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Preparation of Nagpur Mandarin Jelly to Achieve Optimal Quality and Sensory Score

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ABSTRACT

Nagpur mandarin (Citrus reticulata Blanco) is a prominent citrus variety grown in Maharashtra, India, appreciated for its high juice content, vibrant color, and rich aroma. Despite its commercial significance, postharvest losses due to spoilage remain high. This study aims to utilize Nagpur mandarin in jelly production by optimizing sugar concentration and pH for enhanced physicochemical and sensory qualities. Nine different formulations varying in sugar content (60, 65, and 70°Brix) and pH (3.0, 3.2, and 3.4) were prepared and evaluated. Among these, jelly prepared with 65°Brix sugar and pH 3.2 showed the most desirable attributes in terms of gel strength, texture, flavor, and appearance. The findings offer a framework for commercial production of Nagpur mandarin jelly to improve utilization and profitability.

Keywords: Jelly, Nagpur mandarin, Quality parameters

1. Introduction

India is one of the largest producers of citrus fruits, and Nagpur mandarin holds a prominent position due to its appealing taste and nutritional value. Seasonal glut and inadequate storage facilities often lead to considerable postharvest losses. Value addition through jelly processing provides an effective solution for preserving fruit while creating consumer-preferred products. Nagpur mandarin (Citrus reticulata Blanco) is a commercially important citrus variety, predominantly cultivated in the Vidarbha region of Maharashtra, particularly in Nagpur and Amravati districts. Maharashtra accounts for approximately 1.35 lakh hectares under mandarin cultivation, with Vidarbha contributing nearly 80% of the area, making it the citrus hub of the state (Deshmukh et al., 2023; Bhagyashree et al., 2023). The average productivity in Maharashtra is around 3.9 tonnes per hectare, while Vidarbha shows relatively better performance, yielding between 9 to 10 tonnes per hectare under improved management conditions (ICAR-CCRI, 2022).

Jelly is one of the most popular fruit-based products globally due to its appealing taste, attractive color, and extended shelf life. It plays a significant role in the preservation and value addition of seasonal fruits, helping to reduce postharvest losses and stabilize market prices (Ranganna, 2011). In the context of citrus fruits like Nagpur mandarin, jelly processing offers an effective means of utilizing surplus produce, especially during glut seasons, when the fruit has low market demand. Jellies provide a nutritious alternative to artificial spreads and are rich in natural fruit sugars, pectin, and essential vitamins such as vitamin C (Gopalan et al., 2009). Moreover, the processing of jelly enables small and medium enterprises (SMEs) and Farmer Producer Organizations (FPOs) to generate income and employment in rural areas (Deshmukh & Wadatkar, 2021). Therefore the study aims to Preparation of Nagpur Mandarin Jelly to Achieve Optimal Quality and Sensory Score.

2. Materials and Methods

2.1 Raw Materials

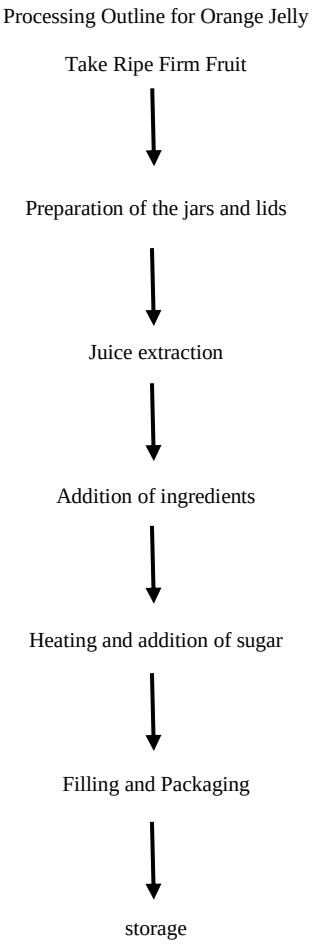
Fresh Nagpur mandarins were sourced from local orchards near Nagpur. Sugar, food-grade citric acid, and commercial citrus pectin were used as ingredients. All chemicals used for analysis were of analytical grade.

2.2 Jelly Preparation

Procedure:

Extract juice from oranges. Lit on the gas flame on medium flame and add sugar in it. Start stirring it. Take a gelatin power according juice. Mix gelatine powder with water. After melting sugar in juice add the wet gelatine powder in it. Start stirring it. At boiling point the gelatine starts to become gummy.

Pour this mixture in a glass mould. Kept the mould for setting jelly. After 45 mins jelly starts to get setted. Cut it into pieces and store it. Fruit preserves are preparations of fruits whose main preserving agent is sugar and sometimes acid, often stored in glass jars and used as a condiment or spread. The process flow chart is given below.



2.4 Physicochemical Analysis

Standard AOAC (2005) procedures were followed:

1. TSS:

Total Soluble Solids (TSS) is an important quality parameter that indicates the concentration of dissolved sugars and other soluble substances in fruit products such as jelly. TSS directly affects the sweetness, texture, and gel formation of jelly. It is commonly measured using a hand refractometer, which determines the refractive index of the sample and expresses it as °Brix, representing the percentage of sucrose by weight. The measurement is conducted by placing a small drop of the jelly on the refractometer prism, and readings are taken at room temperature to ensure accuracy (AOAC, 2005; Ranganna, 2011).

2. pH:

pH Measurement is a critical step in the preparation of fruit jellies, as it influences gel formation, flavor, and preservation. The pH of the jelly sample was measured using a calibrated digital pH meter, following standard procedures (AOAC, 2005; Ranganna, 2011).

3. Acidity

Acidity is an important parameter in assessing the quality of fruit jellies, as it affects flavor balance, preservation, and gel formation. Titratable acidity (expressed as citric acid percentage for citrus fruits) was determined by titrating a known volume of jelly sample against a standard solution of sodium hydroxide (NaOH) using phenolphthalein as an indicator, following the AOAC (2005) method. Briefly, 10 ml of jelly sample was diluted with distilled water, and a few drops of phenolphthalein were added. The solution was then titrated with 0.1 N NaOH until a faint pink endpoint persisted for 30 seconds. The acidity was calculated using the volume of NaOH consumed, considering the sample dilution and expressed as percentage citric acid (Bhagyashree et al., 2024).

2.5 Sensory Evaluation

Sensory evaluation of the sample was carried out by semi-trained sensory panel member using 9 point hedonic scale. Attributes like taste, color, appearance, flavor and overall acceptability was scored based on its intensity scaled. 9-Point Hedonic Scale has been used for the purpose.

4. Results and Discussion

4.1 Sensory Evaluation

Table 4.1 Organoleptic score of Orange Jelly

products	Colour	flavour	Texture	Overall acceptability	Average
Weilfield Jelly	8.4	8.2	8.1	8.1	8.2
Jujube jelly	8.1	8.0	7.9	8.0	8.0
Freshvilla	8.8	8.6	8.4	8.5	8.58
Acme Products	8.3	8.1	8.0	8.1	8.12
Developed Orange Jelly	8.5	8.4	8.2	8.4	8.38

From above table 4.1 it shows that the organoleptic score of developed Jelly was found at par with other commercial products. Average Organoleptic score of Developed orange Jelly was 8.38. colour of Developed orange Jelly is better as compared to other commercial products.

4.1 Physicochemical Quality Parameters

The physicochemical properties of Nagpur mandarin jelly varied significantly with the changes in sugar concentration and pH levels. Table 1 summarizes the mean values for total soluble solids (TSS), pH, acidity.

Table 4.2 Quality Parameters of Jelly

Parameters	Readings
Water activity	0.795
pH	3.25
TSS (%)	68.75
Acidity (%)	3.4

Total Soluble Solids (TSS):

TSS values of prepared jellies ranged from 60 to 70 °Brix, directly influenced by the sugar concentration used. Higher sugar concentrations resulted in higher TSS, which is critical for jelly gelation and sweetness perception.

pH:
pH adjustment with citric acid resulted in values between 3.0 and 3.4. Lower pH favored gel strength but extreme acidity (pH 3.25) adversely affected flavor balance.

Moisture Content:

Moisture content inversely correlated with sugar concentration. Higher sugar formulations had reduced moisture, contributing to better shelf stability but potentially a firmer texture.

Acidity:
Acidity ranged from 3.20 to 3.5% across formulations.

5. Conclusion

The results confirm that sugar concentration and pH are critical factors influencing Nagpur mandarin jelly quality. Moderate sugar content (68 °Brix) and pH (3.25) produced a gel with desirable strength, retained bioactive compounds like vitamin C, and delivered superior sensory attributes. Excessively low pH, although improving gel strength, compromised flavor acceptability, while too high sugar led to crystallization issues.

6. Acknowledgments

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