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REDUCTION OF FERRIC IONS BY THE AQUEOUS EXTRACT OF THE LEAVES OF DESMODIUM LONGIPES (C.) SCHINDL

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ABSTRACT

The aqueous extract of the leaves of *Desmodium longipes* were assessed for its antioxidant potential. The aqueous extract was subjected to *invitro* anti-oxidant screening by reduction of ferric ions. Ascorbic acid was used as reference standard. The study reveals that the aqueous extract of the leaves has potent anti-oxidant activity. The activity exhibited by the leaf extract was comparable with the reference standard used in the evaluation. The anti-oxidant activity was found to be concentration dependent and may be attributed to the presence of phenolic content in the leaves.

KEYWORDS: *Desmodium longipes*, Aqueous extract, Antioxidants, Ferric ions.

INTRODUCTION

Herbal medicines are naturally occurring, plant-derived substances that are used to treat illnesses. These products are complex mixtures of organic chemicals that may come from any raw or processed part of a plant. They are rich in secondary metabolites and potential source of drugs. These secondary metabolites include alkaloids, glycosides, coumarin, flavonoids steroids etc. Millions of dollars have recently been invested in looking for promising medicinal herbs. These substantial research investments in traditional herbal medicine are still relatively modest when compared to the overall pharmaceutical industry, but it proves that researchers are beginning to guide away from conventional drug development and looking towards more alternative and natural forms of treatment.

Antioxidants are the molecules that prevent cellular damage caused by oxidation of other molecules. Antioxidant reacts with the free radicals and terminates the chain reaction by removing free radical intermediates and inhibits other oxidation reactions by oxidizing themselves. Though oxidation reactions are crucial for life, they can also be damaging[1] Antioxidants mainly acts by two mechanisms namely.

Hydrogen electron transfer (HAT): HAT assays analyse the ability of antioxidants to scavenge peroxy free radicals by donating hydrogen atom. Here, one hydrogen atom of antioxidant is removed and antioxidant itself gets converted into a radical. Examples include ABTS and ORAC assays.

Single electron transfer (SET): In SET assays antioxidant reacts with a fluorescent probe, which is an oxidizing agent, than the peroxy free radicals. This reaction results in a colour change during the process of reduction, which is spectrophotometrically measured and the degree of colour change produced by the probe is compared to the concentration of antioxidants. Here, free radicals get an electron from antioxidant and antioxidant becomes a radical cation. Examples of SET assay are DPPH and FRAP.[2]

MATERIALS AND METHODS

Source of the plant

The plant *Desmodium longipes* were collected from Joy Garden of Mannuthy, Thrissur district, Kerala during August 2022. The botanical identity of the plant was confirmed by Dr. Sreeja P, M.Sc. Ph.D., PG Department of Botany& Research Centre, Sir Syed college, Thaliparamba, Kannur, Kerala. A voucher specimen bearing specimen number 9945 has also deposited in the respective college.

Preparation of the extract

The fresh leaves of the plant are collected are subjected to shade drying and then crushed, powdered and soaked in water with occasional stirring to allow the soluble compounds to dissolve into water. After maceration, the liquid is strained to obtain the aqueous extract.[3]

Anti-oxidant studies *(in-vitro)*

Reduction of ferric ions by ortho-phenanthroline color method

Ortho substituted phenolic compounds are found more active than unsubstituted phenol. Hence, these compounds may exert pro-oxidant effect by interacting with iron. In the presence of scavenger, reduction of ferric ions will occur which is measured at 510 nm[4] A reaction mixture containing 1ml ortho-Phenanthroline (0.005g in 10 ml methanol), 2 ml ferric chloride 200 M (3.24 mg in 100 ml distilled water) and 2 ml of various concentrations of the extracts were incubated at ambient temperature for 10 min, then the absorbance was measured at 510 nm.[5] The percentage scavenging has been calculated from the following formula;

$$\% \text{ scavenging} = \frac{\text{control} - \text{test}}{\text{control}} \times 100$$

RESULT

Table 1: Effect of aqueous extract of the leaf of *Desmodium longipes* on Fe^{++}reduction.

Sl No.	Concentration (µg/ml)	Aqueous extract of leaf of *Desmodium longipes*		Ascorbic acid (Reference standard)	
		Absorbance	% Scavenging	Absorbance	% Scavenging
1	5	0.897	3.97	0.818	14.10
2	10	0.799	6.12	0.799	18.77
3	15	0.715	12.25	0.625	27.15
4	25	0.648	19.47	0.557	37.52
5	50	0.597	28.96	0.314	53.25
6	100	0.512	39.75	0.110	65.15
7	250	0.487	48.33	0.089	79.20
8	500	0.325	56.14	0.065	83.50
9	1000	0.229	69.10	0.007	97.45
10	control	0.697		0.612	

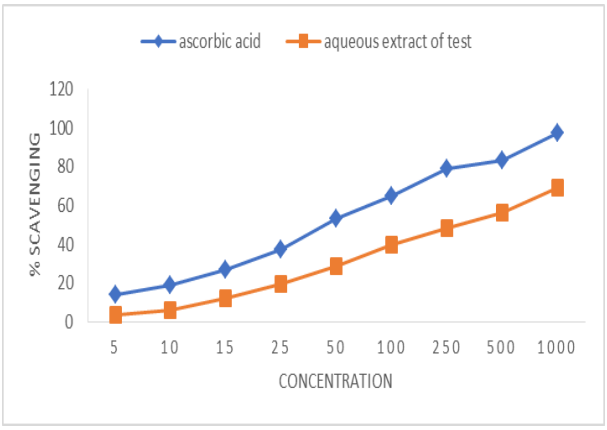

Figure 1: Effect of aqueous extract of the leaf of *Desmodium longipes* on Fe^{++}reduction.

DISCUSSION

Phytochemical screening of aqueous extract of *Desmodium longipes* revels the presence of polyphenolic compounds, Polyphenolic compounds are reported as potent antioxidants. Phenolic compounds in plants possess antioxidant properties due to their ability to donate hydrogen atoms or electrons to neutralize free radicals, there by preventing oxidative damage to cells. These compounds can also chelate metal ions that catalyse the formation of free radicals. Additionally, phenolic compounds can act as scavengers of reactive oxygen species, such as superoxide anions and hydroxy radicals, protecting plants from oxidative stress. Further clarifications on the identification and characterisation of these phenolic compounds in the in vivo analysis has to be evaluated.

Conflict of interest: Nil.

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