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Research Paper

Acceptability of Mango Seed Kernel (Mangifera Indica) as Potential Tea Source

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Abstract

This study determined the acceptability and phytochemical properties of mango seed kernel (Mangifera Indica) as a tea source. Kernels from Carabao, Apple, and Indian Mango seeds were used in the study, which involved four drying processes: 7, 14, 21, and 28 days. The hedonic scale method was used to determine the mean level of acceptability of the tea, which was evaluated by the panelists. The presence of DPPH scavenging activity, total flavonoids, phenols, tannins, and anthocyanins was analyzed for phytochemical analysis. Statistical analysis, including mean and standard deviation, was used to evaluate acceptability levels, and ANOVA was used to determine significant differences. The results revealed that tea derived from Carabao mango kernels dried for 7 days had the highest acceptability. The phytochemical analyses of Carabao mango powder showed DPPH scavenging activity, flavonoids, phenols, and tannins; however, anthocyanins were not detected. The findings indicate that there were no significant differences in the mean sensory evaluation of the Carabao Mango kernel tea samples in terms of color, odor, taste, and general acceptability. In contrast, significant differences were observed among Apple Mango kernel tea samples for color and odor, while no significant differences were found for taste and general acceptability. Similarly, significant differences were noted among the samples of Indian Mango kernel tea for color but not for odor, taste, and general acceptability. The study highlights the potential of using mango seed kernels for tea production, thereby contributing to waste reduction and promoting health-conscious food production and consumption practices.

Keywords: *Mango Seed Kernel (Mangifera Indica) Tea, Phytochemical Analysis, Health-conscious Food Production*

INTRODUCTION

Tea is among the world's most popular beverages, and it is appreciated for its flavor and potential health benefits (Njeru, 2024). Herbal teas, which include a variety of plants beyond the *Camellia sinensis* species, are widely consumed for their therapeutic properties and are caffeine-free (Ubbor et al., 2022). The Philippines embrace tea as part of both traditional and modern wellness practices, especially herbal teas that use local ingredients known for their health benefits (Tek-Ing, 2024).

Mango (*Mangifera indica*), known for its rich nutritional profile, is a staple in the Filipino diet and the economy. Although mangoes are highly valued, the mango seed kernel, comprising approximately 17–22% of the fruit, is typically discarded despite its rich content in bioactive compounds like polyphenols, phytosterols, and tocopherols (Lebaka et al., 2021). Studies indicate that mango seed kernels can improve the nutritional profile of various foods, such as biscuits, when used in flour form (Elgindy, 2017), and possess antimicrobial properties effective against certain antibiotic-resistant bacteria (Bshabshe et al., 2020).

Despite these known benefits, mango seed kernels remain underutilized, particularly a potential tea source. This study explores the acceptability and sensory qualities of mango seed

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kernel tea, a novel approach aimed at addressing food waste and contributing to sustainable development goals. Using mango seed kernels aligns with Sustainable Development Goals (SDG 12: Responsible Consumption and Production, and SDG 15: Life on Land) by promoting waste reduction and resource efficiency.

This study examined the acceptability and phytochemical composition of mango seed kernel (*Mangifera indica*) as a potential tea source and determined whether there was a significant difference in the sensory evaluation scores of three mango seed kernel tea samples.

LITERATURE REVIEW

Mango (*Mangifera Indica*) is a major tropical fruit, with over 33 million tons produced annually worldwide. The seed, which constitutes 20% of the fruit's weight, is rich in starch, fat, protein, and bioactive compounds, such as polyphenols, phytosterols, and tocopherols, and has potential as a functional food ingredient, antimicrobial agent, and cosmetic product (Yadav & Paudel, 2022). Approximately 20% of mangoes are processed into various products, generating significant waste from the peel and seed, which accounts for 40-50% of the fruit's weight. These by products, particularly the seed kernel, are rich in minerals, antioxidants, and phytosterols and have been shown to replace up to 50% of corn starch in food products like soup mixes. Despite its nutritional and health benefits, the commercial exploitation of mango kernels remains limited, presenting an opportunity for further innovation in the food industry (Torres-Leon et al., 2016; Jahurul et al., 2015). Additionally, various parts of the mango plant are used in traditional medicine for their health benefits (Khandare, 2016; Mutua et al., 2016).

Mango seed kernels have gained attention for their health and medicinal properties, with studies showing that flour from mango seeds can enhance the nutritional value of biscuits, increasing fiber, ash, and fat content when replacing up to 40% of wheat flour (Elgindy, 2017). The kernels are processed and subjected to ethanolic extraction to yield bioactive compounds such as polyphenols with strong antioxidant properties (Anany, 2015). Clinical studies have highlighted the antimicrobial effectiveness of mango seed extracts, particularly against Methicillin-Resistant Staphylococcus aureus (MRSA), suggesting their potential as alternatives to conventional antibiotics (Bshabshe et al., 2020). The bioactive molecules in seeds, including flavonoids and carotenoids, provide antioxidant, anticancer, antimicrobial, and anti-inflammatory benefits, reducing oxidative stress and inhibiting cancer cell growth (Quintana et al., 2021). Mango seed extracts, rich in phenolic compounds like gallic acid and naringenin, also show promise in pharmaceutical applications for acne treatments and other conditions (Mahmoud et al., 2023; Nguyen et al., 2023). Additionally, the high phytochemical content of the seeds offers potential as an alternative medicine for treating infections, with mangiferin showing antibacterial effects (Prabhu et al., 2023). Mango seed powder, rich in protein, vitamins, and antioxidants, can enhance the nutritional profile of food products, whereas mango seed kernel oil, which contains unsaturated fatty acids and phytosterols, is valuable for production of cosmetics and biodegradable products (Bordia & Mogra, 2023; Oladapo et al., 2021). However, despite these benefits, excessive consumption may lead to toxicity, causing nausea, vomiting, and abdominal pain (Nguyen, 2017; Meyer, 2018; Ravindran, 2019).

Mango seed kernels (*Mangifera indica*) are a rich source of bioactive compounds, making them promising candidates for tea production. Studies by Lim et al. (2019), Choudhary et al. (2022), and Owino and Ambuko (2021) highlighted the high phenolic content, antioxidant, and antimicrobial properties of mango seed kernels, which can offer health benefits such as enhanced antioxidant activity, antimicrobial effects, and potential therapeutic applications. Additionally, Abdel-aty et al. (2018) identified the significant antioxidant and therapeutic potential of hesperidin in mango seed extracts, emphasizing their broader health applications, including in food fortification and as a

functional ingredient in tea.

Herbal tea, a centuries-old beverage, is enjoyed globally because of its nutraceutical benefits, including analgesic, anti-inflammatory, antibacterial, antiviral, and antiallergic properties (Jones & Ajmera, 2023). Teas made from a variety of plant materials like leaves, seeds, and flowers are rich in antioxidants, vitamins, and minerals, despite having fewer antioxidants than traditional teas like green or black tea (Zakaria et al., 2023). Because they are caffeine-free, they are ideal for energy boosts, hydration, and sleep promotion because of their aroma-active compounds. Herbal teas are composed of various phytochemicals, including flavonoids, alkaloids, and tannins, and are rich in essential minerals like iron, manganese, and zinc (Kinki, 2021). Green tea, a popular variant, provides significant health benefits, such as cancer prevention, improved cardiovascular health, and enhanced glucose metabolism, although moderation is key due to potential adverse effects (Tartillah, 2024). Additionally, studies on the antioxidant content of herbal teas reveal the significant role of phenolic compounds in their health benefits, including anti-inflammatory, antibacterial, and antioxidant effects (Zielinski et al., 2014; Bhebhe et al., 2015). Mango seed kernels, which are also rich in antioxidants and phytochemicals, contribute to health benefits such as improved digestion and diabetes management, with components like gallic acid enhancing their antioxidant and anticancer properties (Wang, 2022; Zafar & Sidhu, 2017).

RESEARCH METHOD

This study used a true experimental design to establish the cause-and-effect relationship between variables, focusing on determining the acceptability of mango (*Mangifera Indica*) seed kernels as tea substitutes. This design was chosen for its ability to effectively control extraneous variables, ensuring the reliability and validity of the results. This approach facilitated a rigorous examination of the potential of mango seed kernels as tea sources, enabling precise conclusions regarding their acceptability and phytochemical properties.

The study used three varieties of mangoes in the research experiment: Carabao, Apple, and Indian mangoes. Product development includes the process illustrated in Figure 1.

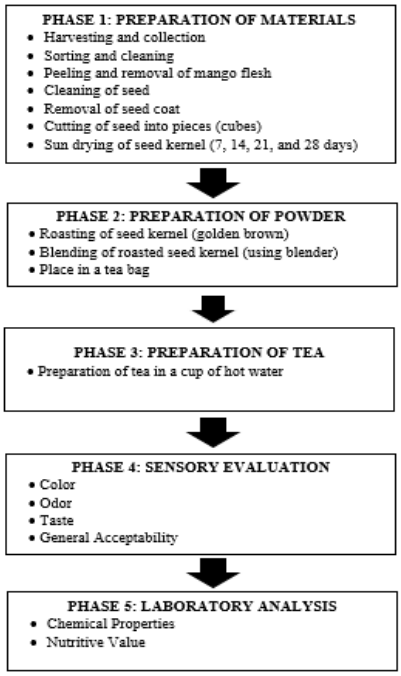

Figure 1. Flowchart of Product Development

The hedonic scale was used in this study to assess the acceptability of the final product. A 1-9 rating scale was employed during the food-tasting process to gauge the panelists' satisfaction levels

with the product. On this scale, a rating of 1 indicated extreme dislike and a rating of 9 indicated extreme liking. This scale measures consumer acceptance and satisfaction regarding various product attributes.

Panelist Hedonic Rating	Liking Score
Like Extremely	9
Like Very Much	8
Like Moderately	7
Like Slightly	6
Neither Like Nor Dislike	5
Dislike Slightly	4
Dislike Moderately	3
Dislike Very Much	2
Dislike Extremely	1

Figure 2. Hedonic Scale

Descriptive statistics, such as mean and standard deviation, were calculated to summarize the panelists' ratings for each variety, including color, odor, taste, and general acceptability. Furthermore, analysis of variance (ANOVA) was conducted to identify any significant differences in the mean sensory evaluation among the sample tea from three mango seed kernels (*Mangifera Indica*). Additionally, the phytochemical analysis included DPPH scavenging activity, total flavonoids and phenols, total tannins, and anthocyanins.

FINDINGS AND DISCUSSION

Table 1. Mean Acceptability Scores of Teas from Mango Seed Kernel in terms of Color, Odor, Taste, and General Acceptability

Variety	Sample	Mean			
		Color	Odor	Taste	General Acceptability
Carabao	A. (Dried for 7 days)	5.55	6.55	6.40	6.45
	B. (Dried for 14 days)	5.20	6.45	6.10	6.25
	C. (Dried for 21 days)	4.95	6.15	5.20	5.75
	D. (Dried for 28 days)	6.05	6.60	5.60	6.20
	Overall	5.44	6.44	5.83	6.16
Apple	A. (Dried for 7 days)	6.80	6.80	5.25	5.65
	B. (Dried for 14 days)	6.40	6.55	5.45	5.85
	C. (Dried for 21 days)	5.15	5.35	5.40	5.15
	D. (Dried for 28 days)	7.60	7.35	3.85	4.65
	Overall	6.49	6.51	4.99	5.33
Indian	A. (Dried for 7 days)	6.90	6.75	5.55	5.55
	B. (Dried for 14 days)	7.10	6.65	5.35	5.65
	C. (Dried for 21 days)	5.55	6.00	5.05	5.45
	D. (Dried for 28 days)	6.10	6.75	4.35	4.85
	Overall	6.41	6.54	5.08	5.38

Legend: 1:00 -1.49 dislike extremely; 1.50 – 2.49 dislike very much; 2.50-3.49 dislike moderately; 3.50 - 4.49 dislike slightly; 4.50 – 5.49 neither like nor dislike; 5.50-6.49 like slightly; 6.50-7.49 like moderately; 7.50-8.49 like very much; 8.50-9.00 like extremely

Table 1 presents the mean acceptability scores of teas from mango seed kernels in terms of color, odor, taste, and general acceptability.

In terms of color

For the Carabao Mango variety, the overall mean of 5.44 (SD= 1.98) indicates that the panelists neither liked nor disliked the tea produced from the Carabao Mango seed kernel in terms of its color. Majority of panelists slightly liked the tea color from Carabao Mango seeds dried for 28 days, as evidenced by the highest mean score of 6.05 (SD= 2.28). This was followed by those dried for 7 days, which the panelists also liked slightly, obtaining a mean of 5.55 (SD= 1.64). Meanwhile, those dried for 14 days had a mean of 5.20 (SD= 1.64), indicating that the panelists neither liked nor disliked it. However, those dried for 21 days received the lowest mean score of 4.95 (SD= 2.24), indicating that the panelists neither liked nor disliked it.

For the Apple Mango variety, the overall mean of 6.49 (SD= 1.64) indicates that the panelists slightly liked the tea produced from the apple mango seed kernel in terms of its color. Majority of panelists very much liked the tea color from Apple Mango seeds dried for 28 days, as evidenced by the highest mean score of 7.60 (SD= 1.54). This was followed by those dried for 7 days, which the panelists also liked moderately, with a mean of 6.80 (SD= 1.28). Meanwhile, those dried for 14 days had a mean of 6.40 (SD= 1.23), indicating that the panelists liked it slightly. However, those dried for 21 days received the lowest mean score of 5.15 (SD= 1.53), indicating that the panelists neither liked nor disliked it.

For the Indian Mango variety, the overall mean was 6.41 (SD= 1.55), indicating that the panelists liked the tea from the Indian Mango seed kernel slightly in terms of color. Majority of panelists moderately liked the tea color from Indian Mango seeds dried for 14 days, as evidenced by the highest mean score of 7.10 (SD= 1.07). This was followed by those dried for 7 days, which the panelists also liked moderately, with a mean of 6.90 (SD= 1.21). Meanwhile, those dried for 28 days had a mean of 6.10 (SD= 1.68), indicating that the panelists liked it slightly. However, those dried for 21 days received the lowest mean of 5.55 (SD= 1.70), indicating that the panelists liked it slightly.

In terms of odor

For the Carabao Mango variety, the overall mean of 6.44 (SD= 1.83) indicates that the panelists slightly liked the tea produced from the Carabao Mango seed kernel in terms of its odor. Majority of panelists moderately liked the tea odor from Carabao Mango seeds dried for 28 days, as evidenced by the highest mean score of 6.60 (SD= 1.96). This was followed by those dried for 7 days, which the panelists also liked moderately, with a mean of 6.55 (SD= 1.79). Meanwhile, those dried for 14 days had a mean of 6.45 (SD= 1.57), indicating that the panelists liked it slightly. However, those dried for 21 days received the lowest mean value of 6.15 (SD= 2.06), indicating that the panelists liked it slightly.

For the Apple Mango variety, the overall mean of 6.51 (SD= 1.55) indicates that the panelists moderately liked the tea produced from the apple mango seed kernel in terms of its odor. Majority of panelists very much liked the tea odor from Apple Mango seeds that had dried for 28 days, as evidenced by the highest mean score of 7.35 (SD=1.50). This was followed by those dried for 7 days, which the panelists also liked moderately, with a mean of 6.80 (SD= 1.20). Meanwhile, those dried for 14 days had a mean of 6.55 (SD= 0.94), indicating that the panelists liked it moderately. However, those dried for 21 days received the lowest mean of 5.35 (SD= 1.79), indicating that the panelists neither liked nor disliked it.

For the Indian Mango variety, the overall mean was 6.54 (SD= 1.46), indicating that the panelists moderately liked tea from the Indian Mango seed kernel in terms of odor. The majority of panelists moderately liked the tea odor from Indian Mango seeds dried for 7 and 28 days, as evidenced by the highest mean score of 6.75 (SD= 1.55, SD= 1.41). This was followed by those dried for 14 days, which the panelists also liked moderately, with a mean of 6.65 (SD= 1.39). However,

those dried for 21 days received the lowest mean value of 6.00 (SD= 1.45), indicating that the panelists liked it slightly.

In terms of taste

For the Carabao Mango variety, the overall mean of 5.83 (SD= 1.67) indicates that the panelists slightly liked the tea produced from the Carabao Mango seed kernel in terms of its taste. Majority of panelists slightly liked the tea taste from Carabao Mango seeds dried for 7 days, as evidenced by the highest mean score of 6.40 (SD= 1.54). This was followed by those dried for 14 days, which the panelists also liked slightly, obtaining a mean of 6.10 (SD= 1.62). Meanwhile, those dried for 28 days had a mean of 5.60 (SD= 1.96), indicating that the panelists liked it slightly. However, those dried for 21 days received the lowest mean of 5.20 (SD= 1.36), indicating that the panelists neither liked nor disliked it.

For the Apple Mango variety, the overall mean of 4.99 (SD= 1.94) indicates that the panelists neither liked nor disliked the tea from the Apple Mango seed kernel in terms of its taste. Majority of panelists neither liked nor disliked the taste of the tea from Apple Mango seeds that had dried for 14 days, as evidenced by the highest mean score of 5.45 (SD= 1.82). This was followed by those dried for 21 days, which the panelists neither liked nor disliked, obtaining a mean of 5.40 (SD= 1.85). Meanwhile, those dried for 14 days had a mean of 5.25 (SD= 1.52), indicating that the panelists neither liked nor disliked. However, those dried for 28 days received the lowest mean of 3.85 (SD= 2.18), indicating that the panelists slightly disliked it.

For the Indian Mango variety, the overall mean of 5.08 (SD= 2.00) indicates that the panelists neither liked nor disliked the tea from the Indian Mango seed kernel in terms of taste. Majority of panelists slightly liked the tea taste from Indian Mango seeds dried for 7 days, as evidenced by the highest mean score of 5.55 (SD= 1.88). This was followed by those dried for 14 days, which the panelists neither liked nor disliked, obtaining a mean of 5.35 (SD= 2.13). Meanwhile, those dried for 21 days had a mean of 5.05 (SD= 1.93), indicating that the panelists neither liked nor disliked. However, those dried for 28 days received the lowest mean of 4.35 (SD=1.98), indicating that the panelists disliked it slightly.

In terms of general acceptability

For the Carabao Mango variety, the overall mean of 6.16 (SD= 1.53) indicates that the panelists slightly liked the tea from the Carabao Mango seed kernel in terms of general acceptability. Majority of panelists slightly liked the tea containing Carabao mango seeds dried for 7 days, as evidenced by the highest mean score of 6.45 (SD= 1.54). This was followed by those dried for 14 days, which the panelists also liked slightly, obtaining a mean of 6.25(SD= 1.29). Meanwhile, those dried for 28 days had a mean of 6.20 (SD= 1.79), indicating that the panelists liked it slightly. However, those dried for 21 days received the lowest mean of 5.75(SD= 1.48), indicating that the panelists slightly liked it.

For the Apple Mango variety, the overall mean of 4.99 (SD= 1.94) indicates that the panelists neither liked nor disliked the tea from the Apple Mango seed kernel in terms of general acceptability. Majority of panelists slightly liked the tea containing apple mango seeds that had dried for 14 days, as evidenced by the highest mean score of 5.85 (SD= 1.50). This was followed by those dried for 7 days, which the panelists slightly liked, obtaining a mean of 5.65(SD= 1.73). Meanwhile, those dried for 21 days had a mean of 5.15 (SD= 1.46), indicating that the panelists neither liked nor disliked. However, those dried for 28 days received the lowest mean score of 4.65 (SD=2.39), indicating that the panelists neither liked nor disliked it.

For the Indian Mango variety, the overall mean of 5.38(SD= 1.94) indicates that the panelists neither liked nor disliked the tea from the Indian Mango seed kernel in terms of general

acceptability. Majority of panelists slightly liked the tea containing Indian mango seeds dried for 14 days, as evidenced by the highest mean score of 5.65 (SD= 2.13). This was followed by those dried for 7 days, which the panelists liked slightly, obtaining a mean of 5.55 (SD= 1.90). Meanwhile, those dried for 21 days had a mean of 5.45 (SD= 1.73), indicating that the panelists neither liked nor disliked. However, those dried for 28 days received the lowest mean score of 4.85 (SD=2.01), indicating that the panelists neither liked nor disliked it.

Carabao Mango Kernel Tea for Laboratory Analysis

Based on these findings, the Carabao mango Kernel tea obtained the highest general acceptability ratings among the three mango seed varieties, as evaluated by the panelists, making it the preferred choice for phytochemical analysis. These findings highlight that Carabao Mango kernels, particularly those dried for 7 days, are more likely to be accepted by consumers as tea substitutes, emphasizing their potential in product development and market acceptance.

Table 2. Phytochemical Analysis of Carabao Mango Powder

Sample	DPPH scavenging activity, %	Total flavonoids, mg CE/g	Total phenols, mg GAE/g	Total tannins, mg CE/g	Total anthocyanins, mg CGE/g
Mango seed powder	90.01 ± 0.25	19.98 ± 0.16	218.13 ± 6.17	6.66 ± 0.15	Not detected

Table 2 shows the results of phytochemical analyses of Carabao mango powder. The phytochemical analyses of Carabao mango powder revealed a rich array of bioactive compounds. The DPPH scavenging activity suggested an exceptional antioxidant capacity of 90.01% ± 0.25, indicating the powder's strong ability to neutralize free radicals and promote health benefits, such as reduced oxidative stress and lower risk of related diseases. The total flavonoid content of 19.98 mg CE/g ± 0.16 underscores the product's antioxidant potential and overall quality, offering significant health benefits and enhancing its appeal to consumers and researchers alike. The high total phenol content of 218.13 mg GAE/g ± 6.17 further highlights its robust antioxidant properties, reinforcing the powder's effectiveness in protecting against oxidative stress and supporting overall health. The total tannin content at 6.66 mg CE/g ± 0.15 contribute moderately to the flavor and health benefits, providing a balanced taste profile while maintaining beneficial properties. However, the absence of anthocyanins suggests that while the product excels in other phytochemical components, it lacks this particular group of pigments, which are also known for their antioxidant properties. Overall, the phytochemical composition of Carabao Mango Powder suggests it is a highly beneficial and marketable product with substantial health-promoting properties, backed by its significant concentrations of antioxidants and other bioactive compounds. These findings collectively highlight the powder's potential as a valuable health supplement and desirable choice in the nutraceuticals market.

Table 3. Significant Difference in Mean Sensory Evaluation Between Four Samples of Carabao, Apple, and Indian Mango Kernel as a Tea

	ANOVA		
	Carabao	**Apple**	**Indian**
	Sig.	**Sig.**	**Sig.**
Color	.328	.000	.003
Odor	.871	.000	.301
Taste	.105	.023	.249
General Acceptability	.532	.160	.567

Table 3 shows the significant difference in the mean sensory evaluation among four samples of carabao, apple, and Indian mango kernel tea.

In terms of Carabao mango kernel, the p-value for color was 0.328, odor was 0.871, taste was 0.105, and general acceptability was 0.532, all of which are greater than the 0.01 threshold; therefore, there were no significant differences in the mean sensory evaluation among the four samples of Carabao Mango kernel tea regarding color, odor, taste, and general acceptability.

In terms of apple mango kernels, the p-values for color and odor were both 0.000, which are lower than the 0.01 threshold, leading to the rejection of the null hypothesis. This indicates that there were significant differences in the mean sensory evaluation of apple mango kernel tea between the four groups in terms of color and odor. However, the p-value for taste was 0.023, and for general acceptability, it was 0.160, both of which were greater than the 0.01 threshold, leading to the retention of the null hypothesis. Thus, there were no significant differences in the mean sensory qualities of the four Apple Mango kernel tea samples in terms of taste and general acceptability.

In terms of Indian mango kernels, the p-value for color was 0.003, which is lower than the 0.01 threshold, leading to the rejection of the null hypothesis. This indicates a significant difference in the mean color of the four Indian mango kernel tea samples. However, the p-values for odor (0.301), taste (0.249), and general acceptability (0.567) were all greater than the 0.01 threshold, leading to the retention of the null hypothesis for these attributes. Therefore, there were no significant differences in the mean sensory qualities of the four Indian mango kernel tea samples regarding odor, taste, and general acceptability.

CONCLUSION

The hypothesis that there was no significant difference in the mean sensory evaluation among the sample tea from three mango seed kernel (*Mangifera Indica*) varieties was partially supported. Specifically, the results revealed no significant differences in color, odor, taste, and general acceptability of Carabao mango kernel tea. In contrast, significant differences were observed among the Apple Mango kernel tea samples for color and odor, while taste and general acceptability showed no significant differences. Similarly, significant differences were noted in the color of Indian mango kernel tea, but no significant differences were found in its odor, taste, or general acceptability. These findings suggest that sensory preferences vary with mango variety and should be considered in the development of mango seed kernel-based tea products. This research contributes to the understanding of mango seed kernel tea's sensory properties and highlights the potential for using different mango varieties to enhance product appeal.

LIMITATION & FURTHER RESEARCH

While providing valuable insights into the acceptability and phytochemical properties of mango seed kernel tea, this study has several limitations. First, the sample size used in the sensory evaluation was relatively small, which may not fully represent the preferences of a larger, more diverse population. Additionally, the study focused only on three mango varieties (Carabao, Apple, and Indian), potentially limiting the generalizability of the findings to other mango varieties. The preparation method for mango seed kernel tea was standardized, but variations in preparation could influence sensory perceptions and phytochemical composition, which were not explored in this study. Lastly, the phytochemical analysis was limited to certain compounds, and other bioactive constituents may have been overlooked.

In future research, it would be beneficial to include a larger, more diverse sample of panelists to better reflect consumer preferences across demographic groups. Expanding the study to include additional mango varieties and other plant-based tea substitutes could provide a broader understanding of the potential of mango seed kernels in the tea industry. Furthermore, testing different preparation methods and exploring their effects on the sensory qualities and bioactive properties of tea could provide more comprehensive insights. Future studies should also investigate the long-term stability of the phytochemical compounds in mango seed kernel tea and assess its commercial viability as a sustainable, health-promoting beverage.

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