



REGULAR ARTICLE

# EXISTENCE OF VITAMIN C FRUIT SOURCES IN THE KANI TRIBAL SETTLEMENTS OF SOUTH TAMILNADU

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## SUMMARY

Kani tribes are one of the important tribals of the Western Ghats of south India. They are well versed in traditional medicines to treat various ailments. Their food materials are rich in all vital compounds necessary for the day to day life. Their main occupation is agriculture. They cultivated many fruits including citrus plants. A field study was conducted in the Kani tribe settlement of Kanyakumari district of TamilNadu and borders of Kerala. From them we were able to collect 15 different kinds of plant species cultivated by the Kani tribes which belong to 8 different families contain vitamin C in the fruits. The vitamin C content for the 15 fruits were estimated and among the 15 plants sources, the Bambilimas has the maximum vitamin C content.

**Key words:** Kani tribes, Ethanobotany, Western Ghats, Vitamin C

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## 1. Introduction

India is a veritable emporium of medicinal, aromatic plants, vegetables and fruits. Plants are the main source of many natural products in major part of India and other countries and are extensively used for traditional human health care systems. The majority of people in the world take care of themselves using plants that have been used for hundreds of generations. (Cordell, 1995; Farnsworth and Soejarto, 1991; Shengji, 2002; Taylor et al. 2001) India is a country of vast biodiversity and the people has traditional knowledge of using herbal medicines to cure many ailments. India has nearly 20,000 species of plants of medicinal and economic importance. Indian System of Medicine, which includes Ayurveda and Siddha systems of medicine, depends on the medicinal herbs for the treatment of various ailments and estimated about 250,000 flowering plants in the world (Heywood, 1993). India is one of the twelve-mega diversity countries of the world. The country has a huge variety of plants, about 45000 species and 81251 species of animals (Lakshmikanth, 2004). The mega diversity of

India is derived mainly from two of its most important bio-diversity “hotspots”: the Himalaya including the northeastern hills along the northern border, and the Western Ghats in the peninsular India (Negi et al., 2003; Ramakrishnan, 2000; Anpin Raja and Prakash, 2007). Indian flora has innumerable fruits, which are collected from forest by the tribal peoples. Since ancient time, mankind depended mainly on the plant kingdom to meet their need for food, medicine, fragrance and flavours. Indian has suitable agroclimatic conditions, which are favourable for the cultivation of different plant species. Usage of plants in medicine had been a long practice by man from ancient times. This practice of using plants in medicine is still prevailing not only among the tribals and others living in the rural areas.

Kanikkars are the most important tribal peoples in south India because they are one of the largest tribes of the whole of Kerala and Tamil Nadu which is located in the southernmost part of Western Ghats. Kanikkar are popularly known as Kani. Among the group an aged man who has

been given the responsibility of controlling the tribal community. He is called Kani Mooppan or Muttukani. Agriculture is the primary occupation of most of these Kanikkar tribes. There is another reason for which the anthropologists have given so much of attention to these Kanikkar tribes because they have vast knowledge about traditional medicine for various diseases. (Prakash, et al, 2008; Silja, et al., 2008; Sunil Kumar Sen and Lalit Mohan Behera, 2008; Rosakutty et al., 1999; Prasad et al., 1996)

Now a day's traditional medicine are attracting more and more attention within the context of health care provision and health sector reforms (Jayaram Kumar, 2006, Jari Olavi Summanen, 1997). However the traditional knowledge of various ethnic communities is eroding very fast. The reasons for such erosion are because of rapid socio-economic and cultural changes, lack of incentives for economic upliftment of local people according to their ecological surroundings. It is important to document and practice the indigenous knowledge base related to ethno medicine and food.

Vitamin C (Ascorbic acid) is a water-soluble vitamin which is found in many biological systems and foodstuffs like fresh vegetables and fruits, mainly in citrus fruits. The Vitamin C was first isolated in 1928 by the Hungarian biochemist Albert Szent-Gyorgyi. In 1937 Szent-Gyorgyi received the Nobel Prize in physiology and medical science for discoveries in the area of biological combustion processes, particularly with regard to vitamin C and fumaric acid catalysis. Linus Pauling was the first to realise the value of vitamin C towards the maintenance of a healthy immune system and in 1970 proposed that a regular intake at far higher levels than the recommended daily allowance (R.D.A) could help prevent and shorten the duration of the common cold. A severe deficiency of vitamin C can lead to the onset of scurvy, a disease that causes swollen gums, loose teeth, a tendency of wounds to not heal and excessive bleeding as well as bone malformations in infants

(Bhagavan, 2001; Cathcart, 1991; Mohora, 2006).

Vitamin C (ascorbic acid) plays an important role in collagen biosynthesis and immune response activation and is involved in wound healing and osteogenesis. It also acts as a powerful antioxidant which fights against free-radical induced diseases. Vitamin C is important for the absorption of iron and reduces ferric iron to its ferrous form and is beneficial in the treatment of those suffering from the iron deficiency anaemia. Vitamin C is vital for the function of the immune system especially for the function of lymphocytes. In addition to its nutritional benefits, vitamin C is used as a photographic developing agent in alkaline solutions and is used industrially as a reducing agent in metallurgy (Serban, 1981; Fox and Cameron, 1989; Wawrzyniak, 2005 )

Vitamins are essential for the humans. The human body is incapable of synthesising this vitamin and is totally dependent on its dietary intake for their survival. Many foods are known for their ability to provide a source of vitamin C but a number of factors such as processing method, storage conditions, exposure to light and heat determine how much is actually present by the time the product is consumed (Chatterjee, 2009). Vitamin C is sensitive to heat, light and oxygen. In food it can be partly or completely destroyed by long storage or over cooking. Taking natural vitamin C sources are quite good than taking artificial supplements. Since vitamin C is a water soluble source, consuming the sources as raw or juice or half cooked is potential. In the present study, ethnobotanical survey was conducted in the Kani settlements of Kanyakumari district of Tamilnadu and Neyyatankarai of Kerala, to collect the different fruits sources which contain vitamin C and their vitamin C content was estimated.

## 2. Methodology

The study areas selected are Kanyakumari district of Tamil Nadu and borders of Kerala. Kanyakumari district is the southernmost district of the state of

Tamil Nadu and located between 77° 15' and 77° 36' of east of longitude and 8° 03' and 8° 35' north of Latitude. A Field survey was conducted in the Kani tribal settlements of Kanyakumari district of Tamilnadu and Neyyatinkara of Kerala located in the Western Ghats region of southern India to identify the commonly cultivated plants containing vitamin C. The information regarding the plants, their local name, plant parts used, method of usage was recorded with the help of aged peoples and local people. The information procured was validated by comparing the information given by two or three people. The collected fruits were identified by the morphological features using the standard literature.

Through the ethnobotanical survey in the Kani tribe settlement, fifteen fruits were collected. From the fruits, only fresh juice in dilute forms, uniformly 1 gm of crushed fruit juice from the ripened fruit is taken for the

analysis. From each fruit juice was collected and the vitamin C content was estimated by dye method (Bessy and King, 1933).

### 3. Result

In the Kani settlements a variety of plants which are used by the Kani tribals for their food, primary healthcare were found. The present study identified that Kani tribal peoples were using 15 different kinds of plant species distributed in 8 different families. Among 15 fruits studied, five belongs to Rutaceae family and three of Euphorbiaceae, two from Oxalidaceae, and the remaining five belong to different families namely Bromeliaceae, Caricaceae, Cucurbitaceae, Myrtaceae and Passifloraceae. The botanical name, family, common name and content of vitamin C are tabulated in Table 1.

Table 1. Ascorbic acid content of Selected Citrus plants

Sl. No	Botanical Name	Family Name	Common Name	Ascorbic acid content (mg/g of conc. fresh Juice)
1	<i>Citrus maxima</i>	Rutaceae	Bumblimas	36.62
2	<i>Averhoa bilimbi</i>	Oxalidaceae	Bilimbi	26.98
3.	<i>Citrus medica</i>	Rutaceae	Narathai	26.93
4.	<i>Phyllanthus emblica</i>	Euphorbiaceae	Arinelli	26.82
5.	<i>Phyllanthus emblica</i>	Euphorbiaceae	Amla (wild type)	23.75
6.	<i>Sechium edule</i>	Cucurbitaceae	Chow-chow	22.56
7.	<i>Citrus aurantium (Type 1)</i>	Rutaceae	Kamala Orange	21.67
8.	<i>Phyllanthus emblica (Hybrid)</i>	Euphorbiaceae	Amla (Emlica)	20.55
9.	<i>Passiflora edulis</i>	Passifloraceae	Passion fruit	19.10
10.	<i>Ananas comosus</i>	Bromeliaceae	Pine apple	18.23
11.	<i>Citrus aurantium</i>	Rutaceae	Orange	17.15
12.	<i>Averrhoa carambola</i>	Oxalidaceae	Star fruit	16.26
13.	<i>Carica papaya</i>	Caricaceae	Papaya	14.78
14.	<i>Citrus emon</i>	Rutaceae	Lemon	10.58
15.	<i>Eugenia jambos</i>	Myrtaceae	Panier Koya	7.97

#### 4. Discussion

Since time immemorial man has used different plant materials to treat and prevent many ailments (Chah *et al.*, 2006). In olden days all medicinal preparations were obtained of plant parts either in the simple or complex form crude extracts, mixtures, etc. Now days an ample number of drugs are prepared from plants materials (Fabricant and Farnsworth, 2001) which are active against a number of diseases by identifying the active principle compound (chemical compound) found in a particular medicinal plant. In the developed countries nearly 25% medicines were prepared by using plants and their derivatives and the use of medicinal plants is well known among the indigenous people in rural areas of many developing countries (Gurib-Fakim, 2006).

Kannikars are one of the most primitive hill tribes and they occupy the slopes of the Western Ghats in the southern part of Tamil Nadu and Kerala. They are commonly distributed in the Tirunelveli and Kanyakumari district of TamilNadu and Neyyatinkara regions of Kerala. The peoples are mostly agriculturists and they use to grow tubers like cassava and fruits especially Jack and Citrus for their own use and also for commercial purpose. In addition to these fruits they cultivate other fruits namely Arinelli, Amla, Passion fruit, Orange, Papaya, Star fruit, Panier Koiya, Bumblimas, Bilimbi, Narathai, Pineapple, Lemon etc., which are richer in vitamin C.

Vitamin C is water-soluble, and the most famous of all the vitamins. Even before its discovery in 1932, physicians recognised that there must be a compound in citrus fruits preventing scurvy, a disease that killed as many as 2 million sailors between 1500 and 1800. Vitamin C contributes to the health of teeth and gums, preventing haemorrhaging and bleeding, improves the absorption of iron from the diet, and is needed for the metabolism of bile acids, which may have implications for blood cholesterol levels and gallstones. In addition, vitamin C plays an important role in the synthesis of several important peptide hormones and neurotransmitters and carnitine. Finally,

vitamin C is also a crucial factor in the eye's ability to deal with oxidative stress, and can delay the progression of advanced age-related macular degeneration (AMD) and vision-loss in combination with other antioxidant vitamins and zinc. Vitamin C (ascorbic acid) is used in the treatment of common cold, allergies and respiratory disorders. It has antioxidant activity and prevents the cell membrane of vital organs from getting damaged due to oxidation. Vitamin C deficiency can lead to scurvy in which there is lack of synthesis of collagen in the human body resulting in bleeding disorders, malformation of bones and growth retardation. The supplement is essential for cartilage health. It is nature's "drug fighter". It helps people withdraw from various drugs-ranging from prescribed mood changers to addictive substances such as heroin.

The supplement is essential for cartilage health but there is an acute supply shortage of the vitamin C tablets. Though vitamin C is a small-product category with annual sales of less than Rs 100 crore, it is a key ingredient of the Rs 1500 crore multivitamin market (Chitlangia, and Mukherjee, 2008; Venkat, 2008). Natural body builders need atleast 1-1.5 g of the vitamin spread over equal doses throughout the day to ensure that stress hormone cortisol, does not affect the muscles and health. People depending on this supplement are facing a tough time now a days due to an acute shortage of vitamin C in the pharmacies and medical stores. With the drug in short supply, the one and major option available with the consumers is to shift to natural sources of vitamin C such as Amla, Lemon, Orange and other citreous fruits. There are many plant sources containing vitamin C (Sumit Madan and Sarika Madan, 2009). The one of reason for the short supply was the preparative method of vitamin C which involves steps using environmentally hazardous chemicals and steps requiring high energy consumption. Also the major source (2-keto-L-gulonic acid) was imported for production of vitamin C and hence the price hike in vitamin C tablets.

By considering all these facts in mind and the utility of Vitamin C, we have proposed to

estimate the amount of Vitamin C in naturally available fruits that are mainly used by Kannikars and they cultivate them in their home gardens. In the present study 15 fruits have been analysed. The result showed that the *Citrus maxima* had maximum vitamin C content among the 15 citrus plants followed by *Averhoa bilimbi*, *Citrus medica* and *Phyllanthus emblica*. Among the 15 different plant species collected from the Kani tribal showed that the plants are exotic and were introduced by the British people in the Kani settlements during the period of establishment. So it is recommended to cultivate more and more citrus plants to fulfill the scarcity of vitamin C.

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