DEVELOPMENT AND QUALITY ASSESSMENT OF MANGO JAM

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Abstract

A mango is an edible stone fruit; the scientific name of mango is *Mangifera indica*. Mangoes are rich in beta-carotene, antioxidants, and vitamin-c, which aids the immunity, iron absorption and growth and repair.it also a good source of fibre, which can help to regulate digestion and prevent constipation. Mango jam is low in calories yet high in nutrient, and it helps to maintain the healthy weight. This study focus on the development of mango jam by using local mangoes and evaluate the sensory evaluation, nutritional values, and shelf life. The mango jam made using mango pulp, sugar, lemon. The different proportions of ingredients used are Mango-200 gm+ sugar 120 gm +1 small size of lemon (sample A), Mango-200gm+ 100 gm of sugar+ 2 tablespoons of lemon (sample B), Mango-200gm +70 gm of sugar+ 1 tablespoon lemon (sample C). sample A demonstrated desirable sensory evaluation based on the taste panel. The selected sample A has a CHO-(56 gm), protein-(6.41 gm), fat- (<0.1), crude fibre-(<0.1), moisture-(37.60), ash - (<0.1). In Sample A, the microbial growth was not observed till the end of the end of the storage period and the total plate count is <10, so it was safe for consumption.

Key words: Mango pulp, nutrient analysis, sensory analysis, microbial analysis.

1. INTRODUCTION

Mango (Mangifera indica L.) is the one of the fruits that around 73 genera of the family Anacardiaceae and it is the most versatile and it widely cultivated fruit crops of subtropical and tropical regions. (*Tamerat Gutema and Anteneh Tadesse, 2022*). While mango peel is considering approximately 7-24% of the total weight mango fruit. Moreover, reported mango peels as a rich source of dietary fibre, cellulose, hemicellulose, lipids, protein enzyme and pectin. It is very good for human health. The research has done on the processing technology of the mango & mango by-product to enhance the quality and utilization of the mango as an important food resource. Mango are processed at two stages as raw and ripe one. Green fruit is used to make chutney, pickles, green mango powder and dehydrate product. After ripe product is used to make mango pulp, slices, jam, juices, beverages, puree, nectar and various dried products. (*Keshawn Deeksha and Mishra Sunita*, 2018).

Mango is one of the well-liked fruit because of it has a rich nutritional profile with an excellent flavour, aroma, taste, texture and colour. Mango is the excellent source of vitamin C and A and rich in dietary antioxidants, carbohydras, minerals like potassium and phosphorus, phenolic compounds and Its yellow-orange characteristic colour was carotenoids. Consumption of mango was suggested to dietary carotenoids are considered to be valuable in the prevention of certain cancers and eye diseases and overcome vitamin A deficiency. (*Melkam Bekele MSc et al,2020)*

Figure 1: Mango *(mangifera indica)*

Due to its unique characteristics nature of horse mango, when it ripe, it has a strong aroma and a coarse texture, the ripe horse mango is eaten or used relatively rare, resulting in relatively low prices for fresh fruit. Farmers therefore prefer to use horse mango for cooking. However, there are still a lot of horse mangoes that cannot be sold. Mostly, the horse mango is consumed as a ripe fruit, and it is well likely consumed as a savoury dish such as yellow curry. The researchers find that, there is an only few products that can be apply horse mango as an ingredient. These studies that can concentrated on the antioxidant properties of commercial mango (Mangifera indica), no research article has been published on the horse mango (Mangifera foetida) variety. Thus, there is a need to explore the health promoting properties of this underutilized fruit. (*Saowapan Palasuwan & Dudsadee Sapbua, 2020).* Approximately, 1/3rd of all fresh fruits has lost before it reaches to the consumers. The Another estimation suggests that is about 30%-40% of total fruits produced and lost between harvest and final consumption and these changes are in the fresh fruits can't be stopped but it can be slow down within certain limits of factors that responsible for such deterioration or by converting the most of the fruits into preserves and conserves forms such as jams, marmalades, jellies and candies that can be enhance its shelf life and availability. *(Emelike NJT and Akusu, 2019).*

Jam is a semi-solid food product made by mixing of fruit pulp, sugar along with thickening agent and acids with continuous heating practice. Sometimes other ingredients such as (preservatives, colours, and tasty ingredients) are also added for the best stability and increased edibility. According to Codex Alementarious commission, the total soluble solids of jam should not be less than 68ºbrix. *(Muhammad Yaseen, et al, 2018).* Jam is an intermediate moisture food prepared by boiling fruit pulp with sugar (sucrose), pectin, acid, and other ingredients (preservative, colouring, and flavouring materials) to a reasonably thick consistency, firm enough to hold the fruit tissues in position According to Bureau of Indian Standards (BIS) and Prevention of Food Adulteration (PFA) specifications, jam should contain more than 68.5% total soluble solids (TSS) and at least 45% fruit. *(Santanu Basu, U.S. Shivhare,2010).*

The success in making the fruit jam is influenced by fillers. Fillers are the food additives which are added to improve the quality of the product being made. The fillers in the manufacture of the mango jam are sugar, lemon (citric acid) and pectin. However, when viewed from the price and how to get it, pectin tends to be expensive and difficult to obtain. Apart from pectin, Carboxyl Methyl Cellulose or CMC has cheaper price and easier to obtain, can also be used as a thickener in making jam because it is able to bind water to form a gel structure in the product. The addition of sugar in making jam can increase the viscosity of the resulting jam. In addition, the use of sugar can also sharpen the appearance of colour and help gelation of pectin. Therefore, it is necessary to do this research to determine the addition of sugar and CMC and the right concentration to produce mango jam with the best characteristics. *(Ni Wayan Ani Maryani, et al, 2023).*

2. MATERIALS AND METHODS

2.1 Collection of raw samples

Best quality fresh, juicy, and mature mangoes were selected and bought from local fruit market. Sugar and lemon were purchased and brought from local supermarket, Hyderabad. The study was performed in in Capital degree and PG College, shapur nagar, Hyderabad, Telangana.

2.1.1 Extraction of pulp

Fresh and ripe mangoes were washed, peeled and pulp was extracted with the help of pulper. (*Muhammad Yaseen, et al, 2018).*

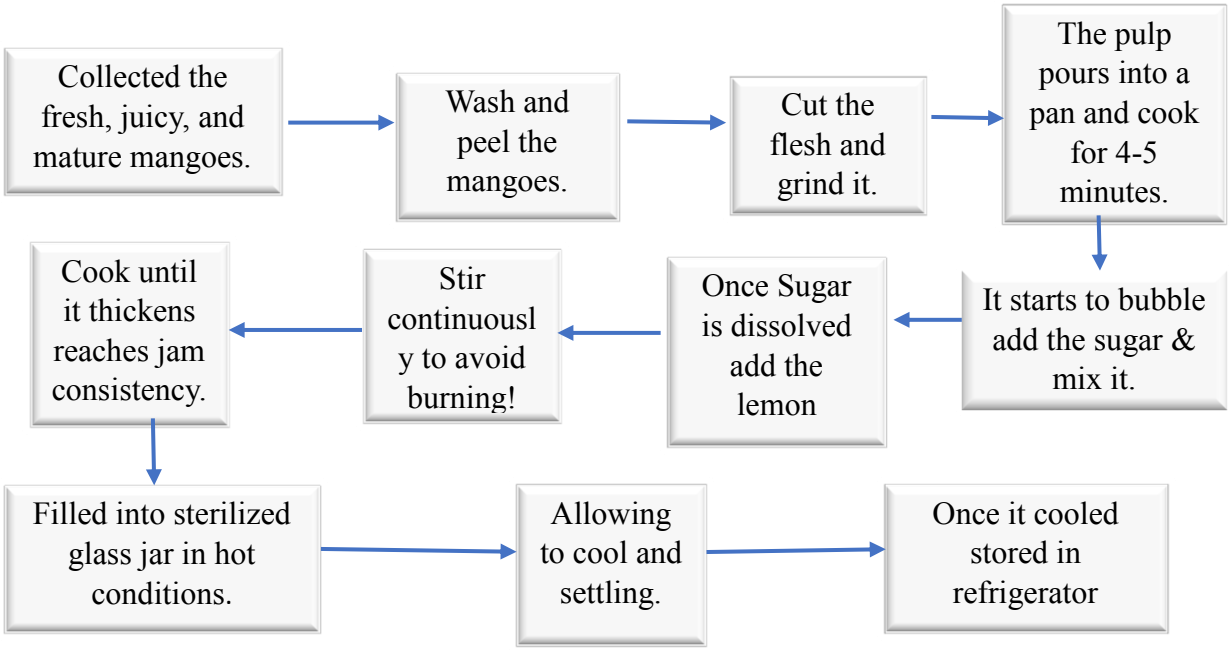
2.2 Standardization:

Different proportions are used to developed standard recipe. The repeated trails are done, and the sample is finalized based on the texture, appearance, taste, aroma, mouth feel, and over all acceptance.

Table -1: Different proportions of mango jam

Ingredients	Sample A	Sample B	Sample C
Mango pulp	200gms	200gms	200gms
Sugar	120gms	100gms	70gms
lemon	1(small size)	2 tablespoons	1 tablespoon

2.3 Preparation of mango jam



2.4 Sensory evaluation

It was carried out by a descriptive test quantifying the sensory differences by 20 panel members, who determined the sensory properties of the samples in the parameters of aroma, appearance, texture taste, mouth feel, overall acceptance. The evaluation was made using a scale of 1 to 5, being 1 the most unpleasant and 5 the most agreeable. Mango jam formulations (A, B, C) were evaluated.

2.5 Nutritional analysis

The nutritional analysis of the selected sample – A, was as follows:

Table-2 Nutritional qualities and methods of Mango jam

Nutritional qualities	Methods
Carbohydrates	IFSH/SOP/C/TE/142
Protein	IS 7219:1973
Moisture	AOAC 925.10
Ash	FSSAI Manual for cereal & cereal products
Crude fibre	FSSAI Manual for cereal & cereal products
Fat	FSSAI Manual for cereal & cereal products

2.6 Statistical analysis:

Data was obtained from the sensory analysis were subjected to mean and standard deviation and it was statistically analysed by one-way ANOVA by using a significance of 0.05.

3. RESULTS AND DISCUSSION

3.1 Sensory evaluation:

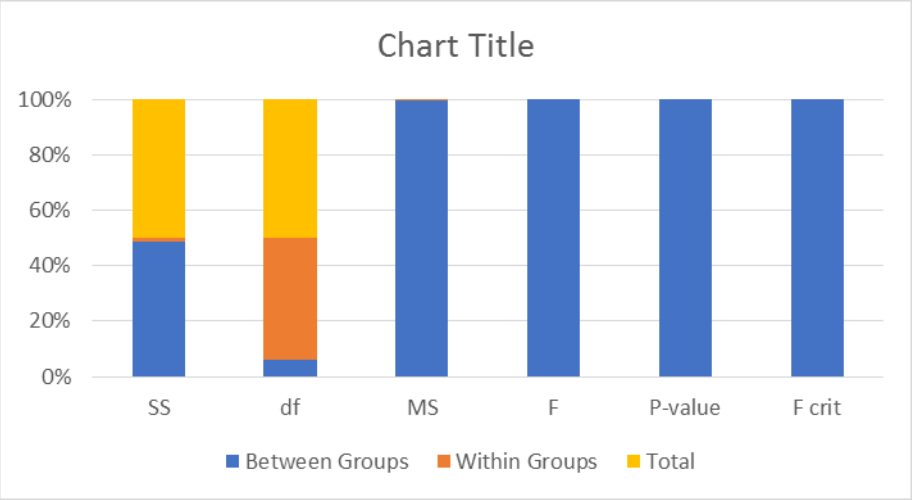
The sensory evaluation of the three samples was performed in Jeedimetla-IDA, Hyderabad. The data in the table-3 shows the average (mean) and the standard deviation of the sensory scores for different parameters. In the evaluation of aroma, Sample-A rating of 4.75, sample B received a score 4 and Sample C scored 3.49. In the term of appearance, Sample A appealing rating 4.75, Sample B received slightly lower 4.17 suggesting very small variability and Sample C obtained a lower score 3.4. Regarding to texture, Sample A received the highest rating of 4.9 indicating a pleasant and consistent texture, Sample B scored 4.17 and Sample C received a score of 3.49 indicating a slightly less consistent texture.

In the term of taste, Sample A showed with a high score of 4 indicating a favourable taste, Sample B scored 4.2 and Sample C obtained a score of 3.22. In the mouthfeel category, Sample A again received a high score of 4.82 gives a pleasant sensation, Sample B obtained a slightly lower score of 4.22 indicating a moderate pleasant sensation and Sample C scored 3.25 suggesting a less consistence mouthfeel compared to the other two samples. In overall acceptability, both Sample A and Sample B obtained high scores of 4.85 and 4.25, respectively, and Sample C obtained a score of 3.37 indicating the lesser overall acceptability.

Table- 3. Mean and Standard deviation of the different samples for sensory parameters

Parameter	Sample-A	Sample-B	Sample-C
Aroma	4.75±0.303	4±0.229	3.49±0.399
Appearance	4.62±0.358	4.17±0.335	3.4±0.383
Texture	4.9±0.205	4.17±0.244	3.49±0.363
Taste	4.8±0.251	4.2±0.340	3.22±0.302
Mouthfeel	4.82±0.293	4.22±0.302	3.25±0.380
Overall Acceptance	4.85±0.235	4.25±0.256	3.37±0.358

Chart-1. Calculated ANOVA values for the means of the samples



3.2 NUTRITIONAL ANALYSIS OF SELECTED MANGO JAM

The nutritional analysis was performed at Intertek labs, Jeedimetla, Hyderabad. As shown in table 4, the selected mango jam sample had 56 g/100g of carbohydrates, <0.1 g/100g of fat, 6.41 g/100g of protein, <0.1 g/100 g of crude fibre,37.60g/100g of moisture content, <0.1 g/100g of ash. According to one of the article the apple mango varieties was observed that moisture content (71.30%), Ash content (0.36%). *(Melkam Bekele, et al, 2020).*

According to another research article jam and marmalade's, result revealed that moisture content of the jam samples ranged from 23.29%-45.21% for Pineapple Jam and Guava Jam, ash 0.19 Mango Jam-0.82% Sour-Sap Jam, protein 0.20 PJ-0.73% Sour-Sap Jam, crude fat 0.02 Lemon Jam-0.44% Cashew apple Jam and carbohydrate 53.64%-74.87% for samples Guava Jam and Pineapple Jam, respectively. Results for the proximate analysis of marmalades showed that moisture content ranged from 24.92%-49.02%, ash 0.24%-0.62%, protein 0.28%-0.86%, fat 0.08%-0.22%, and carbohydrate 50.03%-74.19%. (Emelike NJT and Akusu OM, 2019).

Table- 4. Nutritive values of the mango jam

S.NO	PARAMETERS	RESULTS	UNITS
1	Carbohydrates	56.00	g/100g
2	Protein	6.41	g/100g
3	fat	<0.1	g/100g
4	Crude fibre	<0.1	g/100g
5	moisture	37.60	g/100g
6	ash	<0.1	g/100g
Microbial parameters			
7	Total plate count	<10	CFU/gm

3.3 SHELF-LIFE OF MANGO JAM

The shelf-life analysis was performed at Intertek labs, Jeedimetla, Hyderabad. The selected mango jam sample was kept for 1 month of storage. In selected mango jam, the microbial growth was not observed till the end of the storage period and the total plate count is <10 cfu/gm by total plate count test parameter (Table 4).

there are three verities of mango jams which were taken like Abusamaka, GulbAltour, Magloba. In that the first mango jam of Abusamaka variety, in which initial and 60 th day storage period time was not detected any total vibal count (CFU/G) was zero (0), 120 days total vibal count was-12 CFU/G and in 2nd variety of GulbAltour mango jam in which initial day total vibal count was-12 CFU/G and 60th days total vibal count was-10 CFU/G, 120 days total vibal count was-5 CFU/G the final variety of Magloba mango jam in which initial day total vibal count was-16 CFU/G and 60th days total vible count was-zero (0), 120 days total vibal count was-13 CFU/G (Abdelazim A. M. Nour, et al, 2011).

4. CONCLUSION

The mango jam standardized with 200 mango pulp with 120 of sugar and 1 small size of lemon, was highly acceptable in terms of sensory evaluation such as aroma, appearance, texture, taste, mouthfeel, and overall acceptance. The standardized recipe of mango jam was highly nutritious which can help to regulate digestion and prevent constipation. Mango jam is low in calories yet high in nutrient, and it helps to maintain the healthy weight. carotenoids are considered to be valuable in the prevention of certain cancers and eye diseases and overcome vitamin A deficiency. The microbial growth was not observed till the end of the storage period and the total plate count is <10, so it was safe for consumption.

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