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## Development of orange juice by incorporating peel of *Citrus sinensis*, *Citrullus lanatus*, *Citrus limetta* and evaluation of its nutritional properties

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### Abstract

In the current scenario, we observe that the population is drastically shifting towards a healthy diet which is challenging in current fast paced lifestyle of mass population. An attempt to provide nutritious juice from Oranges and sweet lime by adding orange peel juice to enhance its nutrition and phytochemicals is made. To the same watermelon is added in the juice to reduce its bitterness as watermelon will act natural sweetener and provide vitamins to the juice.

Oranges are found to have different phytochemicals *viz.* carotenoids, that are beta-carotene, leutein and beta-cryptoxanthin flavonoids (e.g., naringenin) and many volatile organic compounds that create the aroma present in orange. Orange juices are very popular among health freaks as they are very nutritious and also are tasty. Consists of low fat and have less amount of citric acid as compared to lime or lemon juice.

Fruits are healthy as they have diverse nutrition, are low in fat, easily digestible. Which makes it preferably when one wants healthy lifestyle.

Fruit juices on other hand are quick easily consumable hence the demand for processed and handy juice has increased.

**Keywords:** Phytochemical, carotenoids, volatile organic compounds, vitamins, nutrition, flavonoids

### 1. Introduction

An upward trend in the healthy diet has been observed recently. But as its incorporation is quite difficult for a busy generation of Today's. To meet the demand for right nutritive value on the go, mass population depends on products that requires significantly less amount of time as well as efforts so as to consume easily in their fast paced lifestyle. Fresh fruit juices, smoothies, healthy drinks are a great option.

Juice is a drink made extraction or pressing of natural liquid contained in fruits & vegetables. Fruit juice is a healthy, low-fat, nutritious beverage (Barbara, 2020) [3]. FJ provides bioavailable micronutrients & plant bio-actives at levels similar to those found in whole fruits. One major difference between the juice and the fruit is the higher pectin (fiber) content of whole fruit, which is largely removed during manufacturing of juice.

### 2. Nutritional Aspect of ingredients

The taste of oranges is determined mainly by the relative ratios of sugars and acids, whereas orange aroma derives from volatile organic compounds, including alcohols, aldehydes, ketones, terpenes and esters.(Tietel *et al.*, 2011) [14] As a citrus fruit, the orange is acidic, with pH levels ranging from 2.9to 4.0.(Sinclair & Bartholomew, 1945) [13]. Orange flesh is 87% water, 12% carbohydrates, 1% protein, and contains negligible fat. Orange peels also have certain benefits as they are rich in vitamins, polyphenols which may help tp prevent chronic diseases.

#### 2.1 Orange (*Citrus sinensis*)

Orangeis rich in Vitamin C, A & B, phosphorus. Orange Juice is widely consumed for its richness of Vitamin C.

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Fig 1: *Citrus sinensis*



Fig 3: *Citrus limettioides*

**2.2 Watermelon (*Citrullus lanatus*)**

It is found to be rich in vitamin C, B, A & also in carotenoid lycopene. Vitamin B which is primarily responsible for production of energy in your body is highly found in watermelon. Hence, consuming watermelon can boost your energy levels.

The antioxidant property of plant material is due to the presence of many active phytochemicals including vitamins, flavonoids, terpenoids, carotenoids, circumin, cumarins, lignin, plant sterol etc. (Lucia, 2008) [9]. Extracts from peel of oranges were found to have a good total radical antioxidative potential (Gorinstein & S, 2003).



Fig 2: *Citrullus lanatus*

**2.3 Sweet Lime (*Citrus limettioides*)**

Sweet lemon and sweet lime refer to groups of citrus hybrids that contain low acid pulp and juice. They are hybrids often similar to non-sweet lemons or limes, but with less citron parentage. (Gulson & Roose, 2001) [6]. Sweet limes and lemons are not sharply separated.

The sweet lime, *Citrus limettioides* Tan., is often confused with the sweet lemon, *C. limetta* Tan., which, in certain areas, is referred to as "sweet lime". In some of the literature, it is impossible to tell which fruit is under discussion. (Morton, 1987) [10]

**3. Ingredients and Methods**

**3.1 Ingredients**

Fresh fruits like Orange, Watermelon, Sweet Lime and orange peel were taken. Sugar was added in the form of small granules with addition of water.

Table 1: Ingredients with Quantity

Ingredients	Quantity (g)
Orange	50
Orange peel	30
Sweet lime	50
Watermelon	120
Water	50(ml)
Sugar	50

**3.2 Methods**

The method used for development of orange juice is mentioned below:

**3.2.1 Procedure**

Fresh fruits were washed, peeled, cut into pieces, sugar was added, grind into fruit juicer, filtered using filter net and then refrigerated for 2 hrs.

Prepared orange juice with the addition of Orange peels, Watermelon, Sweet lime and sugar and then water as per the requirement were added while grinding in the fruit juicer. The filtrate was filtered with the help of filter aid. The method obtained is discussed in Fig.1 with the help of flow diagram.

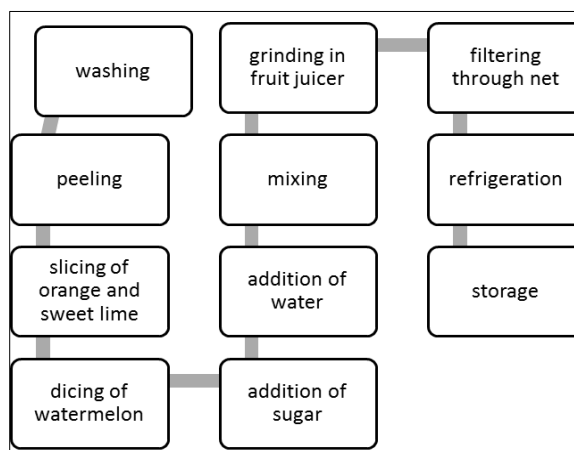
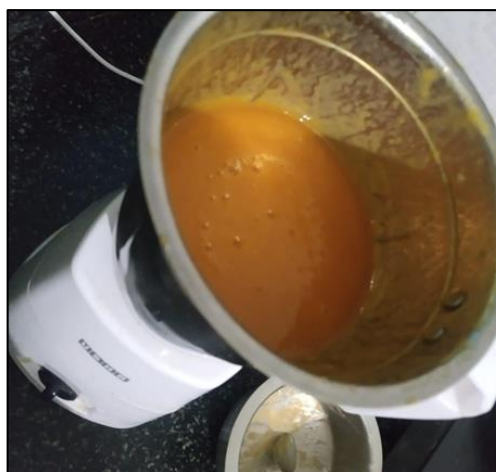


Fig 4: Method of Juice Development



**Fig 5:** Prepared Juice

## 4. Result and Discussion

### 4.1 Result

The result obtained shows the good amount of fibre and energy which very good for health. Juice is mostly consumed in order to get proper nutrition including energy which is found to be present in good amount. The quantity of nutrition found in juice is mentioned below in table.

**Table 2:** Nutritional Chart of The Prepared Juice

Parameters	Quantity
Fibre (mg)	30.8
Calcium (mg)	9
Vitamin A (mcg)	3.2
Energy(kcal)	38
Total sugar (g)	15.6
Added sugar (g)	11.77
Ascorbic acid (mg)	8.25

### 4.2 Parameters tested and Method used by testing lab

Vitamin C: - IS5838: 1970 Reaff 2020

Total Sugar: - By FSSAI Manual for Fruits and Vegetables (10.1) 2016

Added Sugar: - By FSSAI Manual for Fruits and Vegetables (2.6) 2016

## 5. Discussion

Various studies and reports suggest that consuming the fruit juices have potential benefits to individuals in certain aspects of health. Drinking of fruit juice is recommended for improving the quality of nutrient intake in the body so as to achieve a healthier lifestyle. But because the fruit juices contain sugars (total & added) the consumption of the same should be regulated to avoid any health-related problems associated with the sugar intake. Observational trials reports that the sugar sweetened beverages (SSB's) are associated with the increased risk of Type 2 Diabetes & poor Glycaemic control (Wang, Yu, Fang, & Hu, 2015)<sup>[15]</sup> (Imamura, *et al.*, 2015)<sup>[8]</sup> (Papier, *et al.*, 2017)<sup>[11]</sup> (Hirahatake, *et al.*, 2019)<sup>[7]</sup>. Turning to type 2 diabetes and glycaemic control, two SRMAs suggested no risk of type 2 diabetes at FJ intakes of 75 and 150 mL or up to 220 mL (D'Elia, Dinu, Sofi, Volpe, & Strazzullo, 2020)<sup>[4]</sup> (Semnani-Azad, *et al.*, 2020)<sup>[12]</sup>.

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