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# Studies on Preparation of Orange and Beetroot Fortified Jelly

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**Abstract -** Beetroot is rich in bioactive compounds and also rich in betalian, carotenoids, powerful dietary source.Beetroot mainly consist of 87% water,8% carbohydrates and 2-3% of fiber. Fortified Beetroot and orange Jelly making involves important constituents such as pectin, acid and sugar. In order to make value addition, the present study of beetroot jelly fortified with orange (Orbeet jelly) which is in the proportion of 60:40 respectively was successfully done that contains beetroot as base, as it contains active compounds, vitamins and minerals.Orange is selected on the basis of its higher pectin content and rich source of vitamin C, vit.A, floate,Calcium and potassium.It improved heart health, reduce blood pressure and enhance the exercise capacity.it contains Energy-386 Kcal, Carbohydrate-79%, floate-37%, vit.C-14 mg,Vit. A- 6.5 mg. In final product, the present study was made for development of Orbeet jelly and its sensory attribute was carried out. Jelly was successfully developed by using 2% pectin, 0.5% citric acid and 61% sugar.The jelly with the goodness of beetroot and orange having a good nutritional value was developed successfully.it can be recommended to all age groups to maintain the immunity.

***Key Words***: Dietary source, Fortified, Bioactive, Constituents, Sensory attributes.

## 1.INTRODUCTION

**Beetroot (*Beta Vulgaris*)** is botanically classified as a herbaceous biennial from Chenopodiaceous family and has various varieties with bulb colors ranging from yellow to red. Therefore, it can be consider as a factor for cancer prevention. They have anti-microbial and anti-viral properties. They are rich in valuable active compounds such as carotenoids, glycine, betaine, saponins, betacyanin's, folates, betanin, polyphenol and flavonoids. It is an alkaline food with pH range of 7.5 to 8.0. It contains vitamin A, B1, B2, B6, and C. It is good source of calcium, magnesium, copper, phosphorus, sodium, and iron. The bright color of beetroot is due to red pigment known as betalian, Betanin obtained from roots, is used industrially as red food colorant, to improve color and flavor of tomato paste, sauce, desserts, jam and jellies, candy etc.

Beetroot having a good therapeutic and nutritional value and it is rich in carbohydrate, fiber and number of micronutrients and bioactive compounds. Betalian is a natural food colorant which is approved by European Union and labeled as E-162 that gives red color to the final product. Orange is blended with beetroot as a flavour replacer of earthy smell of beetroot. it is a pectin rich fruit and beetroot lacks pectin so that will help to increase the texture and also enrich the jelly with nutrients especially vitamin-C. In order to make value addition, the present study of beetroot jelly blended with orange which is in the proportion of 60:40 was successfully done.

**Orange** is a hybrid (Citrus sinensis or Citrus x sinensis) of ancient cultivated origin belonging to family *Rutaceae.* Orange is known as powerhouse of nutrition.it get pleasant smell is the work of chemical called limonene and linalool. orange fruit is excellent source of vit.C, floate, calcium, phosphorus. It is having a anti-inflammatory, antifungal and antibacterial properties.

Jelly is a semi-solid product prepared by boiling of a clear, strained solution of pectin containing fruit extract, free from pulp, after addition of sugar and citric acid. A perfect jelly should be transparent and well set. It should be firm enough to retain a sharp edge but enough when pressed. It should not be gummy, sticky, and syrupy or have crystallized sugar. Its main constituents are fruit juice, pectin, sugar, citric acid. The jelly has more space to be popular among all age groups.

**Health benefits-**

i. Beneficial for eye and skin health.

ii. It may improve the heart health.

iii. It reduces the blood pressure.

iv. It is helpful to maintaining the Hb.

v. To boosts the immunity.

vi. It has anti-carcinogenic properties.

The health benefits of beetroot and orange are enormous and have huge positive impact on human health. Liping Chen (2021)

## 2. Materials and Methods

**Beetroot**

Fresh, mature undamaged vegetable (beetroot) were purchase from the local market in Malegaon (M.S.)

**Orange**

Fresh and mature undamaged oranges were purchase from the local market in Malegaon (M.S.) and it is available in months of August to March.

**Sugar**

It purchased from the local market. Sugar has several functions in jelly. It does more than give a sweet flavor. The high concentration used it "binds" water. In addition, sugar acts as a preservative by "typing up" water so that most micro-organisms cannot grow

**Pectin**

It purchased from local market. Pectin is used as thickening agent.

**Citric Acid**

It will be purchase from the local market. Acid in fruit is required to form the gel. Low acid will affect gel set and the fruit may flat to the top, instead of staying immersed and it act as a preservative.

**2.1 Manufacturing Process**

1. **Selection of raw material:** Select the beetroot of variety "Beta vulgaris" (Detroit dark Red) and select the matured oranges of variety "tangerine" having high pectin content.

2. **Washing and peeling:** Wash the beetroot as well as oranges with clean water free from Dirt, dust and soil. Remove the outer skin by hand peeling.

3. **Slicing:** Cut the beetroot into pieces and cut the orange into halves and remove the Seeds before juice extraction.

4. **Boiling:** Boiling the pieces of beetroot in 1.5 times of water for extraction of juice.

5. **Extraction of juice:** Extract the juice from both beetroot and orange with the help of Food processor.

6. **Straining of juice (filtration):** Filter the juice with the help of juicer sieve or by muslin Cloth to obtain clear and transparent juice.

7. **Boiling of strained juice with addition of sugar:** Mix the beetroot and orange clear Juice in the ratio of 60:40 respectively. Boil the extract with continuous stirring and add Sugar to it.

8. **Addition of pectin with continuous stirring:** Add the pectin slowly with continuous Stirring to avoid the clump formation.

9. **Heating mixture till end point:** Heat the mixture till it reaches the end point of 65°brix and add of citric acid just before it reaches end point.

10. **Judging the end point:** The end point is obtained at TSS-65° Brix by hand/digital Refractometer or determine it by using sheet test.

11. **Setting of jelly:** Set the jelly at room temperature for minimum 20 minutes.

12. **Packaging and labeling:** Pack the jellies in the wrapper and place it in transparent PET boxes and label them.

13. **Storage:** Store the jelly at clean and dry place.

**2.2 Processing Details:**

Size-2.5cm x 2 cm □

Cooking- temperature- time-70$^0$C-1.30 hour □

Beetroot Juice- 60 %

Orange juice- 40% □

Storage- 3 months

**2.3 Processing and Analytical Equipment:**

1. Knife
2. Hand Peeler
3. Food Processor
4. Cooking Pot
5. Gas Stove
6. Mould
7. Weighing balance
8. Hot Air Oven
9. Muffle Furnace
10. Dessicator
11. Soxhlet Apparatus
12. Kjeldhal Apparatus
13. pH Meter
14. Digital Refractometer
15. Autoclave
16. Incubator
17. Laminar Air Flow
18. Digital Colony Counter
19. Glasswares

## 3. Results and Discussion

### 3.1 Proximate composition of Orange:

**Table 1. Proximate composition of Orange**

| Sr. No. | Parameters (%) | Orange |
|---|---|---|
| 1. | Moisture | 95 |
| 2. | Protein | 5.17 |
| 3. | Crude Fat | 4.41 |
| 4. | Total Ash | 2.53 |
| 5. | Sugar | 9.20 |
| 6. | Total Dietary Fiber | 74.14 |
| 7. | Indigestible Dietary Fiber | 55.47 |
| 8. | Digestible Dietary Fiber | 19.1 |
| 9. | Water holding capacity (g/g) | 5.9 |

Proximate composition of orange peel powder presented in table-1 revealed that it contain 95 per cent moisture, 5.17 per cent protein, 74.14 per cent total dietary fiber and 4.41 per cent fat, these results are comparable with findings reported by Humaira et al.,(2013). The results of the water and oil holding capacity are found comparable with findings reported by Nassar et al., (2008).

### 3.2 Proximate composition of Beetroot:

**Table 2. Proximate composition of Beetroot**

| Sr. No. | Parameters (%) | Beetroot |
|---|---|---|
| 1. | Moisture | 87 |
| 2. | Carbohydrate | 7.59 |
| 3. | Protein | 1.35 |
| 4. | Crude Fat | 0.3 |
| 5. | Total Ash | 1.4 |
| 6. | Crude Fiber | 1.9 |
| 7. | Iron | 0.75 |
| 8. | Calcium | 12.20 |

Proximate composition of Beetroot presented in table-2 revealed that it contain 87 per cent moisture, 1.35 per cent protein, 1.9 per cent crude fiber and 0.3 per cent fat, the iron content is 0.75, while the proportion of calcium in beetroot is more i.e., 12.20 percent. These values are comparable with findings reported by Rifat Jahan et al.,(2021).

### 3.3 Proximate analysis or Orange Beetroot Jelly:

The Orange and Beetroot fortified jelly has been prepared with the formulation of 60:40 ratio of Orange and Beetroot Juice respectively. The formulation was finalized after trials of varied proportions of Orange and Beetroot juices.

**Table 3. Proximate analysis or Orange Beetroot Jelly**

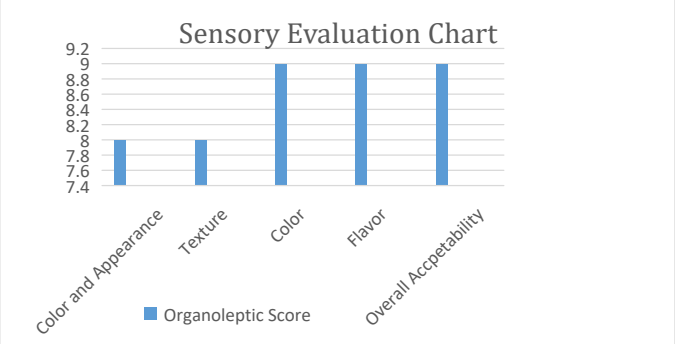
| Sr. No. | Component | Value (Per 100g) | Methods |
|---|---|---|---|
| 1. | Carbohydrate | 79 | By Calculation |
| 2. | Protein | 1.25 | Micro Kjeldhal |
| 3. | Fat | 0 | Soxhlet |
| 4. | Moisture | 8.3 | Hot Air Oven |
| 5. | Ash | 11.4 | Muffle Furnace |
| 6. | Energy | 381 Kcal | By Calculation |
| 7. | Vitamin A | 6.5 mg | Calorimetric |
| 8. | Vitamin C | 14 mg | Titration |
| 9. | Iron | 4 mg | By Reference |
| 10. | Calcium | 1 mg | By Reference |
| 11. | Phosphorous | 3 mg | By Reference |

Proximate analysis given in the table-3 highlights the contents of chemical components analyzed in the Orange Beetroot fortified jelly. The carbohydrate found was 79 percent, protein content found 1.25 percent, Moisture found 8.3 percent, Ash was 11.4 percent, Energy content found to be 381 Kcal per 100 g. The values of vital constituents e.g., Vit. A, Vit. C, Iron, Calcium and Phosphorous found 6.5 mg, 14 mg, 4 mg, 1 mg and 3 mg respectively.

### 3.4 Sensory Analysis:

| Sr. No. | Characteristics | Score |
|---|---|---|
| 1. | Color and Appearance | 8 |
| 2. | Texture | 8 |
| 3. | Taste | 9 |
| 4. | Flavor | 9 |
| 5. | Overall Acceptability | 9 |

### 3.4.1 Sensory Evaluation Chart:




## 4. Conclusion

The beetroot jelly blended was successfully prepared. The primary aim was to introduce the jelly in market with the goodness of both fruit (orange) as well as vegetable (beetroot). In order to make value addition, the present study of beetroot jelly blended with orange which is in the proportion of 60:40 respectively was successfully done. The best formulation for jelly was obtained with use of orange with the combination of beetroot (60:40). The development of beetroot jelly blended with orange was standardized using 2% pectin, 0.5% citric acid and 65% sugar. The jelly is subjected to physical, chemical, microbiological, storage study and shelf-life analysis.

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