

The Comparative Study of Antioxidant Activity Of Monsoon Plant-*Clerodendrum Serratum* Linn.

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ABSTRACT: The increasing demands of convenient food have led to rapid growth in the ready-to-eat product category. Many of the food ingredients contain unsaturated fatty acids that are quite susceptible to quality deterioration, especially under oxidative stress. To combat this, the best strategy is addition of antioxidants. Also, natural antioxidants in the daily diet need to be encouraged in order to improve human health and prevent degenerative diseases like Alzheimer's, coronary heart disease, neurogenetic disorders, cancer, atherosclerosis and inflammations by oxidation of proteins, lipids, nucleic acids, DNA, etc. The DPPH method of free radical scavenging was carried out and the effect of the commercial, fresh, dried and cooked sample of *Clerodendrum serratum* were compared and calculated to check for its antioxidant activity. All samples showed antioxidant activity, highest being in cooked, followed by commercial, fresh and dried samples. Thus, it is advisable to consume the vegetable in cooked form at home as it shows highest radical scavenging power. The dried samples were over-heated, thereby showing minimum antioxidant activity.

KEYWORDS: Antioxidants, Compared, Degenerative diseases, Oxidative stress, DPPH, *Clerodendrum serratum*.

I. INTRODUCTION

LITERATURE REVIEW: The literature review reveals some studies undertaken on the plants of various geographic zones such as Western Ghats, where plants best known to local tribes, are investigated. ⁽¹⁾ References are also available for some of the monsoon vegetables and the species like *Chelodendrum inerme* ⁽²⁾ have been used as an antioxidant drug in various indigenous medicines. ⁽³⁾Organic and aqueous extractions of *C.olebrookianum* ⁽⁴⁾ showed significant inhibition of lipid peroxidation in vitro and in vivo by FeSO₄ ascorbate in rats. This lends scientific support to the therapeutic uses of the plant leaves in tribal medicines. ⁽⁵⁾ Antioxidant activity of some common plants: including *Ocimum sanctum* ⁽⁶⁾, *Piper cubeba* Linn. ⁽⁷⁾, *Camellia sinensis* Linn. ⁽⁸⁾, *Zingiber officinale* Roscoe ⁽⁹⁾ and several Indian and Chinese plants are well studied. The majority of the antioxidant activity is due to the flavones, isoflavone, flavonoids, anthocyanin, coumarin, lignans, catechins, and isocatechins. The antioxidant rich foods are natural cleansers of the body, acting also as anti-aging agents and protection against cancer. They absorb bad cholesterol substantially reducing the risks of heart diseases ⁽¹⁰⁾. Some of the phytoconstituents being used in formulating dietary supplements or health foods have their basis in the antioxidant activity of that constituent. *Clerodendrum serratum* Linn ⁽¹¹⁾ local name, Bharangi, is very widely distributed in tropical and subtropical regions of the world. Some cooking methods may be better than others when it comes to maintaining beneficial antioxidant levels. Depending on the vegetable, cooking on a flat metal surface with no oil (griddling) and microwave cooking maintains the highest antioxidant levels ⁽¹²⁾. It was recently demonstrated that thermal treatments can induce the formation of compounds with new antioxidant properties. These compounds are called Millard Reaction Products (MRPs). Thus, on thermal treatment, antioxidant properties can be maintained or even enhanced by the development of MRPs. ⁽¹³⁾ The current research project aims at the comparative study of antioxidant activity of the monsoon plant *Chlerodendrum serratum* for the three types of leaf samples viz. fresh, dried and cooked.

II. OBJECTIVES:

- Collection of the monsoon plant *Chlerodendrum serratum* from the vegetable vendor.
- Sample preparation into three types- fresh, dried and cooked leaves
- Extraction of all the samples by soxhlet apparatus
- Analysing it by gas chromatography
- Antioxidant activity exhibited by the three samples by DPPH method

- Comparing the antioxidant activity of all the three samples along with the commercial sample (bharangi churna, taken as standard) and checking for the highest antioxidant activity amongst the four samples.

III. MATERIALS AND METHODS:

The plant sample was collected from local markets of Thane.

The sample was divided into three parts:

- Fresh- The leaves were used directly.
- Dried- The leaves were oven dried above 100°C.
- Cooked- The leaves were blanched, and then used.
- The commercial sample was in powdered form, and was used directly.

IV. METHODS:

A. Sample Preparation:

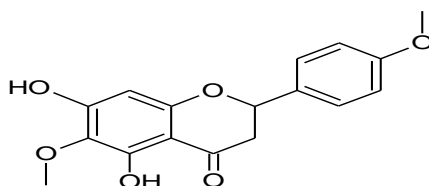
- [1]. **Soxhlet Extraction**⁽¹⁴⁾: 14.92g of each sample was used in the Soxhlet Apparatus⁽¹⁵⁾, using 140mL of ethanol. 7 cycles were carried out for each extraction.
- [2]. **Rotary Evaporation**⁽¹⁶⁾⁽¹⁷⁾: It was carried out to concentrate the samples by evaporation of alcohol and to reduce their volumes.

B. Analysis:

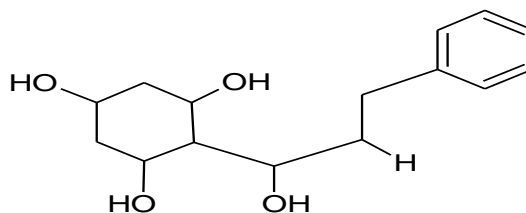
- [1]. **Gas Chromatography-Mass Spectrometry**⁽¹⁸⁾⁽¹⁹⁾: The samples were sent to UNIPOS Environment Pvt. Ltd. Laboratory for GC/MS. The results obtained are as follows⁽²⁰⁾

OBSERVATIONS:

a. Fresh Sample:

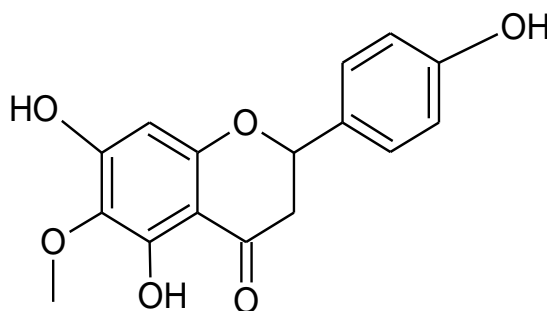


Pectolinarigenin
5, 7-Dihydroxy-6-methoxy-2-(4-methoxyphenyl) chromen-4-one

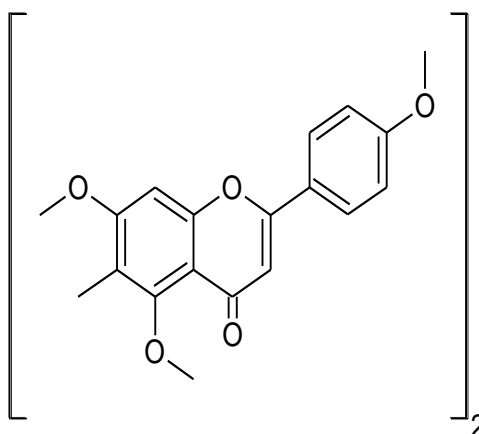


1-Phenyl-3-(2, 4, 6-trihydroxy) cyclohexyl-3-hydroxy-1-propene

b. Dried sample:



Apigenin
(5, 7-Dihydroxy-2, (4-hydroxylphenyl)-4H-1-benzopyran-4-one

c. Cooked Sample:

Dimer of cleroflavone

1. **The DPPH Assay**⁽²¹⁾⁽²²⁾: The antioxidant activity of the plant extracts and the standard was assessed on the basis of the radical scavenging effect of the stable 1,1-diphenyl-2-picryl-hydrazyl (DPPH) free radical activity by modified methods. The diluted working solutions of the test extracts were prepared in ethanol.

- Commercially available Bharangi powder was used as standard.
- 0.002% DPPH was prepared in ethanol.
- 1mL of this solution was mixed with 1mL of sample solutions and standard solution separately.
- These solution mixtures were kept in dark for 30 minutes.
- Optical density was measured at 517nm using Spectrophotometer⁽²³⁾⁽²⁴⁾
- Formula for calculating the antioxidant activity: $[(A1-A2)/A1] \times 100$ ⁽²⁵⁾

Where, A1=Absorbance of control

A2=Absorbance of sample

V. RESULTS AND DISCUSSIONS:**RESULTS:**

SAMPLE	OPTICAL DENSITY (nm) (CONTROL)	OPTICAL DENSITY(nm) (SAMPLE)	ANTIOXIDANT ACTIVITY (%)
1. Commercial	0.21	0.08	61.90
2. Fresh	1.45	0.72	50.34
3. Dried	1.50	1.19	20.66
4. Cooked	0.58	0.15	74.13

VI. DISCUSSIONS:

By observing the values displayed in the observation table, it can be concluded that the **cooked sample** exhibited the highest antioxidant activity (74%), followed by the **fresh sample** (50%) and least activity exhibited by the **dried sample** (20%). The cooked sample was blanched below 100°C. Thus, there was no overheating. Its high result can be attributed to the following sequence of events; Because of the heat, cells get ruptured exposing maximal cell content. The antioxidant moiety comes out and the heat also leads to the formation of new antioxidant-like compounds. All this will happen maximally if cooking is done on the flat metal surface with no oil. This does not hold well in the case of dried leaves, as they were first sun dried and then oven dried, above 100°C. Excessive heat resulted in loss of volatile components, thereby reducing its radical scavenging power. The commercial sample showed 61% antioxidant activity, which were still less than that of the cooked sample. Thus based on these results, it can be suggested that one can eat Bharangi, the leafy vegetable under investigation, in the cooked form which still has the high antioxidant activity.

FUTURE SCOPE:

Investigating less explored edible plants which have high nutritive value and health benefits for public awareness.

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