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Research Article

Salvaging Cashew Apples Through Processing into Simulated Cashew Meat

Jayeola CO[1]*, Orimoloye PO [1], Olalekan AM [1], Olorundare BO[1], Akinola CO[1], Raji MO [1], Bolarinde.FM [1] and Yisa I.K [2]

[1]Cocoa Research Institute of Nigeria, Ibadan PMB 5244, Ibadan

[2]Centro de Promoção e Desenvolvimento de Avicultura Familiar (CEDAVES)/Asas de Socorro, Bissau. Guinea-Bissau

***Corresponding author:** Jayeola Olayinka, Cocoa Research Institute of Nigeria, Ibadan PMB 5244, Ibadan.

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Abstract:

Cashew tree (Anacardium occidentale) is a cash crop mainly grown for its nuts. The dried apple is a good source of protein and non-digestible fibre that is essential to prevent many diseases as it helps in bowel movements to remove waste and non-digestible food materials from human system. The dried apple was obtained from extracting juice from the whole apple before drying.

The use of apple which is a by-product can be an opportunity for diversifying activities on the farm. The farmers' revenue can increase through various opportunities which, exist for using cashew apples. However, these opportunities are presently not utilised adequately since most farmers are of the peasant status and has no knowledge on how to process the apple. Due to its high rate of perishability, cashew apples will not require to be transported over long distances and need to be processed, if possible, at the farm settlements.

Simulated cashew meat was processed by subjecting cashew apple to juice pressing, blanching, salting and different methods of drying. The products obtained were subjected to physiochemical analysis, sensory evaluation and shelf-life studies. The percentage values for pH, moisture, crude protein and crude fiber contents were 4.71, 9.33, 18.31 and 14.32 respectively.

The meat-like substance developed from cashew apple was very similar to dry meat. The sensory analysis revealed that there were no significant differences between processed cashew meat when compared with dry meat. The products were stable at room temperature for three months, studies on going to extend the shelf life further.

Production of simulated cashew meat as a substitute for both meat consumers and vegetarians had come as a way of adding value to cashew apples that waste away in our cashew farms during peak seasons.

Key words: cashew apple; processing; simulation; cashew meat

Introduction

The utilization of cashew apple for Various products have previously been developed and these include juice, wine, syrup jam and host of others. Regarding to the use of cashew apple for meat, there are not many researches mentioned throughout history, humans have considered meat to be an essential part of their diet (Stanford and Bunn, 2001). The consumption of meat has been key for human evolution as it has been linked to the brain growth and development within prehistoric Homo sapiens (Williams and Hill, 2017). Globally, beef, pork, and chicken products are the highest in demand, with the United States and Australia topping the charts for the highest annual meat consumption (Ritchie, 2019). Due to an increase in global population and rapid economic development, the last two decades have seen a 58% growth in the global demand for meats. By 2018, approximately 320 tonnes of meat was consumed worldwide and it is predicted that the market will expand 15% by 2027 (OECD/FAO, 2018). However, the inefficiencies of meat production compared to crop harvesting and the negative impacts from the consumption of conventional meats on human health have become topics of concern in recent years (Godfray etal., 2018; Marinova and Bogueva, 2019). Due to these increasing concerns, food industries are looking for ways to introd uce healthier meat alternatives mad e from non-animal proteins, but with similar appearances, mouthfeel, and smells to consumer markets (Malav et al., 2015). Despite the fact that plant-based meat alternative (PBMA) has become one of the current hottest topics in the academic community, and thus original research articles and review papers outlining different emphasis on this topic have been published (Kumar, 2016). Nevertheless, the research on cashew meat as plant-based meat alternatives (PBMAs) is scanty in literature.

Cashew (Anacardium occidentale, L) is a tropical and edible fruit whose genus name Anacardium which means "shaped like heart" is derived from the shape of cashew apple. Cashew apple is the pseudo-fruit connected to the real fruit which is cashew nut (Zepka and Mercadante, 2009). Cashew apple is characterized by its fibrous nature and a unique astringent smell. The utilization of this apple is mostly for the production of its juice and wine. The residue made of the skin and the husk called bagasse is frequently used for animal feed or even allowed to waste away. The residue has a dark yellow colour, a fibrous aspect, and a typical astringent aroma due to the presence of tannins which could be a limiting factor for the acceptability of the cashew apple and the juice, especially in foreign countries (Michodjehoun-Mestres et al., 2009). Regarding to the use of cashew apple for meat, there are not many researches mentioned. This study therefore focused on the production of a meat-like substance from cashew apples as an alternative source of meat for the vegetarians

This study therefore focused on the production of a meat - like substance from cashew apples as an alternative source of meat for the vegetarians. The essence of the study is to simulate cashew apple to make a meat-like product, analyse the physicochemical and Microbiological Quality of the cashew apple meat and furthermore determine the organoleptic acceptability of the meat through sensory evaluation.

Materials and Methods

Sources

Cashew apples were collected during its peak season from cashew plots of Cocoa Research Institute of Nigeria, Ibadan

Simulated cashew meat Processing

Cashew apples were converted into simulated cashew meat - like substance through the process of juice extraction and drying of the bagasse. The drying was done through the use of different drying techniques such as sun drying, solar drying and oven drying to produce cashew apple meat. The dried cashew meat were stored in polyethylene nylon for further analysis.

Physiochemical Analysis

The biomass composition of the simulated cashew meat was estimated using AOAC 2000. Moisture, pH, crude protein, crude fiber, lignin, cellulose and hemicellulose were analyzed. The products were also subjected to organoleptic appraisal. Cashew meat for organoleptic evaluation were washed and steamed with seasoning just like the meat before evaluation. Ten man trained panelists were used to assess the cashew meat as compared to cow meat. A 9 point scale was used ranging from 9 like extremely to 1 dislike extremely.

Statistical Analysis

The data collected were analyzed using Statistical Package for Social Sciences (SPSS) version 17.0 and were expressed as range, mean+ standard (SD) and percentages. Comparison of the level of the parameters were assessed by subjecting to one way Analysis of Variance (ANOVA). Statistical significance level was set at $p<0.05$

Results

Composition	%
Cellulose	34.21±31
Hemicellulose	26.23±28
Lignin	36.24±15
Ash	3.32±35

Table 1: Biomass Composition of Cashew Meat

Attributes	Samples			
	DC	**SM**	**DM**	**CM**
Color	7.41±0.02	6.42±0.02	8.34±0.01	8.22 ±0.02
Taste	8.52 ±0.03	6.12±0.01	8.62 ±0.02	8.54 ±0.03
Flavor	7.63±0.01	6.42±0.02	7.82±0.01	7.22±0.02
Texture	8.21±0.03	6.12±0.0	8.64±0.0	8.62±0.03
Overall Acceptability	8.14±0.0	6.33±0.0	8.66±0.03	8.42±0.01

Key

Dc – Dried chicken Sm – Dried soymeat

Dm – Dried meat Cm – Dried cashew meat

Composition	%
Moisture	9.33±0.02
pH	4.21±0.05
Soluble solids (°brix)	0.00±0.01
Reducing sugar	0.54±0.02
Crude protein	18.71±0.03
Crude fiber	14.32±0.01
Non-Digestible fiber	82.1±0.03

Table 3: Physicochemical Characterization of Cashew Meat Parameters

Microbial Assay.	Value
Lactobacillus count cfu/g.	0
E. Coli count cfu/g.	0
Total plate count cfu/g.	1.38 X 102

Table 4: Microbiological assay

Discussion

The result for the biomass composition of the cashew meat (Table 1) revealed that the plant based meat alternative has high lignin, cellulose and hemicellulose compositions which contributed to its high fiber content. Also, the organoleptic appraisal of the cashew meat as described in Table 2 shows that the cashew apple meat was compared with meat from cow, chicken, and soybean meat. Surprisingly, cashew meat compared very well with cow meat and were well-accepted by the assessors and that there is no significant difference between the simulated meat and the standard (cow-meat). Thereby, suggesting a probable favorable competition between the cashew meat and the conventional dried meat. Apparently, cashew meat has the potential to compete with commercial meat analogues, thereby adding value to the cashew industry.

Moreover, in the physicochemical characteristics presented in Table 3, the plant-based meat protein's composition was revealed to be 18.71%. Interestingly, this finding is in agreement with the reports of Asgar and Wild that the main component of meat analogues is protein (Asgar et al., 2010; Wild et al., 2014). The cashew meat is also very rich in crude and non-digestible fibers (14.32% and 82.1% respectively) thus, improving bowel movement, easy passage of waste from human system that is very important for good health. Vegetarian diets (meat-free dietary patterns) are associated with reduced risks of many health conditions. Vegetarians have lower incidence of type 2 diabetes, obesity, coronary heart diseases and other non-communicable diseases, thus having greater life expectancy (Le and Sabate, 2014; Dinu et al., 2017). The Academy of Nutrition and Dietetics (formerly the American Dietetic Association) has recognized that a well-planned vegetarian diet is healthful and nutritionally adequate, being appropriate for human growth and development. Meat-free diets are suitable not only in the prevention but also in the treatment of many diseases (American Dietetic Association, Dietitians Association of Canada (2003); Melina et al., 2016; Fresan and Sabate, 2019).

The microbiological analysis indicated that the products is free from faecal and pathogenic organisms showing that it is safe for human consumption.

Conclusion

Developed cashew apple meat has been widely accepted as it has come to add variety to our satiety value. It is good news to the vegetarians who can as well enjoy their meals with meat from plant origin. Conclusively, in our present societies in Nigeria where daily meat consumption is the social norm, aspiring to drastically reduce meat consumption is a challenging endeavor.

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