sodium carbonate were added. The mixture was allowed to stand for 30 minutes and the volume was made with water to get a concentration ranging from 1–10 µg/mL. The absorbance of the resulting solutions was measured at 765 nm against reagent blank. Similar way the test samples were also done. A standard calibration curve was prepared by plotting absorbance against concentration and it was found to be linear over this concentration range. The concentration of total phenol in the test sample was determined from the calibration graph. The total phenol content in the extract was expressed in percentage.

Evaluation of total antioxidant capacity

The assay is based on the reduction of Mo (VI) to Mo (V) by the extract and subsequent formation of a green phosphate/Mo (V) complex at acidic pH [6]-[7]. 0.3 ml extract was mixed with 3 ml of reagent solution (0.6 M sulphuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). The tubes containing the reaction solutions were incubated at 95°C for 90 minutes. Then the absorbance of the solution was measured at 695 nm using a spectrophotometer against blank after cooling to room temperature. Methanol (0.3 ml) in place of extract was used as blank. The antioxidant activity was expressed as ascorbic acid equivalent (mg AAE/ g extract) which served as a positive control.

RESULTS AND DISCUSSION

Five different species of sida are found in Kerala with synonyms and local names as in Table 1 & Figure 1.

Total phenolic content

Phenolic compounds are considered to be the most important antioxidants and are widely distributed among various plant species. These phenols play important roles in plants such as protection against herbivores and pathogens. In this study total phenolic content for the root extract was found highest in

Table 1
Five different species of sida under study

Sl. No.	*Botanical name*	*Synonyms*	*Local name in malayalam*
1	*Sida cordifolia* Linn	*Sida herbacea* Cav, *Sida althaeitolia* Swartz., *Sida rotundifolia* Cav	Velluram
2	*Sida acuta* Burm	*Sida carpinifolia* Linn., *S.lanceolata* Willd. Retz	Anakurunthotti
3	*Sida cordata (Burm.f.) Borssum*	*Sida veronicaefolia* Lamk. *S. humilis* Cav., *Sida pilosa* Retz	Vallikurunthotti
4	*Sida rhombifolia Linn. Ssp retusa*	*Sida chinensis Retz., Sida retusa Willd.*	Vellakurunthotti
5	*Sida rhombifolia* Linn. *Ssp rhombifolia*	*S. Canariensis* Wild., *S.compressa* Wall., *S.rhomboidea* Roxb,ex Fleming, *S.fryxellii*	Neelakurunthotti

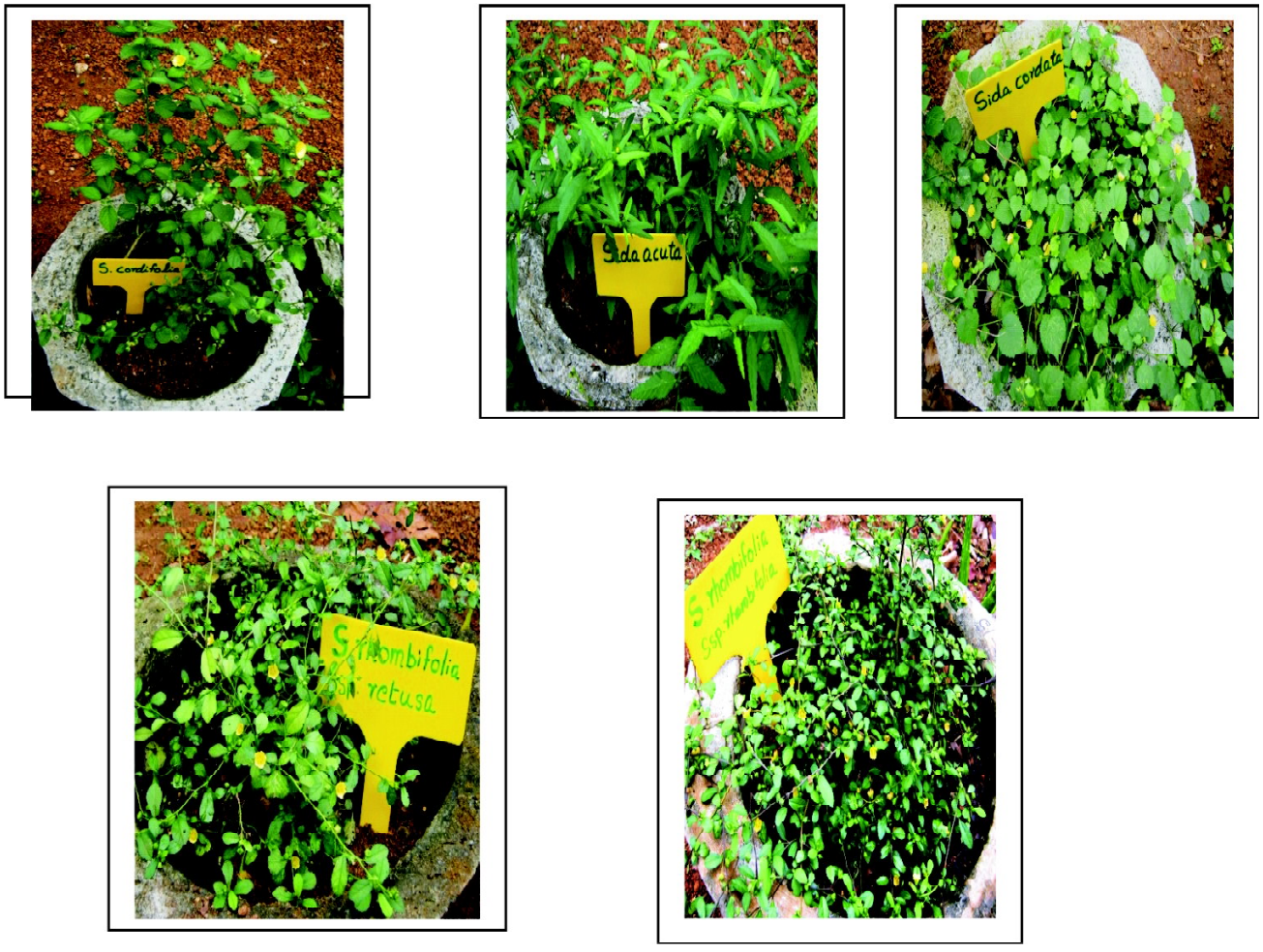

Figure 1: Five different sps of sida found in Kerala

S.cordifolia (1.35 %) followed by *S. acuta* (1.01%) and *S.cordata* (0.90%). Lowest found in *S. retusa* (0.59%) (Table 2).

Antioxidant activity

Total antioxidant capacity is a better way of depiction of combined effect of phenolics, flavonoids and other reducing compounds in the plant extracts and is expressed in terms of ascorbic acid equivalents (AAE). Total antioxidant capacity was observed highest in in *S.cordifolia* (2250) followed by *S.acuta* (1655) and *S.cordata* (922.5). Lowest found in *S. retusa* (495) (Table 2). The total antioxidant capacity values follow the same order as that of phenolic content in the extracts respectively.

Table 2
Total phenolic content (%) and total antioxidant activity (mgAAE/g) of plant extracts

Sl. No	*Sample*	*Total phenolic content %*	*Total antioxidant activity (mg *AAE/g)*
1	*Sida acuta*	1.01	1655
2	*Sida cordifolia*	1.35	2250
3	*Sida retusa*	0.59	495
4	*Sida rhombifolia*	0.82	562.5
5	*Sida cordata*	0.90	922.5

*Ascorbic acid equivalent (AAE).

CONCLUSION

On the basis of the results obtained in the present study, it is concluded that sida roots (all five species) contain high amount of phenolic compounds, exhibit high antioxidant activities. A high correlation is found between the total phenolic content and the *in vitro* antioxidant activities. These plant roots prove to be good source of antioxidants, which might be useful in preventing the progress of various oxidative conditions. However, further phytochemical analysis is required for the isolation of bioactive molecules from these plants that may show a broad spectrum of pharmacological activities.

REFERENCES

Nayar, M. P. and Sastry, A. R. K. (1990), *Red Data Book of Indian Plants*, Botanical Survey of India, Kolkata, vol. III.

Nadkarni, K. M. (2005), *The Indian Materia Medica*., Vol. I, pp. 1104-1105.

The Ayurvedic Pharmacopoeia of India, Part I, Vol.I, pg 14.

Unial, B., Shiva, V. (2015), Traditional knowledge on medicinal plants among rural women of Garhwal Himalayas, Uttaranchal. Ind. J. Trad. Know; 4: 259–266.

Batliwala, S., Srilatha, B.K., Anita Gurumurthy and Chandana, S. W. (1998), *Status of Rural women in Karnataka*, National Institute of Advanced studies, Bangalore;, pp. 128.

Harborne, J. B. (1973), Phytochemical methods –A guide to modern techniques of plant analysis. Chapman and Hall, London.

Kaur, C. and Kapoor, H. C. (2002), Anti-oxidant activity and total phenolic content of some Asian vegetables. Int. J. Food Sci. Technol; 37:153–161.