



NUTRITIONAL AND ANTIOXIDANTS STATUS OF (AVERRHOA CARAMBOLA LINN.)

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Naturally occurring sources of the plants are rich in antioxidants. Averrhoea Carambola Linn (Oxalidaceae), Kamrakh is an evergreen tree. Fruits are long, watery, translucent, fragrant & of a rich amber or golden yellow colour. When green they are astringent, but on ripening develop a sweetish acid taste. The fruits are made into stews, curries, puddings & tarts. The slight unripe ones are made into jams, jellies, pickles and preserves. The present study was planned for knowing the nutritional elements and non enzymatic antioxidants (ascorbic acid, phenol, sugar, proteins) were estimated from the fruits. The results are focused on good amount of ascorbic acid (Vit C) due to which fruits are often used for making refreshing drink and for cleaning metal surfaces, especially for removing rust stains.

Keywords: Kamrakh, nutritional and non enzymatic antioxidants.

Introduction:-

Evidences show use of plants of primitive or ethnic populations in the age of Rig veda. Tribal knowledge of plants is important not just for the tribal people themselves but for the wider world. Many plants recognized as a medicine in earlier days provided valuable drugs in modern medicine. Maximum no. of papers are being published on the aspect of indigenous herbs in health under various titles such as herbal drugs, herbal medicines, phytotherapy, folk medicines, medicinal herbs, traditional medicines etc. *Ocimum Sanctum* (Tulsi), *ficus bengalensis* (Val), *Aegle marmelos* (Bel), *Saraca indica* (Ashoka tree). And many other species have been anciently described as plants which render several protective health benefits (Mitra R, 1997)

Oxygen free radical induced cellular damages in pathobiological conditions including malignancies, bacterial & parasitic infections, lung damage, inflammatory diseases reperfusion injury cerebrovascular damage, atherosclerosis and aging (Nadkarni G.D, Mitra A.G, Deshpande U.R and Pahuja D.N, 1991) A delicate balance of cellular antioxidant defense system is essential to protect the body against oxidative stress (Ray S and Chakraborty P, 1999).

There are heterozygous groups of chemicals which have been found to control oxidant damage to plants, mainly by the inhibition of oxidative processes. These include simple reducing agents, commercial antioxidants & specific antioxidants used in the rubber industry. Antioxidants are more significant in fruits and leafy vegetables.

Many kinds of antioxidative components that contain polyphenolic compounds, chlorophylls, carotenoids, tocopherol derivatives, lignan, and related isoprenoids have been isolated from different kinds of plants, such as oilseeds, cereal

crop, vegetables, leaves, roots, spices, herbs, and seaweeds, for use as antioxidants (Wettasinghe and Shahidi, 1999, Gulcin 2006b).

Polyphenolic compounds not only effectively prevent the oxidation of foods but they also act as a protective factor against oxidative damage in the human body (Castillo and et al., 2000; Lopez-Amoros and et al., 2006).

Sara Jelodarian and et.al. (2012) worked on evaluation of antioxidant activity of fruit *Malus domestica*. Tender stage and mature stage of leaves are also great source of antioxidants (Minakshi Mahajan & Monali Patil (2004).

Averrhoa Carambola Linn is a small handsome evergreen tree 15-30 high with flowers springing from the bark, and acutely five angled ovoid fruits 3-4" long, watery translucent, fragrant and of a rich amber or golden yellow colour.

Material and Method:-

Fresh fruits are collected from naturally grown plants in Botanical garden of Fergusson College. They were rinsed in tap water to remove any adherent impurities & blotted gently between tissues paper folds to remove any remaining water droplets. Then the fruits were weighed & used for the analysis of the various parameters.

Nutritional, enzymic & non enzymic antioxidant status of fruits were analysed.

The parameters are analysed at ripen & unripen fruiting stage. The enzymic, non enzymic, non enzymic & organic constituents were analysed by-

Enzymic antioxidants-

Catalase (Luck H., 1974)

Peroxidase (Vidyasekharan and Durairaj, 1973)

polyphenol oxidase (Vidyasekharan and Durairaj, 1973).

Non enzymic antioxidants are

Ascorbic acid (Sadasivan and Theymoli Balasubramenan, 1987)
 Polyphenols (Farkas and Kiraly, 1962)
 Reducing sugar (Nelson, 1944)
 Starch (Sadashivam and Manikam, 1966)
 proteins (Lowry et al., 1951).

Enzymic and non-enzymic oxidants organic constituents in *Averrhoa carambola* Linn.

Parameters	Unripe fruits	Ripe fruits
Catalase (units min ⁻¹ g ⁻¹)	120	195
Peroxidase (Units/g)	2.25	3.25
Polyphenol oxidase (Units/g)	1.01	2.25
Ascorbic acid (mg/g)	7.24	9.85
Polyphenols (mg/g)	16.58	24.58

Catalase, 1 Unit = amount of enzyme required to decrease the absorbance by 0.5 units at 240 nm.
 Peroxidase, 1 unit = change of absorbance min⁻¹ at 430 nm.

Poly phenol Oxidase, 1 unit = amount of enzyme which transforms 1 micromole of dihydric phenol to quinine.

Level of organic constituents in *Averrhoa carambola* Linn

	Unripe fruits	Ripe fruits
Reducing sugars (mg/g)	3.15	5.25
Total carbohydrates (mg/g)	65.36	110.25
Starch (mg/g)	12.54	9.56
Protiens (mg/g)	7.58	7.25

Conclusion:-

Catalase, peroxidase, polyphenol oxidase, ascorbic acid, polyphenol activities were found to be maximal in the ripened fruits.

Catalase is the hamoprotein & catalyses the decomposition of H₂O₂ to water and OH. Catalase involved in free radical scavenging mechanism on lipid peroxidation (Chander & Kapoor N.K, 1990).

Peroxidase can be regarded as the enzyme having three types of enzyme activities, namely IAA oxidases, polyphenol oxidase & peroxidase. The enzyme catalyses the oxidation of a wide variety of electron donors with the help of H₂O₂

And there by scavengers the endogenous H₂O₂ (Mazumdar A, Adak S, Chatterjee R and Banerjee R.K, 1997).

The fruit is with significant amount of ascorbic acid which increases on ripening, when green the fruits are astringent, but due to ample amount of ascorbic acid fruits on ripening, develop a sweetish acid taste. Due to Vit C fruits are often used for making refreshing drink and for cleaning metal surfaces especially for

removing rust stains.

Ascorbic acid is used to protect a diversity of crops including beans, lettuce from leaf injury caused by air pollutants (Freebain and Taylor, 1960). Ascorbic acid found to be less effective in a nickel-N dibutyl dithio carbamate in protecting bean plants (Dass and Weaver, 1968). The ascorbic acid is an important water soluble antioxidant and plays a significant role in maintaining the water soluble oxidation reduction potential in human tissue (Halliwell and Kutsky 1973).

Due to ascorbic acid and high content of carbohydrates fruits have delicious taste and are made into stews, curries, puddings and tarts. The slight unripe ones are made into jams, jellies, pickles and preserves. The antioxidant activity of polyphenols are reported in human diet. (Faller, A.L.K. and Fialho, E. (2009).

Polyphenols are reported to be promising in treatment of lymphocyte of malignancy. Phenolic compounds have also been shown to exhibit cellular defense mechanism in antherogenesis and cancer (Dacker, 1977). The role of carbohydrates and proteins is well documented in human diet.

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