# Sensory Qualities and Acceptability of Embutido with Bamboo Shoots

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**Abstract**

In the Philippines, Embutido is a typical party food which is served warm at room temperature or even cold. This experimental developmental research generally aimed to prepare a Bamboo Shoot-Enhanced Embutido and further find out its acceptability. Specifically, it sought to: (1) describe the sensory qualities of Bamboo Shoot - Enhanced Embutido in terms of aroma, color, taste, and texture; (2) determine the acceptability of Bamboo Shoot - Enhanced Embutido; (3) find out if there are significant differences in the sensory qualities of Bamboo Shoot - Enhanced Embutido in terms of aroma, color, taste and texture; and (4) find out if there is a significant difference in the acceptability of Bamboo Shoot – Enhanced Embutido. Analysis of Variance in Completely Randomized Design (CRD) with Tukey Post Hoc Test was used to analyze data and pinpoint where the significant difference occurred. Using the three bamboo varieties,it was found out that the bamboo Shoot-Embutido was rated "very much pleasant" in terms of aroma, "very much authentic" in terms of color, "very much delicious" in terms of taste, and "very much soft but firm" in terms of texture. No significant differences existed in the general acceptability of Bamboo Shoot-Enhanced Embutido among three treatments when the sensory qualities were taken into consideration.

**Keywords**: Embutido, Bamboo shoot, enhanced

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## Introduction

Food is any substance consumed to provide nutritional support for the body. It refers to any nutritious substance that people and animals eat or drink or plants that are absorbed in order to maintain life and growth (Food, 2017).

Eating right can help maintain a healthy body and avoid certain health problems. Everyone deserves a healthy living, but still enjoy the lifestyle that they are used to. Therefore, in order to achieve that, there are important things to consider in making a decision that benefits the human body (Malabanan, 2014).

In the Philippines, embutido is a typical party food which is served warm at room temperature or even cold. In the house, after it has been cooked and left to cool - others like to fry it in a little oil before eating to give it some nice brown crust and flavorful, while others serve it with some ketchup or even some sweet chili sauce (Embutido, 2017).

On the other hand, surveys across distinct geographical regions revealed that Bamboo shoots are of low importance throughout the food industry; knowledge of fresh shoots as a food source is minimal, and produced canned (imported) goods provide a secure commodity supply. It is unlikely that this situation will change without a promotional campaign. While the extent of the area of bamboo forests is difficult to estimate because of the often sparsely distributed nature of bamboo clumps and co-dominance of some bamboos with forest species, productivity on a global basis is even harder to ascertain. Quantifying the harvest of shoots as a food commodity is also fraught with error, but recently the Food and Agriculture Organization of the United Nations (FAO 2005) estimated that 3.5 million tons (Mt) of non-wood forest products are harvested annually in Asia for food.

Bamboo Shoots have arich amount of amino acids. Out of 17 amino acids reported in Bamboo Shoots, 8 amino acids were essential for the human body. Nirmala et al. (2007) studied amino acid content of freshly harvested, fermented, and canned shoots of *Dendrocalamus giganteus*. There was adecreased amount in amino acid in fermented (2.005 g/100 g fresh weight) and canned shoots (1.980 g/100 g fresh weight) as compared to freshly collected juvenile shoots (3.863 g/100 g fresh weight).

In addition, due to their characteristic growth habits, particularly itsinterwovensystem of rhizomes and roots that performs the function of cohesion, bamboos have enormous potential for alleviating many environmental conditions such as soil erosion control, waterconservation, land rehabilitation, and carbon sequestration (Benzhi and others 2005).

Though more popularly known for industrial usage, a lesser known fact of bamboos is the utilization of its juvenile shoots as food.A traditional forest vegetable in China for more than 2500 years, Bamboo Shootsare not only delicious but are also rich in nutrients and rank among the 5 most popular healthcare foods in the

world. Bamboo Shoots have a long historyof being used asa source of both food and medicinein China andSoutheast Asia (Bao 2006). In Japan, the bamboo shoot is called the "King of Forest Vegetables."

The shoots have a good profile of minerals, consisting mainly of potassium (K), calcium (Ca), manganese, zinc, chromium, copper, iron (Fe), plus lower amounts of phosphorus (P), and selenium (Nirmala et al., 2007).

Regarding minerals, Bamboo Shootshave a comparatively higher K content than most of the vegetables except forspinach, Spinacea oleracea (Linnaeus) (558 mg/100 g) and potatoes, Solanum tuberosum (Linnaeus) (421 mg/100 g). The sodium (Na) contents in cucumber, Cucumis sativa (Linnaeus), S. tuberosum, brinjal, S. melongena (Linnaeus), and ladies finger, Abelmoschus esculantus (Linnaeus) are lower than that of Bamboo Shoots.

From many different perspectives, the nature of vegetables and the nature of human health are matched up in a way that simply cannot be duplicated by other food groups. Healthy food is one of the major concerns of nutritious diet. Vegetables can offer healthy benefits and some researchers find out that the bamboo shoot has numerous medicinal benefits like cancer prevention and weight loss without sacrificing appetite and digestion. Besides its nutritional value, exploring the usefulness of bamboo shoots could be an avenue in venturing into business. Thus, one can enjoy bamboo shoots not only as healthy food but as a means of increasing and augmenting one's income (FAO, 2005).

With these reasons, the researcher decided the innovation of Embutido with the twist of pork and Bamboo Shoots as its extender. Thus, this study was intended to develop a Bamboo Shoot-Enhanced Embutido and find out its acceptability. Specifically, it sought to: 1.) Describe the sensory qualities of the enhanced Embutido using three bamboo shoot varieties in terms of aroma, color, taste, and texture; 2.) Determine the general acceptability of the enhanced Embutido using three bamboo shoot varieties; 3.) Find out if there are significant differences in the sensory qualities of Bamboo Shoot – Enhanced Embutido in terms of aroma, color, taste, and texture; and 4.) Find out if there is asignificant difference in the acceptability of the enhanced Embutido using the three varieties of bamboo shoots.

## Methodology

The study was conducted at the Bamboo Research Center at Capiz State University, Dumarao Satellite College, Dumarao, Capiz using experimental - developmental research. The experimental method was used to investigate the proportion of bamboo shoots (Varieties: Dalusan, Botong, and Kawayan Kiling) as an extender in making Embutido using the three treatments. The developmental method was used for the production of Embutido using bamboo shoots as an extender for potential product development and commercialization.

Completely Randomized Design (CRD) was utilized in this study wherein varieties of bamboo shoots such as Dalusan, Botong, and Kawayan Kiling were used in making Embutido and subsequently replicated.

Table 1.Ingredients and proportions used in Bamboo Shoot-Enhanced Embutido.

| Ingredients | Treatment | | |
|---|---|---|---|
| | A | B | C |
| Ground Pork | 300 grams | 300 grams | 300 grams |
| Bamboo Shoots (Botong) | 300 grams | - | - |
| Bamboo Shoots (Kawayan) | - | 300 grams | - |
| Bamboo Shoots (Dalusan) | - | - | 300 grams |
| Eggs (Large) | 3 pcs. | 3 pcs. | 3 pcs. |
| Onion (chopped) | 150 grams | 150 grams | 150 grams |
| Carrot (minced) | 150 grams | 150 grams | 150 grams |
| Red Bell Pepper (chopped) | 75 grams | 75 grams | 75 grams |
| Sweet Pickle Relish | 70 grams | 70 grams | 70 grams |
| Sliced Bread (diced) | 60 grams | 60 grams | 60 grams |
| White Pepper | 3 grams | 3 grams | 3 grams |
| Evaporated milk | 100 grams | 100 grams | 100 grams |
| Corn starch | 50 grams | 50 grams | 50 grams |
| Iodized salt | 10 grams | 10 grams | 10 grams |

In scoring the sensory quality and acceptability of Enhanced Embutido using the three varieties of bamboo shoots in terms of aroma, color, taste, and texture, the 9-point Hedonic scale was employed to give weight to the acceptability of the product.

Arithmetic mean was used to interpret the acceptability of the different treatments and varieties of Bamboo Shoots as an extender in making Bamboo Shoot-Enhanced Embutido.

To analyze the significant differences between the treatment means and Bamboo Shoot varieties in terms of color, texture, aroma, and taste Analysis of Variance (ANOVA) was utilized under the Completely Randomized Design under Single Factorial Analysis. In case significant differences arise, the Tukey Post Hoc Test was used to pinpoint where the significant differences occurred.

**Significance of the Study**

The results of the study could significantly enhance the mass knowledge on the importance of bamboo shoots as an extender in making Embutido. Specifically, it would be beneficial to entrepreneur, parents, cooks, Home Economics teacher, bamboo growers, and future researchers.

**Entrepreneurs.** This study would provide them information on how to make nutritious and less expensive Embutido which could provide additional income if sold in the market.

**Parents.** This study would provide them innovative ideas on the acceptability of different bamboo shoots and enable them to cook vegetables for their children's consumption without noticing it.

**Cooks.** The results of the study would give them information on how to make nutritious and less expensive Embutido.

**Home Economics Teachers.** The results of the study may serve as reference in making embutido with a twist of bamboo shoots that can be taught to students.

**Bamboo Growers.** The results of the study may inform bamboo growers of the other functions of bamboo shoots and thus help them appreciate its importance and inspire them to grow more bamboos.

**Future Researchers**. This study is essential in terms of innovating a new kind and healthy embutido through the experimental method.

## Results and Discussion

### Aroma of Bamboo Shoot – Enhanced Embutido

As shown in Table 1, the aroma of the Bamboo Shoot – Enhanced Embutido. The highest mean of 7.65 was recorded with Dalusan followed by Kawayan Kiling and Botong with mean scores of 7.63 and 7.60 respectively described as "Very Much Pleasant" by the panel of evaluators.

Table 1. Aroma of Bamboo Shoot – Enhanced Embutido

| Treatment | Mean | Adjectival Description |
|---|---|---|
| Botong | 7.60 | Very Much Pleasant |
| Kawayan Kiling | 7.63 | Very Much Pleasant |
| Dalusan | 7.65 | Very Much Pleasant |

Finding implies that evaluators similarly perceived the aroma of the three Bamboo Shoot–Enhanced Embutido as "Very Much Pleasant".

The result of this study is in parallel with the result of Galleno, Bechayda, and Bunda (2016) in their study titled Bamboo Shoots in Making Macaroons that aroma had a mean score of 7.29 which means "Very Much Pleasant" to the evaluators. Result

reveals that bamboo shoot can be used as main ingredient for embutido making.

**Color of Bamboo Shoot – Enhanced Embutido**

The weighted means of Bamboo Shoot – Enhanced Embutido when its color was evaluated by evaluators is reflected in Table 2. Botong ranked first in color reflecting the highest mean of 7.91. This was followed by Kawayan Kiling with a mean of 7.84, then Dalusan which registered a mean of 7.53. The Botong, Kawayan Kiling and Dalusan had an adjectival description of "Very Much Authentic".

Table 2. Color of Bamboo Shoot – Enhanced Embutido

| Treatment | Mean | Adjectival Description |
|---|---|---|
| Botong | 7.91 | Very Much Authentic |
| Kawayan Kiling | 7.84 | Very Much Authentic |
| Dalusan | 7.53 | Very Much Authentic |

The result implies that a very much authentic appearance in terms of color is noticeable among the three varieties of bamboo shoots such as Dalusan, kawayan killing, and Botong when made as Bamboo Shoot-Enhanced Embutido.

This further implies that the Bamboo Shoot-Enhanced Embutido looks similarly like that which are found in the market. Therefore, it can compete with those embutidos sold commercially.

**Taste of Bamboo Shoot – Enhanced Embutido**

Table 3 shows the taste of Bamboo Shoot – Enhanced Embutido. It could be noted that in terms of taste, both Botong and Kawayan Kiling got the highest means of 7.83 while Dalusan ranked third which had a mean of 7.62. The three varieties of bamboo shoots were all adjectivally described as "Very Much Delicious" by the evaluators. The outcome implies that Bamboo Shoot-Enhanced Embutido from Botong, Kawayan Kiling, and Dalusan were all equally delicious to consumers.

Table 3. Taste of Bamboo Shoot – Enhanced Embutido

| Treatment | Mean | Adjectival Description |
|---|---|---|
| Botong | 7.83 | Very Much Delicious |
| Kawayan Kiling | 7.83 | Very Much Delicious |
| Dalusan | 7.62 | Very Much Delicious |

**Texture of Bamboo Shoot – Enhanced Embutido**

The texture of Bamboo Shoot – Enhanced Embutido as examined by evaluators is reflected in Table 4. The table showed that in texture, Dalusan got the highest mean of 7.78 followed by Kawayan Kiling 7.75, and Botong 7.70. This indicated that the texture of Botong, Kawayan Kiling and Dalusan were "Very Much Soft but Firm" as evaluated by the evaluators.

Table 4. Texture of Bamboo Shoot – Enhanced Embutido

| Treatment | Mean | Adjectival Description |
|---|---|---|
| Botong | 7.70 | Very Much Soft but Firm |
| Kawayan Kiling | 7.75 | Very Much Soft but Firm |
| Dalusan | 7.78 | Very Much Soft but Firm |

The finding implies that Botong, Kawayan Kiling, and Dalusan had the texture that the evaluators perceived prefer as "Very Much Soft but Firm".

**General Acceptability of Bamboo Shoot – Enhanced Embutido**

Table 5 shows the means of Bamboo Shoot – Enhanced Embutido when general acceptability was considered. The data showed that in terms of general acceptability, both Kawayan Kiling and Botong had the highest mean of 7.76 and Dalusan "Liked Very Much" by the evaluators with a mean of 7.64.

Table 5. General Acceptability of Bamboo Shoot – Enhanced Embutido in three treatments.

| Sensory Qualities | Botong | | Kawayan Kiling | | Dalusan | |
|---|---|---|---|---|---|---|
| | Mean | AD | Mean | AD | Mean | AD |
| Aroma | 7.60 | VMP | 7.63 | VMP | 7.65 | VMP |
| Color | 7.91 | VMA | 7.84 | VMA | 7.53 | VMA |
| Taste | 7.83 | VMD | 7.83 | VMD | 7.62 | VMD |
| Texture | 7.70 | VMSF | 7.75 | VMSF | 7.78 | VMSF |
| General Acceptability | 7.76 | LVM | 7.76 | LVM | 7.64 | LVM |

Legend:

| | | |
|---|---|---|
| AD | = | Adjectival Description |
| LVM | = | Liked Very Much |
| VMP | = | Very Much Pleasant |
| VMA | = | Very Much Authentic |
| VMD | = | Very Much Delicious |
| VMSF | = | Very Much Soft but Firm |

The result implies that the general acceptability of the Bamboo Shoot – Enhanced Embutido from Botong, Kawayan Kiling, and Dalusan were "Liked Very Much" by the evaluators.

The result of this study is in consonance with the result of Mendoza (2015) in her study titled Macaroons from Cassava", that the product was acceptable in terms of aroma, color, taste, and texture.

**Difference in the Sensory Qualities of the Bamboo Shoot – Enhanced Embutido**

Table 6 shows the differences in the sensory quality of Bamboo Shoot – Enhanced Embutido. As revealed, no significant difference was noted in terms of aroma of three varieties of bamboos used in Bamboo Shoot - Enhanced Embutido, with an F value of (2, 357) = 0.047, p > .01. The result implies that the evaluators have the same perception of the aroma of Bamboo Shoot-Enhanced Embutido regardless of the differences in varieties of bamboo shoots. The result further revealed that Bamboo Shoot-Enhanced Embutido was not affected by the different varieties of bamboo shoots used in the study.

Table 6. Differences in the sensory qualities of Bamboo Shoot – Enhanced Embutido

| Sensory Qualities | F | Sig. | Remarks |
|---|---|---|---|
| Aroma | 0.047 | 0.954 | ns |
| Color | 3.634 | 0.027 | ns |
| Taste | 1.194 | 0.304 | ns |
| Texture | 0.148 | 0.863 | ns |

*p < .01, significant at 1% level
ns = not significant

Coherently, the same result was found out with the color of the Bamboo Shoot-Enhanced Embutido, with an F value of (2, 357) = 4.803, p > .01 which implies no significant difference between treatment means. The results implied that the evaluators had the same perceptions on the color of the different Bamboo Shoot-Enhanced Embutido. This means that despite the variety of bamboo shoot used in the preparation of Bamboo Shoot-Enhanced Embutido, the color of the finished product remained the same.

The same result was also found in the taste of Bamboo Shoot-Enhanced Embutido wherein there was no significant difference existed on the taste of Bamboo Shoot-Enhanced Embutido as shown in Table 9. Outcomes showed that the taste of Bamboo Shoot-Enhanced Embutido from the three varieties did not vary from one another, with an F value of (2, 357) = 1.194, p > .01. Findings imply that the evaluators have the same perception on the taste of each variety of Bamboo Shoot-Enhanced Embutido. The taste of the Bamboo Shoot-Enhanced Embutido may have

not been affected by the variety of bamboo shoots used. This means that the three varieties had yielded comparable acceptability in terms of color, aroma, taste, and texture.

Furthermore, there were no notable significant differences existed on the texture of Bamboo Shoot-Enhanced Embutido, with an F value of (2, 357) = 0.148, p > .01. The results imply that the evaluators have the same perceptions on the texture of Bamboo Shoot-Enhanced Embutido. The texture of Bamboo Shoot-Enhanced Embutido was not affected by the variety of bamboo shoots used in its production.

**Difference in the General Acceptability of Bamboo Shoot–Enhanced Embutido**

Table 7 reveals the difference in the general acceptability of Bamboo Shoot – Enhanced Embutido. Result disclosed that no significant difference existed in the general acceptability of Bamboo Shoot-Enhanced Embutido, with an F value of (2, 357) = 0.635, p > .01.

The findings imply that the evaluators had the same evaluations of Bamboo Shoot-Enhanced Embutido as to general acceptability. The different varieties of bamboo shoots used did not affect the general acceptability of the finished product.

Table 7. Differences in the Bamboo Shoot – Enhanced Embutido in terms of General Acceptability

| Source of Variance | Sum of Squares | Df | Mean Square | F | Sig. | Remarks |
|---|---|---|---|---|---|---|
| Between Groups | 1.806 | 2 | .903 | .635 | .531 | ns |
| Within Groups | 507.517 | 357 | 1.422 | | | |
| Total | 509.322 | 359 | | | | |

*p< .01, significant at 1% level
ns = not significant

**Conclusions**

Since the sensory qualities of the different varieties of bamboo shoots as an extender in making Embutido have a pleasing, authentic, delicious, soft but firm quality, it is therefore concluded that the Bamboo Shoots can be used as an extender in making Embutido. All varieties of Bamboo Shoots included in the study can be utilized as an extender in making Embutido.

All varieties of bamboo shoots are liked very much as perceived by evaluators. Thus, the bamboo shoot –Enhanced Embutido has the potential for product development and commercialization.

## Recommendations

The three varieties of bamboo shoots used in the study are recommended as an extender for making Embutido for they have the potential for product development and commercialization.

The aroma, color, taste, and texture of Botong, Kawayan Kiling and Dalusan can still be enhanced considering other modification processes or by adding spices and herbs.

It is highly recommended to rub the bamboo shoots with salt, squeeze and rinse in running water for five (5) times to remove its undesirable taste.

Further studies using other kinds of ingredients such as cheese, meatloaf, sausage, and raisins are recommended to enhance the finished product.

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