



Utilizing *Moringa Pods* as a Functional Ingredient in Preparation of Bread, Idli, Pasta, Noodle, and Nachos

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(Received: 16 June 2025

Revised: 20 July 2025

Accepted: 19 August 2025)

KEYWORDS

Moringa oleifera,
Functional Foods,
Nutritional
Evaluation,
Sensory
Evaluation.

ABSTRACT:

Background: Pods of *Moringa oleifera* known for nutritional and medicinal properties, has gained much attention for its potential use as a food ingredient.

Aim: This study aims to incorporate *Moringa oleifera* pods into commonly consumed foods, enhancing their nutraceutical value.

Objectives:

1. To prepare *Moringa*-fortified food products at varying concentrations.
2. To evaluate the sensory acceptability of the products.
3. To analyze the nutritional composition of the developed products.

Methodology: The study was carried out in three phases: *Moringa* pod powder preparation, development of fortified food products, and sensory/nutritional evaluation. *Moringa* pod powder was prepared by washing, drying, and grinding fresh pods into a fine powder. The powder was incorporated at concentrations of 5%, 10%, and 15% into five food products: bread, idli, pasta, noodles, and nachos. Organoleptic evaluations were conducted using a 9-point hedonic scale, and nutritional analysis was carried out through proximate analysis and mineral content estimation.

Results: Sensory evaluation indicated that 10% *Moringa* pods incorporation generally achieved the highest acceptability across most products. *Moringa*-fortified bread, pasta, and idli showed improved flavor, texture, and nutritional content, particularly in protein, iron, and calcium. Noodles and nachos also showed favorable outcomes, with nachos achieving the highest acceptability at 15% *Moringa*. Nutritional analysis revealed significant increases in energy, protein, and micronutrients, with the 10% formulation offering the most balanced enhancement in all products.

Conclusion: *Moringa oleifera* pod powder enhances the sensory qualities and nutritional profiles of common food products, with 10% incorporation emerging as the optimal level for most products. These findings support the potential of *Moringa* as a functional ingredient to improve public health through enhanced nutrient-rich foods.

Introduction:

Functional foods have gained significant attention in recent years due to their ability to provide health benefits beyond basic nutrition. As consumers increasingly seek foods that support health and wellness, there is a growing demand for innovative ingredients that can enhance the functional and nutritional properties of everyday food products. Among these, *Moringa oleifera*, commonly known as the "drumstick tree," has emerged as a versatile and

nutritionally dense plant with immense potential in functional food development [1]. Known for its high content of essential nutrients such as vitamins, minerals, proteins, and antioxidants, every part of the *Moringa* tree, including its leaves, seeds, and pods, has been studied for its potential health benefits [2]. However, the pods, despite being rich in fiber, protein, and bioactive compounds, remain underutilized in food product development.



Moringa pods are a valuable source of dietary fiber, essential amino acids, and phenolic compounds, making them ideal for fortifying food products with enhanced nutritional and functional attributes [3]. Research has demonstrated that the incorporation of *Moringa*-derived ingredients can contribute to improved immune function, reduced oxidative stress, and better management of chronic diseases such as diabetes and cardiovascular disorders [4]. However, the practical application of *Moringa* pods as a functional ingredient in commonly consumed products remains relatively unexplored.

This study focuses on the development of five innovative food products—**bread, idli, pasta, noodles, and nachos**—fortified with *Moringa* pods as a functional ingredient. By incorporating *Moringa* pods into these diverse food matrices, the aim is to enhance their nutritional value while maintaining their sensory appeal. The nutritional profiling of these products will provide insights into their comparative health benefits, and sensory evaluation will assess their acceptability among consumers.

Aim:

To utilize the pods of *Moringa oleifera* for enhancing the nutraceutical efficacy of certain commonly consumed edibles.

Objectives:

1. To prepare value-added food products by incorporating *Moringa oleifera* pods at various concentrations.
2. To conduct organoleptic evaluations of the prepared food products for sensory acceptability.
3. To estimate the nutritional value of the developed products.

Methodology

The study was conducted in three phases: preparation of *Moringa* pod powder, development of *Moringa*-fortified food products, and evaluation of their sensory and nutritional properties.

[Figure 1: Flow chart of study]

1. Preparation of *Moringa* Pod Powder

Fresh *Moringa* pods were procured from nearby areas of Era University and thoroughly washed to remove any dirt or debris. The pods were then sliced into small pieces and blanched in boiling water for 3–5 minutes to reduce any anti-nutritional factors. The blanched pods were dried in a hot air oven at 50°C for 12–14 hours until they achieved a consistent low moisture content. The dried pods were ground into a fine powder using a high-speed grinder and sieved to ensure uniform particle size. The powder was stored in an airtight container at room temperature until use.

2. Development of *Moringa*-Fortified Food Products

2.1 Selection of Food Products

Five food products—bread, idli, pasta, noodles, and nachos—were selected for fortification with *Moringa* pod powder due to their widespread consumption and versatility.

2.2 Formulation and Incorporation Levels

The formulation for each product was standardized to include *Moringa* pod powder at varying incorporation levels (e.g. 5%, 10%, and 15% w/w) to identify the optimal balance between nutritional enhancement and sensory acceptability. Control samples without *Moringa* pod powder were prepared for comparison.

- **Bread:** *Moringa* pod powder was substituted for a portion of wheat flour in the dough. [Table 1]
- **Idli:** The powder was added to the traditional fermented rice-lentil batter. [Table 2]
- **Pasta:** *Moringa* pod powder was blended with semolina during dough preparation. [Table 3]
- **Noodles:** It was incorporated into the noodle dough formulation. [Table 4]
- **Nachos:** The powder was mixed with maize flour and other ingredients before shaping and frying. [Table 5]

2.3 Product Preparation

Each product was prepared following standard procedures with modifications to incorporate *Moringa* pod powder. The prepared samples were subjected to



baking, steaming, or cooking as appropriate to their respective formulations.

3. Sensory Evaluation/ Organoleptic Evaluation

Sensory evaluation was conducted to assess the acceptability of *Moringa*-fortified products. A panel of 25 trained evaluators rated the products on a 9-point hedonic scale for attributes including appearance, texture, flavor, aroma, and overall acceptability. The scores were compared across different incorporation levels to determine the optimal formulation.

4. Nutritional Profiling

The nutritional analysis of *Moringa* pod powder and the fortified products was carried out using standard laboratory procedures:

- **Proximate Analysis:** Moisture, protein, fat, fiber, ash, and carbohydrate content were determined.
- **Mineral Content:** Levels of iron and calcium were quantified using atomic absorption spectroscopy (AAS).

5. Comparative Analysis

The nutritional properties of *Moringa*-fortified products were compared with their respective control samples to quantify the enhancement achieved through fortification. The findings were analyzed to highlight the most nutritionally superior and sensory-acceptable product formulations.

6. Statistical Analysis

Descriptive statistics, including mean and standard deviation (SD), were used to summarize the sensory evaluation scores and nutritional composition of the products. To determine significant differences among products with varying concentrations of *Moringa oleifera* leaves, Analysis of Variance (ANOVA) was performed. Tukey's post hoc test was also applied to identify specific differences between the formulations. The sensory scores are reported with their respective means and standard deviations, and the statistical tests confirmed whether the observed differences among the formulations were statistically significant (p-value).

Results

The physical appearance of the formulated products

Moringa pod bread, idli, pasta, noodles, and nachos—varied noticeably with the incorporation of *Moringa* pod powder at increasing levels (5%, 10%, and 15%). In **bread**, the color changed from a golden-brown hue in the control (T0) to a darker shade in higher concentrations (T3), with a slightly denser crumb texture observed [Figure 2]. The **idli** formulations displayed a gradual shift from soft white to a light greenish tint, with a slightly firmer texture as *Moringa* content increased [Figure 3]. The **pasta** and **noodles** exhibited a uniform greenish color in the experimental samples, with a smoother surface at lower incorporation levels (T1 and T2) but a marginally rough texture at T3 [Figure 4] [Figure 5]. In the case of nachos, the experimental products developed a deeper greenish hue and maintained crispness comparable to the control, though higher concentrations imparted a slightly coarser texture [Figure 6]. Across all products, the incorporation of *Moringa* pod powder enhanced their visual appeal and contributed to their unique appearance, aligning with consumer expectations for functional, nutrient-enriched foods.

Sensory Evaluation / Organoleptic Evaluation

Moringa Pod Bread:

The 10% formulation (T2) achieved the highest sensory scores: color (8.2 ± 0.69), flavor (8.25 ± 0.63), taste (8.45 ± 0.51), texture (8.3 ± 0.57), and overall acceptability (8.35 ± 0.58), with significant differences across formulations ($p < 0.05$) [Table 6(a)]. Pairwise comparisons via Tukey's HSD [Table 6(b)] showed significant differences between all pairs for color, flavor, and texture, indicating T2's distinct superiority. For taste and overall acceptability, T2 did not differ significantly from T1 ($p > 0.05$), suggesting similar consumer preference at these levels, but both outperformed T0 and T3 ($p < 0.05$). The 15% formulation (T3) scored lowest, likely due to excessive *Moringa* imparting bitterness or textural changes.

Moringa Pod Idli:

The 15% formulation (T3) was most preferred: color (8.1 ± 0.72), flavor (8.4 ± 0.59), taste (8.5 ± 0.51), texture (8.35 ± 0.58), and overall acceptability ($8.5 \pm$



0.51), with significant differences ($p < 0.05$) [Table 7(a)]. Tukey's HSD [Table 7(b)] revealed T3 did not differ significantly from T0 for color ($p > 0.05$), nor from T1 for flavor, taste, and overall acceptability ($p > 0.05$), but differed from T2 and other pairs ($p < 0.05$). This suggests T3's higher Moringa content enhanced sensory attributes without compromising acceptability, unlike T2, which scored lowest, possibly due to insufficient flavor impact.

Moringa Pod Pasta:

The 10% formulation (T2) excelled: color (8.3 ± 0.57), flavor (8.25 ± 0.55), taste (8.25 ± 0.64), texture (8.2 ± 0.61), and overall acceptability (8.4 ± 0.50), with significant differences ($p < 0.05$) [Table 8(a)]. Tukey's HSD [Table 8(b)] indicated significant differences between all pairs for color, flavor, and texture ($p < 0.05$), confirming T2's standout performance. For taste, T2 did not differ from T0 ($p > 0.05$), and for overall acceptability, T2 was similar to T1 ($p > 0.05$), suggesting a balanced sensory profile at 10%. The 15% formulation (T3) scored lowest, likely due to textural degradation.

Moringa Pod Noodles:

The 10% formulation (T2) led: color (8.25 ± 0.64), flavor (8.3 ± 0.65), taste (8.2 ± 0.61), texture (8.15 ± 0.67), and overall acceptability (8.35 ± 0.49), with significant differences ($p < 0.05$) [Table 9(a)]. Tukey's HSD [Table 9(b)] showed T2 did not differ significantly from T0 for color ($p > 0.05$), nor from T1 for overall acceptability ($p > 0.05$), but differed from T3 and other pairs ($p < 0.05$). This indicates T2 maintained color appeal similar to the control while enhancing other attributes, outperforming T3, which declined at 15%.

Moringa Pod Nachos:

The 15% formulation (T3) topped: color (8.05 ± 0.68), flavor (8.2 ± 0.69), taste (8.4 ± 0.50), texture (8.15 ± 0.59), and overall acceptability (8.55 ± 0.51), with significant differences ($p < 0.05$) [Table 10(a)]. Tukey's HSD [Table 10(b)] revealed T3 did not differ significantly from T0 for color and texture ($p > 0.05$), nor from T1 for flavor and taste ($p > 0.05$), but differed from T2 ($p < 0.05$). For overall acceptability, T2 was similar to T1 ($p > 0.05$). This suggests T3's higher Moringa level was well-tolerated, enhancing flavor and

acceptability without altering texture significantly from the control.

Nutritional Analysis

For Bread, the nutritional analysis reveals an increase in energy, carbohydrates, protein, fat, iron, calcium, and vitamin C with the addition of 10% T2, while moisture content decreases. The crude fibre content also increases, contributing to a more nutrient-dense product. [Table 11]

Idli shows a decrease in energy and carbohydrates with the addition of 15% T3, but protein and fat content rise. The moisture content increases, while the crude fibre content decreases. Iron and calcium remain stable, and vitamin C decreases slightly. [Table 12]

For Pasta, there is an increase in energy, protein, and iron with T2, but a slight decrease in calcium. Carbohydrates remain almost the same, and moisture content increases slightly, while the ash content shows a small rise. [Table 13]

Noodles display a decrease in energy and carbohydrates with T2, while protein and fat content increase slightly. There is a significant increase in ash and moisture content, but crude fibre decreases. Iron and calcium levels improve, especially calcium, which sees a large rise. [Table 14]

Nachos shows almost no change in energy, but a slight reduction in carbohydrates is seen with T3. Fat and crude fibre increase substantially, though iron decreases slightly, while calcium improves. The moisture content drops slightly, indicating better crispness. [Table 15]

Discussion

Physical Appearance

The physical appearance of the formulated products showed notable changes with the incorporation of *Moringa* pod powder. In **bread**, the addition of higher concentrations of *Moringa* pod powder (T3) led to a darker color and denser texture, similar to findings in other studies where *Moringa*'s effect on bread texture was reported to increase crumb density [5][6]. Similarly, **idli** exhibited a gradual shift in color from white to a light greenish tint, aligning with the results of another study, who observed color changes and firmer textures in *Moringa*-enriched steamed products or



fermented beverages [7]. The greenish hue in **pasta** and **noodles** at the experimental levels is consistent with another study, where the inclusion of *Moringa* powder in pasta led to improved visual appeal and smoother surface textures [8]. For **nachos**, the deeper green hue and crispness enhancement observed were comparable to those in snacks like chips, where *Moringa* improved both the color and texture, as highlighted by one more study [9].

Sensory Evaluation / Organoleptic Evaluation

The sensory evaluation results revealed that **bread** with 10% *Moringa* (T2) received the highest scores for overall acceptability, color, flavor, and texture, corroborating findings by **Eke et al. (2022)**, who found that moderate concentrations of *Moringa* in bread products led to better flavor and texture scores [10]. However, **bread with 15% Moringa** (T3) showed a decline in acceptability, indicating that higher concentrations may lead to undesirable sensory qualities, such as a more bitter taste. This trend aligns with earlier studies where excessive *Moringa* addition negatively impacted sensory attributes (**Fatima et al., 2024**) [11]. In **idli**, the 15% *Moringa* formulation (T3) was the most preferred, echoing findings by **Zhang et al. (2019)**, who noted that *Moringa*'s antioxidant properties could enhance the flavor and overall acceptability of fermented products [12]. **Pasta** and **noodles** also followed a similar pattern, where 10% *Moringa* (T2) had the highest scores, with 15% *Moringa* (T3) leading to reduced texture ratings. These results are in line with studies on *Moringa*-enhanced pasta, where higher concentrations caused undesirable texture changes (**Coello et al., 2021**) [13]. **Nachos** with 15% *Moringa* (T3) scored the highest in flavor and overall acceptability, which is consistent with the findings of **Famakinwa et al. (2023)**, where *Moringa* incorporation improved flavor and nutritional appeal in snack foods [14].

Nutritional Analysis

The nutritional analysis for **bread** showed an increase in energy, carbohydrates, protein, fat, iron, calcium, and vitamin C with the addition of 10% *Moringa* (T2), consistent with studies by Millaet al. (2021), who found *Moringa* to significantly enhance the nutritional content of baked products [15]. The increase in crude fibre further contributes to the health benefits of the bread. In

idli, the 15% *Moringa* (T3) formulation led to a decrease in energy and carbohydrates, with an increase in protein and fat, which mirrors the findings of **Mohajan et al. (2018)**, where *Moringa* was shown to improve the protein and fat content in fermented foods [16]. For **pasta**, the increase in protein and iron at 10% *Moringa* (T2) aligns with previous studies that reported a significant boost in these nutrients with *Moringa* addition (**Fatima et al., 2024**) [11]. The slight reduction in calcium, however, requires further investigation, as *Moringa* is generally considered a good source of calcium. The decrease in **noodles' energy and carbohydrates** with 10 % *Moringa* (T2) is consistent with previous studies indicating that high levels of *Moringa* powder might reduce the glycemic index of products (**Zulla et al., 2021**) [17]. The increase in ash and moisture content in noodles further supports the idea that *Moringa*'s bioactive compounds contribute to moisture retention and overall texture enhancement. For **nachos**, the slight decrease in carbohydrates with an increase in fat and crude fibre is consistent with studies on *Moringa*-enriched snack products, where higher fibre content was associated with improved health benefits (**Coello et al., 2022**) [18]. The increase in calcium and the decrease in moisture content in nachos suggests that *Moringa* may help in enhancing crunchiness while providing an additional nutritional boost, particularly in terms of calcium, as noted by various researchers (**Iyer et al., 2021**) [19].

Conclusion

Incorporating *Moringa* pod powder into various food products not only improved their physical appearance but also significantly enhanced their sensory and nutritional qualities. Moderate levels of *Moringa* (10%) generally produced the most favorable outcomes across the products, supporting findings from previous studies on *Moringa*-enriched foods. The research further supports the potential of *Moringa* as a functional ingredient capable of improving the nutritional profile of everyday food products while maintaining or enhancing sensory appeal.

References

1. Shivanna SK, Naik NL, Nataraj BH, Rao PS. *Moringa* marvel: navigating therapeutic insights and safety features for future functional foods. Journal of Food



- Measurement and Characterization. 2024 May 9;1-32.
- Islam Z, Islam SR, Hossen F, Mahtab-ul-Islam K, Hasan MR, Karim R. *Moringaoleifera* is a prominent source of nutrients with potential health benefits. *International Journal of Food Science*. 2021;2021(1):6627265.
 - Sahay S, Yadav U, Srinivasamurthy S. Potential of *Moringaoleifera* as a functional food ingredient: A review. *Magnesium (g/kg)*. 2017;8(9.06):4-90.
 - Islam Z, Islam SR, Hossen F, Mahtab-ul-Islam K, Hasan MR, Karim R. *Moringaoleifera* is a prominent source of nutrients with potential health benefits. *International Journal of Food Science*. 2021;2021(1):6627265.
 - Hernandez-Aguilar C, Dominguez-Pacheco A, Valderrama-Bravo C, Cruz-Orea A, Ortiz EM, Ivanov R, Ordonez-Miranda J. Photoacoustic characterization of wheat bread mixed with *Moringaoleifera*. *Current Research in Food Science*. 2021 Jan 1;4:521-31.
 - Nudel A, Cohen R, Abbo S, Kerem Z. Developing a nutrient-rich and functional wheat bread by incorporating *Moringaoleifera* leaf powder and gluten. *LWT*. 2023 Sep 15;187:115343.
 - Don SM, Rambli M, Nore BF. Fermented beverages of natural herbs: *Cymbopogon citratus*, *Zingiber officinale*, *Moringaoleifera*, *Mentha*, and *Curcuma longa*. *Biocatalysis and Agricultural Biotechnology*. 2024 Jun 1;58:103201.
 - AQUILA JABEEN KK, HANAN SHANA KA, NOORBINA R, SHIFA RASHEED VR, SIVAKUMAR V. DEVELOPMENT AND QUALITY EVALUATION OF CAKE FORTIFIED WITH *Moringaoleifera* LEAF POWDER.
 - Espinosa-Ramírez J. Seasonings for Snack Foods. In *Snack Foods 2022* Apr 20 (pp. 179-200). CRC Press.
 - Eke MO, Elechi JO, Bello F. Effect of fortification of defatted *Moringaoleifera* seed flour on consumers acceptability and nutritional characteristics of wheat bread. *European Food Science and Engineering*. 2022;3(1):18-25.
 - Fatima S, Usmani MA, Srivastava AK. Nutritional Value Addition of Bread, Pasta, and Noodles by Incorporating Leaves of *Moringaoleifera*. *Cureus*. 2024 Dec 16;16(12).
 - Zhang T, Jeong CH, Cheng WN, Bae H, Seo HG, Petriello MC, Han SG. *Moringa* extract enhances the fermentative, textural, and bioactive properties of yogurt. *Lwt*. 2019 Mar 1;101:276-84.
 - Coello KE, Peñas E, Martínez-Villaluenga C, Cartea ME, Velasco P, Frias J. Pasta products enriched with *Moringa* sprout powder as nutritive dense foods with bioactive potential. *Food Chemistry*. 2021 Oct 30;360:130032.
 - Famakinwa A, Shuttleworth A, Lubisi S, Olubi O, Oguntibeju OO, Obilana A. Chemical and functional properties of snacks produced from wheat flour fortified with *Moringaoleifera* leaf powder. *African Journal of Food, Agriculture, Nutrition and Development*. 2023;23(9):24467-86.
 - Milla PG, Peñalver R, Nieto G. Health benefits of uses and applications of *Moringaoleifera* in bakery products. *Plants*. 2021 Feb 6;10(2):318.
 - Mohajan S, Orchy TN, Farzana T. Effect of incorporation of soy flour on functional, nutritional, and sensory properties of mushroom-*Moringa*-supplemented healthy soup. *Food science & nutrition*. 2018 May;6(3):549-56.
 - Zula AT, Ayele DA, Egigayhu WA. Proximate composition, antinutritional content, microbial load, and sensory acceptability of noodles formulated from *Moringa (Moringaoleifera)* leaf powder and wheat flour blend. *International Journal of Food Science*. 2021;2021(1):6689247.
 - Coello KE, Frias J, Martínez-Villaluenga C, Cartea ME, Velasco P, Peñas E. Manufacture of healthy snack bars supplemented with *Moringa* sprout powder. *LWT*. 2022 Jan 15;154:112828.
 - Iyer N. *Everyday Superfoods*. Bloomsbury Publishing; 2021 Mar 18.



Tables

Table 1: Composition and Experimental Formulation of *Moringa* Pod Bread

Ingredients	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)
Whole wheat flour	250gm	237.5gm	225gm	212.5gm
Instant yeast	2gm	2gm	2gm	2gm
Honey	10gm	10gm	10gm	10gm
Buttermilk	70ml	70ml	70ml	70ml
Sugar	2gm	2gm	2gm	2gm
oil	5gm	5gm	5gm	5gm
water	15ml	15ml	15ml	15ml
<i>Moringa</i> pod powder	-	12.5gm	25gm	37.5gm

Table 2: Composition and Experimental Formulation of *Moringa* Pod Idli

Ingredients	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)
Sooji	100gm	95gm	90gm	85gm
Water	30ml	30ml	30ml	30ml
Curd	30gm	30gm	30gm	30gm
<i>Moringa</i> pod powder	-	5gm	10gm	15gm

Table 3: Composition and Experimental Formulation of *Moringa* Pod Pasta

Ingredients	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)
Wheat Flour (Whole)	50gm	47.5gm	45gm	42.5gm
Wheat Flour (Refined)	50gm	47.5gm	45gm	42.5gm
<i>Moringa</i> pod powder	-	5gm	10gm	15gm



Table 4: Composition and Experimental Formulation of *Moringa* Pod Noodles

Ingredients	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)
Whole Wheat Flour	100 gm	95gm	90 gm	85gm
<i>Moringa</i> pod powder	-	5 gm	10 gm	15gm

Table 5: Composition and Experimental Formulation of *Moringa* Pod Nachos

Ingredients	T0 (0%)	T1 (10%)	T2 (20%)	T3 (30%)
Maize Flour	50gm	45gm	40gm	35gm
Wheat Flour (Whole)	50gm	45gm	40gm	35gm
<i>Moringa</i> pod powder	-	10gm	20gm	30gm

Table 6 (a): Sensory Evaluation of *Moringa* Pod Bread (9-point Hedonic Scale)

(Bread)Attributes	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)	p-value
Color	7.7 ± 0.57	7.05 ± 0.68	8.2 ± 0.69	5.7 ± 0.73	p < 0.05
Flavor	7.35 ± 0.87	6.8 ± 0.61	8.25 ± 0.63	5.3 ± 0.80	p < 0.05
Taste	7.45 ± 0.68	7.05 ± 0.76	8.45 ± 0.51	5.5 ± 0.81	p < 0.05
Texture	7.45 ± 0.76	6.85 ± 0.67	8.3 ± 0.57	5.6 ± 0.82	p < 0.05
Overall Acceptability	7.4 ± 0.75	7.05 ± 0.68	8.35 ± 0.58	6.15 ± 0.59	p < 0.05

Table 6 (b): Pairwise Comparison: Tukey HSD for *Moringa* Pod Bread

Type	<i>Moringa</i> Pod Bread: Pairwise Comparison: Tukey HSD					Interpretation
COLOR	Difference	Lower CI	Upper CI	p-Value		
T1-T0	-1.15	-1.71007178	-0.58992822	0.00000445195007	There is a significant difference in each type.	
T2-T0	-0.50	-1.06007178	0.06007178	0.09695645857906		
T3-T0	-2.50	-3.06007178	-1.93992822	0.0000000000000000		
T2-T1	0.65	0.08992822	1.21007178	0.01635678512876		
T3-T1	-1.35	-1.91007178	-0.78992822	0.00000009219372		
T3-T2	-2.00	-2.56007178	-1.43992822	0.0000000000000000		



FLAVOUR	▲	Difference	Lower CI	Upper CI	p-Value	There is a significant difference in each type.
	T1-T0	-1.45	-2.06530111	-0.8346989	0.0000001675851	
T2-T0	-0.90	-1.51530111	-0.2846989	0.0014077929246		
T3-T0	-2.95	-3.56530111	-2.3346989	0.0000000000000		
T2-T1	0.55	-0.06530111	1.1653011	0.0963193998630		
T3-T1	-1.50	-2.11530111	-0.8846989	0.0000000678907		
T3-T2	-2.05	-2.66530111	-1.4346989	0.0000000000000		
TASTE	▲	Difference	Lower CI	Upper CI	p-Value	Only T2 compare to T1 POD has not significant difference.
	T1-T0	-1.4	-1.982714	-0.817286	0.0000001006184	
T2-T0	-1.0	-1.582714	-0.417286	0.0001354033722		
T3-T0	-2.8	-3.382714	-2.217286	0.0000000000000		
T2-T1	0.4	-0.182714	0.982714	0.2798701020752		
T3-T1	-1.4	-1.982714	-0.817286	0.0000001006184		
T3-T2	-1.8	-2.382714	-1.217286	0.0000000000000		
TEXTURE	▲	Difference	Lower CI	Upper CI	p-Value	There is a significant difference in each type.
	T1-T0	-1.45	-2.041221247	-0.8587788	0.0000000575837	
T2-T0	-0.85	-1.441221247	-0.2587788	0.0017509476301		
T3-T0	-2.70	-3.291221247	-2.1087788	0.0000000000000		
T2-T1	0.60	0.008778753	1.1912212	0.0453688311451		
T3-T1	-1.25	-1.841221247	-0.6587788	0.0000023336653		
T3-T2	-1.85	-2.441221247	-1.2587788	0.0000000000000		
OVERALL ACCEPABILITY	▲	Difference	Lower CI	Upper CI	p-Value	Only T2 compare to T1 POD has not significant difference.
	T1-T0	-1.30	-1.8461191	-0.7538809	0.0000001286508	
T2-T0	-0.95	-1.4961191	-0.4038809	0.0001078613353		
T3-T0	-2.20	-2.7461191	-1.6538809	0.0000000000000		
T2-T1	0.35	-0.1961191	0.8961191	0.3394528541923		
T3-T1	-0.90	-1.4461191	-0.3538809	0.0002596568816		
T3-T2	-1.25	-1.7961191	-0.7038809	0.0000003531588		

Table 7 (a): Sensory Evaluation of *Moringa* Pod Idli (9-point Hedonic Scale)

Attributes(Idli)	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)	p-value
Color	7.65 ± 0.81	6.9 ± 0.72	6 ± 0.91	8.1 ± 0.72	p < 0.05



Attributes(Idli)	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)	p-value
Flavor	7.55 ± 0.76	7.05 ± 0.76	6.05 ± 0.76	8.4 ± 0.59	p < 0.05
Taste	7.35 ± 0.93	6.9 ± 0.72	5.95 ± 0.99	8.5 ± 0.51	p < 0.05
Texture	7.6 ± 0.75	6.75 ± 0.71	5.95 ± 0.94	8.35 ± 0.58	p < 0.05
Overall Acceptability	7.8 ± 0.61	6.7 ± 0.86	6.3 ± 0.86	8.5 ± 0.51	p < 0.05

Table 7 (b): Pairwise Comparison: Tukey HSD for *Moringa* Pod Idli

Type	<i>Moringa</i> Pod Idli :Pairwise Comparison: Tukey HSD					Interpretation
FLAVOUR	▲	↕	↕	↕	↕	Only T3 compare to T1 POD has not significant difference.
		Difference	Lower CI	Upper CI	p-Value	
	T1-T0	-1.35	-1.9499862	-0.7500138	0.0000005398495	
	T2-T0	-2.35	-2.9499862	-1.7500138	0.0000000000000	
	T3-T0	-0.85	-1.4499862	-0.2500138	0.0020990431548	
	T2-T1	-1.00	-1.5999862	-0.4000138	0.0002174506186	
	T3-T1	0.50	-0.0999862	1.0999862	0.1355588724686	
T3-T2	1.50	0.9000138	2.0999862	0.0000000337764		
COLOR	▲	↕	↕	↕	↕	Only T3 does not have significant difference with respect to T0.
		Difference	Lower CI	Upper CI	p-Value	
	T1-T0	-1.20	-1.86117712	-0.5388229	0.00005133376273	
	T2-T0	-2.10	-2.76117712	-1.4388229	0.000000000000000	
	T3-T0	-0.45	-1.11117712	0.2111771	0.28712814725276	
	T2-T1	-0.90	-1.56117712	-0.2388229	0.00335908277897	
	T3-T1	0.75	0.08882288	1.4111771	0.01982231269066	
T3-T2	1.65	0.98882288	2.3111771	0.00000003553522		
TASTE	▲	↕	↕	↕	↕	Only T3 compare to T1 POD has not significant difference.
		Difference	Lower CI	Upper CI	p-Value	
	T1-T0	-1.60	-2.2757774	-0.9242226	0.0000001482505	
	T2-T0	-2.55	-3.2257774	-1.8742226	0.000000000000000	
	T3-T0	-1.15	-1.8257774	-0.4742226	0.0001555213536	
	T2-T1	-0.95	-1.6257774	-0.2742226	0.0023047225762	
	T3-T1	0.45	-0.2257774	1.1257774	0.3059082093718	
T3-T2	1.40	0.7242226	2.0757774	0.0000036670633		



TEXTURE		Difference	Lower CI	Upper CI	p-Value	There is a significant difference in each type.
	T1-T0	-1.60	-2.2324011	-0.9675989	0.000000024080960	
	T2-T0	-2.40	-3.0324011	-1.7675989	0.0000000000000000	
	T3-T0	-0.75	-1.3824011	-0.1175989	0.013533649452634	
	T2-T1	-0.80	-1.4324011	-0.1675989	0.007348510273913	
	T3-T1	0.85	0.2175989	1.4824011	0.003873248757897	
	T3-T2	1.65	1.0175989	2.2824011	0.000000009799056	

OVERALL ACCEPABILITY		Difference	Lower CI	Upper CI	p-Value	Only T3 compare to T1 POD has not significant difference.
	T1-T0	-1.8	-2.4071314	-1.19286861	0.00000000007675605	
	T2-T0	-2.2	-2.8071314	-1.59286861	0.000000000000000000	
	T3-T0	-0.7	-1.3071314	-0.09286861	0.01730028740998435	
	T2-T1	-0.4	-1.0071314	0.20713139	0.31518050259589248	
	T3-T1	1.1	0.4928686	1.70713139	0.00005296613845818	
	T3-T2	1.5	0.8928686	2.10713139	0.00000004701811218	

Table 8(a): Sensory Evaluation of *Moringa* Pod Pasta (9-point Hedonic Scale)

Attributes(Pasta)	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)	p-value
Color	7.85 ± 0.58	7.25 ± 0.55	8.3 ± 0.57	5.75 ± 0.64	p < 0.05
Flavor	7.45 ± 0.76	6.6 ± 0.50	8.25 ± 0.55	5.45 ± 0.75	p < 0.05
Taste	7.8 ± 0.61	6.85 ± 0.67	8.25 ± 0.64	5.7 ± 0.65	p < 0.05
Texture	7.5 ± 0.76	6.7 ± 0.66	8.2 ± 0.61	5.4 ± 0.82	p < 0.05
Overall Acceptability	7.4 ± 0.59	7 ± 0.65	8.4 ± 0.50	5.9 ± 0.64	p < 0.05

Table 8(b): Pairwise Comparison: Tukey HSD for *Moringa* Pod Pasta

Type	Moringa Pod Pasta: Pairwise Comparison: Tukey HSD					Interpretation
COLOR		Difference	Lower CI	Upper CI	p-Value	There is a significant difference in each type.
	T1-T0	-1.05	-1.5381849	-0.56181512	0.000001578691	
	T2-T0	-0.45	-0.9381849	0.03818488	0.081617669936	
	T3-T0	-2.55	-3.0381849	-2.06181512	0.000000000000	
	T2-T1	0.60	0.1118151	1.08818488	0.009739545877	
	T3-T1	-1.50	-1.9881849	-1.01181512	0.000000000000	
	T3-T2	-2.10	-2.5881849	-1.61181512	0.000000000000	



FLAVOUR		Difference	Lower CI	Upper CI	p-Value	There is a significant difference in each type.
	T1-T0	-1.65	-2.192784	-1.107216	0.000000000000	
T2-T0	-0.80	-1.342784	-0.257216	0.001275854202		
T3-T0	-2.80	-3.342784	-2.257216	0.000000000000		
T2-T1	0.85	0.307216	1.392784	0.000557057980		
T3-T1	-1.15	-1.692784	-0.607216	0.000002225804		
T3-T2	-2.00	-2.542784	-1.457216	0.000000000000		
TASTE		Difference	Lower CI	Upper CI	p-Value	Only T2 compare to T0 POD has not significant difference.
	T1-T0	-1.40	-1.9364748	-0.86352523	0.000000009740324	
T2-T0	-0.45	-0.9864748	0.08647477	0.131576562068405		
T3-T0	-2.55	-3.0864748	-2.01352523	0.000000000000000		
T2-T1	0.95	0.4135252	1.48647477	0.000079430335218		
T3-T1	-1.15	-1.6864748	-0.61352523	0.000001705372336		
T3-T2	-2.10	-2.6364748	-1.56352523	0.000000000000000		
TEXTURE		Difference	Lower CI	Upper CI	p-Value	Significant differences between all pairs except T2 vs. T0 and T3 vs. T1 for color.
	T1-T0	-1.5	-2.0965718	-0.9034282	0.00000002874477	
T2-T0	-0.7	-1.2965718	-0.1034282	0.01487235544225		
T3-T0	-2.8	-3.3965718	-2.2034282	0.000000000000000		
T2-T1	0.8	0.2034282	1.3965718	0.00397347349604		
T3-T1	-1.3	-1.8965718	-0.7034282	0.00000116461994		
T3-T2	-2.1	-2.6965718	-1.5034282	0.000000000000000		
OVERALL ACCEPABILITY		Difference	Lower CI	Upper CI	p-Value	Only T2 compare to T1 POD has not significant difference.
	T1-T0	-1.4	-1.89876383	-0.9012362	0.00000000094251984	
T2-T0	-1.0	-1.49876383	-0.5012362	0.00000739004367556		
T3-T0	-2.5	-2.99876383	-2.0012362	0.00000000000000000		
T2-T1	0.4	-0.09876383	0.8987638	0.16027717748690895		
T3-T1	-1.1	-1.59876383	-0.6012362	0.00000087630188539		
T3-T2	-1.5	-1.99876383	-1.0012362	0.00000000001142553		

Table 9(a): Sensory Evaluation of *Moringa* Pod Noodles (9-point Hedonic Scale)

Attributes(Noodles)	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)	p-value
Color	7.75 ± 0.64	7 ± 0.65	8.25 ± 0.64	5.65 ± 0.81	p < 0.05
Flavor	7.45 ± 0.76	6.8 ± 0.69	8.3 ± 0.65	5.45 ± 0.60	p < 0.05
Taste	7.6 ± 0.59	6.8 ± 0.52	8.2 ± 0.61	5.8 ± 0.69	p < 0.05
Texture	7.35 ± 0.67	6.75 ± 0.64	8.15 ± 0.67	5.5 ± 0.69	p < 0.05



Attributes(Noodles)	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)	p-value
Overall Acceptability	7.35 ± 0.67	7 ± 0.65	8.35 ± 0.49	6.05 ± 0.60	p < 0.05

Table 9(b): Pairwise Comparison: Tukey HSD for *Moringa* Pod Noodles

Type	<i>Moringa</i> Pod Noodles: Pairwise Comparison: Tukey HSD					Interpretation
NOODLES PODS COLOR	Difference	Lower CI	Upper CI	p-Value		Only T2 compare to T0 POD has not significant difference.
	T1-T0	-1.25	-1.8221005	-0.67789953	0.0000010938580	
	T2-T0	-0.50	-1.0721005	0.07210047	0.1080605220182	
	T3-T0	-2.60	-3.1721005	-2.02789953	0.0000000000000	
	T2-T1	0.75	0.1778995	1.32210047	0.0050829247563	
	T3-T1	-1.35	-1.9221005	-0.77789953	0.0000001618348	
	T3-T2	-2.10	-2.6721005	-1.52789953	0.0000000000000	
NOODLES PODS FLAVOUR	Difference	Lower CI	Upper CI	p-Value		There is a significant difference in each type.
	T1-T0	-1.50	-2.06611808	-0.9338819	0.000000006151155	
	T2-T0	-0.85	-1.41611808	-0.2838819	0.000998946722966	
	T3-T0	-2.85	-3.41611808	-2.2838819	0.000000000000000	
	T2-T1	0.65	0.08388192	1.2161181	0.017920049441799	
	T3-T1	-1.35	-1.91611808	-0.7838819	0.000000122752537	
	T3-T2	-2.00	-2.56611808	-1.4338819	0.000000000000000	
NOODLES PODS TASTE	Difference	Lower CI	Upper CI	p-Value		There is a significant difference in each type.
	T1-T0	-1.4	-1.9077838	-0.8922162	0.000000001739789	
	T2-T0	-0.6	-1.1077838	-0.0922162	0.013983535312205	
	T3-T0	-2.4	-2.9077838	-1.8922162	0.000000000000000	
	T2-T1	0.8	0.2922162	1.3077838	0.000510644700916	
	T3-T1	-1.0	-1.5077838	-0.4922162	0.000010698641295	
	T3-T2	-1.8	-2.3077838	-1.2922162	0.000000000000000	
NOODLES PODS TEXTURE	Difference	Lower CI	Upper CI	p-Value		There is a significant difference in each type.
	T1-T0	-1.40	-1.95436909	-0.8456309	0.00000002537952	
	T2-T0	-0.80	-1.35436909	-0.2456309	0.00167099869470	
	T3-T0	-2.65	-3.20436909	-2.0956309	0.000000000000000	
	T2-T1	0.60	0.04563091	1.1543691	0.02870698449218	
	T3-T1	-1.25	-1.80436909	-0.6956309	0.00000051252666	
	T3-T2	-1.85	-2.40436909	-1.2956309	0.000000000000000	



OVERALL ACCEPABILITY	▲	Difference	Lower CI	Upper CI	p-Value	Only T2 compare to T1 POD has not significant difference.
	T1-T0	-1.35	-1.8546451	-0.8453549	0.00000000457712	
	T2-T0	-1.00	-1.5046451	-0.4953549	0.00000942345222	
	T3-T0	-2.30	-2.8046451	-1.7953549	0.00000000000000	
	T2-T1	0.35	-0.1546451	0.8546451	0.27118234032894	
	T3-T1	-0.95	-1.4546451	-0.4453549	0.00002603793696	
	T3-T2	-1.30	-1.8046451	-0.7953549	0.00000001428647	

Table 10(a): Sensory Evaluation of *Moringa* Pod Nachos (9-point Hedonic Scale)

Attributes(Nachos)	T0 (0%)	T1 (5%)	T2 (10%)	T3 (15%)	p-value
Color	7.65 ± 0.74	6.9 ± 0.72	5.9 ± 0.85	8.05 ± 0.68	p < 0.05
Flavor	7.5 ± 0.69	7.15 ± 0.74	5.85 ± 0.87	8.2 ± 0.69	p < 0.05
Taste	7.4 ± 0.94	6.9 ± 0.72	5.85 ± 0.99	8.4 ± 0.50	p < 0.05
Texture	7.7 ± 0.80	6.75 ± 0.71	5.7 ± 0.98	8.15 ± 0.59	p < 0.05
Overall Acceptability	7.85 ± 0.58	6.6 ± 0.82	6.25 ± 0.85	8.55 ± 0.51	p < 0.05

Table 10(b): Pairwise Comparison: Tukey HSD for *Moringa* Pod Nachos

Type	<i>Moringa</i> Pod Noodles: Pairwise Comparison: Tukey HSD					Interpretation
COLOR	▲	Difference	Lower CI	Upper CI	p-Value	Only T3 compare to T0 POD has not significant difference.
	T1-T0	-1.15	-1.7755446	-0.5244554	0.000040614093691	
	T2-T0	-2.15	-2.7755446	-1.5244554	0.0000000000000000	
	T3-T0	-0.40	-1.0255446	0.2255446	0.341447392477175	
	T2-T1	-1.00	-1.6255446	-0.3744554	0.000412360574685	
	T3-T1	0.75	0.1244554	1.3755446	0.012266911903593	
	T3-T2	1.75	1.1244554	2.3755446	0.000000001059987	
FLAVOUR	▲	Difference	Lower CI	Upper CI	p-Value	Only T3 compare to T1 POD has not significant difference.
	T1-T0	-1.05	-1.6769943	-0.42300567	0.000201593243685	
	T2-T0	-2.35	-2.9769943	-1.72300567	0.0000000000000000	
	T3-T0	-0.70	-1.3269943	-0.07300567	0.022553633025844	
	T2-T1	-1.30	-1.9269943	-0.67300567	0.000003601897478	
	T3-T1	0.35	-0.2769943	0.97699433	0.462727749519231	
	T3-T2	1.65	1.0230057	2.27699433	0.000000007570214	



TASTE		Difference	Lower CI	Upper CI	p-Value	Only T3 compare to T1 POD has not significant difference.
	T1-T0	-1.50	-2.1734222	-0.8265778	0.0000006905099	
T2-T0	-2.55	-3.2234222	-1.8765778	0.0000000000000		
T3-T0	-1.00	-1.6734222	-0.3265778	0.0011568886054		
T2-T1	-1.05	-1.7234222	-0.3765778	0.0005928378669		
T3-T1	0.50	-0.1734222	1.1734222	0.2161372623400		
T3-T2	1.55	0.8765778	2.2234222	0.0000003068966		

TEXTURE		Difference	Lower CI	Upper CI	p-Value	Only T3 compare to T0 POD has not significant difference.
	T1-T0	-1.40	-2.0511456	-0.7488544	0.000001591744	
T2-T0	-2.45	-3.1011456	-1.7988544	0.0000000000000		
T3-T0	-0.45	-1.1011456	0.2011456	0.274175863716		
T2-T1	-1.05	-1.7011456	-0.3988544	0.000362207933		
T3-T1	0.95	0.2988544	1.6011456	0.001454619484		
T3-T2	2.00	1.3488544	2.6511456	0.0000000000000		

OVERALL ACCEPABILITY		Difference	Lower CI	Upper CI	p-Value	Only T2 compare to T1 POD has not significant difference.
	T1-T0	-1.95	-2.5377559	-1.3622441	0.000000000000000	
T2-T0	-2.30	-2.8877559	-1.7122441	0.000000000000000		
T3-T0	-0.70	-1.2877559	-0.1122441	0.013031521534423		
T2-T1	-0.35	-0.9377559	0.2377559	0.405055361987274		
T3-T1	1.25	0.6622441	1.8377559	0.000002043067484		
T3-T2	1.60	1.0122441	2.1877559	0.000000002637015		

Table 11: Nutritional analysis result for *Moringa* Pods enriched Bread

Product	Nutrient	T0	T2 (10%)	Result Summary
Bread	Energy (Kcal)	260.55	306.85	Energy increases with T2, showing a higher caloric value.
	Carbohydrates (gm)	53.67	58.95	Carbohydrates increased by 5.28 gm with T2.
	Protein (gm)	8.7	10.6	Protein content rises by 1.9 gm in T2.
	Fat (gm)	1.23	3.14	Fat content significantly increases by 1.91 gm.
	Ash (%)	1.6	1.78	Ash content slightly increases in T2.
	Moisture (%)	34.8	25.53	Moisture content decreases with T2.



	Crude Fibre (gm)	0.82	1.35	Crude fibre increases in T2, improving fibre content.
	Iron (mg)	2.52	3.12	Iron content increases in T2.
	Calcium (mg)	151.2	165.81	Calcium increases in T2.
	Vitamin C (mg)	14.94	27.61	Vitamin C content nearly doubles in T2.

Table 12: Nutritional analysis result for Moringa Pods enriched Idli

Product	Nutrient	T0	T3 (15%)	Result Summary
Idli	Energy (Kcal)	200	184	Energy slightly decreases with T3.
	Carbohydrates (gm)	36.23	27.8	Carbohydrate content decreases significantly with T3.
	Protein (gm)	6.46	9.12	Protein increases by 2.66 gm with T3.
	Fat (gm)	3.31	4.04	Fat content rises slightly in T3.
	Ash (%)	0.53	1.37	Ash content increases significantly in T3.
	Moisture (%)	53.47	57.67	Moisture content increases with T3.
	Crude Fibre (gm)	3.88	2.56	Crude fibre decreases in T3.
	Iron (mg)	0.54	0.55	Iron content remains nearly unchanged in T3.
	Calcium (mg)	54.9	59.41	Calcium slightly increases in T3.
	Vitamin C (mg)	3.35	2.53	Vitamin C content decreases with T3.

Table 13: Nutritional analysis result for Moringa Pods enriched Pasta

Product	Nutrient	T0	T2 (10%)	Result Summary
Pasta	Energy (Kcal)	274.72	295.03	Energy increases by 20.31 kcal with T2.
	Carbohydrates (gm)	62.13	63.64	Carbohydrate content increases marginally in T2.
	Protein (gm)	12.2	13.6	Protein content increases by 1.4 gm in T2.
	Fat (gm)	0.8	0.83	Fat content remains nearly unchanged in T2.
	Ash (%)	1.22	1.29	Ash content increases slightly with T2.



	Moisture (%)	22.55	24.78	Moisture content increases slightly with T2.
	Crude Fibre (gm)	1.1	1.22	Fibre increases marginally in T2.
	Iron (mg)	3.8	6.41	Iron content rises significantly in T2.
	Calcium (mg)	35.5	31.97	Calcium decreases in T2.

Table 14: Nutritional analysis result for Moringa Pods enriched Noodles

Product	Nutrient	T0	T2 (10%)	Result Summary
Noodles	Energy (Kcal)	305	268.36	Energy content decreases with T2.
	Carbohydrates (gm)	75.42	65.06	Carbohydrates decrease significantly with T2.
	Protein (gm)	7.8	8.3	Protein content increases slightly in T2.
	Fat (gm)	0.21	0.64	Fat content increases with T2.
	Ash (%)	0.01	1.4	Ash content increases significantly in T2.
	Moisture (%)	12.2	22.62	Moisture content increases in T2.
	Crude Fibre (gm)	3.28	1.98	Crude fibre content decreases in T2.
	Iron (mg)	1.9	4.19	Iron content increases with T2.
	Calcium (mg)	4.9	45.3	Calcium content increases significantly in T2.

Table 15: Nutritional analysis result for Moringa Pods enriched Nachos

Product	Nutrient	T0	T3 (30%)	Result Summary
Nachos	Energy (Kcal)	345.5	344.63	Energy content remains almost the same with T3.
	Carbohydrates (gm)	70.72	63.37	Carbohydrates decrease slightly in T3.
	Protein (gm)	10.2	11.3	Protein increases by 1.1 gm with T3.
	Fat (gm)	6.3	9.6	Fat content increases significantly in T3.
	Ash (%)	2.79	2.81	Ash content remains almost the same in T3.
	Moisture (%)	8.22	7.62	Moisture content decreases slightly in T3.
	Crude Fibre (gm)	1.77	5.3	Crude fibre increases significantly with T3.
	Iron (mg)	8.99	7.61	Iron content decreases slightly in T3.
	Calcium (mg)	11.44	15.34	Calcium increases in T3.



Figures

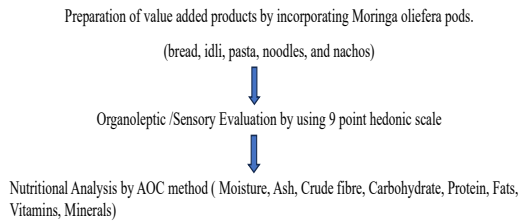


Figure 1: Flow chart of study



Figure 2: Image of prepared Bread-Control and Experimental formulation



Figure 3: Image of prepared Idli-Control and Experimental formulation



Figure 4: Image of prepared Pasta-Control and Experimental formulation



Figure 5: Image of prepared Noodles-Control and Experimental formulation



Figure 6: Image of prepared Nachos-Control and Experimental formulation