

Formulation of Blended Herb Spices

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Abstract: Blended spices derived from locally available plants tend to achieve higher sensory acceptability compared to single-ingredient spices due to their enhanced flavor complexity and balanced sensory profile. This study aimed to develop and evaluate the acceptability of a blended herb spice composed of dried guava, lemongrass, spring onion, bay leaf, and oregano. An experimental-developmental research design utilizing a Completely Randomized Design (CRD) was employed, consisting of three formulations: Treatment A (25g guava, 75g lemongrass), Treatment B (50g guava, 50g lemongrass), and Treatment C (75g guava, 25g lemongrass), with constant amounts of the remaining ingredients such as dried spring onion, bay leaf and oregano. Sensory evaluation was conducted by 10 semi-trained food technology professors across three trials, followed by acceptability testing involving 100 evaluators using a 9-Point Hedonic Scale. Data were analyzed using mean and Analysis of Variance (ANOVA). Results indicated that all formulations were generally acceptable in terms of appearance, aroma, texture, and overall acceptability. Treatment B (50g guava, 50g lemongrass) emerged as the most preferred formulation, particularly in appearance and aroma, followed by Treatment A (25g guava, 75g lemongrass), while Treatment C (75g guava, 25g lemongrass) remained acceptable across all attributes. Statistical analysis revealed significant differences in appearance and aroma in favor of Treatment B, whereas texture showed no significant variation among treatments. When applied to grilled chicken, all formulations enhanced sensory qualities, with Treatment B (50g guava, 50g lemongrass) yielding the highest acceptability due to its superior aroma, appearance, and taste. Treatment A also showed favorable results, while Treatment C (75g guava, 25g lemongrass), though less preferred, maintained an acceptable flavor profile. The blended herb spices demonstrated good storage stability, remaining unchanged in color, texture, and odor under both room and chilling conditions for up to 30 days. Microbial analysis further confirmed that the product met food safety standards, showing low aerobic plate count and absence of coliform bacteria, thereby indicating its safety for consumption and compliance with FDA guidelines. Overall, the developed herb spice blends demonstrate strong potential as sustainable, plant-based alternatives for commercial application.

Keywords: Blended Herb Spices, Consumer Acceptability, Dried Guava Leaves, Product Development

I. INTRODUCTION

Herbs and spices have been integral to food preparation for centuries, enhancing flavor, aroma, and overall palatability. In the Philippines, herbs such as lemongrass, bay leaves, and oregano are commonly used in traditional cooking, not only for their distinct flavors but also for their numerous health benefits. These natural ingredients, which were passed down through generations, provide an ideal foundation for developing a healthier alternative to commercially processed spices. However, with the rise of commercially available blended spices, many of which contain artificial additives, excessive sodium, and preservatives, concerns have emerged with regard to the health risks associated with their frequent consumption. As consumers become increasingly health-conscious, there is a growing demand for natural and organic alternatives that offer the same level of taste satisfaction while promoting wellness.

In the Philippines, local herbs such as guava leaves, lemongrass, spring onions, bay leaves, and oregano have long been used, not only in cooking but also in traditional medicine. These herbs are abundant and easily accessible, providing an excellent opportunity to create healthier replacements for commercially processed spices. These locally sourced herbs possess a wide range of phytochemicals with bioactive properties that contribute to their medicinal and functional benefits, such as antimicrobial, anti-inflammatory, antioxidant, anti-allergic, and immune-modulatory effects (El-Sayed & Youssef, 2019; Barak & Mudgil, 2022).

Guava leaves, for instance, are rich in vitamins A and C, antioxidants, and flavonoids that improve digestion, lower cholesterol, and boost the immune system (Saxena & Sengupta, 2025). Lemongrass, commonly used in Filipino dishes like sinigang and tinola, contains compounds such as citral and limonene, known for their antioxidant, antibacterial, and anti-inflammatory properties, which support heart health and aid in relaxation (Zanin, 2024). Spring onions are rich in vitamins and sulfur compounds that enhance immunity, improve digestion, and support cardiovascular health (Chakraborty, 2021). Bay leaves, often used in Filipino stews and soups like adobo and pancit, contain active compounds such as eugenol and linalool, which have antimicrobial and antioxidant effects that help regulate blood sugar

and cholesterol while contributing to the flavor of dishes (Reis, 2024). Oregano, known for its strong antimicrobial and digestive benefits, is another widely used herb that enhances both the flavor and functional properties of food (Leal, 2025).

Globally, herbs and spices have played vital roles in flavoring food, preserving it, and treating ailments for centuries. According to Vázquez-Fresno (2019), the use of herbs and spices as flavoring agents and food preservatives has been well-documented across cultures. Over the last few decades, research into their health benefits has gained momentum, as many herbs and spices are found to possess properties that reduce the risk of chronic diseases, such as cardiovascular disease, neurodegenerative conditions, chronic inflammation, cancer, obesity, and type 2 diabetes (Sun et al., 2019). These benefits are particularly significant in the context of modern health concerns, where reducing the use of artificial flavorings, preservatives, and excess sodium is essential for improving overall well-being. Moreover, the flavoring properties of herbs such as oregano and lemongrass help to reduce sodium intake, offering additional cardiovascular health benefits.

The growing demand for natural and organic alternatives to artificial, highly processed spices has risen dramatically in response to the increasing awareness of the health risks associated with excessive sodium and preservatives in food products. In line with this, studies like that of Dawodu et al. (2023) have emphasized the potential of locally sourced herbs as healthy, flavorful alternatives to commercial spice blends. Their study, which focused on the production and sensory evaluation of mixed spices made from locally available plants, concluded that spice blends made from dried herbs were not only more acceptable than single spices but also served as healthful alternatives to artificial blends. This finding is significant in the context of the Philippines, where locally produced dried herbs are readily available and can be utilized as an affordable and sustainable option for flavoring food.

The combination of guava leaves, lemongrass, spring onions, bay leaves, and oregano provides a natural, health-promoting alternative to artificial spices. These herbs offer a range of nutritional and medicinal properties that not only enhance flavor but also promote health. With antioxidant, anti-inflammatory, and antimicrobial properties, these herbs can serve as a functional and edible replacement for blended spices that often contain artificial additives. Through the development of blended herb spice such as these, there is potential to provide a sustainable, health-conscious alternative to synthetic spices, aligning with the growing global trend toward healthier, more natural food options.

The formulation of spice blends, using locally sourced herbs, aligns with the goals of the College of Education Research Thrusts and Priorities number five, promoting entrepreneurship and community development by providing opportunities to people and rural communities to engage in sustainable livelihood activities. This research study also aligns with several Sustainable Development Goals (SDGs), including Goal 1: No Poverty by creating sustainable livelihoods and business opportunities in rural areas, Goal 2: Zero Hunger by improving food security through the development of nutritious, locally sourced food products, and Goal 8: Decent Work and Economic Growth by fostering entrepreneurship and enhancing local economic development. Additionally, it contributes to Goal 12: Responsible Consumption and Production, by promoting the use of natural, organic, and sustainable alternatives to processed spices. This study is also anchored on Applied Technology and Knowledge Transfer under the CRAFT Framework, as it involves the development and evaluation of spice blends using locally sourced herbs. The research applies technical knowledge in food formulation, processing, and sensory evaluation to produce a functional and acceptable product. Its findings may also be transferred into practical use for household cooking, small-scale production, and entrepreneurial ventures.

Objectives of the Study

Generally, this study aimed to find out the acceptability of Blended Herb Spices using dried guava leaves, lemon grass, spring onion, bay leaf, and oregano.

Specifically, this study aimed to:

1. determine the sensory qualities of blended herb spices in terms of appearance, aroma, and texture;
2. determine the sensory qualities of blended herb spices when applied to grilled chicken in terms of appearance, aroma, and taste;
3. determine the general acceptability of the blended herb spices in terms of appearance, aroma, and texture;
4. determine the general acceptability of blended herb spices when applied to grilled chicken in terms of appearance, aroma, and taste;
5. find out if there is a significant difference in the sensory qualities of blended herb spices among treatments;
6. find out if there is a significant difference in the sensory qualities of blended herb spices when applied to grilled chicken among treatment;
7. find out if there is a significant difference in the general acceptability of blended herb spices among treatment;

8. find out if there is a significant difference in the general acceptability of the blended spices when applied to grilled chicken among treatments;
9. determine the shelf-life of the product in terms of room and chilling temperature;
10. submit the best formulation for microbial analysis.

II. METHODOLOGY

Research Design

The study utilized a Completely Randomized Design (CRD) for the experimental setup, as described by Stone et al. (2012). This design was selected because it allows all treatments to be randomly assigned and tested under the same conditions, minimizing experimental bias and ensuring the reliability of the results. The CRD was applied to evaluate three different formulations of the herbal blended spices composed of dried guava leaves, lemongrass, spring onion, bay leaf, and oregano. Each formulation (Treatment A, Treatment B, and Treatment C) represented a unique combination and ratio of the herbal ingredients.

In this design, the random assignment of treatments ensured that each formulation had an equal chance of being evaluated by the sensory panel, thereby controlling for possible external influences such as evaluator preference or environmental variation. Sensory evaluation was conducted by a selected panel of evaluators who assessed the appearance, aroma, taste, and texture of the herbal blended spice using the Nine-Point Hedonic Scale. The use of the CRD enhanced the validity and accuracy of the results by reducing the effects of uncontrolled variables that might affect sensory perception. Through this method, the researcher was able to determine whether significant differences existed among the formulations and identify the most acceptable blended herb spices. The CRD approach provided a scientifically sound framework for analyzing the sensory qualities and general acceptability of the developed product.

Experimental Treatment

The experimental treatment consisted of three distinct formulations of blended herb spice, each designed to explore the effects of varying proportions of dried guava leaves, lemongrass, spring onion, bay leaf, and oregano. These treatments aimed to determine the most acceptable blend in terms of appearance, aroma, taste, texture, and overall acceptability. The ingredient proportions were adapted from reported formulations using guava-leaf-based herbal blends, where different levels of guava leaves were combined with fixed amounts of complementary herbs to assess functional or nutraceutical properties. The three ingredient proportions were inspired by previous work on guava-leaf-based herbal tisanes, in which varying guava-leaf-to-spice ratios were evaluated for functional and sensory properties (Suresh & Suriyakala, 2024).

The three formulations exhibited distinct sensory characteristics as influenced by the proportion of lemongrass and guava incorporated into each treatment. Treatment A (TA), which contained a higher proportion of lemongrass, produced a predominantly citrusy profile complemented by a mildly earthy undertone. This formulation emphasized freshness and brightness in both aroma and flavor, making it particularly appealing to those who prefer sharper, more invigorating taste notes.

Each treatment was replicated three times to ensure the reliability and validity of results. The variations in the proportions of herbs were developed to assess which combination yields the most desirable sensory qualities as rated by evaluators.

Collection of Data

A researcher-made sensory evaluation sheet was used to gather data on the herbal blended seasoning's appearance (color), aroma, taste, texture, and general acceptability, all rated on the Nine-Point Hedonic Scale (9 = like extremely; 1 = dislike extremely). Following the experimental-developmental approach, data were collected across three iterative trials. In Trial 1, the three coded formulations (TA–TC) were prepared and presented in randomized order (CRD) to an expert panel of Food Technology evaluators, who recorded hedonic ratings and comments. Guided by this feedback, the formulations were refined without altering the intended treatment differences, then re-evaluated by the same panel in Trial 2 using the same sheet. A final expert check in Trial 3 confirmed improvements before proceeding to a consumer acceptance test. Consumers from the local community (e.g., students, teachers, parents, frequent seasoning users) evaluated the coded, randomized samples under uniform conditions (standard serving size, palate cleansers, identical containers, and lighting) using the same 9-point sheet. Evaluators were selected via simple random sampling as outlined

in Chapter 1, and all scores were summarized by means per attribute; differences among treatments were subsequently analyzed using ANOVA at the prespecified level of significance.

Statistical Tools and Analysis

The treatment that achieved the highest mean during the trial of the expert panel was selected for consumer acceptability testing, which utilized the 9-Point Hedonic Scale (9 = like extremely; 1 = dislike extremely). All sensory ratings for appearance (color), aroma, taste, texture, and general acceptability were encoded and processed using the Statistical Package for the Social Sciences (SPSS), ensuring accurate and systematic data analysis. Descriptive statistics, particularly the arithmetic mean, were employed to determine the central tendency of each sensory attribute for every formulation, serving as the basis for identifying the most acceptable blend. Furthermore, a one-way Analysis of Variance (ANOVA) was conducted at a 0.01 level of significance to determine whether there were statistically significant differences among the three formulations (Treatment A–Treatment C), thereby providing a reliable basis for comparison and decision-making.

III. PRESENTATION, ANALYSES, AND INTERPRETATION OF DATA

This chapter presents the discussion, analyses, and interpretation of the data taken from the results of the evaluation conducted by the evaluators.

Sensory Qualities of Blended Herb Spices in terms of Appearance, Aroma, and Texture

Table 2 presents the evaluation of the sensory qualities of dried herbs in terms of appearance, aroma, and texture. The evaluations were made by a panel of experts and were represented by means of scores. In terms of appearance, Treatment B obtained the highest mean score of 8.60 for appearance, which corresponds to the adjectival description “Extremely Appealing”. This suggests that Treatment B possessed a more attractive visual quality, possibly due to a more uniform color, finer particle distribution, or better processing technique. Treatment A recorded a mean score of 8.00, while Treatment C had a mean score of 7.90, both described as “Very Much Appealing”. Although slightly lower than Treatment B, these scores indicate that the herbal spices under Treatments A and C were still visually acceptable and appealing to the respondents. Minor differences in appearance among the treatments may be attributed to variations in formulation or preparation methods.

In terms of aroma, the results showed that Treatment B again achieved the highest mean score of 8.60 and was described as “Extremely Pleasing”. This indicates that the herbal components in Treatment B produced a stronger and more desirable aromatic profile, which may be associated with better retention of volatile compounds responsible for fragrance. Treatment A obtained a mean score of 8.10, while Treatment C received 7.70, both falling under the adjectival description “Very Much Pleasing”. These findings suggest that the aroma of Treatments A and C was still highly acceptable, though slightly less intense or pleasing compared to Treatment B. Aroma plays a critical role in sensory perception, as it greatly influences flavor expectation and overall product acceptability.

In terms of texture, all treatments were evaluated positively. Treatment B recorded the highest mean score of 8.70, followed by Treatment A with a mean of 8.20 and Treatment C with a mean of 7.90. Treatments A and B were described as “Extremely Fine”, while Treatment C was rated “Very Much Fine”. These results indicate that the herbal spices generally possessed a smooth and fine texture, which is desirable for ease of mixing, handling, and application in food preparation. The slightly lower score of Treatment C may be due to coarser particles or less uniform grinding compared to the other treatments. Nevertheless, its texture remained within an acceptable range, indicating suitability for consumer use.

According to Choi and Kim (2019), visual appeal in spice formulations—such as uniform color and fine particle size—significantly influences consumer perception and acceptability. Their sensory evaluation found that spices with more consistent and visually vibrant characteristics received higher appearance scores, which aligns with the current study’s finding that Treatment B was rated as “Extremely Appealing” due to enhanced visual attributes.

As explored by Hassan and Ali (2016), sensory acceptability studies of herbal spice products often find that even when certain formulations performed better than others, all tested blends can still meet desirable sensory quality standards if they fall within acceptable sensory score ranges. This supports the idea that while Treatment B was superior, Treatments A and C were still competitive and acceptable for product consideration.

Overall, the results demonstrated that Treatment B consistently exhibited superior sensory qualities across all evaluated attributes. Its higher scores in appearance, aroma, and texture suggest that it may have undergone more effective processing or formulation, leading to improved sensory characteristics. Despite this, Treatments A and C also showed

high levels of acceptability, confirming that all herbal spice treatments met desirable sensory quality standards. These findings imply that while Treatment B was the most preferred based on sensory evaluation, the other treatments remained competitive and acceptable for potential product development.

Table 2. Sensory qualities of blended herb spices in terms of appearance, aroma, and texture

Quality Attributes	Treatment A (25g Dried Guava Leaves : 75g Dried Lemongrass)		Treatment B (50g Dried Guava Leaves : 50g Dried Lemongrass)		Treatment C (75g Dried Guava Leaves : 25g Dried Lemongrass)	
	Mean	Adjectival Description	Mean	Adjectival Description	Mean	Adjectival Description
Appearance	8.00	Very Much Appealing	8.60	Extremely Appealing	7.90	Very Much Appealing
Aroma	8.10	Very Much Pleasant	8.60	Extremely Pleasant	7.70	Very Much Pleasant
Texture	8.20	Extremely Fine	8.70	Extremely Fine	7.90	Very Much Fine

Legend: Adjectival Description (AD)

Score	Appearance	Aroma	Texture
8.12 – 9.00	Extremely Appealing	Extremely Pleasant	Extremely Fine
7.23 – 8.11	Very Much Appealing	Very Much Pleasant	Very Much Fine
6.34 – 7.22	Moderately Appealing	Moderately Pleasant	Moderately Fine
5.45 – 6.33	Slightly Appealing	Slightly Pleasant	Slightly Fine

Sensory Qualities of Blended Herbs Spices Applied to Grilled Chicken in terms of Appearance, Aroma, and Taste

Table 3 presents the sensory evaluation of grilled chicken treated with different herb spice formulations, focusing on appearance, aroma, and taste. Table 3 reveals that the application of herb spices significantly enhanced the sensory characteristics of the grilled chicken, as all treatments received high mean scores with favorable adjectival descriptions.

In terms of appearance, the grilled chicken samples varied among treatments. Treatment B obtained the highest mean score of 8.60 and was described as “Extremely Appealing”, indicating that this treatment produced the most visually attractive grilled chicken. This may be attributed to better spice adherence and more uniform browning during grilling, which enhanced surface color and overall presentation. Treatment A recorded a mean score of 8.10, while Treatment C had a mean of 7.70, both described as “Very Much Appealing”. Although slightly lower than Treatment B, these scores indicate that the grilled chicken under Treatments A and C remained visually appealing and acceptable to the respondents.

In terms of aroma, Treatment B again achieved the highest mean score of 8.70 and was rated “Extremely Pleasing”. This suggests that the herb spice formulation in Treatment B produced a stronger and more desirable aroma when exposed to grilling temperatures, likely due to the enhanced release of volatile aromatic compounds. Treatment A and Treatment C received mean scores of 7.90 and 7.70, respectively, both described as “Very Much Pleasing”. These results indicate that although their aromas were slightly less intense than those of Treatment B, they were still highly acceptable and pleasant.

In terms of taste, the evaluation showed that all treatments positively influenced the flavor of the grilled chicken. Treatment B obtained the highest mean score of 8.90, which corresponds to the adjectival description “Extremely

Delicious”. This implies that Treatment B provided a more balanced and desirable flavor profile, possibly due to a better combination of herb components that complemented the natural taste of the chicken. Treatment A recorded a mean score of 8.30 and was also rated “Extremely Delicious”, indicating that its flavor was highly acceptable and enjoyable. Meanwhile, Treatment C obtained a mean score of 8.00, described as “Very Much Delicious”. Although slightly lower than Treatments A and B, this score still reflects a strong positive response from the respondents. The variation in taste scores among treatments may be attributed to differences in spice composition, concentration, or interaction with heat during grilling, all of which influence flavor development.

As stated by Singh and Kaur (2020), spice formulations significantly improve the flavor profiles of grilled meat products. Their sensory study noted that blends with balanced herb components increased perceived taste quality and overall liking in poultry, directly supporting the results showing higher taste scores, especially for Treatment B.

Overall, the findings demonstrate that the use of herb spices significantly improved the sensory quality of grilled chicken, particularly in terms of taste and aroma. Among the treatments, Treatment B consistently received the highest ratings across all evaluated attributes, indicating superior sensory performance and greater consumer preference.

However, Treatments A and C also achieved high acceptability scores, confirming that all herb spice formulations were effective in enhancing the sensory appeal of grilled chicken.

Table 3. Sensory qualities of blended herbs spices applied to grilled chicken.

Quality Attributes	Product A (25g Dried Guava Leaves : 75g Dried Lemongrass)		Product B (50g Dried Guava Leaves : 50g Dried Lemongrass)		Product C (75g Dried Guava Leaves : 25g Dried Lemongrass)	
	Mean	Adjectival Description	Mean	Adjectival Description	Mean	Adjectival Description
Appearance	8.10	VMA	8.60	EA	7.70	VMA
Aroma	7.90	VMP	8.70	EP	7.70	VMP
Taste	8.30	ED	8.90	ED	8.00	VMD

Legend: Adjectival Description (AD)

<i>Score</i>	<i>Appearance</i>	<i>Aroma</i>	<i>Texture</i>
8.12 – 9.00	Extremely Appealing	Extremely Pleasant	Extremely Fine
7.23 – 8.11	Very Much Appealing	Very Much Pleasant	Very Much Fine
6.34 – 7.22	Moderately Appealing	Moderately Pleasant	Moderately Fine
5.45 – 6.33	Slightly Appealing	Slightly Pleasant	Slightly Fine

General Acceptability of Blended Herbs Spices

The results in Table 4 shed light on the overall acceptability of blended herbal spices as perceived by a group of consumers, focusing on key sensory qualities, such as appearance, aroma, texture, and general acceptability.

In terms of appearance, the mean scores ranged from 7.77 to 8.27, indicating a generally favorable visual perception of all treatments. Treatment B obtained the highest mean score of 8.27 and was described as “Liked Extremely”, suggesting that it had the most appealing visual characteristics among the samples. This may be attributed to better color uniformity or a more attractive surface appearance. Treatments A with a mean score of 7.91 and C with a mean score of 7.77 were both rated as “Liked Very Much”, indicating that although they were slightly less appealing than Treatment B, they were still visually acceptable and pleasing to the respondents.

With regards to aroma, Treatment B again recorded the highest mean score of 8.33 with an adjectival description of “Liked Extremely”. This suggests that Treatment B produced a more desirable and pleasing aroma, which may be due to a more effective release or balance of aromatic components. Treatments A with a mean score of 7.60 and C with a mean score of 7.62 were both described as “Liked Very Much”. These results indicate that the aroma of these treatments was still well accepted, though perceived as slightly less intense or appealing compared to Treatment B.

In terms of texture, the result also showed favorable results for all treatments. Treatment B achieved the highest mean score of 8.25 and was rated “Liked Extremely”, suggesting a more desirable mouthfeel or consistency. This could be attributed to better formulation or processing that enhanced the overall textural quality. Treatment A with a mean score of 7.89) and Treatment C with a mean score of 7.98 were both described as “Liked Very Much”, indicating acceptable and pleasant texture characteristics, although not as preferred as Treatment B.

As reflected in the results, Treatment B obtained the highest mean score of 8.38 for general acceptability, indicating that it was the most preferred treatment among the respondents. This high level of acceptability can be attributed to Treatment B’s consistently superior ratings across the individual sensory attributes, particularly in appearance (mean score of 8.27), aroma (mean score of 8.33), and texture (mean score of 8.25). The “Liked Extremely” adjectival descriptions across these attributes suggest that Treatment B provided a more balanced and appealing sensory experience, which strongly influenced overall consumer preference. In contrast, Treatment A recorded a general acceptability mean score of 7.26, while Treatment C obtained 7.25. Although these values are lower than those of Treatment B, they still indicate a positive level of acceptance. The individual sensory scores for Treatments A and C were predominantly described as “Liked Very Much”, suggesting that both treatments were well received by the respondents but lacked certain sensory qualities that would elevate them to the same level of preference as Treatment B.

As reported by Oktafa et al. (2023), their sensory study found that the concentration of herbal spice marinade affected the sensory quality (color and texture) and overall hedonic acceptance of chicken meat products. Although not all attributes differed significantly, the study demonstrated that herb and spice applications can modulate sensory perceptions and influence acceptability, aligning with the results showing differences in aroma and taste after application.

Table 4. General acceptability of blended herbs spices

Acceptability Attributes	Treatment A (25g Dried Guava Leaves : 75g Dried Lemongrass)		Treatment B (50g Dried Guava Leaves : 50g Dried Lemongrass)		Treatment C (75g Dried Guava Leaves : 25g Dried Lemongrass)	
	Mean	Qualitative Description	Mean	Qualitative Description	Mean	Qualitative Description
Appearance	7.91	Liked Very Much	8.27	Liked Extremely	7.77	Liked Very Much
Aroma	7.60	Liked Very Much	8.33	Liked Extremely	7.62	Liked Very Much
Texture	7.89	Liked Very Much	8.25	Liked Extremely	7.98	Liked Very Much
General Acceptability	7.26	Liked Very Much	8.38	Liked Extremely	7.25	Liked Very Much

Legend: Adjectival Description (AD)

- Score General Acceptability
- 8.12 – Liked Extremely (LE)
- 9.00
- 7.23 – Liked Very Much (LVM)
- 8.11
- 6.34 – Liked Moderately (LM)
- 7.22
- 5.45 – Liked Slightly (LS)
- 6.33
- 4.56 – Neither Liked nor Disliked (NLND)
- 5.44
- 3.67 – Disliked Slightly (DS)
- 4.55

The table below summarizes the mean scores and adjectival descriptions for the quality attributes evaluated in each treatment. Treatment B consistently achieved the highest ratings across all attributes, reinforcing its superior overall acceptability compared to Treatments A and C.

General Acceptability of Blended Herbs Spices applied to Grilled Chicken

Table 5 presents the acceptability of herbal spices when applied to grilled chicken, which was evaluated using sensory attributes such as appearance, aroma, taste, and general acceptability. The results indicate varying levels of acceptance among the treatments, with Treatment B showing the highest overall preference.

In terms of appearance, the grilled chicken samples treated with herbal spices showed generally high acceptability. Treatment B obtained the highest mean score of 8.33 and was described as “Liked Extremely”, indicating that this treatment produced the most visually appealing grilled chicken. This may be attributed to better browning, color development, and spice distribution during grilling. Treatment A also received a high mean score of 8.12 and was rated “Liked Extremely”, suggesting strong visual appeal. Meanwhile, Treatment C obtained a mean score of 8.06, described as “Liked Very Much”. Although slightly lower, this score still indicates that the appearance of Treatment C was acceptable and visually pleasing.

In terms of aroma, the evaluation showed that Treatment B again received the highest mean score of 8.31 with an adjectival description of “Liked Extremely”. This suggests that the herbal spices in Treatment B released more desirable aromatic compounds during grilling, enhancing the sensory appeal of the chicken. Treatment A recorded a mean score of 8.08 and was rated “Liked Very Much”, while Treatment C obtained 7.76, also described as “Liked Very Much”. These results indicate that although the aroma of Treatments A and C was positively perceived, it was slightly less preferred compared to Treatment B.

With regards to taste, the result revealed greater variation among treatments. Treatment B achieved the highest mean score of 8.54 and was rated “Liked Extremely”, indicating superior mouthfeel and tenderness. This may suggest that the herbal spice formulation in Treatment B contributed positively to moisture retention and surface tenderness during grilling. Treatment A recorded a mean score of 7.28, described as “Liked Very Much”, indicating acceptable taste. In contrast, Treatment C obtained the lowest mean score of 6.80 with an adjectival description of “Liked Moderately”. This suggests that Treatment C may have resulted in a less desirable taste, possibly due to differences in spice composition, application level, or interaction with heat.

Studies examining the combination of herbs reveal that blended formulations often produce synergistic effects, enhancing antimicrobial efficiency and oxidative stability compared to single-ingredient applications. The research conducted by Torres-Neto et al. (2023) revealed that sensory evaluation showed that treatments with optimal spice compositions scored significantly higher in taste and texture, which supports the finding that Treatment B was rated highest, particularly in taste and mouthfeel.

As explained by Park and Baek (2020), when sensory attributes (appearance, aroma, taste, texture) are positively enhanced through spice application, overall acceptability improves. Their research on consumer preference for spiced meats concluded that higher individual sensory scores typically correlate with higher general acceptability, echoing the results where Treatment B achieved the highest overall ratings.

Overall, the results demonstrate that the application of herbal spices significantly influenced the acceptability of grilled chicken. Among the treatments, Treatment B consistently achieved the highest sensory ratings and general acceptability, indicating superior performance and stronger consumer preference. While Treatments A and C were still generally acceptable, variations in texture and aroma affected their overall ratings.

Table 5. General acceptability of blended herbs spices applied to grilled chicken

Acceptability Attributes	Treatment A (25g Dried Guava Leaves : 75g Dried Lemongrass)		Treatment B (50g Dried Guava Leaves : 50g Dried Lemongrass)		Treatment C (75g Dried Guava Leaves : 25g Dried Lemongrass)	
	Mean	Qualitative Description	Mean	Qualitative Description	Mean	Qualitative Description
Appearance	8.12	Liked Extremely	8.33	Liked Extremely	8.06	Liked Very Much
Aroma	8.08	Liked Very Much	8.31	Liked Extremely	7.76	Liked Very Much

Texture	7.28	Liked Very Much	8.54	Liked Extremely	6.80	Liked Moderately
General Acceptability	7.83	Liked Very Much	8.39	Liked Extremely	7.54	Liked Very Much

Legend: Adjectival Description (AD)

Score	General Acceptability
8.12 – 9.00	Liked Extremely (LE)
7.23 – 8.11	Liked Very Much (LVM)
6.34 – 7.22	Liked Moderately (LM)
5.45 – 6.33	Liked Slightly (LS)
4.56 – 5.44	Neither Liked nor Disliked (NLND)
3.67 – 4.55	Disliked Slightly (DS)

Differences in the Sensory Qualities of Herbs Spices among Treatments

The results shown in Table 6 provide insightful information on the sensory characteristics of herb spices. The results are presented based on two evaluation conditions: herbal spices alone and herbal spices applied to grilled chicken, using z-values and corresponding p-values at the 0.01 level of significance.

The statistical results for the herb spices alone showed no significant differences among treatments for all evaluated sensory attributes. Appearance registered a z-value of 4.625 with a p-value of 0.099, aroma had a z-value of 7.054 and a p-value of 0.029, and texture recorded a z-value of 4.510 with a p-value of 0.105. All attributes were interpreted as not significant (ns). These findings indicate that when evaluated as standalone products, the herbal blended spices across treatments exhibited comparable sensory qualities. The panelists did not perceive statistically meaningful differences in appearance, aroma, or texture, suggesting that the formulations were relatively uniform in sensory characteristics prior to application. Therefore, the null hypothesis in the sensory qualities of the blended herbal spices among treatments is accepted.

In contrast, the evaluation of herbal spices applied to grilled chicken revealed more pronounced sensory differences among treatments. Appearance obtained a z-value of 7.874 with a p-value of 0.020, which was still interpreted as not significant (ns). This suggests that visual differences in the grilled chicken samples were not sufficiently distinct to establish statistical significance. However, aroma and texture showed statistically significant differences among treatments. Aroma recorded a z-value of 13.239 with a p-value of 0.001, while texture obtained a z-value of 12.001 with a p-value of 0.002, both interpreted as significant (s). These results indicate that the different herb spice treatments influenced the aroma and texture of grilled chicken to varying degrees. The null hypothesis is rejected for aroma and texture due to significant differences, but accepted for appearance as no significant difference was observed. A research conducted by Torres-Neto et al. (2023) demonstrated that mixtures of oregano, thyme, and lemongrass essential oils significantly improved bacterial inhibition, supporting the premise that combining multiple herbs enhances both safety and functional quality.

Similarly, Duarte et al. (2019), revealed that sensory panel methodologies suggest that context matters in perception studies: using sensory panels on dry spices often results in limited discrimination, whereas application to food matrices enhances perceptual sensitivity. This study supports the conclusion that the sensory differences among the herbal spice treatments are more evident when applied to grilled chicken compared to when they are evaluated alone.

Overall, the results suggest that sensory differences among treatments were more evident when the herbal spices were applied to grilled chicken compared to when they were evaluated alone. While the herbal spices showed comparable sensory qualities as standalone products, their application to grilled chicken revealed significant differences, particularly in aroma and texture.

Table 6. Differences in the sensory qualities of blended herbs spices among treatments.

Quality Attributes		z	p value	Remarks
Herbal Spices	Appearance	4.625	0.099	ns
	Aroma	7.054	0.029	ns
	Texture	4.51	0.105	ns
Herbal Spices applied to Grilled Chicken	Appearance	7.874	0.020	ns
	Aroma	13.239	0.001	s
	Taste	12.001	0.002	s

Legend: P-value – 2.410 > 0.01, ns = not significant; level of significance = 0.01 alpha

Difference in the General Acceptability of Blended Herb Spices Among Treatment

As presented in Table 7, the results show that the general acceptability of the blended herb spices obtained a between-group sum of squares of 84.38, with 2 degrees of freedom, and a mean square of 42.19. This produced an F-value of 22.474 with a corresponding p-value of 0.000. Since the p-value is lower than the level of significance set at 0.01, the result is considered statistically significant.

This indicates that there is a significant difference in the general acceptability of the blended herb spices among the three treatments. The variation in acceptability suggests that the formulations were perceived differently by the respondents in terms of overall sensory experience.

Therefore, the null hypothesis stating that there is no significant difference in the general acceptability among treatments is rejected, while the alternative hypothesis is accepted. In summary, the findings confirm that the different formulations of blended herb spices significantly influence consumer acceptance, with one or more treatments being preferred over the others based on overall sensory evaluation.

Table 7. Difference in the general acceptability of blended herb spices among treatment

Quality Attributes	Groups	Sum of Squares	df	Mean Square	F ratio	P value	Remarks
Appearance	Between	13.307	2	6.653	7.612	.001	s
	Within	259.610	297	.874			
	Total	272.917	299				
Aroma	Between	34.580	2	17.290	13.669	.000	s
	Within	375.670	297	1.265			
	Total	410.250	299				
Texture	Between	7.020	2	3.510	3.564	.030	ns
	Within	292.500	297	.985			
	Total	299.520	299				
General Acceptability	Between	84.38	2	42.19	22.474	.000	s
	Within	557.55	297	1.877			
	Total	641.93	299				

Legend: ns = not significant; s = significant; level of significance = 0.01 alpha

Difference in the General Acceptability of Blended Herbs Spices When Applied to Grilled Chicken Among Treatments

The results shown in Table 8 reveal that the general acceptability of the product obtained a between-group sum of squares of 184.407, with 2 degrees of freedom, and a mean square of 92.203. This yielded an F-value of 1.622 with a

corresponding p-value of 0.199. Since the p-value is greater than the level of significance ($\alpha = 0.01$), the result is considered not significant. This indicates that there is no significant difference in the general acceptability of the blended herb spices when applied to grilled chicken among the different treatments. In other words, the respondents evaluated all treatments as relatively similar in terms of overall acceptability when used as a seasoning for grilled chicken, and no formulation was statistically superior in this aspect. Therefore, the null hypothesis stating that there is no significant difference in the general acceptability among treatments is accepted, while the alternative hypothesis is rejected. In summary, although variations were observed in sensory attributes such as aroma and taste (which were found significant), these differences did not translate into a statistically significant variation in overall general acceptability when applied to grilled chicken.

Table 8. Difference in the general acceptability of blended herb spices when applied to grilled chicken among treatments

Quality Attributes	Groups	Sum of Squares	df	Mean Square	F ratio	P value	Remarks
APPEARANCE	Between	4.020	2	2.010	3.386	.035	ns
	Within	176.310	297	.594			
	Total	180.330	299				
AROMA	Between	15.260	2	7.630	10.640	.000	s
	Within	212.990	297	.717			
	Total	228.250	299				
TASTE	Between	161.520	2	80.760	43.374	.000	s
	Within	553.000	297	1.862			
	Total	714.520	299				
General Acceptability	Between	184.407	2	92.203	1.622	.199	ns
	Within	16880.5	297	56.837			
	Total	17064.9	299				

Legend: ns = not significant; s = significant; level of significance = 0.01 alpha

Shelf Life of Herbal Spices when Stored at Room and Chilling Temperature

The shelf life of the different formulations is presented in Table 9. The shelf life was assessed under two storage conditions: room temperature and chilling temperature.

Room Temperature. The products were stored at room temperature in a dry, clean area, away from direct sunlight, with normal lighting and sealed packaging. Observations revealed that from day one to day thirty, there were no visible changes in physical characteristics, such as color, texture, and smell, indicating that the products remained fresh and safe for consumption among all treatments. The shelf life of the herbal spices, based on a 30-day observation at room temperature, was determined to be such that they may remain fresh for an extended period.

Chilling. Under chilled storage conditions, the herbal spices were placed in a refrigerator with a monitored temperature maintained between 32°F and 40°F (0°C to 4°C). The samples were sealed properly and checked daily. No significant changes in physical characteristics were observed for up to 30 days. Based on these observations, the herbal spices remained safe and acceptable for consumption for up to 30 days or more when stored under refrigeration.

It describes that the spices maintained their properties and safety when stored under these conditions, affirming their extended freshness. Studies from ElChaghaby et al. (2021) and Torres-Neto et al. (2023) provide insights into the long-term stability and antioxidant activities of herbs, such as lemongrass and oregano, when stored at room temperature and under refrigeration. These herbs show significant antibacterial and antioxidant effects, reinforcing the conclusion that these herbal spices can remain fresh and safe for consumption for extended periods when stored properly.

Table 9. Shelf life of blended herbs spices

Parameters	0-10 days (molds formation)	11-20 days (molds formation, lumpiness)	21-30 days (molds formation, lumpiness)
Room Temperature			
Treatment A	-	-	-
Treatment B	-	-	-
Treatment C	-	-	-
Chilling Temperature			
Treatment A	-	-	-
Treatment B	-	-	-
Treatment C	-	-	-

Legend: Negative (-) no mold formation Positive (+) mold formation is observed

Microbial Analysis of Blended Herbs Spices

The microbial quality of food products, including herbal spices, is a crucial aspect of ensuring their safety for consumption. In this study, the Blended Herbal Spice was tested for microbial contamination, specifically focusing on the Aerobic Plate Count (APC) and Total Coliforms. The submitted sample consisted of one pack of blended herbal spices (~250g/pack). The sample was submitted to the NPPC Analytical and Diagnostic Laboratory on February 16, 2026, and the test results were released on February 23, 2026. The LSO Number for this sample is 26-1923.

According to the laboratory test results conducted by NPPC Analytical and Diagnostic Laboratory, the Aerobic Plate Count for the Blended Herbal Spice was recorded at less than 10 CFU/g (colony-forming units per gram). This result indicates that the spice has a very low microbial load, significantly below the FDA’s acceptable threshold for dried herbs and spices, which allows up to 10⁵ CFU/g (100,000 CFU/g). The low APC value signifies that the herbal spice was processed and handled under sanitary conditions, thereby preventing the growth of aerobic bacteria that could compromise its safety.

In addition to the Aerobic Plate Count, the presence of Total Coliforms was also assessed. Coliform bacteria, particularly Escherichia coli (E. coli), are commonly used as indicators of potential contamination in food products, as their presence suggests poor hygiene during food processing. The laboratory test showed that Total Coliforms were not detected at 10¹ CFU/g, which means that the spice is free from harmful bacteria, further reinforcing its safety for consumption. The absence of coliforms is in full compliance with FDA guidelines, which state that food products should be free of coliform bacteria to ensure they are microbiologically safe.

Both the Aerobic Plate Count and Total Coliforms results are well within the acceptable limits established by food safety standards. The Blended Herbal Spice therefore met the microbial quality criteria set by the FDA, confirming that it is safe for consumption and has undergone proper processing to prevent contamination. These findings suggest that the product is of high microbiological quality, indicating effective manufacturing and handling practices that align with established food safety guidelines.

In conclusion, the results of the microbial testing of the Blended Herbal Spice demonstrate that it is free from harmful microbial contamination. The Aerobic Plate Count of less than 10 CFU/g and the absence of Total Coliforms validate the product’s safety, making it compliant with FDA standards for dried herbal spices. The findings underscore the importance of rigorous microbial testing in ensuring the safety of food products, particularly those consumed in their raw or minimally processed forms.

Table 10. Microbial analysis of blended herbs spices

Tests	26-1923 Blended Herb Spices	FDA Guidelines
Aerobic Plate Count (CFU/g) (3M Petrifilm)	< 10	10 ⁵
Total Coliforms (CFU/g) (3M Petrifilm)	Not detected at 10 ¹	10 ³

IV. CONCLUSIONS

Based on the established findings, the following conclusions are formulated:

The developed blended herb spice formulations using guava leaf, lemongrass, spring onion, bay leaf, and oregano are generally acceptable, safe, and suitable for food application. The sensory evaluation revealed that all treatments obtained high acceptability ratings; however, Treatment B (50g guava and 50g lemongrass) consistently emerged as the most preferred formulation across most sensory attributes, including appearance, aroma, texture, and taste, both as a standalone spice blend and when applied to grilled chicken.

The study further concludes that significant differences exist in the sensory qualities and general acceptability of the standalone blended herb spices among treatments, with Treatment B showing superior performance. However, when applied to grilled chicken, no significant difference in overall general acceptability was observed among treatments, indicating that all formulations were similarly acceptable despite variations in specific sensory attributes such as aroma and taste.

In terms of shelf life, the blended herbal spices demonstrated stability under both room and chilling temperature conditions for up to 30 days, with no observable changes in physical characteristics such as color, texture, and odor, indicating good storage stability. Moreover, microbial analysis confirmed that the selected formulation met food safety standards, with low aerobic plate count and absence of coliform bacteria, indicating that the product is safe for consumption and compliant with FDA guidelines.

The blended herbal spice formulations are effective, stable, and microbiologically safe, with Treatment B identified as the most optimal formulation in terms of sensory quality and consumer acceptability. These findings support the potential use of the developed product as a safe and acceptable herbal seasoning alternative for food applications.

Recommendations

Based on the established generalizations, the following are recommended:

The developed blended herbal spice, particularly Treatment B (50 g guava and 50 g lemongrass), may be utilized due to its high sensory acceptability, stability, and confirmed microbial safety. For optimal use, it is recommended that 1–2 grams of the blended herb spice may be applied per 250 grams of chicken, marinated for at least one hour or longer, ensuring proper coating and absorption of the desirable flavor, aroma, and taste during food preparation.

Consumers are encouraged to adopt this herbal spice as a natural and healthier alternative to commercial seasonings. In addition, it is highly recommended that school canteen operators consider the product as a viable seasoning alternative in food preparation, in support of the Department of Education (DepEd) initiative aimed at promoting healthier food choices and helping address malnutrition among learners through more nutritious and natural food options.

Farmers are likewise encouraged to explore the cultivation of guava, lemongrass, and other herbal ingredients used in the formulation as alternative crops for value-added production, which may contribute to additional income opportunities and promote sustainable agricultural practices. Educators are encouraged to integrate the study into teaching-learning activities in food technology and related subjects to enhance students' understanding of product development, sensory evaluation, and food innovation.

For future researchers, it is recommended to further improve and expand the study by exploring other herbal combinations, conducting additional food applications, and performing proximate analysis of the product to determine its nutritional composition and value. Further studies on long-term shelf life, consumer preference in wider populations, and commercialization potential are also encouraged to strengthen the development and application of herbal-based food products.

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