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**FREE RADICAL SCAVENGING (DPPH) AND FERRIC REDUCING ABILITY (FRAP)
OF SOME COMMELINACEAE MEMBERS**

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ABSTRACT

Three commelinaceae members from animal diet (as fodder) were identified and analyzed for their antioxidant capacities by two most common radical scavenging assays of FRAP and 1,1-diphenyl-2-picrylhydrazyl. *Commelina benghalensis*, *Cyanotis cristata* and *Rhoeo spathacea* all these species belonging to family commelinaceae are not known/studied for their economic properties. Vegetables are known to contain a wide variety of antioxidants which may provide protection against the development of a number of disease states. Recently there has been a large increase in the number of vegetable juices which have become commercially available. In this study, analysis of the antioxidant activity by DPPH and FRAP method for aqueous leaf extracts of commelinaceae species has been carried out to know usefulness of these species.

Keywords: Commelinaceae, DPPH, FRAP

INTRODUCTION

Commelinaceae is a monocotyledon family of flowering plants possibly contain 40 genera which includes 650 species [1]. For current investigation commelinaceae species viz. *Commelina benghalensis*, *Cyanotis cristata* and *Rhoeo spathacea* were selected for studying their antioxidant potential. The concept of antioxidant capacity first

originated from chemistry and was later established to biology, medicine, epidemiology and nutrition [2, 3, 4]. If there is a use of synthetic antioxidants in diet, that may result in liver damage and carcinogenesis. Such problems are not seen by using natural antioxidants extracted from

herbs and spices, therefore, such natural antioxidants are used in food applications.

This study was conducted to assess and compare FRAP and DPPH scavenging capacity of 3 species of commelinaceae grown around and in campus of YC Institute of Science, Satara. The information obtained from this study may be used to promote consumption of these species for its rich natural antioxidants.

MATERIALS AND METHODS

DPPH Free Radical Scavenging Activity

The antioxidant activities of plant extracts and the standard were assessed on the basis of the free radical scavenging effect of the stable 1, 1-diphenyl-2-picrylhydrazyl (DPPH)-free radical activity by modified method [5]. The diluted working solutions of the test extracts were prepared in methanol. Ascorbic acid (10mg/ml) was used as standard. 0.002% DPPH was prepared in methanol and 3 ml of this solution was mixed with 1 ml of sample solution and standard solution separately. These solution mixtures were kept in dark for 30 min and optical density was measured at 517 nm using Spectrophotometer. Methanol (1 ml) with DPPH solution (0.002%, 3 ml) was used as blank. The optical density was recorded and % inhibition was calculated using the formula given below:

Percent Inhibition of DPPH Activity =

$$\frac{\text{Absorbance (cont)} - \text{absorbance (sam)}}{\text{Absorbance (cont)}} \times 100$$

Ferric-Reducing Antioxidant Power (FRAP)

The ferric reducing antioxidant power (FRAP) assay was used to measure the total antioxidant power of commelinaceae members (leaf extracts). In the FRAP assay, reductants (antioxidants) in the sample reduce Fe³⁺/tripirydyltriazine complex, present in stoichiometric excess, to the blue colored ferrous form, with an increase in absorbance at 593 nm. Antioxidant activity assays were performed as per the method described by Benzie and Strain [6]. The results are expressed as ascorbic acid equivalent antioxidant capacity.

RESULT AND DISCUSSION

An antioxidant can be defined as “any substance that, when present at low concentrations compared with those of an oxidizable substrate, significantly delays or prevents oxidation of that substrate” [7]. Recently free radical biology is researched more broadly in life science. Antioxidants are considered important nutraceuticals on account of their many health benefits and they are widely used in the food industry as inhibitors of lipid peroxidation [8]. The recent studies have demonstrated the potential of

plant products to act as antioxidants against various diseases stimulated by free radicals [9]. A variety of assays have been developed to measure the concentration of specific antioxidant as well as that of all antioxidants present within the cells of an organism.

In the present investigation an antioxidative property of commelinaceae members has been investigated by two different methods. The purpose of this study was also to evaluate the comparability of antioxidant capacity measurements in commelinaceae species by DPPH assay, FRAP assay. In recent years, a wide range of spectrophotometric assays have been adopted to measure antioxidant capacity of foods.

a. DPPH Radical Scavenging Activity

The DPPH assay has many advantages than other methods, advantages such as good stability, credible sensitivity, simplicity and feasibility [10, 11]. Scavenging activity of free radical DPPH has been widely used to evaluate the antioxidant activity of natural products from plant and microbial sources [12]. The reactive rate and the ability of the radical scavenger depend on the rate and the peak value of disappearance of the DPPH [13]. The changes in the free radical scavenging ability of aqueous extracts of leaves of three commelinaceae members on the basis of percent inhibition is presented in

Table 1. It is evident from the results, that the aqueous extract of *Commelina bengalensis* has the highest (at 0.5% extract) and that of *Cyanotis cristata* has the lowest free radical scavenging potential among the commelinaceae members studied. The scavenging properties of antioxidants are often associated with their ability to form stable radicals [14]. The DPPH assay measures the ability in leaf extract of commelinaceae members to donate hydrogen to the DPPH radical resulting in bleaching of the DPPH solution. The greater the bleaching action, the higher the antioxidant activity. The results of the DPPH free radical scavenging assay suggest that leaves of all commelinaceae members have exhibited potent antioxidant effect and these species can serve as a potent source for the bio-chemo protective therapy.

Ferric Reducing Antioxidant Power (FRAP)

The ferric reducing antioxidant plasma activity in leaves of commelinaceae members is presented in **Table 2**. It is clear from the results that the FRAP activity of leaves of *Rhoeo spathacea* is the greatest among all other species studied. The ferric reducing antioxidant potential (FRAP) assay is a simple and inexpensive procedure that measures the total antioxidant levels in a

sample. The change in absorbance at 600 nm [15] can then be compared with a standard to determine the antioxidant potential in a given sample. According to Dennog *et al.* [16], FRAP can be used to analyze antioxidant status in humans after hyperbaric oxygen therapy. It has also been used to compare antioxidant activity in plant and mammals [17] and plant extracts [18]. FRAP measures the ability of the extract to donate electron to Fe (III). The higher the FRAP value the greater is the antioxidant activity. The highest absorbance of FRAP was observed in *Rhoeo spathacea* at 0.5% and the lowest was found in *Cyanotis cristata* at 0.50% i.e. 1.0527 ± 0.00252 and 0.145 respectively. Similar kind

of study has been reported by Majer *et al.* [19] from tobacco leaves and Aparadh *et al.*, [20] in *Cleome* species. When all commelinaceae members are compared for each concentration the following pattern of absorbance can be observed *Commelina benghalensis* < *Cyanotis cerifolia* < *Rhoeo spathacea*. In all commelinaceae species 0.4% and 0.5% concentrations are effective to react with ferric tripyridyltriazine (Fe^{III} - TPTZ) complex. From all these observations it can be concluded that *Commelina benghalensis*, *Cyanotis cristata* & *Rhoeo spathacea* has the greater antioxidant activity than that in other species.

Table 1: Radical Scavenging Activity of Different Commelinaceae Species

Plant Powder Concentrations		DPPH OD = 1.349			Control Abs = 0.936			MEAN	SD
		PLANT EXTRACT			RSA-I	RSA-II	RSA-III		
		ODs at 517nm			Set1	Set2	Set3		
<i>Rhoeo</i>	0.10%	0.708	0.707	0.709	24.36	24.47	24.25	24.36	0.107
	0.20%	0.637	0.636	0.636	31.94	32.05	32.05	32.02	0.062
	0.30%	0.571	0.571	0.571	39.00	39.00	39.00	39.00	0.000
	0.40%	0.548	0.545	0.545	41.45	41.77	41.77	41.67	0.185
	0.50%	0.505	0.504	0.505	46.05	46.15	46.05	46.08	0.062
<i>Commelina</i>	0.10%	0.773	0.771	0.77	17.41	17.63	17.74	17.59	0.163197
	0.20%	0.658	0.656	0.655	29.70	29.91	30.02	29.88	0.163197
	0.30%	0.618	0.615	0.613	33.97	34.29	34.51	34.26	0.268869
	0.40%	0.564	0.561	0.557	39.74	40.06	40.49	40.10	0.375201
	0.50%	0.537	0.535	0.533	42.63	42.84	43.06	42.84	0.213675
<i>Cyanotis</i>	0.10%	0.469	0.468	0.466	49.89	50.00	50.21	50.04	0.163197
	0.20%	0.827	0.827	0.827	11.65	11.65	11.65	11.65	0
	0.30%	0.807	0.808	0.808	13.78	13.68	13.68	13.71	0.061683
	0.40%	0.767	0.767	0.768	18.06	18.06	17.95	18.02	0.061683
	0.50%	0.734	0.735	0.735	21.58	21.47	21.47	21.51	0.061683
	0.50%	0.682	0.684	0.684	27.14	26.92	26.92	26.99	0.123365

Table 2: Ferric-Reducing Antioxidant Power in Some Commelinaceae Species

Plant Species	Concentration of Plant Extract	Abs 595nm Mean	SD
<i>Cyanotis</i>	0.10%	0.145	0.000000
	0.20%	0.184	0.000000
	0.30%	0.274	0.000000
	0.40%	0.353	0.000000
	0.50%	0.4697	0.000580
<i>Commelina</i>	0.10%	0.231	0.000000
	0.20%	0.412	0.001000
	0.30%	0.5	0.001000
	0.40%	0.591	0.001000
	0.50%	0.7053	0.001530
<i>Rhoeo</i>	0.10%	0.253	0.001000
	0.20%	0.481	0.001000
	0.30%	0.7097	0.001530
	0.40%	0.9117	0.001530
	0.50%	1.0527	0.002520

CONCLUSION

The study of antioxidant ability of Commelinaceae species indicates that *Commelina benghalensis*, *Cyanotis cristata* & *Rhoeo spathacea* can be used in medicine and these species have a potent antioxidant property of inhibiting free radicals and therefore can serve as a potent source for the chemo protective therapy. And by FRAP assay, the Ferric-reducing antioxidant power in leaves of *Rhoeo spathacea* is the greatest among all other species studied indicates this species has potent source of herbal antioxidant.

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