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## Studies on development and organoleptic evaluation of sweet orange juice by using different chemical preservatives

Shravan R, DM Shere and Wadmare VB

**Abstract**

This study was carried out to investigate the effect of chemical preservatives on sweet orange juice. The samples were; sweet orange juice (T<sub>0</sub>), pasteurized sweet orange juice with 500 PPM sodium benzoate (T<sub>1</sub>), pasteurized sweet orange juice with 750 PPM sodium benzoate (T<sub>2</sub>), pasteurized sweet orange juice with 1000 PPM sodium benzoate (T<sub>3</sub>), pasteurized sweet orange juice with 500 PPM potassium sorbate (T<sub>4</sub>), pasteurized sweet orange juice with 750 PPM potassium sorbate (T<sub>5</sub>), pasteurized sweet orange juice with 1000 PPM potassium sorbate (T<sub>6</sub>), pasteurized sweet orange juice with 500 PPM citric acid (T<sub>7</sub>), pasteurized sweet orange juice with 750 PPM citric acid (T<sub>8</sub>), pasteurized sweet orange juice with 1000 PPM citric acid (T<sub>9</sub>). T<sub>3</sub> sample were found to be most preferred variant with respect to sensory quality such as color, flavour, taste, and overall acceptability the study conclude that Among all the treatment T<sub>3</sub> were more effective in maintaining the good sensory quality attribute and it was taken for further analysis.

**Keywords:** sweet orange juice, preservatives, quality, attribute, sensory properties.

**Introduction**

Sweet Orange is considered as most important fruit crop of citrus group with their wholesome nature multifold nutrition and medicinal value have made them so important. Sweet Orange (*Citrus sinensis*) belongs to family Rutaceae. Sweet orange is native of Southern China. It is now widely distributed and naturalized in sub-tropical zone of India. It is cultivated particularly in Brazil, China, Japan, Turkey and India. Sweet orange need dry climate and arid weather with distinct summer and winter seasons with low rainfall. It is grown on wide range of soil ranging from clay to light sandy and sensitive to salt. Sweet orange is well grown on medium black, red, alluvial river bank loamy soil of Maharashtra state and Goradu soil of Gujarat.

Botanical classification of orange Kingdom: *Plantae*; Division: *Magnoliophyta*; Class: *Dicotyledons*; Sub Class: *Sapindales*; Order: *Rosidae*; Family: *Rutaceae*; Sub family: *Aurantoideae*; Genera: *Citrus*; Species: *sinensis*. (Parle and Chaturvedi dev, 2012)<sup>[6]</sup>. Orange, the tasty, juicy fruit, belonging to the family *Rutaceae* is botanically known as *Citrus sinensis*. *Citrus sinensis* is one of the most important and widely grown fruit crop, with total global production reported to be around 120 million tons. Orange trees are widely cultivated in tropical and subtropical climates for its tasty juice and medicinal value. In worldwide trades citrus fruits generate about 105 billion dollars per year all over the world. Orange fruit is cultivated in more than 130 countries including India, UK, France, Germany, Holland, Brazil, China, USA and Spain. Oranges are generally available from winter through summer with seasonal variations depending on the variety.

The major sweet orange producing states in India are Andhra Pradesh, Maharashtra, Tamil Nadu, Karnataka, Madhya Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Uttar Pradesh, Punjab and Haryana. In India, about 27.47 lakh ha. Area is under sweet orange cultivation with production of 424.82 lakh tones of fruits with 15.5 MT productivity. (Anonymous, 2016)<sup>[3]</sup>.

In Maharashtra, sweet orange is grown in Jalna, Aurangabad, Parbhani, Nanded, Nagpur, Amravati and Ahmednagar districts. It is cultivated on area of 61.8 thousand ha. with the production of 543.0 thousand MT of fruits and productivity is 8.8 MT/ha. (Anonymous, 2015)<sup>[2]</sup>. Oranges form a rich source of vitamin C, flavonoids, phenolic compounds and pectins. The main flavonoids found in citrus species are hesperidine, narirutin, naringin and eriocitrin. Just

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one orange provides 116 per cent of the daily requirement for vitamin C. Vitamin C is the primary water-soluble antioxidant, which prevents free radical generation in the body and damage to the tissues in the aqueous environment both inside and outside cells. Drinking of orange juice without salt and sugar is associated with reduced severity of inflammatory conditions, like asthma, osteoarthritis, and rheumatoid arthritis. Vitamin C is also necessary for the proper functioning of immune system. Vitamin C is good for preventing cold, and cough. (Parle and Chaturvedi, 2012) [6] The beneficial effect of citrus fruit consumption on human health due to presence of antioxidant and anti-radical properties (betoret *et al.* 2009) [4]

Sweet oranges are rich source of vitamin A, C and potassium and supplies around 116.2 per cent of daily value of vitamin C. It contains moisture of 86.0 g/100g followed by carbohydrates 12.0-12.69 g/100g, calcium 40-43 g/100g, protein 0.8-1.4 g/100g, fiber 0.8 g/100g and fat 0.2-0.4 g/100g. Sweet orange juice has pH 3.5, total soluble solids 10 °Brix, acidity 0.4 per cent, moisture content 88.4 per cent, protein 0.6 per cent, fat 0.05 per cent, carbohydrates 10.5 per cent, fiber 0.12 per cent and ash 0.3per cent. Sweet oranges are not available round the year so should be processed in the form of juice; concentrate, squash, etc., to minimize the post harvest losses due to spoilage (Syed *et al.* 2012) [7].

According to the book "Nutritive Value of Indian Foods" published by the National Institute of Nutrition, 100g of sweet orange has 88.4g moisture, 9.3g carbohydrate and provides 43kcal energy, 0.8g protein, 0.3g fat, 0.7g minerals, 0.5g fiber, 40mg calcium, 30mg phosphorous, 490mg potassium, 0.7mg iron and 50mg vitamin C. It is widely consumed fruit juice by normal as well as sick people and is well known for its instant energy, vitamin C and potassium content.

Sweet oranges are very versatile and can be included in fruit and vegetable salads as well as in other dishes. Sweet orange juice is refreshing after any hectic activity or on a dry, hot day to quench thirst. A glass of sweet orange juice every morning helps to aid digestion, neutralize the acidic digestive juices produced by the stomach, and flush out toxins from the excretory system.

Sweet orange juice also benefits individuals suffering from indigestion, irregular bowel movement, and other gastrointestinal problems. Sweet orange juice is an excellent thirst quencher and a good replacement for carbonated sweetened drinks. It has a cooling effect in cases of fever and jaundice. It provides relief from stomach related problems. Sweet oranges are also a rich source of potassium; hence they help in curing diarrhea and dysentery. Sweet oranges are rich in vitamin C hence helps by making up for the deficiency that causes scurvy. It also helps prevent and cure gum diseases which are mainly caused due to the deficiency of vitamin C.

This fruit enjoyed as a juice or as a whole after a morning jog, walk or yoga. A freshly squeezed glass of sweet lime has the ability to instantly cheer up and energize for the day ahead. Sweet orange Juice or Mosambi juice is recommended during fever for its cooling effect. Sweet orange juice can serve as a road side thirst quencher in busy bus stations, railway stations, work places, construction sites etc.

Now a day preservation of fruit juice has become the business activity of great significance and countries with abundant fruit resources, having short harvest season are emphasizing more for established storage to maintain quality of fruits, increase shelf life and preserve fruit juice for off-season use (tasnim *et al.*, 2010) [8].

Preservation of fruit juices with chemicals is mainly adopted to prevent microbial spoilage during storage, both in the retail stores and consumer homes. Preservation of fruit juices with chemicals is mainly adopted to prevent microbial spoilage during storage, both in the retail stores and consumer homes. In Europe, benzoic acid (E210) and sodium benzoate (E211) are permitted food preservatives with an acceptable daily intake of 5 mg/kg of body weight by the FAO/WHO due to its long history of safe use. Sodium benzoate with its broad antibacterial range, non-volatility and water solubility, is widely used as a fruit beverage preservative (Walker and Philips, 2008) [9]. and methods

## Materials and methods

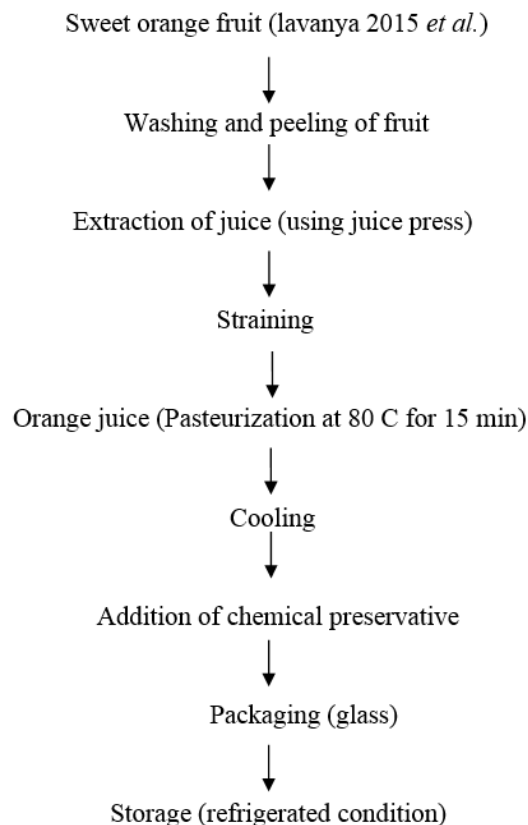
### Materials

Sweet orange (*Citrus sinensis* (L) Osbeck) required for the experiment were procured from local market of Parbhani. Chemicals and reagents (analytical grade) and standards will be taken from laboratory, Department of Food process Technology, College of food technology, VNMKV, Parbhani

### Methods

The sweet orange juice extracted according to method described by (lavanya *et al.* 2015) [5] Fruits were washed in tap water to remove outer dirt and extraction of juice was done by using juice extractor followed by straining, pasteurization at 80°C for 15 min, followed by cooling, addition of chemical preservative such as sodium benzoate, potassium sorbate, and citric acid with different concentration such as 500 PPM, 750PPM, and 1000PPM respectively, filling in glass bottles and stored at refrigerated condition

### Flow diagram for preparation of sweet orange juice



**Table 1:** Composition of various trials

Samples	Sweet orange juice	Preservatives	Concentration
Control	1000 ml	-	-
T1	1000 ml	Sodium benzoate	500 PPM
T2	1000 ml	Sodium benzoate	750 PPM
T3	1000ml	Sodium benzoate	1000 PPM
T4	1000ml	Potassium sorbate	500 PPM
T5	1000ml	Potassium sorbate	750 PPM
T6	1000ml	Potassium sorbate	1000 PPM
T7	1000ml	Citric acid	500 PPM
T8	1000ml	Citric acid	750 PPM
T9	1000ml	Citric acid	1000 PPM

Control- sweet orange juice without addition of chemical preservatives, T1- pasteurized sweet orange juice with 500 PPM sodium benzoate per liter, T2- pasteurized sweet orange juice with 750 PPM sodium benzoate per liter, T3- pasteurized sweet orange juice with 1000 PPM sodium benzoate per liter, T4- pasteurized sweet orange juice with 500 PPM potassium sorbate per liter, T5- pasteurized sweet orange juice with 750 PPM potassium sorbate per liter, T6- pasteurized sweet orange juice with 1000 PPM potassium sorbate per liter, T7- pasteurized sweet orange juice with 500 PPM citric acid per liter, T8- pasteurized sweet orange juice with 750 PPM citric acid per liter, T9- pasteurized sweet orange juice with 1000 PPM citric acid per liter.

#### Organoleptic evaluation of sweet orange juice with different chemical preservatives

Organoleptic evaluation of sweet orange juice with different chemical preservatives with different concentration for colour and appearance, flavour, after taste and overall acceptability was carried out by using standard method of (Amerine *et al.*, 1965) [1]. For these 10 semi-trained judges were used and 1 to 9-point hedonic scale was used for rating the quality of the sweet orange juice. The mean of ten judges was considered for evaluating the quality.

#### Result and Discussion

**Table 2:** Organoleptic evaluation of sweet orange juice with different chemical preservatives

Sample	Colour	Flavor	Taste	Overall acceptability
Control	7.5	7	7	7
T1	7.8	7.4	7.3	7.5
T2	8.3	7.8	7.7	7.8
T3	8.5	8	8	8.2
T4	7.6	7.5	7.2	7.6
T5	7.8	7.8	7.7	7.8
T6	8.5	7.9	7.9	8
T7	7.7	7.3	7.2	7.4
T8	7.9	7.5	7.5	7.6
T9	8.0	7.7	7.8	7.8

Data pertaining to sensory evaluation of sweet orange juice with different chemical preservatives with respect to colour, flavour, taste and overall acceptability were carried out. Accordingly, results obtained are depicted in table. 2.

Data indicated in table 2. Showed that the sample T3 are the most acceptable product.

In case of colour control sample got the least score (7.5) and T6 and T3 sample are highest score (8.5 and 8.5) respectively. In case of flavor and taste T3 got the highest score (8 and 8) respectively. Sample control got the lowest score (7 and 7).

In terms of overall acceptability and T3 and T6 sample had high score (8.2 and 8.0) respectively. Control sample got the least score (7)

From the above discussion we can conclude that sample T3 sample were selected for further studies.

#### Conclusion

Orange fruit has recognized its utility as a base ingredient in various value added products like jam, jelly, beverages, various products and so on, the use of chemical preservatives in sweet orange juice preservation does not influence negatively the consumer acceptability of the product. From the study it can be concluded that pasteurized sweet orange juice with 1000 PPM sodium benzoate (T<sub>3</sub>) per liter were found most acceptable sensory evolution were selected for further investigation.

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