Place :
Havana, Cuba

Date :
February 1-3, 2024

ISBN: 978-1-955094-96-2

PROCEEDINGS BOOK

6th INTERNATIONAL LATIN AMERICAN SCIENTIFIC RESEARCH CONGRESS

EDITORS

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Latin American Scientific Research Programmes

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13.02.2024

by Liberty Academic Publishers

New York, USA

ISBN: 978-1-955094-96-2

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PROXIMATE AND ORGANOLEPTIC ANALYSIS OF PLANTAIN-BASED SNACK (PLANTAIN MOSA) AND PUFF-PUFF

Dr. Oluwakemi C. Apata, Miss Suliyat O. Fashina

Faculty of Renewable Natural Resources, University of Ibadan, Nigeria.

ORCID NO: 0000-0001-8387-0703

ABSTRACT

Ready to eat dry foods refrigerated meals, shelf stable food etc mixes like cake mixes are all examples of convenience foods in Nigeria. Organoleptic properties of food such as color, taste, flavor, aroma, and texture have distinct and influential effect on food acceptability and specifically influence the decision that a consumer makes regarding the preference of food substance. Despite being a rich source of complex carbs vitamins and minerals, plantains are quite simple to digest. It serves only as a replacement side dish and is often consumed with other foods. It has not yet been completely developed to create snack items in terms of vitamins and other nutrients. This study aimed at investigating the proximate and organoleptic analysis of plantain mosa and puff-puff and specifically compared the level of their acceptability. Proximate analysis of plantain mosa and puff-puff were carried out in the Laboratory to ascertain their level of composition of moisture content, protein,fat,ash, crude fibre and carbohydrate. One hundred samples of sensory evaluation forms were administered to respondents comprising of all kind of visitors at University of Ibadan Hotel under University of Ibadan ventures in its environ to assess the organoleptic properties of plantain mosa and puff-puff to determine most preferred sample. Random and convenience sampling were used to determine the respondents at the hotel. Data were analyzed using descriptive statistics (use of charts and percentage). The findings included variations in the proximate analysis value of Plantain mosa and puff-puff.

Keywords: Organoleptic analysis, plantain mosa, puff-puff

INTRODUCTION

Convenience Foods are foods bought that require little or no preparation before eating (SAN, 2011). Convenience foods include ready – to – eat dry products, frozen foods, and shelf – stable foods, mixes such as cake mix and snack food. Convenience indicates that they satisfy a consumer's need: to speed up or even avoid preparation of meals altogether. It describes a variety of hot or cold foods and dishes that require little or no effort in preparation (SAN, 2011).

A snack is a portion of food often smaller than a regular meal, generally eaten between meals (Oluwalana, 2014). Snack foods are typically designed to be portable, quick and satisfying. Snack accompany social or simply nice moments. Snacks come in a variety of forms including packaged snack foods and other processed foods as well as items made from fresh ingredients at home. Snacks can be made out of variety of food items including wheat flour, plantain flour,among others. Plantain mosa is a plantain (Paradisiaca) based snack.

Plantain (Musa Paradisiaca) has its native origin to Southeast Asia but it is now cultivated extensively across both tropical and subtropical climates including Nigeria . Plant of Musa Paradisiaca combine characters of two parents, M. acuminata and M. balbisiana, the botching on the pseudo stem is pale or absent. A tropical plant, tree like producing the large, pulpy and starchy fruit (Plantain). The fruit, a pulp, differing from bananas in being starchy rather than sweet tasting, is a rich source of diverse nutrients and photochemicals (Benett et al. 2010, Oyeyinka and Afolayan, 2019). Musa are rich in Vitamin C, B6, minerals and dietary fiber. They are also rich energy source with carbohydrates accounting 22% and 32% of fruit weight. In terms of food security, Plantain has grown to strategically

become an important instrument for rural development, creation of employment as well as the generation of income for crop producing households (Sartori and Menegalli 2016). Plantain flour can be combined with wheat flour and plantain to produce plantain mosa (plantain puff-puff) a snack gradually gaining acceptance in parties especially in West Africa like Oyo State and Lagos State.

Plantain flour is delicious and all natural pure flour produced from green plantains which are grown across Asia, Columbia, Africa and more. The peels of each plantain is removed by hand and the plantains are washed in spring water before sun drying for the sweet sun kissed flavor after which it is killed into flour. There are no added preservatives, colorings or flavoring. It is a high energy food which is calorie dense with low fat and low sugar but high nutritive value and high dietary fiber which is good for cholesterol related ailments, helps reduce constipation , enhances respiratory system and improves digestive system (Sommer *et al.*, 2002).

Plantain mosa also known as plantain puffies, a deep fried product from plantain (flour). *Plantain mosa* are a relatively new snack food made from a combination of over ripe plantain - Egss and pepper and selected spices Sthe combination of ingredients – onions, pepper and groundnut oil, makes it a complete, nutritious food. The snack food is gradually gaining acceptance in Nigeria as caterers are already making the products as small chops during celebration (Mary Ann Olaoye,2018). With the addition of plantain flour as a means of fortification to increase its nutritional benefits which include it being medicinal for some ailments like diabetes.

Puff-Puff is a traditional Nigerian snack made of fried dough. Other names for the food include (buffloaf or boflot) in Ghana. It is prepared using flour, yeast, sugar, butter, salt, water and eggs from which a stiff paste is made. It is then deep-fried in vegetable oil until golden brown. After frying, puff puffs can be rolled in sugar like the French beignet or in any other spice or flavoring such as cinnamon, vanilla and nutmeg. (Christine Serrano, 2019)

Proximate analysis consists of determination of ash content, moisture content, volatile matter, and fixed carbon on an as received basis. The quantitative analysis of macromolecules in food. A combination of different techniques, such as extraction, kjeldahl, NIR are used to determine protein, fat, moisture, ash and carbohydrates levels which are the five standard proximate (Parimelazhagan Thangaraj, 2015). According to (Udochuwu *et al.*, 2023), proximate analysis is a method which helps determines the macro nutrients values in food samples and are usually declared as nutritional facts display mostly on the final product's label. Like many processed foods, snacks are subjected to physical , chemical and microbial contamination by organisms like staphylococcal and moulds like Rhizopus (Annah-Prah et al.,2011)

Organoleptic analysis also known as sensory evaluation is defined as a scientific discipline used to evoke, measure, analyze and interpret those responses to products that are perceived by the senses of sight, smell, touch, taste and hearing (Milica Lukic et al., 2014) consisting of texture, color, aroma, taste and flavor. Organoleptic analysis is very important in food products because if it doesn't taste good, the nutritional value can't be analyzed as a result of no one eating it (Muflihatin and Purnasari,2019). Organoleptic properties are differentiated based on the purpose of Organoleptic assessment which include differentiation test (discriminative test), acceptance test (affective test) and description test (descriptive test) as stated by Lawless and Heymann, (2010) . Lawless and Heymann (2010) defined an expert as an individual acknowledged or self-ordained to act as a judge of sensory attributes, defects, or overall product quality based on experience and/or training; generally not used in a sensory evaluation". They must be capable of recognizing many different sensory characteristics of a product and must reach agreement on how these are perceived and should be labeled. The panel used for the study are the visitors (tourists) of University of Ibadan Hotel

As tourism development has greatly improved and increased to be one of the many stakeholders concerns, tourist however would need to take some meals in form of snacks as replenishment before meals. Local snacks are often sold by itinerant sellers from trays or boxes in their head , from stores in the market, at school or by roadside in small rural towns as well as large urban centers (Apata *et al.*, 2017). The hotels visitors were used as untrained panels in which the test is called an affective test

An affective test could also be basically referred to as customer acceptance tests and product success through sensory evaluation tests. In this type of product test, the quality of a prototype is tested subjectively by potential customers in order to make sure that product development efforts have moved the design and features towards customer requirements (Mian K. Sharif et al., 2017). Heldman (2004) stated that the acceptance of food as well as snack is dependent on whether it responds to consumer needs and as on the degree of satisfaction that it is able to provide. Plantain mosa which is made from plantain fortified with plantain flour however is not yet known as there is a little tweaking of its production and it is yet to gain public acceptance compared to other snack like (puff-puff, chin-chin etc) as even few who eats it doesn't know exact name of what they are eating and adding of plantain flour is a new healthy way of eating the snack. Based on the Literature review, previous similar work conducted in this exact field is not yet seen. Therefore, it was considered very important to undertake this study which will be developed further in the future. This study is aimed at investigating the proximate and organoleptic analysis of plantain mosa and puff-puff, comparing the acceptability level with each other among hotels visitors.

Objectives of the study

The general objective of this study was to investigate the proximate and organoleptic analysis of plantain mosa and puff-puff among University of Ibadan Hotel visitors. Specifically, the study determined:

1. Proximate analysis of plantain mosa and puff-puff
2. Organoleptic analysis of plantain mosa and puff-puff
3. Comparison level of plantain mosa and puff-puff

Materials and Methods

Design of study: It is an experimental study. It involved the use of primary and secondary data to gather information as relating to the study. The primary data involved the use of questionnaire, sensory evaluation forms and Laboratory experiment

Materials: Plantain (Musa x Paradisiaca) and the packaging materials were purchased from Bodija market, Ibadan, Oyo state and was kept in a tight jar for 3 days to show black spots which is the sign of being over-ripe, as well as other ingredients such as scotch bonnet (ata rodo), cayenne pepper, onions, oil, seasoning cube, salt, yeast, milk, flavor, butter, baking powder and Plantain flour.

Preparation of *Plantain mosa*

Recipe

- 5 medium sized Over-ripe plantain
- 50tbsp. Plantain flour
- 200g of scotch bonnet, diced
- 10 tbsp. Bakers yeast
- Salt to taste
- 6 pieces of seasoning cube
- 5 cups of warm water (adjust to mixture)
- Oil for deep-frying (half of frying pan)

Procedure for preparation: Plantains were sliced and pieces were put along with diced pepper into a blender with a little bit of water for some minutes until the mixture looked smooth. The plantain flour and salt was then poured and blended again to make sure the mixture texture isn't too thick and smooth. The batter was then covered for some minutes between 15-20 minutes to allow rest and rise. While the batter was rising, the frying pan was put on gas stove to heatup and then oil was poured into hot frying

pan. The mixture was scooped with hand and extrude into the hot oil and the mosa were deep fried until golden brown. It was then removed, drained and cooled. After cooling, the mosa were properly packaged in a small rectangular foil plate.

Chemical/Proximate Analysis: Analytically, four of the constituents Fat, Protein, moisture and crude ash) are obtained via chemical reactions and experiments i.e. determined by the method of Association of official Analytical Chemists (1996). The constituents, carbohydrate was obtained based on the determination of the four others (Udochukwu *et al*, 2023) In other words, carbohydrate was determined by difference.

Sensory Evaluation: This involves;

Selection of panel of judges: The respondents include panel of 100 untrained judges made up of Hotel guests and staff of the University of Ibadan hotel, Ibadan, Oyo-State. 100 copies of semi-structured questionnaire were administered to the respondents that were randomly selected within the hotel using convenience sampling technique in order to rate the food items whether they meet food standard and requirements

Instrument for data collection: Questionnaire and Sensory evaluation form were used for data collection in which the questionnaire assessed the demographic characteristics of respondents and Sensory evaluation form addressed the organoleptic evaluation of both samples and the acceptability of plantain mosa in comparison with Puff-puff. The organoleptic evaluation involves the use of respondents' sense organs to assess the color, taste, flavor, aroma and texture of both samples using the 7-point hedonic scale of measure to rate the samples

Data collection method/procedure: The sensory attributes of plantain mosa and puff-puff were determined using the simple hedonic scale test Each panelist was asked to score each attribute on a 7-point hedonic scale which is (1 = dislike strongly, 2 = dislike moderately, 3 = dislike slightly, 4 = indifferent, 5 = like slightly, 6 = like moderately, 7 = like extremely) The sensory attributes evaluated were color, taste, flavor, aroma, texture, and overall acceptability

Data analysis: Data was analyzed using descriptive statistics in form of charts and percentages charts and percentage distributing of some variable related to the research work

Result of the study

Proximate analysis

The chemical composition of the samples checked include carbohydrate, moisture content, protein, ether extract (fat), ash and crude fibre,Ascorbic acid, Thiamin, Riboflavin and Niacin. This chemical analysis was carried out to know the amount of nutrients that can be derived from the samples.

Table 1: Proximate analysis of *plantain mosa* and *puff-puff*

Parameter	Regular puff puff	Plantain mosa
Moisture content %	19.3	21.2
	19.5	21.5
	19.6	21.4
Protein %	12.2	14.1
	11.9	14.4
	12.3	14.3
Ether Extract %	16.7	19.0
	16.8	19.3
	16.5	19.4
Ash %	2.1	2.3
	2.0	2.4
	2.1	2.2
Crude Fibre	0.4	0.6

	0.3	0.7
	0.3	0.6
Carbohydrate/NFE (By difference) %	49.3	42.8
	49.5	41.7
	49.2	42.1
Ascorbic Acid (mg/100g)	2.2	7.8
	2.1	7.5
	2.2	7.6
Thiamin (mg/100g)	0.16	0.22
	0.18	0.24
	0.19	0.25
Riboflavin (mg/100g)	0.12	0.17
	0.11	0.19
	0.13	0.16
Niacin (mg/100g)	2.10	2.87
	2.15	2.89
	2.14	2.79

Source: field survey, 2023

Data analysis shows that respondents' purpose of stay in the University of Ibadan Hotel reveals 45% of the respondents' was work, 29% was leisure, and 26% of the respondents gave other reasons

Figure 1: Percentage distribution of respondents' level of preference for samples t1 and t2

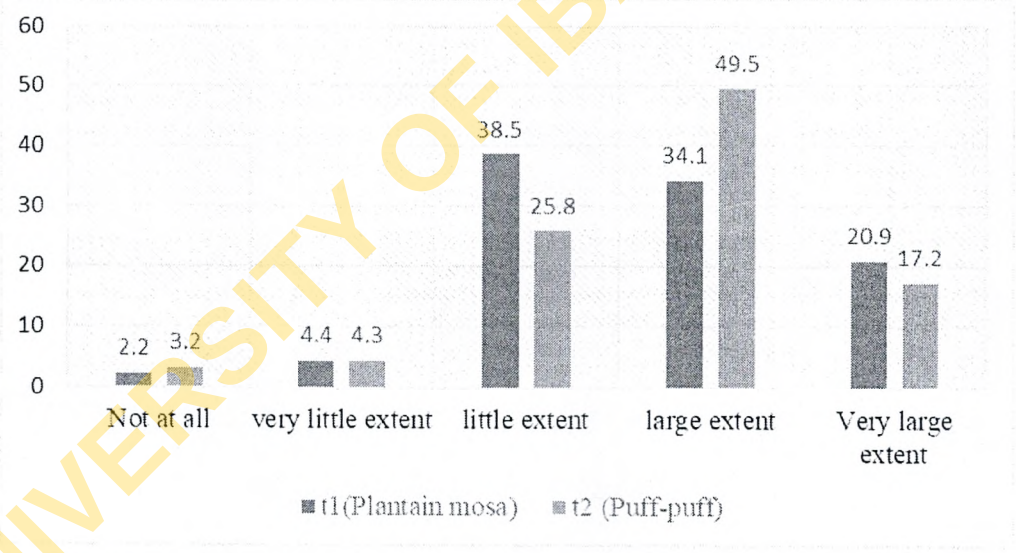

Figure 1: shows the percentage distribution by respondents' level of preference for samples t_1 (plantain mosa) and t_2 (puff-puff). For sample t_1, 20.9% of the respondents prefer it to a very large extent, 34.5% prefers it to a large extent, 38.5% prefer it to a little extent, 4.4% prefers it to a very little extent and 2.2% do not prefer it at all. For sample t_2, 17.2% of the respondents prefer it to a very large extent, 49.5% prefer it to a large extent, 25.8% prefer it to a little extent, 4.3% prefer it to a very little extent and 3.2% do not prefer it at all. Given 20.9% of the respondents prefer t1 (plantain mosa) to a very large extent while 17.2% of the respondents prefer t2 (puff-puff) to a very large extent. It could be said that t1 was well received and liked

Table 2: Organoleptic sampling of t1 (plantain mosa) in preference to t2 (puff-puff)

Respondents' organoleptic sampling of plantain mosa (t1) and puff-puff (t2)

Source: Field Survey, 2023

Variable	Dislike strongly	Dislike moderately	Dislike Slightly	Indifferent	Like slightly	Like moderately	Like extremely
Color							
t_1	4 (4.1%)	11 (11.2%)	17 (17.3%)	21 (21.4%)	15 (15.3%)	18 (18.4%)	12 (12.2%)
t_2	0 (0.0%)	1 (1.0%)	0 (0.0%)	9 (9.0%)	26 (26.0%)	40 (40.0%)	24 (24%)
Taste							
t_1	1 (1.0%)	1 (1.0%)	2 (2.0%)	9 (9.2%)	18 (18.4%)	30 30.6%)	37 (37.8%)
t_2	0 (0.0%)	1 (1.0%)	2 (2.0%)	4 (4.0%)	25 (25.3%)	44 (44.4%)	23 (23.2%)
Flavour							
t_1	0 (0.0%)	1 (1.0%)	6 (6.1%)	9 (9.2%)	20 (20.4%)	29 (29.6%)	33 (33.7%)
t_2	0 (0.0%)	0 (0.0%)	1 (1.0%)	6 (6.0%)	29 (29.0%)	39 (39.0%)	25 (25.0%)
Aroma							
t_1	0 (0.0%)	1 (1.0%)	5 (5.1%)	8 (8.2%)	31 (31.6%)	27 (27.6%)	26 (26.5%)
t_2	2 (2%)	0 (0.0%)	2 (2.0%)	11 (11.0%)	28 (28.0%)	39 (39.0%)	18 (18.0%)
Texture							
t_1	2 (2.1%)	2 (2.1%)	5 (5.2%)	15 (15.5%)	16 (16.5%)	29 (29.9%)	28 (28.9%)
t_2	0 (0.0%)	1 (1.0%)	2 (2.0%)	4 (4.0%)	26 (26.0%)	40 (40.0%)	27 (27.0%)
Overall acceptability							
t_1	0 (0%)	0 (0%)	4 (4.3%)	6 (6.5%)	22 (23.9%)	31 (33.7%)	29 (31.5%)
t_2	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (4.4%)	23 (23.3%)	41 (45.1%)	23 (25.3%)

Discussion

As Plantains, one of the main ingredients in plantain mosa are nutritious food item with many potential health benefits such as being a source of vitamins, fiber, potassium and antioxidants and are a low fat source of starchy carbohydrates and fiber. They also contain good amounts of vitamins and minerals, including vitamin C and potassium.

Therefore from the result of the proximate analysis conducted on the snack showed in Table 1, it was observed that plantain mosa contained moisture content (21.2%), Protein (14.1%), Ether extract(fat)(19.0%), Ash content (2.3%), Crude Fibre (0.6%), Carbohydrate/NFE (42.8%), Ascorbic acid (7.8%), Thiamin (0.22%),Riboflavin(0.17%), Niacin(2.87%); an increase in all nutritional

component tested against puff-puff which contained . However, variations were observed in the result of the proximate analysis of the snack as there were slight decrease in carbohydrates content (from 49.3% - 42.8%) , while all other cases recorded increase especially a rapid increase in Ascorbic Acid (Vitamin C) (from 2.2% - 7.8%), in protein (12.2% – 14.1%), fat (16.7% – 19.0%) and Niacin(2.10% - 2.87%). Hence, affirming the health benefits plantain and other derived food source from it gives the body

According to the analysis, the carbohydrates content in puff-puff was higher compared to plantain mosa. According Ludwig et al.,(2018) to having a high level of carbohydrates could type for risk of chronic diseases such as type 2 diabetes, coronary heart diseases and perhaps obesity when the carbohydrates affet postprandial hyperglycaemia and hyperinsulinaema.

The protein content in plantain mosa was higher in comparison with Puff-puff. A high protein diet has major benefits for weight loss and metabolic health such that it could serve as muscle building block, growth control,and mostly reduces appetite and hunger level resulting in maintaining body wealth that could control obesity (Ortinau LC *et al.*,2014).

The moisture content of plantain mosa was higher than that of puff-puff according to the analysis. The moisture content shows information about the Shelf-life (storage) and microorganisms viability. Excess water (High moisture content) in food product can cause an increase in the rate of microbial growth which cannot only spoil a product before it reaches the shelves but could also decrease the length of time it can stay fresh for (IvyPanda,2022) which shows the Shelf-life of plantain mosa being extremely small

The ether extract content of plantain mosa was higher than puff-puff. Ether extract (fat) contributes to energy and essential fatty acid provision;however it being in excess can contribute to increasing problem of obesity and overweight (Geeth G. et al.,2020)

The Ascorbic Acid content of plantain mosa was extremely higher compared to that of puff-puff. According to Pullar JM et al., (2017), Ascorbic Acid (vitamin c) contributes to many major body functions including formation of collagen, absorption of iron, the proper functioning of immune system and an important water soluble vitamin for wound healing.

The crude fibre content reported for plantain mosa was higher to that of puff-puff .However both have a relatively low crude fibre content. Crude fibre stimulates digestion and also encourages the production of important intestinal bacteria (Dhingra D. *et al.*,2011)

Table2, shows the results of the organoleptic sampling of plantain mosa and puff-puff which includes the sensory attributes carried out by the respondents on color, taste, flavor, aroma, texture, and the overall acceptability of the both products. The assessment was done using the 7-point hedonic scale. The result shows that a large percentage of the respondents like the color of t2 compared to t1. Specifically, 40% like moderately the color of t2, while 18.4% like moderately the color of t1. However, 17.3% dislike slightly the color of t1, while zero percent dislike slightly the color of t2. More so, the majority of the respondents liked the taste of the two products. 37.8% extremely like the taste of t1, and 44.4% moderately like the taste of t2. The result further shows that 33.7% extremely like the flavor of plantain mosa while 6.1% slightly dislike the flavor of plantain mosa. About 28.9% and 26.5% of the respondents extremely like the texture and aroma of plantain mosa respectively. Finally, in terms of overall acceptability, the table shows that 31.5% extremely like plantain mosa, 33.7% moderately like, 23.9% slightly like, 6.5% were indifferent, and 4.3% slightly dislike plantain mosa.

Color is the first organoleptic attributes seen by respondents when analyzing the sensory characteristics and it plays an important role in choice making of food to consumed as it influences the perception of food consumption as it is said "eat with your eyes" (Huang *et al.*,2015)

The average respondent's assessment of the taste of the samples ranked high from 5-7 on the hedonic scale for the like slightly: 18.4% - plantain mosa, 25.3% - puff-puff; like moderately: 30.6% - plantain mosa, 44.4% - puff-puff; like extremely: 37.8% - plantain mosa, 23.2% - puff-puff respectively. The

contribution of different sensation to food choice is imperative as that consumers choose snacks according to their preference (Duerlund M *et al.*, 2020)

Flavor is an organoleptic parameter for denoting the odour, taste and mouthfeel sensations. Flavoring snacks preceeds the taste choice of any consumer and they are aromatic compounds with the combination of odour and taste perceived by the mouth and nose (Sorenson LB et al.,2003) . The respondents ranked flavor the higest from 5-7 on the hedonic scale scale for the like slightly: 20.4% - plantain mosa, 29.0% - puff-puff; like moderately: 29.6% - plantain mosa, 39.0% - puff-puff; like extremely: 33.7% - plantain mosa, 25.0% - puff-puff respectively.It can be concluded that plantain mosa was rated slightly higher than puff-puff in terms of flavor.

According to the analysis of the study, aroma of the two samples was rated highest from 5-7 on the hedonic scale scale for the like slightly: 31.6% - plantain mosa, 28.0% - puff-puff; like moderately: 27.6% - plantain mosa, 39.0% - puff-puff; like extremely: 26.5% - plantain mosa, 18.0% - puff-puff respectively. The combination of aroma and taste induced great satiation as Aroma is referred to as volatile compounds perceived by the odour receptors of olfactory tissues and muscles of the nose (Yin *et al.*,2017)

According to the study, texture of the two samples was rated highest from 5-7 on the hedonic scale scale for the like slightly: 16.5% - plantain mosa, 26.0% - puff-puff; like moderately: 29.9% - plantain mosa, 40.0% - puff-puff; like extremely: 28.9% - plantain mosa, 27.0% - puff-puff respectively. Sensory texture characteristics of snacks could be departmentalized into various ways such as its crispness, fracturability, thickness, creaminess, smoothness is a strong indicator of food quality and affects food acceptability (Kumar R *et al.*, 2021) Food texture influences food intake via oral processing depending on the factors listed earlier (Dieuwerke P *et al.*,2020)

Overall acceptability comprises of all the organoleptic properties – color, taste, flavor, aroma, and texture of the two samples studied. In the study carried out, it was found out that the plantain mosa snack was well accepted by tasters. In which the taste of the snack was rated 37.8% in being liked very much by respondents, though there were variations in its likeness (like slightly – 18.4%, like moderately – 30.6%, like extremely - 37.8%). Also the variation in its being accepted by the color was that 15.3% of the respondents liked it slightly, 18.4 of the respondents liked it moderately and 12.2% liked extremely. In terms of its texture, 16.5% of the respondents liked it slightly, 29.9% liked it moderately while 28.9% liked it very much. On the basis of its aroma, there were variations for being liked slightly, like moderately, and like extremely with percentage variations of 31.6%%, 27.6%, and 26.5% respectively. It was observed from the study that most of the respondents liked the taste more because of plantain present in it. The organoleptic properties of food have distinct effects on food acceptability because they are the main determining agents of food acceptability either the consumer would like the food or not (Martinez S *et al.*,2021). Therefore, it can be concluded that plantain mosa was highly accepted by the respondents compared to puff-puff according to the study

Conclusion

The findings of the study concluded that dominant components of plantain mosa and puff-puff in high content are carbohydrate, protein, moisture content and fat. However plantain mosa has extremely high content than puff-puff in Ascorbic Acid, Riboflavin, Niacin and Thiamin. On the other hand, ash and crude fibre contents were relatively low. The results indicated variations in the proximate values of plantain mosa and puff-puff. It was observed that plantain mosa had higher contents of protein, moisture content, ether extract fat), as, crude fibre and vitamins ike Ascorbic acid in Comparison with puff-puff. On the other hand, puff-puff contained a higher proportion of carbohydrate compared to plantain mosa organoleptic properties of food such as color, taste, flavor, aroma and texture have influential and certain effects on food acceptabiity and influences consumer preference

References

Annan-Prah, A., Amewowor, DHA K., Osei-Kofin, J., Amoono, S.E., Akorli, E., Saka, S.Y., Ndadi, H.A., 2011. Street Foods: Handling, hygiene and client expectations in a World Heritage Site Town, Cape Coast, Ghana. *African Journal of Microbiology Research* 5(13):1629-1634

Apata O.C., Abimbola A.F., Oyewole M. F., (2020) Acceptability of selected indignous snacks by Tourist in tourist centers in south western Nigeria. Nigeria Journal of Home Economics (Nig. JHOC) (6)(2)March ,2018

AOAC, 1996. Official Methods of Analysis. 16th Edition, Association of Official Analytical Chemist, Washington DC

SAN, 2011. Convenience foods. *Fatty acids in foods and their health implications,* Third Edition, ISBN 97814 20006902, Chapter 14, Pg 376

Oluwalana IB, Oluwamukomi MO. 2011. Proximate Composition, Rheological and Sensory Qualities of Plantain Flour blanched under three temperature regimes. African Journal of Food Science, 5(14): 769-774.

Oyeyinka, Barnabas & Afolayan, Anthony. (2019). Comparative Evaluation of the Nutritive, Mineral, and Antinutritive Composition of Musa sinensis L. (Banana) and Musa paradisiaca L. (Plantain) Fruit Compartments. Plants (Basel, Switzerland). 8. 10.3390/plants8120598.

Sartori, Tanara & Menegalli, F.C.. (2015). Development and characterization of unripe banana starch films incorporated with solid lipid microparticles containing ascorbic acid. Food Hydrocolloids. 55. 210-219. 10.1016/j.foodhyd.2015.11.018.

Sommer, A., Davidson, F.R., Anney, A., 2002. Assessment and control of Vitamin A deficiency.

Lawless, H.T., Heymann, H., 2010. Sensory Evaluation of Food: principles and practices. Vol. 5999, Springer

Mary Ann Olaoye, 2018. Five dishes you can make with plantain.*Guardian.ng/life/five dishes. The Guardian Nigeria.*

Mian K. Sharif, Masood Sadie Butt, Hafiz Rizwan Sharif ., Muhammad Nasir.,2017.

Sensory Evaluation and Consumer Acceptability in the Handbook of Food

science and Technology (pp.362-386)

Milica Lukic., Snezana Slavic.,2014. Emulsion systems: From stability concerns to sensory properties.(4.7.3, volume 1)

Parimelazhagan Thangaraj.,2015. Proximate Composition Analysis (PDR, volume 71; pp 21-31)

Heldman, D.R., 2004. Identifying food science and technology research needs. *Food Technology* 58: 32-34

Udochukwu, V.E., Christogonus, I.U., Francis, C.E., Ifunaya, L., Omeje, B.M., 2022. Analytical Methods in Proximate Composition of Ten Commonly Used Seasonings in Nigeria. *European Journal of Food, Science and Teachnology 10(2); pp 24 – 34* ISSN 2056 – 5798 (print)

Ludwig DS, Hu FB, Tappy L, Brand-Miller J. Dietary carbohydrates: role of quality and quantity in chronic disease. BMJ. 2018 Jun 13;361:k2340. doi: 10.1136/bmj.k2340. PMID: 29898880; PMCID: PMC5996878.

Ortinau LC, Hoertel HA, Douglas SM, Leidy HJ. Effects of high-protein vs. high- fat snacks on appetite control, satiety, and eating initiation in healthy women. Nutr J. 2014 Sep 29;13:97. doi: 10.1186/1475-2891-13-97. PMID: 25266206; PMCID: PMC4190484.

IvyPanda. (2022, July 7). Analysis and Significance of Food Moisture Content. https://ivypanda.com/essays/analysis-and-significance-of-food-moisture-content/

Pullar JM, Carr AC, Vissers MC. The roles of vitamin C in skin health. Nutrients. 2017 Aug 12;9(8):866.

Dhingra D, Michael M, Rajput H, Patil RT. Dietary fibre in foods: a review. J Food Sci Technol. 2012 Jun;49(3):255-66. doi: 10.1007/s13197-011-0365-5. Epub 2011 Apr 12. PMID: 23729846; PMCID: PMC3614039.

Huang, Lei & Lu, Ji. (2015). Eat with Your Eyes: Package Color Influences the Perceptions of Food Taste and Healthiness Moderated by External Eating. Marketing Management. 25. 71-87.

Duerlund M, Andersen BV, Alexi N, Peng M, Byrne DV. Subjective Sensations related to Food as Determinants of Snack Choice. Foods. 2020 Mar 12;9(3):336. doi: 10.3390/foods9030336. PMID: 32178388; PMCID: PMC7143542.

Sorensen LB, Moller P, Flint A, Martens M, Raben A: Effect of sensory perception of foods on appetite and food intake: a review of studies on humans. Int J Obes Relat Metab Disord. 2003, 27: 1152-1166. 10.1038/sj.ijo.0802391.

Yin, Wenting & Hewson, Louise & Linforth, Robert & Taylor, Moira & Fisk, Ian. (2017). Effects of aroma and taste, independently or in combination, on appetite sensation and subsequent food intake. Appetite. 114. 10.1016/j.appet.2017.04.005.

Kumar R, Chambers E 4th, Chambers DH, Lee J. Generating New Snack Food Texture Ideas Using Sensory and Consumer Research Tools: A Case Study of the Japanese and South Korean Snack Food Markets. Foods. 2021 Feb 22;10(2):474. doi: 10.3390/foods10020474. PMID: 33671546; PMCID: PMC7927123.

Dieuwerke P. Bolhuis, Ciarán G. Forde, Application of food texture to moderate oral processing behaviors and energy intake, Trends in Food Science & Technology, Volume 106, 2020, Pages 445-456, ISSN 0924-2244,

Martínez S, Carballo J. Physicochemical, Sensory and Nutritional Properties of Foods Affected by Processing and Storage. Foods. 2021 Dec 2;10(12):2970. doi: 10.3390/foods10122970. PMID: 34945521; PMCID: PMC8701254.