



Preparation and Standardisation of Gulamba and Assessment of Acceptability through Sensory Evaluation

^{*1}Dr. Leena R. Chitlange

^{*1}MSc, Ph.D. (Food Sci & Nutrition), DJ, L.L.B.

Principal, Savitribai Phule Mahila Mahavidyalaya, Washim, SGB Amaravati University, Amravati, Maharashtra, India.

Abstract

In present investigation Gulamba was prepared in three samples A, B, C with different proportions, i.e. 1:0.80, 1:1 and 1:1.2 respectively. Standardization of Gulamba was done to check the acceptability and ensure fixed nutritional content and ease of preparation. Proximate analysis of all three products and raw ingredients was conducted. There was no significant difference in nutritional quality of all three products, however ranking can be done on the basis of sensory evaluation. Product A stood third, product B stood second and product C stood first in overall acceptability of the product. The intension of this investigation was to promote the incorporation of the Gulamba as source of vitamin A, vitamin C, folic acid, energy, fibre and many other antioxidants with medicinal properties as well as minerals like potassium, in the meals of common people.

Keywords: Mango, Jaggery, Vitamin A, Vitamin C, Energy, Potassium, Antioxidants, Mangiferin, Fibre, Standardization, Sensory Evaluation, Acceptability.

Introduction

Mango, the word itself makes the mouth watery. The mango is called the king of all fruits. It is only due to the nutritional quality of mangoes. This fruit is a complete package of almost all nutrients. Mangoes are generally available in summer only. There are variety of food products which are available in mango flavor just like, ice creams. Pickles, Squashes, Cakes, Jams, Jellies, Soft Drinks and many more. There are many traditional methods of preserving the flavor of mangoes throughout the year. These include; Pickles, Murabba, Methamba, Chutneys and Gulamba.

Gulamba a classic Maharashtrian recipe of a raw mango jam or a flavorful raw mango chutney is a perfect accompaniment to make an ordinary meal extraordinary. It can be used as accompaniment with chapati, Missi Roti (Thalipith in Maharashtra), as a bread Spread, in sandwiches, muffins, Swiss tarts or even in cakes. Preparation and ingredients used in making Gulamba may change with geographical regions, or even community wise. But their integral position in Indian meals, no one could change, rather variations as per taste, texture, availability of the variety of raw mango and shelf life are common.

Gulamba can play a very important role in nutritional completion, appearance and overall acceptability of a meal. We can consider Gulamba as a flavoring ingredient as well as a source of macro and micro-nutrients in a meal.

Present study was aimed to develop and standardize the

Gulamba as a source of vitamin A, vitamin C, folic acid, energy, fibre and many other antioxidants with medicinal properties as well as minerals like potassium, in the meals of common people for increasing the acceptability/attraction of the meals and to assess the overall acceptability of the product with reference to various sensory parameters like appearance, aroma, texture and taste. Cost and storage period was also considered.

Importance of Standardization of Recipe

All recipes may not be equally perfect although the person preparing is same every time. There may be some lacunas in taking quantity or in preparation in absence of a standardized recipe, which may vary or affect the acceptability of the product. A Standardized recipe is a set of written instructions used to consistently prepare a known quantity and quality of food. A standardized recipe will produce a product which is very close to identical in taste and in yield every time it is prepared and no matter if the person preparing is changed or same. Standardized recipe has very important role in food industry either on large or small scale. Through use of a standardized recipe, one can achieve a consistent quality, quantity, standard portion size and cost assuring nutritional content and addressing dietary concerns, such as in case of therapeutic diets or food allergies. It aids in purchasing raw ingredients, work simplification, training of new staff, curtail wastage and most importantly can satisfy consumer ^[1, 2, 3].

Sensory evaluation has been defined as a scientific discipline used to evoke, measure, analyze, and interpret human reactions to food product's sensory characteristics as perceived by sight, smell, taste, touch, and hearing by the Institute of Food Technologists (IFT). Sensory science has been recognized as a scientific discipline and sensory evaluation is used as a component to judge quality, shelf-life, and consumer acceptance of the food products [3].

Sensory evaluation is necessary before marketing to ensure the acceptability of a food product by the consumers. Sensory evaluation is a statistical analysis method based on human sensory perception, which is carried out under double-blind conditions. When compared with other detection and analysis methods, sensory evaluation can not only measure the taste of food, but also detect changes in aroma, color, surface features, and taste perception. The results of a sensory evaluation can provide the necessary grounds for adjusting the taste to satisfy the consumer [2, 4].

Mango

In some parts of the world, mango (*Mangifera indica*) is called the "king of fruits". It's a drupe, or stone fruit, which means that it has a large seed in the middle. Mango is native to India and Southeast Asia, and people have cultivated it for over 4,000 years. Hundreds of types of mangoes exist, each with its own characteristic taste, shape, size, and color. [5]

Mango is not only delicious but also boasts an impressive nutritional profile. Mango is rich in vitamins, minerals, and antioxidants, and it has been associated with many health benefits, including potential anticancer effects, as well as improved immunity and digestive and eye health. [5]

Aids in Weight Loss: In fact, most fresh fruits and vegetables tend to have a low calorie density. One study found that consuming fresh fruit like mango at the start of a meal could help keep you from overeating later on in the meal. [6]

Helps to Prevent Diabetes: A 2020 study concluded that consuming fruits and vegetables high in vitamin C and carotenoids could help prevent the onset of diabetes [7]

High in Antioxidants: Mango is packed with polyphenols, which are plant compounds that act as antioxidants to protect your body. [3] Mango has different types concentrated antioxidants in its pulp, peel, and even seed kernel. These include mangiferin, catechins, anthocyanins, gallic acid, kaempferol, rhamnetin, hydroxybenzoic acid. Antioxidants protect cells against free radicals. Research has linked free radical damage to signs of aging and chronic diseases. [8]

Builds Immunity: Mango is a good source of immune-boosting nutrients. It is rich in Vitamin A and Vitamin C. 1 cup approximately 165g of mango supplies 10% and 67% respectively of daily requirements. Vitamin A supports eye health and Vitamin C along with other nutrients like copper, Folic acid, Vitamin E and several B vitamins support to build immune health. [9]

Supports Heart Health: Mango contains nutrients that support a healthy heart. It contains good amounts of magnesium and potassium which maintain a normal blood flow as well as relax blood vessels resulting in lowering blood pressure. Studies have found that mangiferin may protect heart cells against inflammation, oxidative stress, and cancer. In addition, it may help lower your blood cholesterol, triglycerides, and free fatty acids. [10]

Aids in Digestion: Mango has several qualities that make it excellent for digestive health, as it contains a group of digestive enzymes called amylases. Digestive enzymes break

down large food molecules so that your body can absorb them easily. Moreover, since mango contains plenty of water and dietary fiber, it may help with digestive issues like constipation and diarrhea.

One 4-week study in adults with chronic constipation found that eating mango daily was more effective at relieving symptoms of the condition than taking a supplement containing an amount of soluble fiber similar to that of mango. [11]

Eye Health Support: Mango is full of nutrients that help support healthy eyes. Two key nutrients they contain are the antioxidants lutein and zeaxanthin. Mangoes are also a good source of vitamin A, which supports eye health.

Anticancer: Mango is high in polyphenols, which may have anticancer properties. Polyphenols can protect against a harmful process called oxidative stress. [12]

Mango is delicious, versatile, and easy to add to your diet as part of smoothies, squashes, marmalades and many other dishes. To preserve the taste of this king fruit throughout the year, many recipes are available. Gulamba is one of them.

Jaggery: Jaggery is more than just a sweetener. For centuries, it has been an essential part of traditional diets in various cultures, especially across South Asia, Africa, and Latin America. Jaggery is generally considered healthier than refined white sugar because it retains minerals like iron, calcium, and potassium, which are removed during processing of sugar. From being a natural source of energy to supporting digestion and boosting immunity, jaggery offers a multitude of health benefits.

Jaggery helps to clean the liver by flushing out harmful toxins from the body. It stimulates digestive enzymes and aids bowel movement, preventing constipation. It helps balance pH levels and reduces acidity in the stomach. It acts as a natural cleanser, removing mucus and easing asthma and bronchitis symptoms. Jaggery mixed with warm water or ginger can act as a natural remedy for cold and cough. When consumed in moderation, jaggery can support metabolism and reduce water retention.

Jaggery is rich in antioxidants and minerals like zinc and selenium, jaggery strengthens the immune system. Its high iron content helps to increase hemoglobin levels and prevents anemia. The potassium and sodium in jaggery help maintain acid levels and regulate blood pressure. The antioxidants in jaggery help to reduce oxidative stress, keeping skin healthy and glowing. Its potassium and antioxidants support heart health by regulating blood flow. Some trace minerals in jaggery support the eye health and may help to reduce age-related decline. Jaggery contains calcium and magnesium, which are essential for bone strength. Its anti-inflammatory properties can help to reduce joint pain and stiffness. Its mineral content supports metabolic functions and improves nutrient absorption.

Jaggery helps release endorphins in the brain, relieving stress and inducing relaxation. Unlike refined sugar, jaggery provides slow-release energy, keeping you energized longer. Jaggery is known to relieve menstrual pain and regulate hormone levels. It is often recommended for breastfeeding mothers to improve milk production. In traditional medicine, jaggery has been used to improve libido and reproductive health. [13]

Watermelon Seed: Watermelon seeds are rich in nutrients like magnesium, iron, and calcium, which support bone and muscle health, regulate blood pressure, and enhance immune function. They contain heart-healthy fats and bioactive compounds, such as lycopene, which may support heart health

and help protect against chronic disease. Watermelon seeds provide plant-based protein and insoluble fiber, which support digestion and may help manage cholesterol and blood sugar levels. [14]

Materials and Methods

For this investigation following material and methods were used.

Preparation of Chutney

- i). **Totapuri Mango:** 3 kg
- ii). **Jaggery:** 3 kg
- iii). **Rock Salt:** 10g/1kg of all ingredient's mixture.
- iv). **Black Salt:** 10g/1kg of all ingredient's mixture.
- v). **Melon Seeds:** 25g/1kg of all ingredient's mixture.
- vi). **Cardamom Powder:** 1 tsp.
- vii). **Nutmeg Powder:** ½ tsp.

Method

- i). Just ripe and undamaged Totapuri Mangoes were selected. Mangoes were soaked in water for half an hour, cleaned; peeled and cut into small pieces (for each 1kg mango separately)
- ii). Mango pieces were steamed for 10 minutes.
- iii). 0.8 kg, 1.0 kg and 1.2 kg of Jaggery was crushed separately for all three products and processed into a 2-string syrup after straining for removal of impurities.
- iv). 1kg of steamed mango pieces were added to 3 different

syrup sample

- v). Then cooked together for 15 minutes (Plate test for flowing consistency)
- vi). Then rock salt, black salt, cardamom powder, nutmeg powder and watermelon seed kernels were added and cooked for five minutes.
- vii). After cooled down stored in 3 different jars.
- viii). Special care was taken for maintaining hygiene.

Selection of Sensory Evaluation Panel

Balanced individuals were selected as panel member for this purpose. Their evaluation skill was tested. Three samples of the product were kept for this test. In these three samples two were identical in proportions, and third sample was prepared with minor difference in proportions, though all three were looking same. Individuals were asked to evaluate the products. Individuals who could recognize the same sample were selected as a panel member for the sensory evaluation. All the members of sensory evaluation panel were asked to give score out of 10 to sample A, B and C.

Score shall be

10 - Very good.

9 - Good.

8 - Fair.

Proximate Analysis: Proximate analysis of all ingredients and samples was done in MIT College, Sambhajinagar with standardized methods.

Results and Discussion

Table 1: Nutritional content of Totapuri Mango and Jaggery per 100g. [15, 16]

Nutrient	Protein (g)	Fat (g)	Fibre (g)	CHOs (g)	Energy (Kcal)	Vit C (mg)	Vit A (µg)	Potassium (mg)	Calcium (mg)	Iron (mg)
Totapuri Mango	0.8	0.2	1.7	18	65	35	607	160	13.3	0.28
Jaggery	0.4	0.1	00	97	383	00	00	1056	86	11.0

In sample A proportion of Totapuri Mango Pulp and Jaggery is 1:0.8, In Sample B percentage of Totapuri Mango Pulp and Jaggery is 1:1 and in Sample C percentage of Totapuri Mango Pulp and Jaggery is 1:1.2. However, quantity of watermelon

seeds, Cardamom and nutmeg powder is same in all three samples. i.e. 25g, 5g, and 2.5g respectively. Even, quantity of the Rock Salt, Black Salt (10g each) used is also same in all the three products A, B and C.

Table 2: Nutritional Content of Sample A (Totapuri Mango Pulp 100g + Jaggery 80g i.e. proportion 1:0.8)

Nutrient	Protein (g)	Fat (g)	Fibre (g)	CHOs (g)	Energy (Kcal)	Vit C (mg)	Vit A(µg)	Potassium (mg)	Calcium (mg)	Iron (mg)
Total	1.12	0.28	1.7	95	371	35	607	1005	82	9.1
Value per 10%	0.11	0.03	0.17	9.5	37	3.5	69	100	8.2	0.91

Table 3: Nutritional Content Per 100g of Sample B (Totapuri Mango Pulp 100g+ Jaggery 100g i.e. proportion 1:1)

Nutrient	Protein (g)	Fat (g)	Fibre (g)	CHOs (g)	Energy (Kcal)	Vit C (mg)	Vit A(µg)	Potassium (mg)	Calcium (mg)	Iron (mg)
Total	1.2	0.3	1.7	115	448	35	607	1216	99	11.3
Value per 10%	0.12	0.03	0.17	11.5	45	3.5	60	121	10	1.13

Table 4: Nutritional Content Per 100g of Sample C (Totapuri Mango Pulp 100g+ Jaggery 120g i.e. proportion 1:1.2)

Nutrient	Protein (g)	Fat (g)	Fibre (g)	CHOs (g)	Energy (Kcal)	Vit C (mg)	Vit A(µg)	Potassium (mg)	Calcium (mg)	Iron (mg)
Total	1.28	0.32	1.7	134	524	35	607	1427	116	13.5
Value per 10%	0.13	0.03	0.17	13.4	52	3.5	60	143	11.6	1.35

Difference in nutritional content of all the three products is insignificant, however, if we consider 10g serving of Gulamba, it supplies good quantity all nutrients in such small

serving size, It can prove good source of Vitamin A, Vitamin C, Potassium, Iron and Energy (Table 2, 3 and 4) and apart from these good amounts of antioxidants in a daily diet.

Table 5: Sensory Evaluation Average Score for Appearance (Sight), Aroma, Texture and Taste.

Qualities	Sample A	Sample B	Sample C
Appearance	10	10	10
Aroma	10	10	10
Touch	10	10	10
Taste	08	9	10
Total	48	49	50

From the average score for appearance. Aroma, touch and taste mentioned in table 5, it can be stated that though there is no significant difference in/between Sample A, B and C. But acceptability of the product C is consistently better in all parameters of sensory evaluation. Followed by Product B and product A is lowest in average. Though score of sensory evaluation is slightly different for all three when compared, but when served single all were acceptable to common people.

Summary and Conclusions

For promoting the incorporation of Gulamba in daily meals of common people, as a good and easily available source of Vitamin A, Vitamin C, Energy, Potassium and many other many other antioxidants with medicinal properties, three samples of Gulamba with different proportion of Jaggery were prepared. Sample C (proportion 1:1.2) ranked first, followed by Sample B (proportion 1:1) and Sample C (proportion 1:0.8) respectively. Product C was better for preservation also.

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