Assessment of Consumption Rate, Packaging and Storage System of Cassava Products in Ibadan South-West Local Government, Oyo State, Nigeria

Makinde, O. O.[1], Adegbokan, O. B.[1], Fadele, N. T[1]., Akinola, O. J.[1], and Aremu, D. O.[1]

[1]Department of Agricultural and Environmental Engineering, University of Ibadan, Nigeria
[2] Department of Agricultural Engineering, Federal college of Agriculture, Moor Plantation, Ibadan, Nigeria

Abstract: Cassava is the third largest source of food carbohydrate in the tropic after rice and maize; consumption rate of cassava products varies with tribe, locality and culture. The main objective of this study was to assess the consumption rate, packaging, storage system and duration of cassava products. Cassava products assessed include *gari, fufu, lafun,* starch, flour and chips. A case study of Ibadan south-west local government in Oyo state, Nigeria was selected for the study due to availability of people of the major tribes in Nigeria; the local government has 40 km^2 area and population of 282,585. Data was collected for this study with the aid of well-structured questionnaire and personal interviews were also granted. Simple random techniques were used to select seventy five respondents from the study area and descriptive statistical tool was used to analyze the data obtained. The result showed that the most consumed product in the area is *fufu* with the highest cumulative (33%) followed by *gari* with cumulative percentage of 24%. Cassava products are consumed daily in most households in this local government area most especially *gari*. The packaging material mostly used for these products is nylon and *gari* was found to have the highest shelf life of about six month in well drained store. The study shows that many dwellers in Ibadan south-west local government depends on cassava products for their survival.
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Keywords: Cassava products; consumption rate; packaging; storage system and duration

1. Introduction

Cassava *(Manihot esculenta)* is the third largest source of food carbohydrate in the tropics after rice and maize. It is a major staple food in the developing world, providing basic diet for over half a billion people, it is one of the most drought-tolerant crops, capable of growing on marginal soil. It is classified as sweet or bitter; farmers often prefer the bitter variety because they deter pest, animal and thieves. Bitter and sweet varieties of cassava contain anti-nutritional factors and toxins. Improper preparation of cassava can leave enough residual cyanide to cause acute cyanide intoxication and goiters, and may ever cause ataxia or partial paralysis (Aregheore and Agunbiade, 1991).

World production of cassava root was estimated to be 184 million tons in 2002, rising to 230 million tons in 2008; majority of production in 2002 was in Africa where 99.1million tons were grown; 51.5 million tons grown in Asia and 33.2 million tons in Latin America and the Caribbean. Nigeria is the largest producer of cassava in the world. Its production is currently about 34 million metric tons/year (Asante-Pok, 2013). Total area harvested of the crop in 2001 was 3.125 million ha with an average yield of 10.83 tons per ha (Adekanye et al. 2013).

Presently, cassava is primarily processed locally for food especially in the form of *gari, lafun* and *fufu* with little or no use in the agribusiness sector as an industrial raw material. But the crop can be processed into several secondary products include chips, pellets, flour, adhesives, alcohol, and starch, which are vital raw materials in the livestock feeds, alcohol/ethanol, textile, confectionary, food and soft drinks industries; they are also tradable in the international market. No continent depends as much on root and tuber crops in feeding its population as does Africa. Cassava food products are the most important staples of rural and urban households in Nigeria (Mattos, 1996; Awoyemi, and Amao, 2012) which as a result made the price of cassava rise significantly in the last half decade, and lower income people have turned to other carbohydrate reach foods such as rice.

Cassava plays an important role in agriculture in developing countries especially in sub Saharan Africa because it does well on poor soils and with low rainfall and it is also a perennial crop that can be harvested as required. Its wild harvesting allows it to act as a famine reserve and is available in managing labor schedules. It offers flexibility to resource poor farmer because it serves as either subsistence or cash crop. The crop contains nearly the maximum theoretical concentration of starch on a dry weight basis among food crops. Fresh roots contain about 30% starch a major source of carbohydrate and very little protein (O'Hair, 1990; Oboh and Oladunmoye,

2007). It can be processed into several products of industrial market value and by-product such as *gari, fufu, lafun*, starch, flour, chips, tapioca and so on. The roots can be peeled, boiled, packed or fried like potato. It is not recommended to eat cassava uncooked, because of potentially toxic concentrations of cyanogenic glucoside that are reduced to innocuous levels by processing (Olumide, 2004). The young tender leaves can be used to prepare *egusi* soup containing high level of protein (8-10%). Moreover, the shelf life of these products mainly depends on the type of packaging and storage system used for their preservation. This aim of this research work was to access the types of cassava products commonly consumed in Ibadan South-West Local Government area and the packaging and storage structure used to increase their shelf life.

2. Material and Methods

An assessment of consumption rate of cassava products was carried out within Ibadan South-West Local Government. The approach of this study involved personal interview and survey with the use of questionnaires, after which descriptive statistic reflected the respondents' percentage and frequency of occurrence.

Sampling:

Research was carried out on the consumption rate of some cassava products (*gari, fufu, lafun*, starch, flour, and chips) and the suitable packaging and storage system used for the preservation of the products. 75 well-structured questionnaires were administered in the study area by consumers and processors of cassava moreover; personal interview was conducted to ensure that the information gathered were true representation of what should be obtained; reluctant respondents were persuaded with extensive explanation on the research work. The equal amounts of questionnaire were administered within the three major ethnic groups in Nigeria (Yoruba, Igbo and Hausa) all within Ibadan South-West local Government.

Measurement of Variable:

Demographic characteristics of respondent; sex (measured and marked as; male or female), education (marked as; no formal education, primary, secondary or tertiary education); consumption Rate (measured based on level of preference as; not at all, preferred, more preferred and most preferred), frequency of consumption of cassava product (measured as daily, weekly, monthly, and yearly or No- response) for each cassava product, consumers choice of cassava product (measured based on reasons for consumption of the products and level of likeness using parameters like likeness, addicted, refreshment, situation, for clothing and No-response), packaging materials (nylon, sack, container or polythene bag); storage system (refrigerator, basket, platform, drained store); performance of storage system (good, better or best) and durability of storage system (1-3 days, 4-6 days, 1 week, 1-4 month, 6 months and No-response).

Study Area:

Ibadan South-West local government area in Oyo State, Nigeria was selected for this study; this is as a result of people of the major tribes living peacefully together in this area. The local government has an area of 40 km^2 and a population of 282,585 at the 2006 census. There are twelve wards in the Local Government area.

Data Analysis and Evaluation:

Frequency distribution, percentage and descriptive statistics were used to evaluate the data obtained with Software Statistical Package for Social Science (SPSS), Version 17.

3. Results

A survey of the rate of cassava consumption was carried out in Ibadan South-West Local Government of Oyo State. The major cassava products consumed in this Local Government include; *gari, fufu, lafun*, starch, flour, chips.

The following observations were made from the study;

Demographic Characteristics of Respondent

It was observed that higher percentage of the respondent are male (54.7%) while 45.3% are female also, higher percentage of respondents has secondary education.

Consumption of Cassava Products:

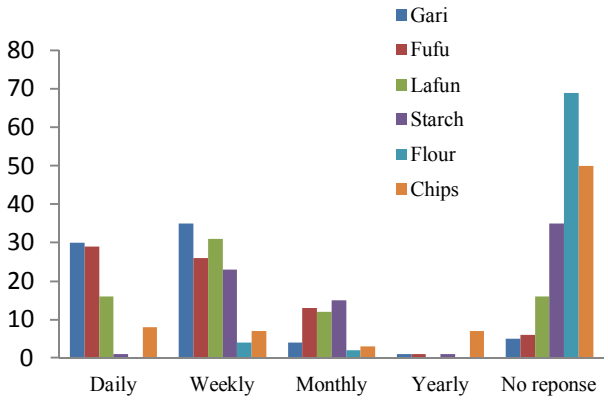

Figure 1: Frequency of Consumption by Respondent

Cassava products commonly consumed by dwellers in Ibadan South-West Local government include *gari, fufu, lafun,* starch, flour and chips but in varying proportions. However it was observed that the most preferred cassava food product is *fufu* (a solid food made from roasting of soaked cassava tubers). The cumulative frequency of cassava food products consumed in Ibadan South-West Local Government is presented in Figure 1. It was obtained that cassava products (especially *gari*) consumed daily in most homes in Ibadan South-West Local government however, some families consume some other products weekly, monthly, and yearly (Figure 1) this findings can be attributed to findings of Onwueme (1998) who reported that cassava contain carbohydrate and little content of protein which makes it product acceptable within the populace and similar trends were reported by Onyemanwa (2010); Ogunniyi (2011).

Consumer Choice of Cassava Products:

Most respondents consume cassava product because of its high carbohydrate (energetic) content, this has made them to have more likeness for the products. Major reasons why respondents consume cassava products is represented in Table 1.

Table 1: Consumer choice of Cassava Product

Purpose of Consumption	*Gari*	*Fufu*	*Lafun*	Starch	Flour	Chips
Likeness	24	41	32	3	2	3
Addicted	5	5	2	-	-	2
Refreshment	24	1	3	-	3	19
Situation	17	24	21	1	1	1
For clothe	-	-	-	39	-	-
No response	5	4	17	34	69	50
Total	**75**	**75**	**75**	**75**	**75**	**75**

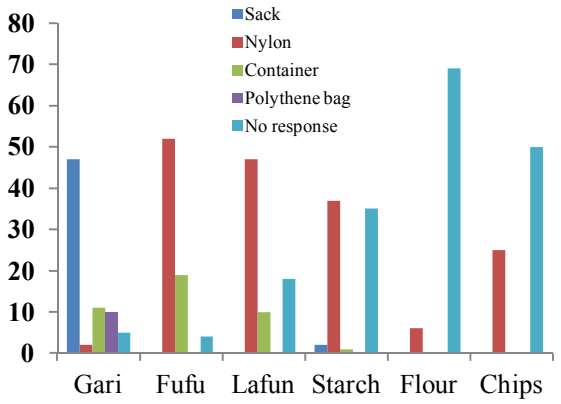

Figure 2: Packaging Materials for Cassava Products

Packaging Materials for Cassava Products:

Most commonly used packaging materials for cassava product in Ibadan South-West Local Government is sack for packaging *gari* and nylon for *fufu, lafun*, starch and chips. Other packaging materials used include container and polythene bags as presented in Figure 2.

Storage of Cassava Products:

Frequency of storage systems used for cassava products is presented in Table 2.

Table 2: Storage-ability of Cassava Products

Storage System	*Gari*	*fufu*	*Lafun*	Starch	Flour	Chips
Refrigerator	-	-	-	11	1	-
Basket	-	20	14	-	-	-
Platform	-	5	7	2	-	3
Drained Store	64	-	-	-	-	-
No response	11	50	54	62	74	72

Duration of Storage System:

51% respondents submitted that *gari* takes up to 6 months in a drained store before deterioration occur, 24% respondents agreed that *fufu* deteriorates within 4-6 days in basket and 28% respondents agreed that *lafun* deteriorates within 1-3 days, while 9% said starch spent up to a month in refrigerator before deterioration takes place as presented in Table 3.

Table 3: Duration of Storage System

Storage Duration	*Gari*	*Fufu*	*Lafun*	Starch	Flour	Chips
1 -3 days	-	5	21	-	-	-
4 – 6 days	-	18	-	3	-	2
1 week	-	2	-	3	1	1
1 – 4 months	26	-	-	7	-	-
6 months	38	-	-	-	-	-
No response	11	50	54	62	74	72

4. Conclusion

Cassava products are one of the most consumed food products because of it availability, nutrient content and low cost. The most commonly used packaging material for cassava products is Nylon because of its relative availability, ease of use and cost while the most commonly consumed cassava products is *Gari* because it is a fast food that some people consume for refreshment before taking any other food. *Fufu* is mostly consumed by *Igbo* ethnic group in Ibadan South-West Local Government because of its satisfaction and solidity while starch is used for clothing. *Lafun* is mostly consumed by Yoruba ethnic group in Ibadan South-West Local Government.

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Corresponding Author:

Makinde, Oluyemi Olusegun

Department of Agricultural and Environmental Engineering, University of Ibadan, Ibadan, Nigeria

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