

Development of Talisay (*Terminalia catappa*) Butter

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Received: 22 March 2022

Revised: 13 April 2022

Accepted: 17 July 2022

Available Online: 30 July 2022

Volume I (2022), Issue 3, ISSN: 2945-3577

Abstract

Aim: The study primarily developed a butter out of Talisay (*Terminalia catappa*) seeds. Particularly, assessed the level of acceptability of the developed butter in terms of its appearance, texture, aroma, and taste. The study also explored the difference on the assessment made by the faculty and students towards the acceptability of the formulated butter in terms of the aforementioned variables, as well as to determine the products cost analysis.

Methodology: The study used the experimental design where three products were developed using different formulations. The design involved different volume of Talisay nut in the formulation of the products which formed the experimental variable. The ingredients used were held constant in the different products. The acceptability test of the products was carried out through a taste test by a panel of evaluators and the data generated were subjected to statistical analysis which is required of an experimental design.

Results: Among the formulations, the butter with the greatest ratio of talisay nuts (WF3) was found to be the most preferred by majority of the evaluators, the most acceptable and closest to the commercialized butter in terms of appearance or color, aroma, texture and taste. Although its cost of production is higher, since a greater volume of product was obtained, it appeared that it had the lowest cost for serving.

Conclusion: The Talisay butter is acceptable as food. Its appearance, texture, aroma and taste is certainly acceptable for the consumers. Also, it is highly available at a low cost. Thus, it could be manufactured at greater scale at a reasonable cost within the reach of low income families. It is recommended to conduct a similar study with other indigenous nuts available in the country and include the study on the shelf-life of the products and their nutritive content for market purposes.

Keywords: *Terminalia catappa*, Butter, Catappa seed

INTRODUCTION

Nuts are very nutritious (Agatemor & Ukhun, 2006). They are one of the best plant sources of protein which do not contain a dreaded cholesterol. In addition, they are good sources of fiber, minerals, vitamin E, folacin, fat and other B vitamins. Nuts provide supplementary nutrients provided by cereals, legumes and vegetables (Balogun, 1982; Brundage, 2015).

One of the abundant trees in the Philippines that can be a source of nut is *Terminalia catappa*. The fruit seed of *Terminalia catappa* could provide essential nutrients needed by man. Besides, its nut is more tender than an almond (Lee, 2001). It has been found to contain a substance that could lower the low-density lipoprotein (LDL) which is regarded as bad cholesterol in the blood that causes heart disease, thus, eating it may reduce the risk of developing blood clots that could result to a fatal heart attack (Lee, 2001).

The seed within the fruit is edible when fully ripe and tastes almost similar to almond with a sweet-acidic pericarp. The inconspicuous, greenish-white, springtime blossoms appear in six-inch-long terminal clusters and are followed by the edible fruits.

When the seeds are toasted in suitable length of time and temperature, they become crispy and almond-like or hazel nut-like flavor.

Studies shows that *Terminalia catappa* seed protein has a good pattern of the EAA, is highly digestible, can support growth and positive nitrogen balance making it to have a high dietary protein quality (Lee, 2001).

Although the fruit provides natural sources of soluble carbohydrates, phosphorus, and fibre, the presence of secondary plant metabolites, also referred to as antinutritional factors (ANFs), such as haemagglutinin, tannin and phytic acid in the raw seed could interfere with growth rate and nutrient utilization when fed to rats unless these ANFs are eliminated or reduced to insignificant levels by heat treatments (Balogun, 1982; Brundage, 2015; Winston, 2012).

The high proportion of fibre (200 g kg⁻¹) in the whole fruit also limits the extent to which it can be used directly in diet formulation for monogastric animals, especially poultry, which lack the appropriate digestive enzymes for degrading fiber (Balogun, 1982; Brundage, 2015; Winston, 2012).

The fruit has a pleasant aroma but is not too tasty. The ripe husks of the fruit can be eaten raw but

are best when young and sweet. The oil can also be used for cooking or to make soap. Leaves can be used as plates or to wrap small amounts of food.

In this era where there is shortage of food supply, new products and recipes are produced from indigenous resources which are available within the local community and the seemingly nuisance litters (Thornley, 2011). And the call for environmental conservation also attracted the international scenario (Parry, Rosenzweig, & Livermore, 2005). There is a world-wide advocacy to sustain the environment which gave birth to the program on three Rs – reduce, reuse and recycle (Parry, Rosenzweig, & Livermore, 2005; Vidal, 2012).

On the other hand, the campaign slogan *May PERA sa BASURA* is the Philippines' response to the call for environmental conservation at the grassroot level and as an approach to waste management.

In this study, product development out of waste materials is encouraged to lessen the problem on waste while at the same time an approach to confront the problems brought about by poverty, health risks, and environment degradation.

Presently, various kinds, shapes and brands of nut products, locally and foreign produced, line the shelves of groceries (Anthony, 2015). Nuts have become popular due to their versatility, as snack, recipe ingredient, or confectionery. They make tasty additions to fruit or vegetable salads, casseroles, baked breads or muffins, oatmeal, and meat dishes (Anthony, 2015).

Since the *Talisay* nut could be a good source of some nutrients needed by the body (Balogun, 1982; Brundage, 2015; Winston, 2012), and processing it into product readily available for consumption particularly of children who needed these substances for their normal growth, the researcher come up with the idea of generating butter out of *Talisay (Terminalia catappa)* and test its viability as a source of food available for everyone.

Objectives

The study primarily developed a butter out of *Talisay (Terminalia catappa)* seeds. Particularly, it sought answers to the following questions:

1. What is the level of acceptability of the products formulated in terms of:
 - a. appearance;
 - b. texture;
 - c. aroma;
 - d. taste?
2. Is there a significant difference on the assessment made by the faculty and students towards the acceptability of the formulated butter in terms of the aforementioned variables?
3. What is the cost analysis of the products?

METHODS

A. Research Design

This study used the experimental design where three products were developed using different formulations. The design involved different volume of *Talisay* nut in the formulation of the products which formed the experimental variable. The ingredients used were held constant in the different products.

The acceptability test of the products was carried out through a taste test by a panel of evaluators and the data generated were subjected to statistical analysis which is required of an experimental design.

B. Processing of *Talisay* Seed

The *talisay* fruits were dried under the sun for 2-3 days prior to the preparation proper. With the aid of a nut cracker, the hard coat were broken to expel the nut and collected in a sterilized container. More than enough nuts were collected to ensure that sufficient amount is available to avoid a continuous flow of the preparation of the products.

C. Assessment of *Talisay* Butter

Panel of Assessors. Ten (10) faculty and 20 student evaluators were selected using the purposive-total-enumeration procedure.

Table 1. Panel of evaluators who passed judgment on the products

Respondents	College of Teacher Education	Institute of Hospitality Management	Total
Faculty	5	5	10
Students		20	20
Total	5	25	30

Of the 10 faculty evaluators, 5 were from the College of Teacher Education while the other 5 were from the Institute of Hospitality Management. These faculty teach Home Economics and Food Sciences, thus, could be considered authorities when it comes to food evaluation.

The 20 student evaluators are taking Foods and related subjects in Home Economics and Home Technology and therefore, were presumed to be more knowledgeable in food preparation and tasting, thus,

are more capable of passing a more objective and accurate evaluation on the products.

Instrument. The score card used by Garcia (2014) was adapted in the study. It was modified according to the indicators pre-determined by the researcher to suit the characteristics called for. It contained the criteria as basis for evaluation and unto which the panel of evaluators could reflect their assessment of the products along the indicators. The instrument was subjected to review by the members of the advisory committee.

Scoring. The products were rated by the panel of evaluators in each of the indicators using the 5-point Hedonic Scale as follows:

- 5 - Like very much
- 4 - Like much
- 3 - Like moderately
- 2 - Like slightly
- 1 - Dislike

Using the scales 1 – 5 with 5 as the highest, the panel of evaluators rated the products based on how they perceived them to have approximated the following indicators:

Appearance - The color of the Talisay butter is similar to the color of a commercialized butter which is brown (Castillo & Steudel, 2003; Hashmi, 2007).

Texture - The Talisay butter is very smooth and is free from any particles or granules as the commercialized butter (Arora, 2013; Hashmi, 2007).

Aroma - The odor of the Talisay nut dominates and highly distinguishable (Anthony, 2007; Hashmi, 2007).

Taste - The product gives a unique taste indicative of the Talisay nut (Hashmi, 2007; Ryan, 2009).

The evaluators recorded their corresponding ratings on the score cards provided to each of them during the evaluation proper.

Data Analysis and Interpretation

The mean ratings obtained by each indicator were analyzed and interpreted using the following ranges

Range	Descriptive Equivalent	Descriptive Interpretation
4.51 – 5.00	Like very much	Highly acceptable
3.51 – 4.50	Like much	Acceptable
2.51 – 3.50	Like moderately	Moderately accepted
1.51 – 2.50	Like slightly	Slightly accepted
1.00 – 1.50	Dislike	Not acceptable

Statistical Treatment of Data

The weighted means were calculated to determine the average scores obtained by each indicator. The Analysis of Variance (ANOVA) and Duncan’s Multiple Range Test (DMRT) were used to determine the differences on the evaluations made by the panel of evaluators.

Cost Analysis

The cost of production of the products were subjected to cost analysis to find the economic value of the products (Sulochana, 2013; Swinton, 2007).

Equation (Sulochana, 2013; Swinton, 2007):

$$ROI\% = \text{Total Sales} \div \text{Total Expenses} \times 100$$

Results and Discussion

Level of Acceptability of the Talisay Butter

Talisay butter was also made out of the three formulations with three different amount of talisay nuts used. The sample products were also subjected to sensory evaluation by the same panel of evaluators using a rating scale in terms of appearance/color, texture, aroma and taste.

Appearance. Among the products developed, Formulation 3 (WF3) was found to be very *highly acceptable* by the panel of evaluators as manifested by the mean rating of 4.89 it obtained. This goes to say that the product approximated the commercially available butter. The products developed from WF2 and WF1 came in descending order.

Texture. It was found that WF3 obtained a perfect mean rating of 5.0 indicating that it is very highly acceptable. This indicates that the panel of evaluators found the product to possess the desired smoothness compared to WF2 and WF1. This implies that the product is highly acceptable and comparable to the commercially available products.

Aroma. The panel of assessor found the WF3 bearing the characteristic odor of Talisay nut as manifested by the mean rating of 4.83 descriptively interpreted as very highly acceptable. This is not surprising though as it contains greater volume of nuts in its ratio, thus, the aroma of the product dominates.

Taste. In terms of taste, WF3 garnered a perfect rating of 5.00 indicating that it is very much

acceptable Formulation 3 is the most acceptable and inviting over Formulation 1 and 2.

Table 2. Level of Acceptability of the Talisay Butter

Sensory Characteristics	Samples	Mean Rating	Descriptive Interpretation
Appearance/Color	WF1	3.03	Like moderately
	WF2	3.43	Like moderately
	WF3	4.50	Like much
Texture	WF1	3.10	Like moderately
	WF2	3.73	Like much
	WF3	4.83	Like very much
Aroma	WF1	3.07	Like moderately
	WF2	3.80	Like much
	WF3	5.00	Like very much
Taste	WF1	3.13	Like moderately
	WF2	3.93	Like much
	WF3	5.00	Like very much

Differences in the Acceptability of the Products

The results of the Analysis of variance (ANOVA) and Duncan's Multiple Range Test (DMRT) revealed significant differences between and among the mean ratings of the three formulations as indicated by the computed F-value of 158.225 which is much higher than the probability value of 0.000 at .01 level.

In terms of appearance or color, there exists a significant difference between the formulations where the F-value of 94.754 was higher than the probability value of 0.000 at .01 level. Evidently, the mean rating of WF3 (4.50) is significantly higher than the mean ratings of WF 2 and WF1 which indicates that in terms of color, WF3 is the most acceptable among the three. Therefore, WF3 has the closest appearance or color with the commercialized butter.

On the other hand, the mean rating of WF3 in the texture was found to be significantly higher than the mean rating of the two sample products. WF3 which garnered a perfect score is the most acceptable which implies among the products developed, it has the smoothest texture.

Further, the results of the test for aroma revealed significant differences among the mean ratings of the products as manifested by the F – value of 157.678 which is much higher than the probability value at .01 level. The result of the analysis proved that WF3 is the most aromatic among the three sample products implying that the odor of the Talisay nut is very evident. Thus, WF3 is the most acceptable as far as its aroma is concerned.

Moreover, the taste of the products was found to differ significantly with each other as evidenced by the computed F-value of 429.200 which is much higher than the probability value at .01 level of significance. The mean rating of WF3 (5.00) is significantly higher than the mean ratings of WF2 and WF1 which implies that it is the most acceptable in terms of taste.

Generally, among the products developed, it could be gauged that WF3 is *very highly acceptable* in terms of all the parameters used in the sensory evaluation. This contention could be justified by the results of the One-Way ANOVA and DMRT tests.

Table 3. Differences in the Acceptability of the Products

Sensory Characteristics	Samples	Mean Rating	F-value	Prob.
Appearance/Color	WF1	3.03 ^c	94.754**	.000
	WF2	3.43 ^b		
	WF3	4.50 ^a		
Texture	WF1	3.07 ^c	372.940**	.000
	WF2	3.80 ^b		
	WF3	5.00 ^a		
Aroma	WF1	3.10 ^c	157.678**	.000
	WF2	3.73 ^b		
	WF3	4.83 ^a		
Taste	WF1	3.13 ^c	429.200**	.000
	WF2	3.93 ^b		
	WF3	5.00 ^a		

Cost and Return Analysis

Of the three products developed, Formulation 3 yielded the highest cost of production which is attributed to greater cost of producing the amount of Talisay nuts used in the formulation. Among the formulation, F3 used 2 1/3 cups of the nut which was valued at P44.00, thus, resulting to a P100.00 total cost of production compared to the other products. Formulation 1 had the lowest cost as the volume of nuts used was less than 50% of F3.

Although F3 obtained the highest cost of production, it yielded about 325g of product which when served at an average of 5g each, the cost per serving is still lower at a price of P1.53. Since there were more nuts in the formulation, it yielded greater volume of the product resulting to greater number of serving, thus, lower cost per serving. With these results, it can be inferred that using Talisay butter is

still more economical than the commercially prepared one. A bottled commercial butter of similar volume costs twice as much as the cost of Talisay butter which at equal amount per serving, is twice more expensive than the latter.

Table 4. Cost and Return Analysis

Nature of Expenditures	Cost		
	WF1	WF2	WF3
A. Cost of <i>talisay</i> nut	20.00	27.00	44.00
B. Cost of labor in the preparation of the product for one hour	20.00	20.00	20.00
C. Cost of ingredients			
Sugar	6.00	6.00	6.00
Oil	15.00	15.00	15.00
D. Cost of Fuel in Cooking	5.00	5.00	5.00
E. Cost of Electricity in mixing	10.00	10.00	10.00
Total cost of Production	76.00	83.00	100
Number of servings produced at 5g each	25	37	65
Average cost per gram	3.04	2.24	1.53

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CONCLUSION AND RECOMMENDATIONS

Results revealed that formulation 3 (WF3) is rated *Very Highly Acceptable* by the panel of evaluators with the mean rating of 4.89. This formulation was most preferred and most acceptable by the majority of evaluators over the two other formulations, WF1 and WF2. Formulation 3 (WF3) has the closest similarity to the color of the commercial butter.

As to texture, the mean rating of WF3 is significantly higher than the mean ratings of the other two sample products. These results imply that the Formulation WF3 (5.00) which garnered a perfect score is the most acceptable among the three sample products as to texture. This implies that WF3 is very smooth.

As to aroma, the mean rating of WF3 (4.83) is significantly higher than the mean ratings of the two other formulations. Therefore, WF3 is the most aromatic among the three sample products or formulations.

And as to taste, WF3 (5.00) Formulation 3 is the most acceptable and inviting over Formulation 1 and 2.

Based on the results of the study, it concludes that Talisay butter is acceptable as food. Its appearance, texture, aroma and taste is certainly acceptable by the consumers. Also, it is highly available at a low cost. Thus, could be manufactured at greater scale at a reasonable cost within the reach of low income families.

In addition, Talisay butter can help in promoting better nutrition among school children. The ingredients needed are low-cost. The procedures are simple and replicable by parents, home economics teachers and entrepreneurs. Therefore, Talisay butter production can be a profitable home industry to boost family income.

Study shows that the production of Talisay butter is promising and its potential as a substitute for commercial butter. It is recommended to conduct a similar study with other indigenous nuts available in the country and includes the study on the shelf-life of the products and their nutritive content for market purposes.

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