

# Formulation, Sensory, Chemical and Nutritional Attributes of Star fruit, Muskmelon and Orange Squash with Basil Seed

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**Abstract:** Mixed fruit squash was formulated with different combinations of star fruit, muskmelon and orange juice. In phase I, total soluble solid, pH and acidity of star fruit, muskmelon, and orange juice were analyzed. The juice was used for preparation of mixed squash with various combinations along with basil seeds and other ingredients. The combinations were noted as S1, S2 and S3. Sugar and citric acid were used for improving the sweetness and lowering the pH respectively. Potassium meta-bisulphate (KMS) was used as preservative. In phase II, the sensory properties of squash were evaluated by a taste testing panel consisting of 10 panelists. The results showed that squash S3 with 24% star fruit, 28% muskmelon and 48% orange juice got highest score. In phase III, chemical and nutritional evaluation for various parameters like moisture content, total soluble solid (TSS), ash, pH, acidity, vitamin C (ascorbic acid), total sugar, carbohydrates, fat and protein of processed mixed squash was done. The squash can be utilized in form of nourishing and delightful product with all nutritional and medicinal values of a raw fruit. The squash is a rich source of vitamin C (329 mg), flavonoids and has numerous health benefits.

**Keywords:** Squash, Star fruit, Orange, Basil

## 1. Introduction

The human diet contains important micronutrients namely vitamins C and E, carotenoids and flavonoids, essential for maintenance of human health. Multiple dietary sources of these compounds are present virtually in all plant material [6]. The nutritional importance of foods is due to the presence of these functional food ingredients and antioxidant nutraceuticals or phytochemicals. Phytochemicals are present in edible fruits and vegetables and when eaten potentially modulate human metabolism in a favorable manner, thereby prevent chronic and degenerative diseases [7]. Increase in fruits and vegetables consumption protects against degenerative pathologies such as cancer and atherosclerosis [1]; as epidemiological surveys had shown an inverse relationship between dietary flavonoid intake from citrus and cardiovascular diseases [17].

Fruit squashes are becoming popular in comparison with synthetic beverages evidently because of their taste, flavor, nutritive value and their storage stability. A number of research workers in different countries investigated the formulations of different fruit based on soft drinks, squash, non-carbonated fruit juice drink etc. containing sugar, water, citric acid, KMS, artificial color and flavor [15]. A fruit juice beverage is a clear or nearly clear unfermented liquid which is developed from the removal of the sweet watery sap from live fruits. This beverage may be served as fresh juice drink as soon as it is expressed from the fruit. It could also be processed then packaged for future use as a processed juice such as squash [18].

Squash is non-alcoholic concentrated syrup that is usually fruit-flavored and made from fruit juice, water, and sugar or a sugar substitute. Squash must be mixed with a certain amount of water or carbonated water before drinking.

Among all beverages squash is quite popular all over the world as nutritious soft drink [4]. It consists essentially of strained juice containing moderate quantities of fruit pulp to which sugar is added for sweetening. Acid is added to lower the pH which arrests the growth of microorganisms responsible for spoilage of the product. Acid in combination with sugar also improve the taste of sugar. Sulphur dioxide (SO<sub>2</sub>) is used as a preservative to prevent non-enzymatic browning reaction.

There are various aspects for which mixed squash made from star fruit, muskmelon, orange and basil seeds was formulated. Star fruit, muskmelon, orange and basil seed squash is rich source of vitamins, especially vitamin C and minerals, increases the metabolism system, speeds up the digestion of carbohydrates and fats, good for people who are trying to lose weight naturally, good for improvement in the immunity system of the body, provides high nutritive and medicinal value and helps to treat anemia, circulatory problems and skin disorders.

The perishability of the fruit is attributed to immense physiological changes after harvest [19]. Juice blending is one of the best methods to improve the nutritional quality of the fruits beverages. It can improve the vitamin and mineral content depending on the kind and quality of fruits used [14].

The present investigation was planned with the objectives to find out the suitable formulation for mixed fruit squash from star fruit, muskmelon, orange juice and basil seeds; to evaluate the proximate composition of mixed fruit squash; to study the sensory evaluation and chemical attributes of the final product; and to study the storage potentiality of final product.

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## 2. Health Benefits of Raw Material

### 2.1. Star fruit (carambola) [24]:

Star fruit or **carambola** (*Averrhoa carambola*), is a star-shaped tropical fruit with sweet and sour flavor. Carambola fruit features light-green to yellow with attractive smooth waxy surface. Inside, it's crispy, and juicy pulp can either be mildly sweet or extremely sour depending upon amount of oxalic acid concentration. Star fruit is one of the very low-calorie exotic fruits. 100 g fruit just provides 31 calories, which is much lower than for any other popular tropical fruits. Nonetheless, it has an impressive list of essential nutrients, antioxidants, and vitamins required for well-being.

The fruit along with its waxy peel provides a good amount of dietary fiber. Fiber helps prevent absorption of dietary LDL-cholesterol in the gut. The dietary fibers also help protect the mucous membrane of the colon from exposure to toxic substances by binding to cancer-causing chemicals in the colon.

Star fruit contains good quantities of **vitamin-C**. Vitamin-C is a powerful natural antioxidant. 100 g of fresh fruit provides 34.7 mg or 57% of daily required levels of vitamin-C. In general, consumption of fruits rich in vitamin-C helps the human body develop resistance against infectious agents and scavenge harmful, pro-inflammatory free radicals from the body.

Star fruit is rich in antioxidant phytonutrient *polyphenolic flavonoids*. Some of the important flavonoids present are **quercetin**, **epicatechin**, and **gallic acid**. Total polyphenol contents (Folin assay) in this fruit is 143 mg/100 g. Altogether, these compounds help protect from deleterious effects of oxygen-derived free radicals by warding them off the body.

Besides, it is a good source of B-complex vitamins such as folates, riboflavin, and pyridoxine (vitamin B-6). Together, these vitamins help as co-factors for enzymes in metabolism as well as in various synthetic functions inside the body.

Star fruit also carries a small amount of minerals and electrolytes like potassium, phosphorus, and zinc and iron. Potassium is an important component of cell and body fluids helps controlling heart rate and blood pressure; thus, it counters bad influences of sodium.

**Table 1:** Star fruit (*Averrhoa carambola*), Fresh, Ripe, Nutritive value per 100 g, ORAC value-5900

Principle	Nutrient Value	Percentage of RDA
Energy	31 Kcal	1.5%
Carbohydrates	6.73 g	5%
Protein	1.04 g	2%
Total Fat	0.33 g	1%
Cholesterol	0 mg	0%
Dietary Fiber	2.80 g	7%
<b>Vitamins</b>		
Folates	12 µg	3%
Niacin	0.367 mg	2.25%
Pyridoxine	0.017 mg	1.5%

Riboflavin	0.016 mg	1.25%
Thiamin	0.014 mg	1%
Vitamin A	61 IU	2%
Vitamin C	34.4 mg	57%
Vitamin E	0.15 mg	1%
Vitamin K	0 µg	0%
<b>Electrolytes</b>		
Sodium	2 mg	0%
Potassium	133 mg	3%
<b>Minerals</b>		
Calcium	3 mg	0.3%
Iron	0.08 mg	1%
Magnesium	10 mg	2%
Phosphorus	12 mg	2%
Zinc	0.12 mg	1%

(Source: USDA National Nutrient data base) [28]

### 2.2. Muskmelon (cantaloupe) [22]:

**Cantaloupe** (*Cucumis melo reticulatus*) fruits feature round or oblong shape, weigh often more than a kilo. Internally, its flesh color ranges from orange-yellow to salmon, has a soft consistency and juicy texture with a sweet, musky aroma that emanates best in the completely ripe fruits. Wonderfully delicious with rich flavor, muskmelons are very low in calories (100 g fruit has just 34 calories) and fats. Nonetheless, the fruit is rich in numerous health promoting polyphenolic plant derived compounds, vitamins, and minerals that are absolute for optimum health.

The fruit is an excellent source of **Vitamin-A**, (100 g provides 3382 IU or about 112% of recommended daily levels) *one of the highest among cucurbita fruits*. Vitamin-A is a powerful antioxidant and is essential for healthy vision. It also required for maintaining healthy mucosa and skin. Consumption of natural fruits rich in vitamin-A has been known to help protect from lung and oral cavity cancers.

It is also rich in antioxidant flavonoids such as *beta-carotene*, *lutein*, *zeaxanthin*, and *cryptoxanthin*. These antioxidants have the ability to help protect cells and other structures in the body from oxygen-free radicals and hence; offer protection against colon, prostate, breast, endometrial, lung, and pancreatic cancers. Total antioxidant strength regarding oxygen radical absorbance capacity (ORAC) of cantaloupe melons is 315 µmol TE/100 g. **Zeaxanthin**, an important dietary carotenoid, selectively absorbed into the retinal macula lutea in the eye where it is thought to provide antioxidant and protective UV light-filtering functions. It, thus, offers protection of eyes from "Age-related macular degeneration" (ARMD) disease in the elderly.

Star fruit is an ideal source of electrolyte, potassium. 100 g fruit provides 267 mg of this electrolyte. Potassium is an important component of cell and body fluids and helps control heart rate and blood pressure. It thus offers protection against stroke and coronary heart diseases.

The fruit also contains moderate levels of B-complex vitamins, such as niacin, pantothenic acid, and vitamin C, and minerals like manganese. Consumption of foods rich in **vitamin-C** helps the human body develop resistance against infectious agents and scavenge harmful oxygen-free radicals.

The human body uses manganese as a co-factor for the antioxidant enzyme, *superoxide dismutase*. Commercially, muskmelons are being used to extract an enzyme superoxide dismutase (SOD), which plays a vital role as a first-line antioxidant defenses in the human body.

**Table 2:** Cantaloupe (*Cucumis melo*), Fresh, Matured, Nutritive Value per 100 g

Principle	Nutrient Value	Percentage of RDA
Energy	34 Kcal	1.5%
Carbohydrates	8.6 g	6.5%
Protein	0.84 g	1.5%
Total Fat	0.19 g	<1%
Cholesterol	0 mg	0%
Dietary Fiber	0.9 g	2.25%
<b>Vitamins</b>		
Folates	21 µg	5%
Niacin	0.734 mg	4.5%
Pantothenic acid	0.105 mg	2%
Pyridoxine	0.072 mg	5.5%
Riboflavin	0.026 mg	2%
Thiamin	0.017 mg	1%
Vitamin A	3382 IU	112%
Vitamin C	36.7 mg	61%
Vitamin E	0.05 mg	0.5%
Vitamin K	2.5 mcg	2%
<b>Electrolytes</b>		
Sodium	1 mg	0%
Potassium	267 mg	6%
<b>Minerals</b>		
Calcium	9 mg	1%
Copper	41 µg	4.5%
Iron	0.21 mg	2.5%
Magnesium	12 mg	3%
Manganese	0.041 mg	2%
Zinc	0.18 mg	1.5%
Carotene-α	2020 µg	--
Crypto-xanthin-β	1 µg	--
Lutein-zeaxanthin	26 µg	--

(Source: USDA National Nutrient data base) [28]

### 2.3. Orange [23]:

The orange most commonly grown today is *Citrus sinensis* (sweet orange) which differs from *Citrus aurantium*, the bitter orange. Sweet orange commonly called orange is a member of **citrus** family and a major source of vitamins, especially vitamin C, sufficient amount of folacin, calcium, potassium, thiamine, niacin and magnesium [25].

Fruits belonging to the citrus group described as “hesperidium,” which means a fruit with sectioned pulp inside a separable rind. Citrus fruits, as such have long been valued for their wholesome nutritious and antioxidant properties. It is a scientifically established fact that citrus fruits especially oranges by their abundance of vitamins, antioxidants, and minerals can benefit in many ways.

Moreover, it is now an acknowledged fact that the other biologically active, non-nutrient compounds in the citrus fruits such as **phytochemical antioxidants, soluble and insoluble dietary fibre, pectin** which help in cutting down cancer risk, chronic diseases like arthritis, obesity, and coronary heart diseases. By binding to *bile acids* in the colon, pectin has also been shown to reduce blood

cholesterol levels by decreasing its re-absorption in the colon.

The fruit is low in calories, contains no saturated fats or cholesterol.

Oranges is an excellent source of **vitamin-C** (provides 48.5 mg per 100 g, about 81% of DRI); Vitamin-C is a powerful natural antioxidant which helps the human body develop resistance against infectious agents and scavenge harmful, pro-inflammatory free radicals from the blood.

The fruit contains a variety of phytochemicals. **Hesperetin, naringin, and naringenin** are flavonoids found in citrus fruits. Naringenin is found to have a bioactive effect on human health as antioxidant, free radical scavenger, anti-inflammatory, and immune system modulator.

Oranges also contain very good levels of *vitamin-A*, and other flavonoid antioxidants such as *α* and *β* -carotenes, *β* -cryptoxanthin, *zeaxanthin* and *lutein*. These compounds have been known to have antioxidant properties. Vitamin-A also required for maintaining healthy mucosa and skin and essential for good eye sight. It is also a very good source of B-complex vitamins such as thiamin, pyridoxine, and folates. These vitamins are essential in the sense that the human body requires them from external sources to replenish.

The fruit contains some amount of minerals like potassium and calcium. Potassium is an important component of cell and body fluids that helps control heart rate and blood pressure through countering pressing effects of sodium [2].

Orange juice is rich source of essential nutrients and antioxidants. The total antioxidants activity of orange juice is found to be higher than the orange wine [21].

A 225 ml glass of orange juice contains approximately 125 mg of vitamin C, 500 mg of potassium, 75 mcg of folic acid [8]. One medium orange provide approximately 70 mg of vitamin C, 235 mg of potassium, 3.0g non-starch polysaccharides (NSP) contributing to meeting the daily fibre goal [8].

**Table 3:** Oranges (*Citrus sinensis*), Ripe Nutritive Value per 100 g. Total-ORAC- 1819 µmol TE/100 g

Principle	Nutrient Value	Percentage of RDA
Energy	49 Kcal	2.5%
Carbohydrates	11.89 g	9%
Protein	0.94 g	1.5%
Total Fat	0.30 g	0.5%
Cholesterol	0 mg	0%
Dietary Fiber	2.50 g	6%
<b>Vitamins</b>		
Folates	39 µg	10%
Niacin	0.274 mg	2%
Pantothenic acid	0.250 mg	5%
Pyridoxine	0.063 mg	4.5%
Riboflavin	0.040 mg	3%
Thiamin	0.087 mg	7.5%
Vitamin C	48.5 mg	81%
Vitamin A	230 IU	8%
<b>Electrolytes</b>		
Sodium	0 mg	0%



Potassium	179 mg	4%
<b>Minerals</b>		
Calcium	40 mg	4%
Copper	39 µg	4%
Iron	0.09 mg	1%
Magnesium	10 mg	2.5%
Manganese	0.023 mg	1%
Zinc	0.06 mg	1%

(Source: USDA National Nutrient data base) [28]

#### 2.4. Basil Seeds

Sweet Basil Seeds are a boon and are considered to be a superfood due to its tremendous qualities it possesses in terms of medicinal uses thanks to its different chemical constituents. Sweet Basil Seeds belong to plant *Ocimum basilicum*.

Sweet Basil Seeds are a rich source of many polyphenolic flavonoids especially Orientin and Vicenin; essential oils like eugenol, citronellol, linalool, limonene, citral and terpineol; High levels of beta carotene, lutein, zeaxanthin, Vitamin A and Vitamin K; minerals like potassium, manganese, copper, calcium and magnesium, and vitamins C and folates. Moreover there have been various studies to prove that Sweet Basil Seeds are having properties like weight loss, healthy skin, cooling effect, prevention of acidity, anti-inflammatory, anticancer, etc [5].

Sweet Basil Seeds are having many uses, nutritional facts and medicinal values and surprising health benefits:

**Basil seeds for weight loss:** It is used for weight management purposes. It is rich in fiber thus it makes your stomach full and don't feel hungry to a certain period of time. After soaking into water, Sweet Basil Seeds have the capacity to expand to 30 times their original size making an excellent natural diet supplement [26]. They are helpful for *hair nourishment* [20]. Sweet Basil seeds contain adequate amount of vitamin K, protein and iron. The latter are important to make your hair healthy and shiny. They are good to get healthy skin [9]. Sweet Basil Seeds when used along with coconut oil is effective to eliminate many skin related diseases. They help to *treat acidity* [10]. Sweet Basil Seeds are having *cooling* and *soothing* effects on the stomach treating stomach burn. Helps in *treatment of diabetes*. The seeds work very well to control blood sugar in people with type 2 diabetes. *Relieves constipation:* Soaked sweet basil seeds when eaten help to cleanse the inner stomach. It ensures easy bowel movement and helps to flush out harmful toxins from the stomach. It is also taken with milk before going to bed to ease constipation. *As a coolant:* These seeds are used to lower body heat. It is an important ingredient used in summer in a number of drinks such as 'Alooda-A Mauritian Speciality', 'Falooda in Asian Countries', 'Indian lemonade', 'Indian Lemon water'. These delicious and refreshing drinks are well appreciated by any person in need to quench their thirst. *Lowering Cholesterol Levels* [16]. Sweet basil seeds could be used to reduce cholesterol levels in patients. *Anti Cancer:* The Omega-3 fatty acids and the antioxidants in Sweet Basil Seeds reduce the production of free radical in the body and reduce degenerative diseases like cancer, *Alzheimer's diseases* and many more [3].

#### Nutritional values of sweet basil seeds [3, 11]:

Contains many polyphenolic flavonoids especially Orientin and Vicenin. These contribute to the antioxidant benefits. These compounds were tested in-vitro laboratory for their possible anti-oxidant protection against radiation-induced lipid per-oxidation in mouse liver.

Rich in essential oils like eugenol, citronellol, linalool, limonene, citral and terpineol. These provide antibacterial and anti inflammatory benefits.

High levels of beta carotene, lutein, zeaxanthin, Vitamin A and Vitamin K. These compounds help act as protective scavengers against oxygen-derived free radicals and reactive oxygen species (ROS) that play a role in aging and various disease processes.

Zeaxanthin is a yellow flavonoid carotenoid compound, is selectively absorbed into the retinal macula lutea where it found to filter harmful UV rays from reaching the retina. Studies suggest that Sweet Basil Seeds which are rich in zeaxanthin anti-oxidant help to protect from age-related macular disease (AMRD), especially in the elderly.

Contains good amounts of minerals like potassium, manganese, copper, calcium and magnesium, and vitamins C and folates. Potassium is an important component of cell and body fluids, which helps control heart rate and blood pressure. Manganese is used by the body as a co-factor for the antioxidant enzyme, superoxide dismutase. It is a very good source of iron at 40% RDA per 100 grams. Iron, being a component of hemoglobin inside the red blood cells, is one of the chief determinants of oxygen-carrying capacity of the blood.

Contains 42% of carbohydrates, 20% proteins and almost 25% fats. High fiber content. Low in calories and have alpha-linolenic acid abbreviated as ALA acid. It is highly beneficial since it has Omega-3 fatty acids.

High in calcium (244% of recommended daily dose (RDD)), magnesium (178% RDD), iron (499% RDD), potassium (56% RDD), folic acid (78% RDD) and vitamin E (53% of RDD).

**Table 4:** Basil seeds (*Ocimum basilicum*), Nutritional value per 100g of Sweet Basil Seeds [27]

Principle	Nutrient value
Energy	975 kJ / 233 Kcal
Protein	23 g
Carbohydrates	48 g
Fat	4 g
<b>Vitamins</b>	
Vitamin A	744 IU
Vitamin B6	1.34 mg
Vitamin E (alpha-tocopherol)	10.7 mg
Vitamin K	1714.5 mcg
Vitamin B1	0.08 mg
Vitamin B2	1.2 mg
Vitamin B3	4.9 mg
Vitamin B5	0.838 mg
Vitamin B9	310 mcg
Vitamin B complex	54.9 mg
Betaine	16.1 mg

Minerals	
Calcium	2240 mg
Iron	89.8 mg
Magnesium	711 mg
Phosphorus	274 mg
Zinc	7.1 mg
Copper	2.1 mg
Manganese	9.8 mg
Selenium	3 mcg
Electrolytes	
Sodium	76 mg
Potassium	2630

### 3. Material and Methods

#### 3.1. Material Required

For the preparation of star fruit, muskmelon, orange and basil seed squash required material was collected. The fresh ripe star fruit, fresh ripe orange and matured muskmelons were procured from the local market and cleaned thoroughly with potable water before preparation of pulps. Chemicals and solvents used in the study were of AR grade and water was glass distilled. Sugar and basil seeds were procured from the local market. Potassium Metabisulphite (KMS), citric acid and other materials required were used from the laboratory stock.

#### 3.2. Preparation of Mixed Fruit Squash:

At first, juice was extracted from orange, star fruit and pulp from muskmelon. For extraction, fresh and ripe oranges and star fruit were collected. In case of muskmelon, matured ones were procured from the local market. Then orange, star fruit and muskmelon were washed thoroughly and peeled. The sections of orange were passed through electric fruit juicer to extract juice. Muskmelon was cut into small pieces using steel knife, the seed and other fibrous material were removed from central cavity. The scooped out pulp was blended using a mixer, homogenized and filtered through a muslin cloth. Star fruit was cut into pieces and pressed by using juice press. The juice from star fruit and orange was strained separately through muslin cloth.

##### 3.2.1. Preliminary study:

The preliminary test was carried out to determine initial total soluble solid percentage (TSS) and acidity of all three juice samples. The TSS was measured using the hand refractometer. Acidity was measured as % of anhydrous citric acid.

**Table 5:** Preliminary test results:

Juice	TSS	pH	% acidity
Orange	12	3.3-4.9	0.8
Muskmelon	13	6.17-7.13	0.2
Starfruit	10	3.44-4	0.8

According to specification, squash was formulated. The required specification was **TSS: 40%**; **Acidity: 1.25%**; **Juice: 25%**; **KMS: 350 ppm (SO<sub>2</sub>)**.

For 500 ml of each sample:

$$\text{KMS required} = \frac{(350 \times 222 \times 500)}{(10^6 \times 128)}$$

Acid to be added = (acid required – acid present in pulp)  
 Sugar to be added = TSS required – (TSS present + acid to be added + KMS required)  
 Water to be added = 500 – (pulp + acid to be added + KMS required + Sugar to be added)

The formulations of all samples are given in Table 6.

**Table 6:** Different proportions of ingredients for preparation of 500 ml Squash

Ingredients	Sample S <sub>1</sub>	Sample S <sub>2</sub>	Sample S <sub>3</sub>
Juice (ml)	125	125	125
Sugar (gm)	181.3	186.43	187.68
KMS (gm)	0.303	0.303	0.303
Citric acid (gm)	5.76	5.76	5.76
Water (ml)	162.5	182.5	181.34

The blended juices were used for preparation of squash as per FPO guidelines by mixing star fruit, muskmelon and orange juice in different combinations. The formulations of squashes were coded as S1, S2 and S3 for the study.

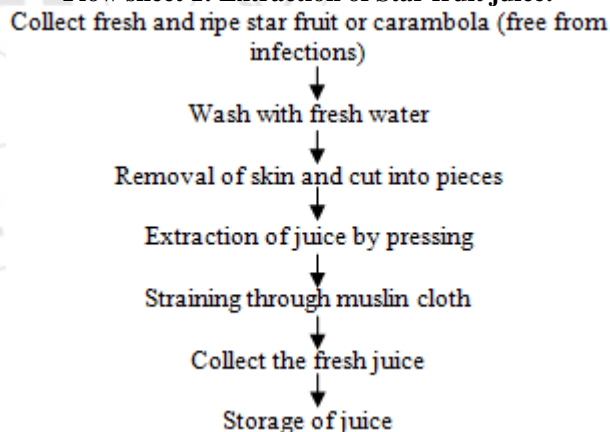
**Table 7:** Different proportions of fruit juices for preparation of 125 ml mixed fruit juice

Fruit juice composition	Sample S1	Sample S2	Sample S3
Star fruit	33.28%	24%	28%
Muskmelon	33.28%	48%	24%
Orange	33.28%	28%	48%

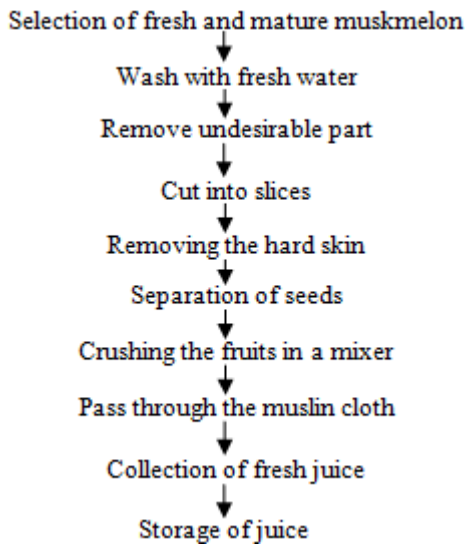
Basil seeds were added in same proportion for all the three samples. Sugar and citric acid was used for improving the sweetness and lowering the pH respectively. Potassium meta-bisulphate (KMS) was used as preservative.

#### 3.2.2. Procedure for preparation of Mixed Fruit Squash:

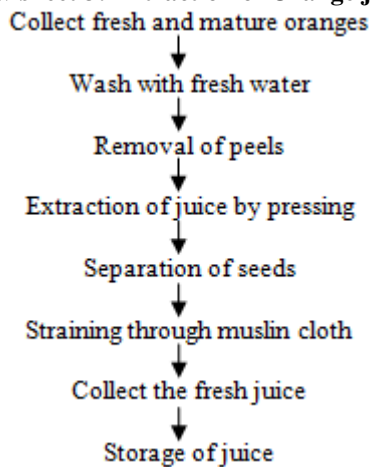
##### Flow sheet 1: Extraction of Star fruit juice:



##### Flow sheet 2: Extraction of Muskmelon juice:

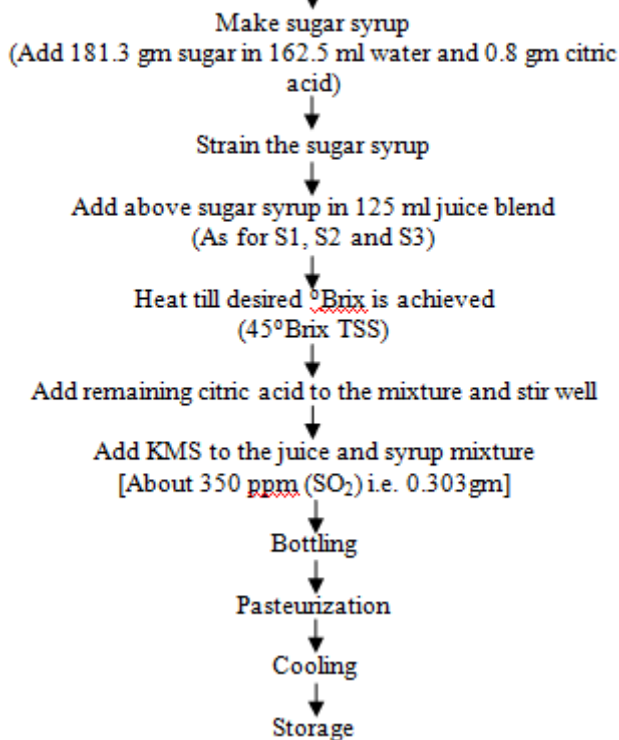


**Flow sheet 3: Extraction of Orange juice**



**Flow sheet.4: Preparation of Mixed Fruit Squash (FPO, 1995)**

Blending of Star fruit, Muskmelon and Orange juice  
 (At various levels like S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub>)



**4. Sensory Evaluation**

Sensory evaluation is a scientific discipline that analyses and measures human responses to the composition of food and drink, e.g. appearance, touch, odor, texture, temperature and taste. Various scales or methods are used for the sensory evaluation of product. For sensory analysis of my star fruit, muskmelon and orange squash, three samples were prepared and sensory was done with the help of semi-trained panel of 10 members. For sensory analysis of my fruit squash, hedonic scale was used for better result. It is most widely used scale for measuring food acceptability is the 9 point hedonic scale. On this scale rating or marks are given according to acceptability of product. Various parameters are included in this scale for sensory analysis such as color, flavor, overall acceptability, clarity, consistency etc.

**5. Chemical and Nutritional Evaluation**

Chemical and Nutritional evaluation of squash made from star fruit, muskmelon, orange and basil seeds was done for parameters like pH, moisture, ash, acidity, TSS, energy, protein, carbohydrates, total sugar, fat and vitamin C was carried out by AOAC method.

**6. Result and Discussion**

**6.1. Sensory Analysis Results:**

After that, according to specification, squash was formulated. The formulations of squashes were coded as S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub> for the study.

The ratio of Star fruit: Muskmelon: Orange was:

S<sub>1</sub> = 33.28 : 33.28 : 33.28;

S<sub>2</sub> = 24 : 48 : 28;

S<sub>3</sub> = 24 : 28 : 48

9 point hedonic scale was used starting from like extremely to dislike extremely.

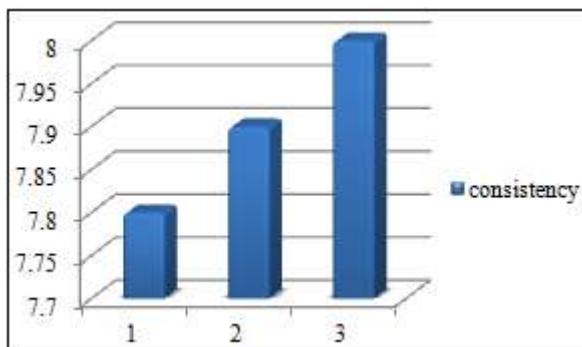
**Table 8:** Format for 9 point hedonic scale

Sample	Consistency	Flavor	Appearance	Taste	Overall acceptability
A					
B					
C					

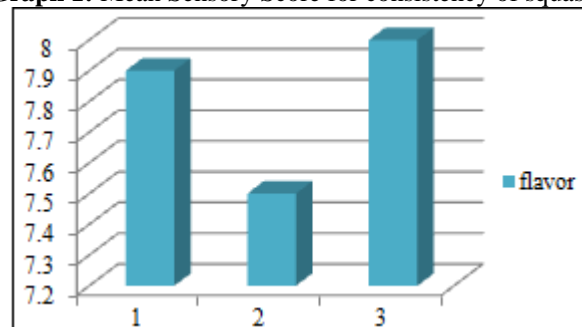
1. Dislike extremely
2. Dislike very much
3. Dislike moderately
4. Dislike slightly
5. Neither like nor Dislike
6. Like slightly
7. Like moderately
8. Like very much
9. Like extremely

**Table 8:** Mean sensory score of mixed fruit squash

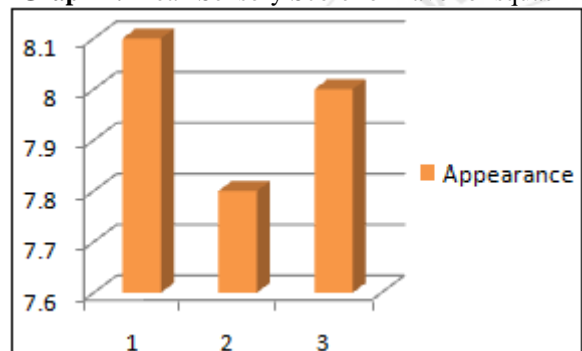
Sample	Consistency	Flavor	Appearance	Taste	Overall Acceptability
A	7	6.9	7.4	7.1	7.3
B	7.7	7	7.5	7.5	7.6
C	7.6	7.5	7.5	7.9	7.7



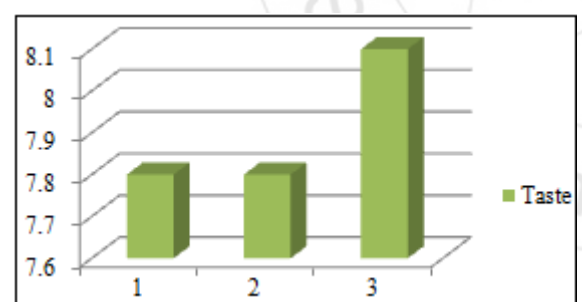
Graph 1: Mean Sensory Score for consistency of squash



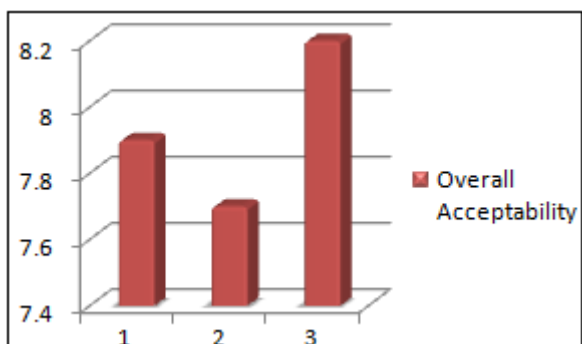
Graph 2: Mean Sensory Score for flavor of squash



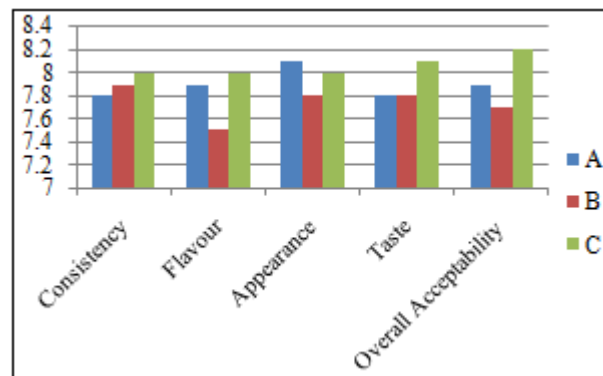
Graph 3: Mean Sensory Score for appearance of squash



Graph 4: Mean Sensory Score for taste of squash



Graph 5: Mean Sensory Score for overall acceptability of squash



Graph 6: Mean Sensory Score obtained for various proportions of squash

## 6.2 Chemical and Nutritional Analysis Results

Nutritional evaluation of squash made from star fruit, muskmelon, orange and basil seeds was done for parameters like pH, moisture, ash, acidity, TSS, energy, protein, carbohydrates, total sugar, fat and vitamin C was carried out by AOAC method.

Table 9: Nutritional and physico-chemical parameters

Sr. No.	Parameter	Result
<b>Chemical and Physical Parameters</b>		
	pH	4.19
	Moisture	48.4 %
	Total Ash	0.06 %
	Acidity	1.25 %
	Total Soluble Solids/°Brix	45 %
<b>Nutritional Analysis</b>		
	Energy Value	206 Kcal/100 ml
	Protein	0.1 g/100 ml
	Carbohydrate	51.5 g/100 ml
	Total sugar	36.4 g/ 100 ml
	Fat	0.1 g/ 100 ml
	Vitamin C (as Ascorbic acid)	329 mg/100ml

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