

AN EXOTIC FRUIT WHICH FORMS THE NEW NATURAL SOURCE FOR VITAMIN-C

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ABSTRACT

Vitamins are crucial to all life functions. Vitamins are also called as co-enzymes because they work with enzyme and enable them to trigger all body processes. Among the vitamins, the Vitamin C is an important vital amine to maintain the body in good health. The main sources of Vitamin C are from fresh fruits and vegetables. In the present study two exotic fruits namely *Avverrhoa bilimbi* and *Avverrhoa carambola* collected from the Kannikar settlement of Kanyakumari District, TamilNadu during the ethnobotanical survey. The fruit juice contains Vitamin C and in addition to that it contains glucose and protein. The nutritive contents were estimated. The Antibacterial activity of above two plants fruit juice were carried out in order to ascertain the disease resistance property.

Keywords: Vitamin C, Fruits, Deficiency, Kanikars.

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INTRODUCTION

Vitamins are essential constituents for the growth of plant and animal body. Vitamin C plays an important role among the Vitamins. The North American Dietary Reference Intake recommends 90 milligrams per day and not more than 2 grams per day. The Nobel Prize winner “Linus Pauling” an expert on Vitamin C said to take 2000-5000 mg of Vitamin C per day keeps the doctor away. The pregnant women should have to take at least 500 mg of Vitamin C along with riboflavin that keeps them in healthy condition. Vitamin C mainly cures Scurvy¹⁻². It is an extremely important antioxidant³. It strengthen various immune functions by enhancing White Blood Cell functions and its activity, increasing interferon levels, antibody response and secretion of thymic hormones⁴. It also resists all types of stress like physical, chemical, mental and even due to environmental factors such as water and air pollution. It is a natural antibiotic, wonderful in curing all types of fever and infections. It also helpful in treating asthma, allergies, high blood pressure, cataracts, Parkinson’s disease, skin ulcers, wound healing and pregnancy related conditions⁵. Cancer patients are also advised to take lot of Vitamin C⁶⁻⁷. In modern system of medicine the Vitamin C is prepared by synthetic method. More over the consumption of synthetic Vitamin C may cause many ill effects even its leads to sterility on human beings. Therefore physicians recommended for the intake of only natural source of Vitamin C rather than synthetic tablets. In India, the natural sources for Vitamin C is from fruits like Indian goose berry, Oranges, limes, grapes, banana, mango, etc.,. Now there is an urgent need for searching the natural sources from plant origin. In this contest, an ethno botanical survey was made and 15 fruit were enumerated from the kannikar tribal settlements⁸. Among the fifteen fruits, two fruits namely *Avverrhoa bilimbi* and *Avverrhoa caambola* were studied in detailed in the present study.

EXPERIMENTAL

The study area selected is Kani settlements of Kanyakumari district, Tamil Nadu. Kanyakumari district is the southernmost part of Western Ghats region which is located between 77° 15' and 77° 36' of east of longitude and 8° 03' and 8° 35' north of Latitude. Frequent field trips were made in the Kani tribal settlements to identify the commonly cultivated plants containing vitamin C. The information regarding the morphological feature of *Avverrhoa bilimbi* and *Avverrhoa caambola*, their local name, plant parts used

and mode of applications were recorded with the help of aged Kani tribes and with local people. The information collected from the tribes validated by comparing the information given by the local people. The collected fruits were identified by the morphological and taxonomical features by using the standard literature. Through the Ethno-botanical survey in the Kani tribes, two fruits were collected. From the fruits uniformly 1 gm of fresh tissue was crushed and fruit juice obtained is taken for the analysis of Vitamin C content and estimated by dye method⁹. The major nutrient content like glucose and protein were also estimated by Lane- eynon method and Biuret method respectively. The mineral content was estimated by using normal analytical method. In addition to that the antibacterial activity against some pathogenic bacteria was evaluated by Kirby Bauer method.

RESULTS AND DISCUSSION

Ethanobotanical studies

The family Oxalidaceae consists of a genus *Avverhoa*. The genus *Avverhoa* has two species namely *A.bilimbi* and *A.carambola* commonly found in the Kani settlements of Kanyakumari district. (Plate - 1)



Habit with Flowers of *Avverhoa bilimbi* .



Habit with flowers of *Avverhoa carambola*

Plate - 1

Avverhoa bilimbi Linn.

The tribal name of this plant is Pulichikkai. It is commonly called as cucumber tree in English, bilimbi in Malayalam, bilimbu in Sanskrit, belambu in Hindi and Kochittamarattai in Tamil. It grows well in tropical region to the height of 4 to 8 meters. The leaves are pinnately compound and slightly hairy leaflets ranging from 10-35. Flowers are reddish purple in colour, found on the trunk (cauline) and branches in clusters. The fruits are oblong, fleshy, looking like a tender cucumber that's why it is called as Cucumber tree. The fruits are yellow when they ripe and have very juicy and sour in taste.

The leaves are made into paste and applied externally for skin itches and scabies. The leaf paste is applied for pimples and rheumatism. The ripened fruit is mainly used in the culinary preparations of both vegetarian and non-vegetarian dishes as an alternative to tamarind in order to reduce obesity. The raw fruits were made into pickles without any additives. The ripened fruit is taken in for proper dental, gums and bone growth. The fruit juice is taken to reduce the body heat and also to strengthen the stomach. The fruit juice is used to treat mouth disease and sore throat. The fruit juice is taken in to cure fungal diseases and also cure hemorrhage of stomach and bowels. The fruit juice with honey is taken in to increase the vital activity and to remove infertility in both sexes. The fruit juice is recommended for characterized weakness and nerve damages.

Avverhoa carambola Linn.

The tribal name of this plant is Seemai Pulichikkai. It is commonly called as carambola or star fruit in English, kamarangam in Malayalam, brihaddala in Sanskrit, kamaranga in Hindi and Kandasagadam in Tamil. It is a handsome ornamental tree grows well in tropical region up to the height of 8 meters. The leaves are ovate to elliptic, flowers are bell shaped, small with purple colored petals. The winged fruits

are pulpy and juicy with five ribs. The sliced fruits looking like a star shape and that's why it is called as star fruit. The golden yellow colored ripen fruits are slightly sweet with sour.

The leaves are made into a paste and applied for stings and bites of venomous insects. The fruit juice is taken in for temporally mental disorder caused by high fever. The fruit juice cure and prevents bleeding piles. The fruit juice mixed with honey as syrup for body cooling. The fruit is eaten while climbing on the hills to quench thirst. The fruit juice is used as a natural tonic to promote digestion. The fruit juice is taken as diuretic. The fresh sliced fruit is taken in for the proper development of teeth, gums and bones. The dried fruits were also used in culinary purposes of various dishes.

Phytochemical studies

The nutritive value like Glucose, Protein, Mineral content like calcium, phosphorous, iron, magnesium and vitamin C content of *Avverrhoa bilimbi* and *Avverrhoa carambola* fruit juice were estimated and presented in Table- 1.

Table-1: Nutritive value of *Avverrhoa bilimbi* and *Avverrhoa carambola*

Fruit juice	Major constituents (gm)		Minerals (mg/g)				Vitamins (mg/g)
	Glucose	Protein	Ca	P	Fe	Mg	Vitamin C
1. <i>Avverrhoa bilimbi</i>	8.2	0.61	3.4	11.1	1.01	11.7	26.98
2. <i>Avverrhoa carambola</i>	9.3	0.98	5.6	15.2	1.6	12.3	16.26

Antibacterial activity

The antibacterial activity of *Avverrhoa bilimbi* and *Avverrhoa carambola* fruit juice was evaluated against some broad spectrum pathogenic bacteria. The results were given in Table 2.

Table-2: Antibacterial activity of *Avverrhoa bilimbi* fruit extract

S.No	Bacterial resources	Inhibition zone(mm)	Standard Gentamycin Inhibition zone (mm)
I	Gram positive organism		
1.	<i>Staphylococcus aureus</i>	15.1	21
2.	<i>Staphylococcus epidermis</i>	13.3	18
II	Gram negative organism		
3.	<i>Pseudomonas aeuroginosa</i>	17.6	27
4.	<i>Salmonella typhimurium</i>	21.1	31

Table -3: Antibacterial activity of *Avverrhoa carambola* fruit extract

S.No	Bacterial resources	Inhibition zone(mm)	Standard Gentamycin Inhibition zone (mm)
I	Gram positive organism		
1.	<i>Staphylococcus aureus</i>	15.5	21
2.	<i>Staphylococcus epidermis</i>	12.8	18
II	Gram negative organism		
3.	<i>Pseudomonas aeuroginosa</i>	18.1	27
4.	<i>Salmonella typhimurium</i>	21.4	31

Among the fruits, the Indian gooseberry is said to have contain maximum Vitamin C content of about 23.75 mg / g. But the Vitamin C content of *A.bilimbi* contains is more than that of Indian gooseberry i.e. 26.98 mg / g of Vitamin C⁸. Next to *A.bilimbi*, *A. carambola* contains 16.26 mg / g of Vitamin C. Even though *A.bilimbi* and *A.carambola* are being an exotic fruit which were introduced by British people in

Indian and originally grown in the tribal settlements due to its fruit value. Now it is escaped from the settlement and grown as wild. As per the available literature both *A.bilimbi* and *A.carambola* were cultivated in garden throughout the plains of India, also naturalized and run wild in the tropical parts of India¹⁰. The Avverhoa produce fruits thrice or four times in a year depending upon the monsoon. The Average production rate is also higher than other fruit trees which contain Vitamin C. All edible fruits normally contain a large quantity of glucose and trace quantity of protein, like that this fruits also contains nearly 10% of glucose and 1% of protein on fresh weight basis. In addition to Vitamin C, the fruits of *A.bilimbi* and *A.carambola* contain the essential minerals like Ca, P, Fe and Mg in a substantial level. The above data gives a clue that this fruit juice can be taken as a dietary supplements¹¹.

Since the fruit juice is taken in as a remedy for mouth infection and sore throat caused by pathogenic microbes. In order to substantiate that the antibacterial activity of the above fruit juice against broad spectrum bacteria like *Staphylococcus aureus*, *Staphylococcus epidermis*, *Pseudomonas aeuroginosa*, *Salmonella typhimurium* were conducted. The result clearly indicate that the Gram positive organism showed more than 70% inhibition and Gram negative organisms showed more than 65% inhibition efficiency. Because of the high nutritive and mineral content and also due to its high antibacterial activity this fruit could be recommended for the Vitamin C deficiency and to get the power of disease resistances.

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REFERENCES

1. J.M.Olmedo, J.A.Yiannias, E.B.Windgassen, M.K.Gornet, *Int. J. Dermatol.* **45** (8),909 (2006).
2. Narayana Das Prajapati, S.S. Purohit, K.Arun, Sharma, Tarun Kumar, *A hand book of Medicinal Plants, Agarobios (India), Jodhpur*, (2003).
3. Padayatty, J.Sebastian, Katz, Arie., Wang, Yaohui, Eck, Peter; Kwon, Oran; Lee, Je-Hyuk; Chen, Shenglin; Corpe, Christopher et al. *Journal of the American College of Nutrition* **22** (1),18 (2003).
4. V.R.Preedy, R.R.Watson, Z. Sherma *Dietary Components and Immune Function (Nutrition and Health)*. N.J.Totowa, *Humana Press*, **36**, 52,(2010).
5. Vance Ferrell, M.Harolodm, M.D.Cherne, *The Master book of Home remedies. Natural remedies encyclopedia. Oriental Watchman Publishing House, Pune, India*, (2006).
6. F. Cabanillas, *Puerto Rico Health Sciences Journal* ,**29** (3), 215(2010)
7. L.M.Heaney, J.R.Gardner, N.Karasavvas, D.W.Golde, D.A.Scheinberg, E.A.Smith, O.A.O'Connor, *Cancer Research*, **68** (19), 8031(2008).
8. V. N. Meena Devi, K. Kalirajan, P. Nagendra Prasad, *Journal of Phytology*, **2**(4), 27(2010).
9. Bessy and King, *J. Biol. Chem.*, **103**,687(1933).
10. R.N.Chopra, S.L. Nayar, I.C. Chopra, *Glossary of Indian Medicinal Plants. Council of Scientific and Industrial Research, New Delhi*, (1956).
11. J.C.Kurian, *Plants That Heal. Vol-I. Oriental Watchman Publishing House, Pune, India*, (2004).

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