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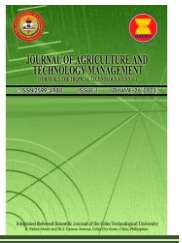

Sensory quality and acceptability of squash (cucurbita maxima) crackers as influenced by the levels of squash puree in the formulation

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ABSTRACT

The main aim of this study was to develop a squash (Cucurbita maxima) cracker and determine its acceptability at Cebu Technological University during the Academic Year 2017-2018. This study was conducted in CTU – Tuburan Campus of selected courses with 90 respondents. This research utilized the descriptive method. The data were treated using a simple percentage, weighted mean, and hedonic points scale. The data gathered from the respondents were subjected to statistical treatment. The majority of the employees/teachers and students preferred treatment 2 (T2), which contains 1000 grams of flour with 500 grams of squash puree with fifteen or 16.67 percent of the employee/teacher respondents and thirty-four or 37.78 percent of the respondents preferred treatment 2 (T2) because it has a good sense of taste, texture, aroma, and color and more appealing. Furthermore, the positive response of the respondents/consumers and overwhelming demand for the product can be used as an input to the Income Generating Project of the Institutions. It was recommended further that the squash crackers can be used as an Income Generating project for the Institution. The food technology instructions, it could serve as an additional input to their instructions. For further development of the product, future research could conduct studies to feature more attributes that help the product more realize and become a productive one.

KEYWORDS: *squash, Cucurbita maxima, crackers, Nutri pack, vocational education, Cebu Technological University, Tuburan*

1 INTRODUCTION

Food Crackers are generally made of flour and baked flour. It is one source of carbohydrates that helps the human body provides energy and regulates blood glucose. It is more popular as an essential snack for young and adults. It offers proper nutrition to the human body and a convenient and easy way to consume snack food.

Squash is an organic vegetable because it is a food term that holds several different kinds of vegetables that contain medicinal benefits to the human body.

Moreover, aside from leading an innovative product, this study also introduces a new recipe for squash crackers out of squash noodles. The squash itself is beneficial to our immune system and a good source of nutrients, Vitamin and other antioxidant compounds. It helps to avoid diseases and other factors that could harm our health and prevent a fatal swath of illnesses like cancer, heart disease, and premature aging. Besides, squash fruits contain high levels of Vitamin A and have carotenoid phytonutrients (Mercola, 2016). All of this could benefit the body to improve and strengthen its immune response and secure against harmful diseases; it also helps to deal with diabetes through the proper, regulated good metabolism in our body.

Tuburan, Cebu is blessed with perfect soil, which produces a bountiful crop in which squash is one of its products. Fortunately, the University President of Cebu Technological University signed a "Memorandum of Agreement" (MOA) with the "Department of Science and Technology" (DOST) Region VII, represented by its Regional Director, to support its project entitled "S & T support on the Production of Vegetables Based on Bread, Pastries, Noodles product of CTU- TUBURAN in Tuburan Cebu ." However, the author Dr. Daisy G. Tamayo, chairperson of the Production/Income Generating Project (IGP), thought of an excellent idea to produce something very unique and new to the market. A cracker out of squash noodles came out brilliantly with a unique blend of sweet and spicy.

The study also discusses the related literature and studies, which are informative and significant, taken from books, journals, periodicals, dissertations, and theses written by famous and dignified authors to enrich and strengthen the study.

According to Sabelli, quoted by Fullido (2014), innovation is the process of creating a novel idea. Innovation is the taking of a creative way of making ideas and their development as useful tools or methods, just like the development of squash crackers using the squash fruit as primary ingredients for innovative pursuit. Human advancement is fundamental to continuous innovative procedures (Héctor Sabelli, M.D., Ph. D.,2008).

As mentioned by Ackbarali & Maharaj (2014),

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sensory analysis can be traced by the users of the proper discipline of science. It helps to contribute an original formulation of innovation in a food product. It strongly holds the variance and sensory attributes for the acceptability of the study.

According to Joseph J and Sukla S. (2015), taking nutritious foods that is rich in vitamin C helps to improve body resistance against infectious diseases, pro-inflammatory free radicals from the blood, and scavenge harmfully.

According to Borro and Gemora (2016) of "SENSORY ACCEPTABILITY OF SQUASH (CUCURBITA MAXIMA) IN BAKING CAKE," a grated squash puree of 380 grams grated squash was liked very much by the respondents. There were significant differences in the level of acceptability of the different treatments as to appearance, taste, color, texture as well as general.

Republic Act No. 8435 Section 14 pointed out that the Departments and agencies shall have a medium and long-term plan for addressing Poverty, Food Security, Social Equity, and Income Improvement. It helps gain good income and profit, reduce poverty, lessen malnutrition, reduce unemployment and underemployment, and improve the land tenure of the farmers.

According to the Republic Act No. 10068 Section 24, schools should be highly encouraged to use organic agriculture farming to promote and develop good production. This practice strengthens the economy of our community, LGUs, organic farmer's organizations, etc. It helps to ensure food safety because of the practices, using organic substances in agriculture farming improves the income-generating of institutions.

This study aimed to ascertain the "Sensory Quality and Acceptability of Squash (Cucurbita maxima) Crackers as Influenced by the Levels of Squash Puree in the Formulation." Specifically, it aimed to determine the level of sensory acceptability of squash in making crackers in terms of appearance, taste, color, aroma, texture, and general acceptability; and to find out the significant differences in the level of acceptability in Three various treatments of different level squash puree as product's aroma, color, taste, texture, and general acceptability. This denotes that the experimental undertaking on developing squash crackers will contribute to the development in this field as the government realizes it.

2 MATERIALS AND METHODS

The study was experimental research using parallel **g**roup designs in which there were three (3) treatments. These three treatments were examined, and criteria were set as bases for comparisons and introduced in Cebu Technological University – Tuburan Campus.

The first part is the procurement of materials. The second part includes the development of squash crackers. The third is the acceptability level of the different formulations as to these sensory attributes: Aroma, Color, Taste, and Texture. The fourth is the nutritive value of the accepted/most preferred formulation.

Procurement of Materials and Ingredients

Purchase squash puree (Cucurbita Maxima) 2,000 grams, 3,000 grams of flour, and other ingredients in the public market and prepare the kitchen utensils.

Experimental Design or Experimental Treatment

Treatments	Wheat flour (g)	Squash puree (g)
T1	1,000	0
T2	1,000	500
T3	1,000	850

The development of squash crackers varies according to the measurement of its ingredients. It has different measurements as to Treatment I or T1 as our controlled, Treatment 2 or T2, and Treatment 3 or T3.

The ingredients of T1 were first-class flour 1,000 grams, water 200 ml. (in place of squash puree), salt 50 grams, pepper (kulikot) 50 grams, flavoring is also 50 grams using 1000 ml. of oil for the first frying and calamansi extract 30 ml. and 250 grams of brown sugar for the syrup to be coated for the second frying.

While the ingredients of T2 were the following: first-class flour 1,000 grams, squash puree 500 grams, salt 50 grams, pepper (kulikot) 50 grams, flavoring also 50 grams using 1000 ml. of oil for the first frying, and calamansi extract 30 ml./ and 250 grams of brown sugar for the syrup to be coated for the second frying with the same procedure in the frying of T1.

With regards to the ingredients of T3, it differed from T1 and T2, respectively, because it uses 200 grams of water and 500 grams of squash puree, while T3 uses first-class flour of 1,000 grams, squash puree was 850 grams as liquid, salt 50 grams, pepper (kulikot) 50 grams, flavoring is also 50 grams using 1,000 ml. of oil for the first frying and calamansi extract 30 ml. and 250 grams of brown sugar for the syrup to be coated for the second frying.

Preparation of Squash Crackers Process Flow

This study was conducted at Cebu Technological University-Tuburan Campus, Tuburan, Cebu. The selected colleges, namely, Bachelor of Science in Secondary Education Major in Technology and Livelihood Education-Home Economic Technology; Bachelor of Science in Industrial Technology Major in

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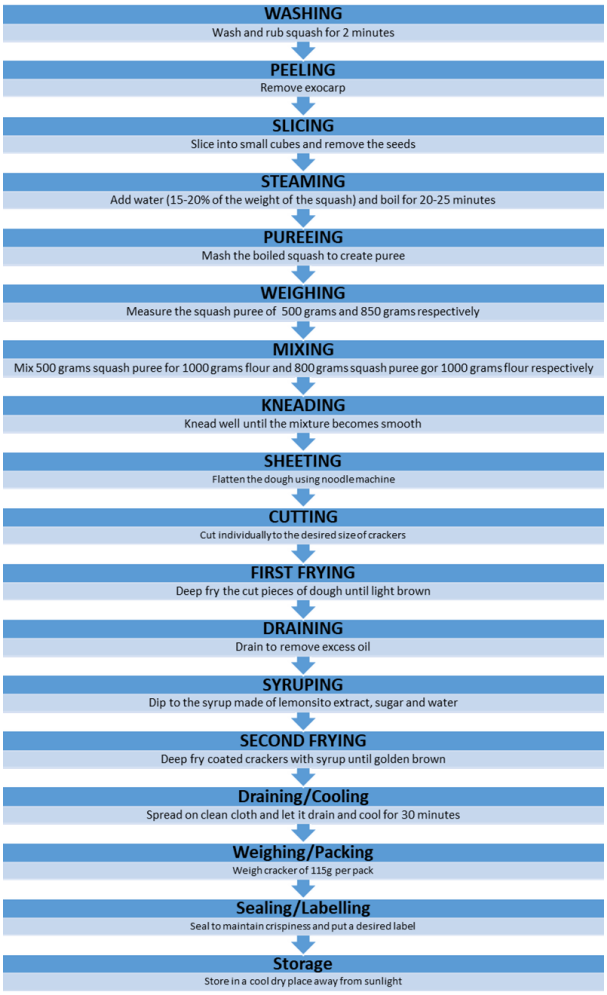
Food Technology; and Bachelor of Science in Hospitality Management.

The main tool for gathering data is a research-made questionnaire framed based on the readings and some



instruments used by the previous researchers, especially by Fullido (2014) in her master's thesis. The research also used the qualitative and quantitative description analyses of the acceptability of Squash Crackers with corresponding treatments as Treatment - 1, 1,000 g. flour with no squash puree as controlled, Treatment - 2, 1,000 g. flour with 500 g squash puree. Treatment - 3, 1,000 g. flour with 850 g. squash puree.

The tool was designed to discover relevant responses used as bases for the acceptability of the product's aroma, color, taste, texture, and general acceptability.

Product Quality Evaluation Procedure

1. Asking for Permission

A letter was sent to the Campus Director, Dean of the Different Colleges asking permission to research on the campus.

2. Experimentation

The research used the experimental type of research. The squash fruits were the main ingredients in the crackers. Trial treatments of the product were applied to ensure its acceptability of the product.

3. Sensory Evaluation

The respondents of the study are the students and employees of the CTU-Tuburan Campus. All the respondents were determined using a random sampling, number of respondents by the Department of the Colleges. There were 60 students and 30 employees/teachers, with a total of 90 respondents. The respondents were instructed to taste the product and were provided enough time to do the sensory evaluation in terms of color, aroma, taste, and texture to ensure reliable results. Since there were only three types of crackers to test, after testing, the evaluation sheet was retrieved after the testing process.

4. Testing of Nutrition Information

The nutrition facts were tested and computed by the Department of Science and Technology (DOST), Regional Office No. 7, Regional Standards and Testing Laboratory with laboratory number R7-022018-CHE-0060. All data results are from the DOST.

Statistical Treatment

To determine the profile of the acceptability level of T1, T2, and T3, the researcher used the formula of the simple percentage and weighted mean as the statistical treatment.

1. Simple Percentage. This was used to determine the number of respondents who preferred the said formulation.

2. Weighted Mean. This was used to determine the general acceptability of squash crackers which were preferred by most of the respondents.

The data gathered from the respondents in the questionnaires were classified according to the scoring procedures.

The Nine-point Rating Scale was used to determine the acceptability levels of the three formulations as to their sensory attributes.

Where:

Scale	Description
9	Extremely Like
8	Very Much Like
7	Moderately Like
6	Slightly Like
5	Neither like nor dislike
4	Slightly Dislike
3	Moderately Dislike

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2	Very Much Dislike
1	Extremely Dislike

3 RESULTS AND DISCUSSIONS

Table 1 shows that there were eight (8) or 8.89 percent of Employee/Teacher respondents and 13 or 14.44 percent of Student respondents preferred T1, which contains 1,000 grams of flour without squash puree; 15 or 16.67 percent of Employee/Teacher respondents and 34 or 37.78 percent of Students respondents preferred T2 which contains 1,000 grams of flour with 500 grams of squash puree, and seven (7) or 7.78 percent of Employee/Teacher and 14 or 14.44 percent of Student respondents preferred T3 which contains 1,000 grams of flour with 850 grams of squash puree.

It implies that the majority of the Employees/Teachers and Students preferred treatment 2 or T2, which contains 1,000 grams of flour with 500 grams of squash puree, because it had good appealability and a good sense of taste, texture, aroma, and color.

Table 2 Mean Acceptability score of the sensory attributes of squash crackers as influenced by the level of squash puree in the formulation

No. Panelist: 100
Panelist used:100

Scale	Description
9	Extremely Like
8	Very Much Like
7	Moderately Like
6	Slightly Like
5	Neither like nor dislike
4	Slightly Dislike
3	Moderately Dislike
2	Very Much Dislike
1	Extremely Dislike

Table 2 shows that in terms of color, between three (3) treatments, T1 got a 7.74 weighted means

of a rating of "Very Much Like", T2 got 8.8 weighted means of a rating "Like Extremely", and T3 got 4.22 weighted mean of a rating of "Dislike Slightly". It implies that the significant reason T2 got the highest rating for the result was that all ingredients used in three (3) treatments were almost the same except the amount of squash puree.

Furthermore, the color of treatment 2 was most favored by the respondents. The data further show the acceptability of the three (3) treatments of the squash crackers in terms of Aroma of T2, which contains 1000 g. with 500 g. squash puree had the highest rating of 8.53, “Like Extremely”. It implies that a certain amount of squash puree used contributes overall aroma of the squash crackers.

In terms of taste, among the three (3) treatments, T2 and T3 got the same rating of "Like Extremely" except for the weighted mean, 8.52 and 8.61. This denotes that T3, which contains 850 grams of squash puree, adds an extreme sense of taste to squash crackers.

In terms of texture, the three (3) treatments had different ratings and weighted mean. T1 got a 6.74 weighted mean and a rating of “Like Moderately”, T2 got a 7.91 weighted mean and a rating of “Like Very Much”, and T3 got a 2.69 weighted mean and a rating of "Dislike Very Much". It implies that T2, which had 500 grams of squash puree, gives a good sense of texture.

Similarly, the data revealed that there is a significant difference in the Sensory Attributes, which were Aroma, Color, Taste, and Texture were T2 - 1000 g. with 500 g. squash puree got the overall highest acceptability level of respondents. It implies that the sensory attributes of the three treatments were significantly different from their corresponding food cost.

Based on the results, the Squash Crackers to be developed will be treatment 2 or T2, which contain 1000 grams of flour and 500 grams of squash puree because it contains a high value of calories and energy needed for the body.

As analyzed and computed by the Department of Science and Technology (DOST), Regional Office No. 7, Regional Standards and Testing Laboratory with Laboratory Number R7-022018-CHE-0060, Table 3 and 4 shows the Nutrition Information “Nutri Pack” based on

Table 1. Preferred Treatment of the Respondents

Treatments	Employees/ Teachers		Students	
	f	(%)	f	(%)
T1 – 1,000 g. flour without squash puree	8	8.89	13	14.44
T2 – 1,000 g. flour with 500 g. squash puree	15	16.67	34	37.78
T3 – 1,000 g. flour with 850 g. squash puree	7	7.78	13	14.44
Total	30	33.33	60	66.67

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Table 2. Mean Acceptability score of the sensory attributes of squash crackers

Treatments	Sensory Attributes			
	Color	Aroma	Taste	Texture
T1	7.74	7.82	7.89	6.74
T2	8.80	8.53	8.52	7.91
T3	4.22	7.67	8.61	2.69

Table 3 Squash Crackers Nutrition Information 115g/pack "Nutri Pack" format from NLEA-USFDA

Nutrition Information		
Serving Size 1 oz(28g)		
Servings Per Container about 4		
	Amount per Serving	% RENI*
Energy	150kcal	6 %
Total Fat	9g	-
Total Carbohydrates	16g	-
Protein	2g	3%
Sodium	0mg	-

a format from NLEA-USFDA and Philippine Requirement respectively.

Based on Table 3 and Table 4 Squash Crackers Nutrition Information 115g/pack "Nutri Pack" format from NLEA-USFDA, the data shows that in serving size of 1 oz(28g), nutrients found energy with 150kcal, Total fat with 9g, Total carbohydrates with 16g, Protein with 2g, and with 0mg of sodium

4 CONCLUSIONS

Based on the results, among the three experimental treatments of squash cracker, T2 or treatment 2, which contained 1,000 grams of flour and 500 grams of squash puree, was most preferred and accepted by the respondents in terms of their sensory attributes. This treatment shows that it had an appearance, taste, texture, and aroma that the respondents liked the most.

Based on the positive response of the respondents, the researcher recommended the following:

1. The squash crackers could be used as an Income Generating project for the Institutions
2. The recipe for squash crackers must be followed correctly to prevent damage to the product.
3. For food technology instructors, it could serve as an additional input to their instructions.

For further improvement of the product, future research could conduct further studies to feature more attributes that help the product more realize and become

Table 4 Squash Crackers Nutrition Information 115g/pack format based on Philippine Requirement

NUTRITION FACTS	
4 Serving per contain	
Serving size	1 oz(28g)
Amount per serving	
Calories	150
% Daily Value*	
Total Fat 9g	14 %
Sodium 0mg	0 &
Total Carbohydrates 16g	5 %
Protein 2g	
*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

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a productive one and also demand analysis.

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