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An Assessment of Cassava Processing Plants in Irepodun Local Government Areas, Kwara State, Nigeria

T.A. Adekanye[1,*], S.I Ogunjimi[2], A. O. Ajala[2]

[1]Department of Agricultural and Biosystems Engineering, Landmark University, Omu Aran, Kwara State, Nigeria
[2]Department of Agricultural economics and extension, Landmark University, Omu Aran, Kwara State, Nigeria
*Corresponding author: adekanye.timothy@lmu.edu.ng

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Abstract An assessment of cassava processing plant was conducted in Irepodun local Government Area of Kwara State, Nigeria to evaluate different cassava processing machinery being used by the processors, the common machines, and costs of machines, type of prime movers and sex of machine operators. The study was carried out in five communities and five cassava processing centres were selected from each of the community to give a total of twenty–five processing centres. Many of the processing centres were owned by private individuals. 292 cassava processing machines were observed altogether during the study and most of these were obsolete equipment. Grating machine, dewatering machine and milling machines were more prominent in the Local Government. The diesel engine was the only prime mover in all visited centres. Cassava processors preferred diesel despite its high cost, this may be as a result of incessant petrol scarcity and constant absence of electricity supply from Power Holding Company of Nigeria. This assessment showed that inappropriate and unaffordable cassava processing machinery is responsible for low level of cassava processing and utilization in Nigeria which is the largest cassava producer.

Keywords: *adaptive technology, processors, machines, mechanization, operators*

1. Introduction

Cassava (*Manihot esculenta* Crantz) is a major food and industrial crop in tropical and subtropical Africa, Asia and Latin America [1]. Nigeria has been consistently ranked as the world's largest producer of cassava, producing around 45 million tonnes in 2009, almost 19% of total world production [2]. Cassava grows well on Nigeria soil, resistant to drought and survives in a variety of soils. Cassava is a very versatile commodity with numerous uses and by - products. The leaves may be consumed as a vegetable, or cooked as a soup ingredient or dried and fed to livestock as a protein feed supplement. The stem is used for plant propagation and grafting. The roots are typically processed for human and industrial consumption. Cassava root is a good source of carbohydrates. The plant is used to make a local starchy food called gari, and it is also a source for bio-fuel as well as animal feed**.**

The major constraint of cassava processing is rapid deterioration of the roots. Cassava roots have a shelf-life of 24–48 hours after harvest [3,4]. Once harvested, it has to be either consumed immediately or processed into more stable product forms. Fresh roots must be processed within 2 to 3 days from harvest. To reduce this level of losses, it is very necessary that they are processed as early as possible (Figure 1).

Cassava processing using traditional methods is tasking, ineffective, time- consuming and also inefficient. Such difficulties arise in the grating and draining of the starchy fluid from the cassava dough since the conventional methods available involve processes that require a lot of labour and man hours. The problem is worsened when the quantities to be produced are very large, [5]. Cassava farmers are often unable to process harvested roots and have to sell their crops at a very low price to middlemen who are willing and able to reach them [6]. Mechanization is necessary for production, harvesting and processing to reduced cost and to and to minimize waste.

Traditional tools used in Gari processing includes: Millstone, grinding stone, pestle and mortar. These methods have low productivities and low hygienic. These problems led to the designing and construction of machines that can grate the cassava of high quality in a short period of time and reduce human drudgery. Some of the machines include: roller crushing mill, hammer mill, bar mill, grater etc. The quality of product differs from one operator to another and sometimes from one batch to another [7]. New technology and different types of equipment have been designed and manufactured to improve the processing of cassava into gari and other products. These processing machines include: cassava harvesters, cassava graters, cassava pressing machines, mill, sifter and fryers [8]. This research was carried out to assess different cassava processing machineries available and used by cassava in Irepodun local Government of Kwara State, Nigeria.

The specific objectives of the study are to:

i describe the personal socio-economic characteristics of cassava processor;

ii identify different type of machines used by cassava processors in the study area;

iii asses on gender basis the operations undertaken in cassavas processing; and

iv identified constraints associated with usage of improved processing machines.

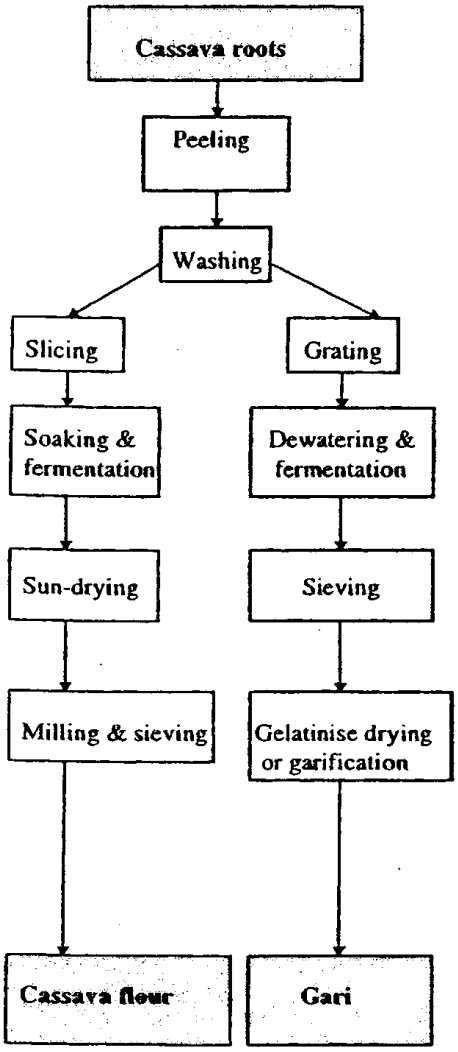

Figure 1. Traditional processes for production of cassava flour and gari

2. Materials and Methods

This study was conducted in Irepodun Local Government area of Kwara State, Nigeria. The local government has an area of 737 km^2 and a population of 148,610 at 2006 census. This research was carried out using participant observation, on spot assessment and interview schedule. Five communities were randomly selected in the local government area. These communities include; Omu Aran, Ajase-Ipo, Oro, Ayedun, Rore and Igbonla.

Five cassava processing centres were selected in each of the communities hence a total of twenty - five cassava processing centres were considered for this study. Five cassava processors were randomly selected in each of cassava processing centres giving a total of 125. Some of the parameters addressed by the interview schedule were: types of machines used for cassava processing, most common machines, gender of cassava processors, and problems associated with cassava processing plants such as cost of machines, maintenance costs, erratic power supply and inadequate water supply Data were collated and subjected to statistical analyses using SPSS.

3. Results and Discussion

Results in Table 1 show that the mean age of cassava processors was 41.1 years with a standard deviation of 13.2. Majority (60.8%) of the respondents were adults with their ages between 30 and 60 years old. This indicates that majority of cassava processors in the study area are in their productive age which means that they still have strength and vigour to contribute immensely to the economy of their community.

Findings in Table 1 show that, both female (52.2 percent) and male (48.2 percent) were into cassava processing in the study area. This is in line with [9] findings that both men and women make significant contributions to the cassava processing industry. Majority (95%) of them were married. [10], reported that the marital status of a farmer could have significant influence on production decisions. They opined that in African traditional society, married men are considered to be more responsive since it is assumed that a person having family would want to have the best results that would translate to more output and consequently income to meet family needs.

Table 1. Distribution of cassava processors according to their socio-economic characteristics

Socio-economic characteristics	Frequency	Percentage	Mean
Age			
< 30	32	25.6	41.1
31 – 60	76	60.8	δ = 13.2
61 and above	17	13.6	
Sex			
Male	61	48.8	
Female	64	52.2	
Marital Status			
Single	27	21.6	
Married	83	66.4	
Widowed/Widower	6	4.8	
Separated	9	7.2	
Household Size			
1 – 5	31	24.8	8.7
6 – 10	68	54.4	δ = 4.9
11 – above	26	20.8	
Educational Level			
No – formal	9	7.2	
Primary	23	18.4	
Secondary	67	53.6	
Tertiary	26	20.8	
Visits by Extension Agent			
≤ 5	98	78.4	
6-10	21	16.8	
11 and above	6	4.8	

Source: Field survey, 2010

The mean household size was 8.7 with a standard deviation of 4.9. The size of households may be due to the fact that majority of the respondents were monogamists, which could be attributed to their level of education and religious affiliation. This finding is in line with [11]; reported that the mean household size of rural areas of farmers in South-Western Nigeria was 8.0. Majority (92.8%) of the cassava processors had primary, secondary or tertiary education. This indicates that they can easily comprehend what they have learnt and can read instructions and manuals on the usage of the improved cassava processing technologies. This is in line with [12] assertion that it is often easier for an educated person to be favourably disposed to improved technologies because he can give a reasonable consideration to its adoption.

Moreover, [13] stressed that education is an important instrument for successful implementation of technologies and profitability on the part of farmers. Majority (76.6%) were literate, while 23.3 per cent had never been to school. Majority (78.4%) of respondents had less than 5 extension contacts in the past one year. The low level of extension contact might be due to the fact that extension agents were not well equipped to face the challenges ahead as a result of inadequate funding and inadequate training on the improved processing technology. This result is in line with the conclusion of [14,15] that there was low level of extension contact among farmers in Osun state.

It was observed that most of the cassava processing centres have three common machines: lister engine, grater and presser. A total of 292 machines were observed in the study areas.

Table 2 shows that grating machine was commonly available in almost all the centres (47.9%), mechanical dewatering (34.6%), and mill machines (15.8%) were also common. However it was observed that no single cassava processing centre has a mechanical peeler and mechanical garri fryer. This might be because of the costs of these labour saving machines were beyond the local cassava processors. All observed machines were locally fabricated except the prime movers.

The cassava grating machines were available in all the processing centres. Ruggedness and availability of spare parts may be responsible for its acceptance.

Peeling, washing, drying and frying were undertaken manually. Peeling as a unit operation was largely undertaken by women and children using knife [16]. Mechanical dewatering machines were also available in all the centres. Three types of mechanical dewatering machines were observed; power screw press, parallel board press and hydraulic press. The hydraulic dewatering machine was more favoured by the cassava processors due to its high efficiency, ease of operation and least efforts to supply power.

It was observed that diesel engine was the only prime mover in all visited centres. Cassava processors preferred diesel despite its high cost. This may be as a result of incessant petrol scarcity from petrol stations and constant absence of electricity supply from Power Holding Company of Nigeria.

Table 3 shows ownership of the cassava processing centres. It was observed that none of the cassava processing centre was owned by Government, they were owned by private individuals and cooperative societies who cannot afford expensive labour saving machines required for cassava processing.

Table 2. Cassava processing machines in the study area

Machine Type	Omu Aran	Igbonla	Oro	Ayedun	Rore	Total machine observed	%
Peeler	-	-	-	-	-	-	
Washing	-	-	-	-	-	-	
Grating	38	24	26	24	28	140	47.9
Presser	26	19	16	16	24	101	34.6
Sifting	5	-	-	-	-	05	1.7
Frying	--	-	-	-	-	-	-
Drying	-	-	-	-	-	-	-
Milling	14	9	6	6	11	46	46

Source: Field survey, 2010

Table 3. Ownership of cassava processing plants (N=125)

Ownership	Frequency	%
Individual	90	72.4
Cooperative	35	27.6
Non-Government	0	0.0
Government	0	0.0

Source: Field survey, 2010

Table 4. Distribution of the respondents according to gender differences in performing cassava processing activities

Operation	**Frequency**	**%**
Harvesting		
Male	76	60.8
Female	19	15.2
Male/Female	30	24.0
Peeling		
Male	2	1.6
Female	85	68.0
Male/Female	38	30.4
Washing		
Male	0	
Female	102	81.6
Male/Female	23	18.4
Grating		
Male	92	73.6
Female	2	1.6
Male/Female	31	24.8
Fermenting		
Male	39	31.2
Female	72	57.6
Male/Female	14	11.2
Dewatering		
Male	78	62.4
Female	27	21.6
Male/Female	20	16.0
Sieving		
Male	15	12.0
Female	84	67.2
Male/Female	26	20.8
Roasting		
Male	18	14.4
Female	86	68.8
Male/Female	21	16.8

Source: Field survey, 2010

Table 4 reveals that certain cassava processing operations are predominantly for certain sex. Harvesting (60.0%), grating (73.6%), dewatering (62.4%) and milling (91.3%) operations are predominantly undertaken by men. While peeling 68.0%, washing (81.6%), frying (68.8%), drying (82.6%) and sieving (67.2%) are performed mainly by women. Women operated petrol engines while men operate diesel engines. Thus sex of machine operators depends on the prime mover.

The major bottleneck to the growth of mechanisation of cassava processing in Nigeria as mentioned by respondents include high cost of machines, high operation cost of some of the cassava processing machines, erratic supply of electricity, inadequate water supply and

inadequate credit facilities. This finding is in agreement with [17] that prominent number of processors reported that cost of machines, high operation cost of some of the cassava, processing machines stood as a major bottleneck to the growth of mechanisation of cassava processing in Nigeria.

Table 5 Distribution of respondents according to the problems associated with cassava processing plants

Constraints	Mean	Rank
High cost of machine	3.7	1st
High operational cost of some machines	3.4	2nd
Erratic power supply of electricity	3.2	3rd
Inadequate water supply	2.9	4th

Source: Field survey, 2010

4. Conclusion

This study revealed that individuals and cooperative societies are more committed to cassava processing than government. Most of the cassava processing centres visited had more than two machines prominent among them were grating machine, dewatering machine, milling machine and shifters. The most common cassava machine and engine were grating machine and diesel engine respectively. Most of the machine operators were men while women were engaged in manual unit operations such as peeling, washing, sifting, frying and drying.

High cost of processing machines is a major setback for cassava processors as this hindered them from fully mechanizing cassava processing. The costs of mechanical peeler and fryer were beyond the small scale cassava processors. Many of the cassava processors complained of non-assistance from the government.

5. Recommendations

Nigeria is rated as the world's largest cassava producer yet inadequate processing machinery and equipment, high costs of machines, lack of credit facilities for small scale processors, and perishability of the cassava crop are some of the constraints that must be overcome. Reference 16 asserted that the task of the Agricultural Engineers is to mechanized agriculture in order to increase production and ensure food security. The following conclusions and recommendations are made;

1 High cost of cassava machines is a major bottleneck for small scale processors, government should render financial assistance to them so as to boost cassava processing; cassava processors can also form corporate bodies as this will enable them to buy communally those machines needed.

2 Provision of basic amenities such as constant electricity, accessible roads, water and constant availability petrol will have positive effects on small scale cassava processors,

3 Adaptive technology such as cassava processing machines developed by Nigerian engineers, research institutes and Universities should be demonstrated for cassava processors and government should help in commercializing these machines to make them readily available and affordable to cassava processors who are the end users.

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