

Development and Evaluation of Sweet Potato Breakfast Cereal with Kulitis Leaves

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Abstract

The number of working parents is rising, thus there is no time to prepare food at home. Hence, this created the need for using ready-to-eat foods. In this fast-paced world, everybody wants things quick and easy. Food manufacturers have responded to these needs and over the years have developed foods that are ready in an instant.

Cereals are the most important sources of food (FAO 2002), and cereal-based foods are a major source of energy, protein, B vitamins, and minerals for the world population. This study would like to ascertain the acceptability of breakfast cereal made of locally grown root crops (sweet potato) and vegetables (kulitis leaves) which can be eaten without too much preparation. The locally available ingredients were utilized to give variation to the food products. Furthermore, the economic value of the breakfast cereal was also determined for possible commercialization and production.

A Nine (9)-point Hedonic Scale checklist was used among 50 consumers to determine the acceptability based on sensory qualities such as appearance, aroma, crunchiness, taste, and texture. Based on the survey mean results, Treatment B was “Liked Extremely” while Treatment A and C were both “Liked Very Much”. Moreover, the unit price of the developed breakfast cereal made of sweet potato and kulitis leaves per pack was Php 4.15 per 30 grams, which was cheaper compared to the existing in the market.

Keywords: Breakfast Cereal, Sweet Potato and Kulitis Leaves

Introduction

The number of working parents is rising, thus there is no time to prepare food at home. Hence, this created the need for using ready-to-eat foods. In this fast-paced world, everybody wants things quick and easy. Food manufacturers have responded to these needs and over the years have developed foods that are ready in an instant. Like breakfast cereal which is made from processed grains and often fortified with vitamins and minerals. It is commonly eaten with milk, yogurt, fruit, or nuts (Smith JD, Jain N, Bailey RL, 2020). Cereals can be defined as a grain or edible seed of the grass family, Gramineae (Bender & Bender 1999). Cereals are grown for their highly nutritious edible seeds, which are often referred to as grains. Some cereals have been staple foods both directly for human consumption and indirectly via livestock feed since the beginning of civilization (BNF 1994). Cereals are the most important sources of food (FAO 2002), and cereal-based foods are a major source of energy, protein, B vitamins, and minerals for the world population.

Generally, cereals are cheap to produce, are easily stored and transported, and do not deteriorate readily if kept dry. Further, the utilization of locally grown root crops like cassava and sweet potatoes are great resources in producing local breakfast cereals with the integration of kulitis leaves in order to combat

malnutrition among children. Since there is no local breakfast cereal produced using the native Filipino root crops. Thus, the study was realized.

The present study was the development and evaluation of root crops cereal with kulitis leaves. The acceptability of this root crops cereal was evaluated based on sensory qualities such as appearance, aroma, crunchiness, taste, and texture. The economic value was also determined for possible commercialization and marketing.

This study generally aimed to utilize locally available root crops and determine the acceptability of the ready-to-eat breakfast cereal.

1. Determine the acceptability of sweet potato cereal with kulitis leaves in terms of appearance, aroma, crunchiness, taste, and texture.
2. Find out the unit cost of the product developed.

Sweet potato, locally known as “camote” and scientifically named *Ipomoea batatas* L., is popularly known as the poor man’s crop in the Philippines. It is a nutritious food primarily consumed as a staple and vegetables. From a mere supplemental source of income to small farmers, sweet potato has become a vital livelihood crop due to new and high market demand for sweet potato products such as flour, confections, wine, and feedstuff. Based on the data from the Philippine Statistics Authority (PSA), as of 2019, Eastern Visayas remained the top sweet potato producer with 98.95 thousand metric tons, sharing 18.8 percent of the total output in 2019. Bicol Region followed this with a 16.0 percent share; Central Luzon, 9.9 percent; Western Visayas, 8.6 percent; and Caraga, 7.6 percent. The crop is commonly consumed boiled, fried, or roasted and is also used traditionally to create snacks and ingredients for various dishes. It can also be processed into different food products such as chips, noodles, and alcohol. Some products not for human consumption derived from the sweet potato include animal feed and its use as a thickening agent (ispweb.pcaarrd.dost.gov.ph).

Kulitis (*Amaranthus spinosus*) is a tall plant with broad, crinkly leaves and tiny bunched-up flowers and a native vegetable that is packed full of nutrients. Our local kulitis is a member of the Amaranth family, a group of edible plants that thrive in the hot regions of the world. The leaves are edible and are cooked similarly to spinach. The seeds are also edible and highly nutritious as they are packed with protein and calcium, making them healthier than quinoa or other popular grains. It was the staple food for some ancient South American civilizations. In the Philippines, the leaves are widely consumed as a vegetable (Costea and Sanders, 2001).

The present study was based on the following prior arts such as:

US6303177B1. Soy-containing breakfast cereal. The present invention provides a breakfast cereal for human consumption that contains at least one cereal grain and a soy material selected from soy flour, soy grits, soy flakes, a comminuted whole soybean material, or combinations thereof. The soy material contains at most 20 $\mu\text{mol/g}$ raffinose and 35 $\mu\text{mol/g}$ stachyose, and at least 200 $\mu\text{mol/g}$ sucrose. A process for producing such a breakfast cereal is also provided in which at least one cereal grain and a soy material selected from a soy flour, soy grits, soy flakes, a comminuted whole soybean material, or combinations thereof are blended, cooked to form a cereal dough, and a ready-to-eat cereal is formed from the cereal dough. The soy material contains at most 20 $\mu\text{mol/g}$ raffinose and 35 $\mu\text{mol/g}$ stachyose, and at least 200 $\mu\text{mol/g}$ sucrose. A process of reducing coronary heart disease risk in a human is also provided in which a cereal containing a soy material containing at most 20 $\mu\text{mol/g}$ raffinose and 35

mumol/g stachyose, and at least 200 mumol/g sucrose is administered to a human (Ning Luping L, et.al, 2001).

US3976793A. Breakfast cereal process and product. An improved sugar-coated ready-to-eat breakfast cereal flake composed principally of oat and soy flour has enhanced crispness retention and sweetness impact by impregnation of the flake surface with a dilute sweetening syrup which is crystallized thereon so as not to be grossly visible (Robert D. Olson, et. al., 1976).

US6242033B1. High protein cereal. The present invention includes an expanded cereal-type product and a method for making such a product wherein the cereal-type product has a high protein content. A starch derived from a tuber is used to aid in expanding the extrudate to form cereal-type pieces. The amount of denatured protein relative to functional protein is adjusted to obtain selected textured characteristics (Eugene H. Sander, 1999).

Synthesis:

The studies cited are the baseline data in the development, formulation, and evaluation of the root crops cereal specifically in the utilization of sweet potato in this study. Due to the high demand for a balanced instant food packed with important nutrients in just a few minutes of preparation, these breakfast cereals will utilize sweet potato and kulitis leaves made into cereal flakes as healthy snack alternatives.

Methodology

The present study used the Nine Point Hedonic Scale scorecard as a research instrument. It looked into the five (5) sensory qualities such as appearance, aroma, crunchiness, taste, and texture as scoring variables in evaluating the product. Mean was used to determine the acceptability of the product based on the sensory qualities. There were three trials done to come up with the most acceptable sweet potato breakfast cereal with kulitis leaves in terms of sensory qualities. The product formulations were done in three trials and evaluated with semi-trained panelists. The consumers' acceptability was evaluated by 50 respondents. Each respondent was given bottled water to neutralize their taste bud before the evaluation of each treatment.

The experiment was carried out in three (3) treatments. Treatment A (85 % sweet potato (mashed), 5% kulitis leaves (fresh), 10% flour), Treatment B (80 % sweet potato (mashed), 10% kulitis leaves (fresh), 10% flour) and Treatment C (75 % sweet potato (mashed), 15% kulitis leaves (fresh), 10% flour) in three trials.

Product Preparation

Step 1. Preparation of Sweet Potatoes. The sweet potatoes are bought from a well-known dealer to ensure quality. The sweet potatoes are washed with running water. Then, the cleaned sweet potatoes are placed in the pot with water and cooked until done. Remove the sweet potatoes from the pot and let it cool for a while. The sweet potatoes are peeled and mashed until become soft. Place the mashed sweet potatoes in the blender, add a small amount of water, and blend until the mixture becomes smooth. Set aside for later use.

Step 2. Preparation of Kulitis Leaves. The kulitis leaves are bought from a well-known dealer to ensure quality. The kulitis leaves are sorted out and washed to remove the dirt. The cleaned kulitis leaves are placed in the blender and add small amount of water. Blend the kulitis leaves until become fine in texture. Set aside for later use.

Step 3. Sweet Potato Breakfast Cereal with Kulitis Leaves

Ingredients: Flour, Powdered Milk, Brown Sugar, Fat (butter), Egg yolks, Water, Sweet Potato (Mashed), Fresh Kulitis Leaves (Chopped Finely)

Procedure:

In a mixing bowl, all the dry ingredients are combined. The egg yolks, butter (melted), and water are mixed and the dry ingredients are added and mixed thoroughly, then add the mashed sweet potato and kulitis leaves until the dough texture is achieved. The dough is placed in the refrigerator for three (3) minutes before being flattened. Then, flatten the dough using a rolling pin. The dough is baked for five (5) minutes in a preheated oven until the texture becomes dry. Then, remove the dough from the oven and cut it into small cube sizes, arrange it in a baking tray, and bake for another ten (10) minutes until crisp. Remove the cereal flakes from the oven to cool before packing in a sealed container.

Results and Discussions

General Acceptability of Sweet Potato Breakfast Cereal with Kulitis Leaves

Table 1 shows the preferences of the 50 consumers regarding the general acceptability of Sweet Potato Breakfast Cereal with Kulitis Leaves in terms of their appearance, aroma, crunchiness, taste, and texture. Generally, Treatment B was “Liked Extremely” and potential products for development as shown by the grand mean ratings of 8.34. Treatment A (8.04) and C (7.90) was shown as “Liked Very Much”. However, consumers have generally preferred Treatment B among other products when preparing sweet potato breakfast cereal with kulitis leaves.

Table 1. Acceptability of Sweet Potato Breakfast Cereal with Kulitis Leaves as Evaluated by Consumers.

SENSORY QUALITY	Treatment A		Treatment B		Treatment C	
	Mean	QD	Mean	QD	Mean	QD
Appearance	8.06	LVM	8.3	LE	7.90	LVM
Aroma	8.04	LVM	8.4	LE	7.74	LVM
Taste	8.04	LVM	8.5	LE	7.88	LVM
Crunchiness	8.05	LVM	8.2	LE	7.88	LVM
Texture	8.04	LVM	8.3	LE	8.08	LVM
General Acceptability	8.04	LVM	8.34	LE	7.90	LVM

Legend:

Scale of Means	Qualitative Description
8.12 – 9.00	Liked Extremely
7.23 – 8.11	Liked Very Much
6.34 – 7.22	Liked Moderately

Unit Cost of Sweet Potato Breakfast Cereal with Kulitis Leaves

The total unit cost of sweet potato breakfast cereal with kulitis leaves was Php 124.60 including the 40% labor. The total unit cost of the product was Php 4.15 per 30 grams.

Labor	=	Php 35.60 (40%)
Cost of Materials	=	89.00
Product Cost	=	124.60/30 packs per 30 grams
Cost per pack	=	4.15/ 30 grams

The price of available commercial breakfast cereal per pack was Php 5.00 and up. Therefore, the breakfast cereal made of sweet potato and kulitis leaves was cheaper compared to the existing in the market based on the product cost computation.

Conclusions

Based on the findings of the study, the following conclusions are drawn: Sweet potato and kulitis leaves can be utilized as the main ingredients in making breakfast cereal. The acceptability of the sweet potato breakfast cereal with kulitis leaves meets the demand of people. The unit cost of breakfast cereal made of sweet potato and kulitis leaves is cheaper compared to the existing in the market.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are forwarded: Sweet potato and kulitis leaves are recommended ingredients in making breakfast cereal. The breakfast cereal made of sweet potato and kulitis leaves is recommended for all groups of people as an alternative breakfast meal or snack since it is cheaper compared to the existing in the market. Conduct of shelf-life test of sweet potato breakfast cereal with kulitis leaves is recommended for proper storage. The sweet potato breakfast cereal with kulitis leaves may be subject to proximate analysis, microbial analysis, and nutrient content analysis in preparation for commercialization and production.

References

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