Original Research Article

Development and Organoleptic Evaluation of Malabar Tamarind (*Garcinia Cambogia*) Paste

Abstract

It is crucial that we incorporate nutritious and medically significant components into our daily dietary intake during this modern era. One such medicinal plant that fits this description is *Garcinia cambogia* also known as Malabar Tamarind. This plant is native to Asia and belongs to the Clusiaceae family, which is known for its medicinal properties. The Malabar Tamarind can be utilized in the form of a paste as a food preservative, tendering agent, flavoring agent, or food bulking agent for culinary purposes. The sensory acceptability of Malabar Tamarind paste is a crucial factor in its daily consumption. This study focused on the development and sensory acceptability of processed Malabar Tamarind paste. Malabar Tamarind is rich in antioxidant properties, which help boost immunity and promote good health. The research involved the formulation of the culinary paste, employing dried Malabar Tamarind rinds. The paste was evaluated through a recipe of 'Rasam' by a panel of 30 members using a hedonic scale test. The results showed that the paste was more distinguishable in terms of appearance, aroma, and mouthfeel rather than flavor and aftertaste. The paste had a dark brown to black color. These findings suggest that the paste made with Malabar Tamarind is a suitable alternative for culinary purposes, as it can replace Tamarind as a souring and tenderizing agent.

Keywords: Development, sensory evaluation, Malabar tamarind, culinary paste

1. Introduction

Fruits are magnificent blessing from nature to humanity. Undoubtedly, these consumable fruits are medicinal treasures enriched with vitamins, minerals, antioxidants, and numerous phyto-nutrients. They provide an exquisite visual delight, not only due to their vibrant colors and delightful flavors but also because of their exceptional nutritional composition that contributes to maintaining a healthy human body [1]

Native to Southeast Asia, Garcinia gummi-gutta (L.) Roxb., also called the Malabar tamarind, was formerly known by the scientific name *Garcinia cambogia* (Gaertn.) Desr. (Clusiaceae) [21]. The fruit has the appearance of a petite pumpkin and ranges in color from green to a light shade of yellow. Along the Malabar Coast, it is referred to as kudam puli, while in Tamil-speaking regions of Sri Lanka and India, it is known as goraka [2]. It has been used as a traditional remedy to treat constipation, piles, rheumatism, oedema, irregular menstruation, and intestinal parasites in many Asian countries [3] . The fruit rind of Garcinia exhibits nutraceutical properties attributed to Hydroxy Citric Acid (HCA), serving as an anti-obesity agent through its ability to suppress appetite. This is achieved by the inhibition of the enzyme ATP-citrate lyase, ultimately impeding the conversion of carbohydrates into glycogen [4]. Malabar tamarind has high anti-oxidant activity due to the presence of Garcinol a potential anti-oxidant, which proves its role in scavenging alkyl-peroxyl radicals to suppress and prevents several degenerative disorders by causing apoptosis of the carcinogenic cells [5,6].The market has witnessed a rapid surge in the popularity of products containing G. cambogia, which has earned attention from both positive and negative media sources [7]. The immense interest in this particular product is clearly demonstrated by the staggering number of over 11 million search results for "*Garcinia cambogia*" on Google®. Although weight-loss remains a trending topic, the discussion

surrounding this product has been extensive [8]. Drying, a traditional method for food preservation, is currently the primary technique used to preserve Garcinia. When there is an abundance of Garcinia, it can be transformed into longer-lasting value-added goods through the application of contemporary preservation and processing methods, thus preventing spoilage during times of surplus (Fassina, 2015) [9]. Potent anti-proliferative activity against CaCo2 and HeLa carcinoma cells was noted for all of the G. cambogia fruit pericarp extracts screened with IC50 values generally substantially<200µg/ml for the methanol, water, ethyl acetate and chloroform extracts. Despite its wide array of traditional therapeutic uses12, the anticancer properties of G. cambogia were previously unreported. However, recent studies have examined the anti-proliferative properties of the taxonomically related species G. mangostana1,42 and G. atroviridis43 and reported similar anti-cancer efficacies (Hart, 2016) [10]
The development of this culinary paste represents an exploration into harnessing the rich flavors and nutritional properties of Malabar Tamarind to create a versatile and palatable product. Formulation of the paste involves careful selection and proportioning of ingredients, including the Malabar Tamarind. Through this meticulous process, we aim to achieve a harmonious balance of flavors and textures that accentuate the unique characteristics of the Malabar Tamarind while offering a delightful culinary experience.

Following the formulation stage, the organoleptic evaluation becomes imperative in assessing the sensory attributes of the culinary paste. This evaluation encompasses a comprehensive analysis of its appearance, aroma, taste, texture, and overall acceptability. By engaging a panel of trained sensory evaluators, we seek to obtain valuable insights into the sensory perception of the paste and its potential for consumer acceptance.

The significance of this research lies not only in the development of a novel culinary product but also in the exploration of the sensory dimensions of Malabar Tamarind as a culinary ingredient. As the culinary landscape continues to evolve, the utilization of unique and exotic ingredients like Malabar Tamarind opens doors to innovative culinary creations that appeal to diverse palates. Through this study, we hope to contribute to the enrichment of culinary knowledge and the promotion of flavorful and nutritious food options.

2. Materials and Methods

Sample collection and preparation:

A specific variety of dried Garcinia Cambogia rind, which had a dark brown to black color, was selected for analysis and preparation purposes. The samples were collected randomly from the local market in Narikkuni village, located in the Kozhikode district of Kerala state. Each dried rind weighed approximately 10 to 15 grams, and a total of 200 grams of samples were taken. These samples were soaked overnight to loosen the membrane and then pressure cooked for 3-4 whistles. The Malabar tamarind was then ground to pulp using a grinder and strained in a hot pan for 5 minutes. Finally, the Malabar tamarind paste was bottled in glassware after proper cooling.

2.1 Preparation of paste

For the preparation of Malabar tamarind paste, dried rinds are washed in running water to remove the dirt and then soaked overnight. Thereafter, the Malabar tamarind rinds are pressure cooked for about 3-4 whistles. Later the rinds are added to a normal blender to form a thick paste. The paste was removed and then strained in a hot pan until they reach the desired paste consistency (Rao, 2012) [11]. Afterward, the paste was allowed to cool for approximately 5 minutes before being bottled in glassware to prevent spoilage as shown in Fig..1 and pictorially represented in fig .2

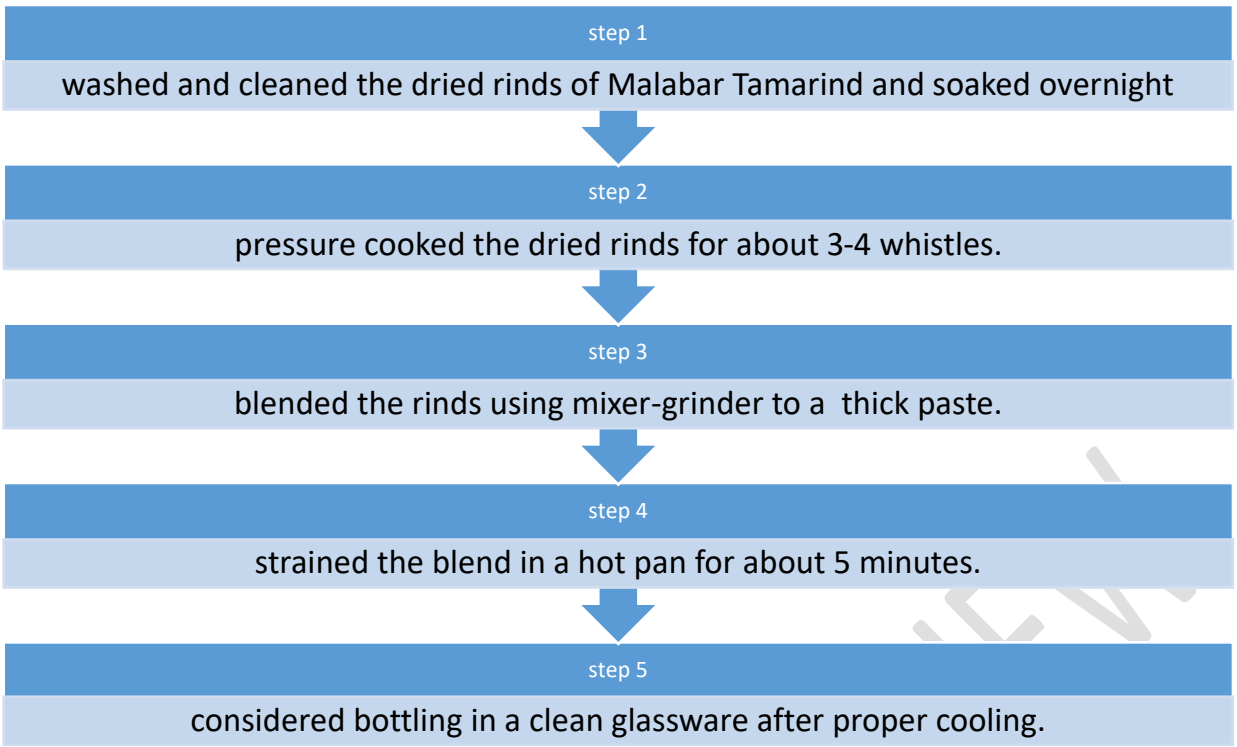
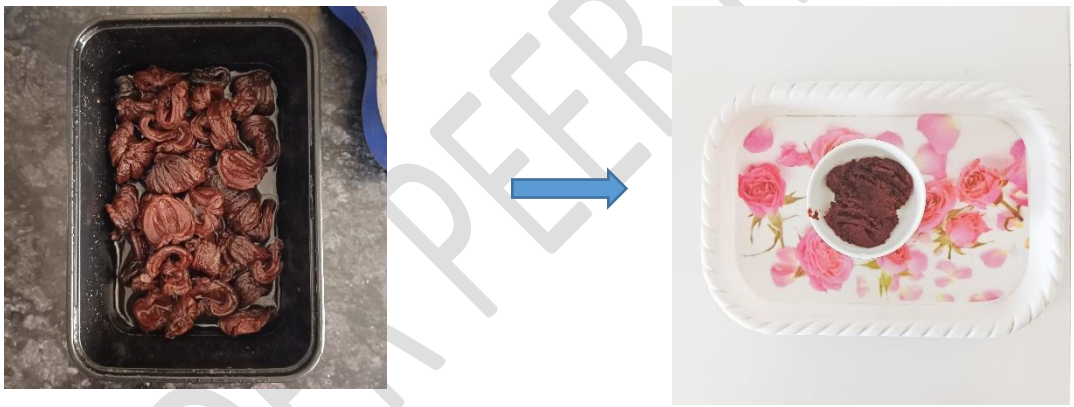


Fig. 1 Malabar Tamarind paste processing flow chart



Initial stage Final stage

Fig. 2 Preparation of Malabar tamarind paste

2.2 Preparation of 'Rasam' by incorporating Malabar Tamarind paste

'Rasam' is a quintessential South Indian dish which is a flavorful and aromatic soup-like preparation.. it is Made from a base of tamarind juice, tomatoes, and a mix of spices including coriander, cumin, black pepper curry leaves and green chilies. Mustard seeds, dried red chilies, and asafoetida are also added for further flavor enhancement. Here, Malabar Tamarind Paste is employed in place of normal tamarind.3 samples were prepared with 10, 15 and 20 gram Malabar Tamarind paste and were marked as T1, T2 and T3 respectively. (Devarajan, 2017) [12].Table 1 indicates the ingredients required for the preparation of 'rasam' and fig 3represents steps of preparation in a flow diagram. Figure 4 represents the preparation using pictures.

Ingredients required:

Table .1 ingredients required for preparing ‘Rasam’

S NO	Ingredient	Quantity
1	Malabar Tamarind paste	10/15/20
2	Hot Water	1 Cup (250 ml)
3	Black Pepper	2 Teaspoons
4	Ginger	1½ Inch Piece
5	Garlic	8 Cloves
6	Shallot	8 Nos
7	Cooking Oil	3 Tablespoons
8	Mustard Seeds	½ Teaspoon
9	Fenugreek Seeds	¼ Teaspoon
10	Dry Red Chilli	3 Nos
11	Coriander Powder	1 Tablespoon
12	Chilli Powder	1 Teaspoon
13	Turmeric Powder	¼ Teaspoon
14	Tomato	1 Nos
15	Curry Leaves	2 Springs
16	Water	3 Cups (750 ml)
17	Asafoetida Powder	1 Teaspoon
18	Salt	2 Teaspoons
19	Coriander Leaves	2 nos

Process of preparation of 'Rasam'

Heat a pan with 3 table spoon oil and add half teaspoon mustard seeds,quarter teaspoon of fenugreek and 3 dry red chillies

Add the crushed Ginger ,garlic and shallots into it.after 2 minutes add 1 tablespoon of coriander powder ,1 teaspoon chilli powder ,quarter teaspoon of turmeric powder and crushed black pepper

after 2 minutes add sliced tomato,2 springs of curry leaves and Malabar Tamarind paste , 3 cups of water and 1 teaspoon of asafetida powder.turn up the flame and mix it well.

later Add 2 teaspoon of salt and mix well .amount of salt depends upon the sourness of the Malabar tamarind .cook in medium flame for 5 minutes and then add coriander leaves and mix well .Rasam is prepared using Malabar Tamarind paste

Figure 3 : Flow chart demonstrating the preparation of 'Rasam' to evaluate Malabar Tamarind paste

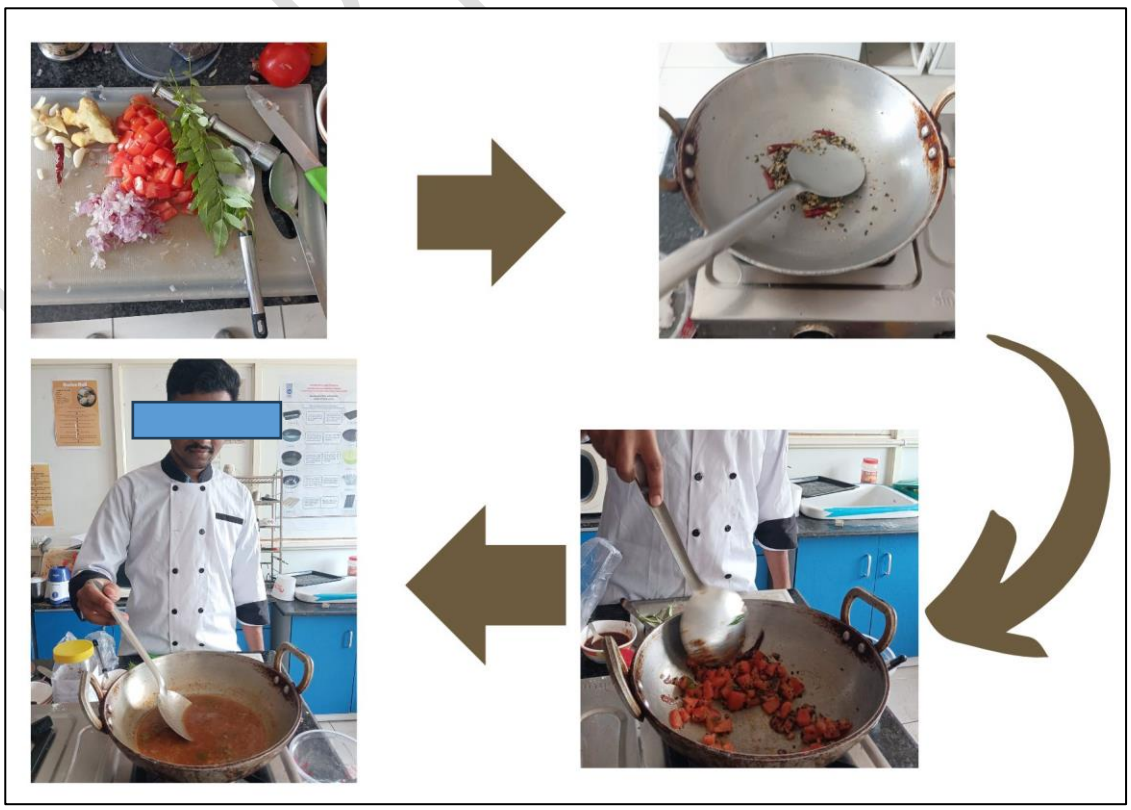


Figure 4: Flow diagram representing the preparation of 'Rasam' sample for sensory evaluation.

2.3 Sensory Evaluation

Sensory evaluation is a scientific discipline used to evoke, measure, analyze, and interpret reaction to those characteristics of food material as they are perceived by the senses of sight, smell, taste, touch, and hearing (sound) (Kemp, 2018) [13]. The sensory attributes of quality of food are measured to determine consumer acceptance/preference in order to manufacture an acceptable and affective product at maximum production economy. The sensory attributes include appearance (color, size, shape, and consistency of liquid and semisolid products), kinesthetic (texture, consistency, and viscosity), and flavor (taste and odor) (Singh-Ackbarali, 2014) [14]. The evaluation is done to determine quality criteria by which raw materials and finished products may be graded and classified. The sensory techniques help food scientists to determine the conformity of a food with established government or trade standards and food grades and product development while maintaining desirable sensory characteristics (V. Jain, 2005) [15].

Selection of panel members

The Department of Food Science & Technology at Babasaheb Bhimrao Ambedkar University Lucknow utilized an analytical separation method to carefully select panelists for the evaluation of Malabar tamarind paste. The panelists, consisting of 30 individuals who were all students and staff of the Department of Food and Nutrition, played a crucial role in the sensory analysis. They were responsible for determining the appropriate descriptive terms and standards to be employed during the evaluation process. Prior to participating, panelists were required to cleanse their mouths, abstain from consuming any food, and drink room temperature mineral water to enhance their sensory experiences (Lawless, 2010) [16]. The attributes assessed included appearance, color, flavor, taste, smell, texture, and mouthfeel. The panelists approached the hedonic test with utmost seriousness and provided their respective verdicts. Approach for the sensory evaluation is depicted in figure 6.

Sample presentation

The sample was thoroughly evaluated by the sensory panelists. The overall training experience was satisfactory. The panel members provided valuable feedback based on their taste preferences, and there was no significant impact on the results due to the session. The Malabar Tamarind paste was prepared in the Department of Food & Nutrition. Approximately 10g,15g and 20 g the prepared paste was added in sample marked as T1,T2 and T3 respectively,and they were served at a temperature of around 37°C during the evaluation. The panelists were instructed to consume at least one teaspoon of the sample. We also encouraged them to provide any suggestions to enhance the nutritional value of the Malabar Tamarind paste (Stone, 2020) [17]. Each panelist was provided with a score card and a feedback section, which greatly contributed to the improvement of our study.

Hedonic rating test

The 9-point hedonic scale utilized to assess consumer acceptability and satisfaction across all aspects yielded a positive response (Nicolas, 2010) [18]. The 40 panel members, selected randomly from Babasaheb Bhimrao Ambedkar University, were untrained, ensuring the authenticity of their judgments. These tests are designed to measure the level of acceptability of a food product compared to its unacceptability. Consumer acceptability is evaluated through this test, where a food product is assessed based on how much it is favored or disliked by the panelists. The scale typically ranges from 0 to 9, with ratings ranging from "extremely like" to "extremely dislike" as shown in figure 6 (Lim, 2011) [19]. Following the rating on these scales, the results are examined for preference using data from a large untrained panel. To streamline products, semi-trained panels are employed to sift through

numerous products, leaving only a select few for-consumer analysis. When evaluating a single product, separate evaluation cards are utilized, while a single evaluation card with an equal number of columns is used for testing and comparing multiple samples (O'Sullivan, 2011) [20].

Table 2. 9-Point hedonic scale for sensory evaluation

Rating Scale/ Hedonic scale	Score
Like Extremely	9
Like Very Much	8
Like Moderate	7
Like Slightly	6
Neither Like nor Dislike	5
Dislike Slightly	4
Dislike Moderately	3
Dislike Very Much	2
Dislike Extremely	1

Fig. 5. Sensory evaluation

3. Result and Discussion

The sensory evaluation data of the Malabar Tamarind paste induced samples were thoroughly analyzed based on the ratings provided by the panel members. The panelists not only tasted the samples, but also carefully assessed their flavor, appearance, aroma, and texture. The evaluation process was effective and produced valuable results. The findings indicate that the paste made with Malabar Tamarind is a suitable alternative for culinary purposes, as it can replace the souring and tenderizing agent Tamarind. Additionally, it is highly nutritious and possesses medicinal properties. The result of the evaluation is given below in a tabular form Table 3.

Table 3. Results of sensory evaluation

Attributes	T1 (10g)	T2 (15g)	T3 (20g)	Standard deviation
Appearance	7.6	8.4	8	±0.40
Taste	7.4	8.2	7.13	±0.55
Smell	7.26	8	7.86	±0.39
Texture	7.66	8.33	7	±0.66
Mean	7.356	8.132	7.464	

Table 3 shows the results of a hedonic rating scale sensory evaluation of Malabar tamarind paste. The hedonic rating scale is a method used to measure how people perceive the overall liking of a food product. In the study, panelists rated the appearance, taste, smell, and texture of Malabar tamarind paste on a scale presumably from 1 to 9. Higher scores indicate greater liking.

The average score for appearance across all three treatments (T1, T2, T3) was 7.97. The standard deviation was 0.40, which suggests that the panelist scores were fairly consistent. the average score for taste was 7.58. The standard deviation was 0.55, indicating a bit more variation in scores compared to appearance. The average score for smell was 7.71. The standard deviation was 0.39, which is similar to appearance. the average score for texture was 7.66. The standard deviation was the highest at 0.66, indicating the most variation in scores among all attributes. the panelists seemed to have a favorable perception of the tamarind paste, with all attributes scoring above 7 on a 9-point scale. The appearance and smell seemed to be the most consistent across tasters, while texture showed the most variation (Figure 6)

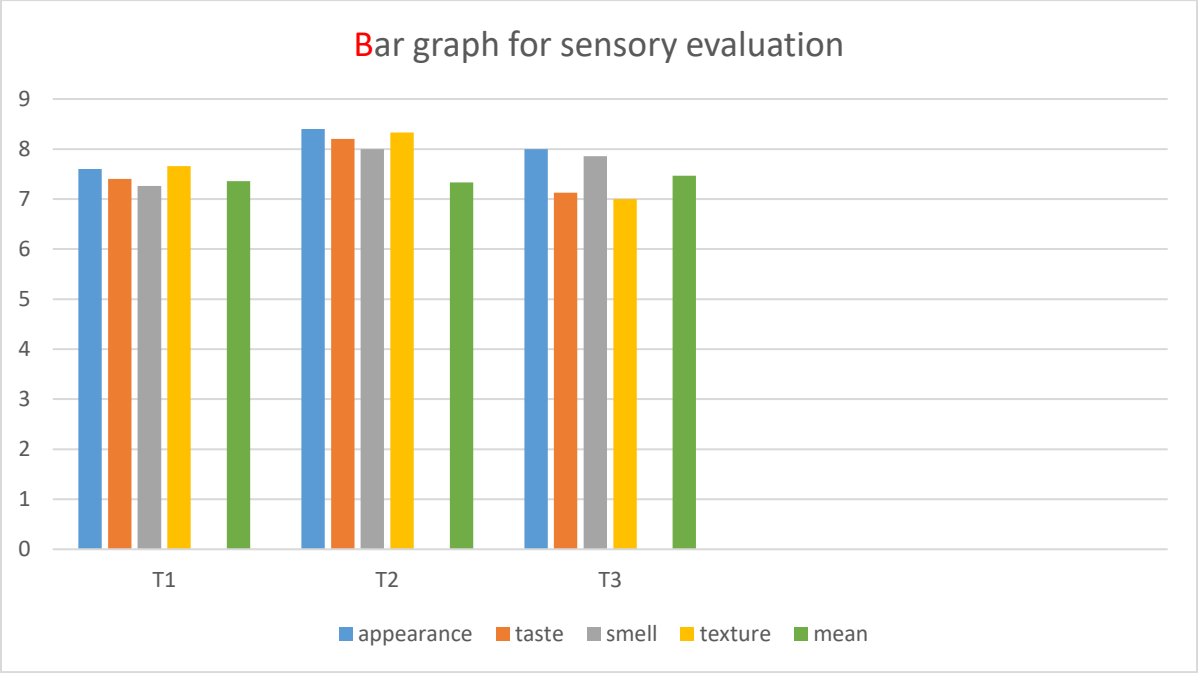


Fig. 6. Graphical representation of sensory evaluation

Conclusion

The development and organoleptic evaluation of the culinary paste prepared using Malabar Tamarind (Garcinia Cambogia) have yielded promising results. Through meticulous formulation and sensory assessment, we have successfully created a versatile and palatable product that showcases the unique flavors and textures of Malabar Tamarind.

Following a thorough analysis of the findings, it is evident that Malabar Tamarind paste has a beneficial impact on consumers, making it a viable addition to our diets for enhancing the nutritional value of our food in a practical manner.These results signify that sample T2 which was incorporated with 15g Malabar Tamarind paste was more preferred . Furthermore, this will aid food industries in diversifying their product offerings. The organoleptic evaluation provided valuable insights into the sensory attributes of the culinary paste, confirming its visually appealing appearance, aromatic complexity, well-balanced taste profile, and smooth texture. These findings underscore the potential of Malabar Tamarind as a valuable culinary ingredient, offering both flavor enhancement and nutritional benefits.

Moving forward, further research and development efforts may focus on refining the formulation of the culinary paste, exploring additional applications in various culinary contexts, and assessing its market potential. By continuing to explore the culinary possibilities of Malabar Tamarind, we can unlock new avenues for culinary innovation and contribute to the diversification of flavorful and nutritious food options.

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