Mechanization Level of Cassava Processing in Bayelsa State, Nigeria.

*Obiakor, S.C., Ochin, N.G., Willoughgy, F. A., Onyemize, U.C., Jimoh, R.O. and Ehiosun, P.E.

*Corresponding Author:chuksobisyl@yahoo.com

Abstract

Cassava is a crop that is of great importance in Nigeria. The Nigerian government of Buhari-Osinbajo has shown concerns in diversifying the country economy, which agriculture is one of the major sectors considered for the diversification of the economy. For this sole purpose in August 2019, A research exercise was carried out in Bayelsa State to ascertain the present level of agricultural mechanization obtainable for cassava processing, in order to identify areas in the processing operation of cassava roots into various products like garri and flour that needs urgent attention in the State. Snowball technique of data collection was used to identify active cassava processing centers and structured questionnaires were administered to the respondents in the study areas. Descriptive statistical analysis involving frequency counts and percentage in a Statistical Package for Social Sciences (SPSS) was used to analyze the data obtained. Survey results indicated that only nine (9) cassava processing unit operations involved in the processing of cassava roots into various products was captured; cassava peeling, dewatering, garification and bagging unit operations were dominated by manual processing method with values of 76.00, 72.00, 72.00 and 80.00% in all the cassava processing units visited in the State. It was also observed that the sum of 37.33% was recorded for mechanical processing method for the nine (9) cassava processing unit operations such as grating and milling operations resulted into this figure. This 37.33% value obtained for mechanical involvement for the processing of cassava in the State calls for urgent attention of the Bayelsa State government to increase the percentage of cassava processing machines used for cassava roots processing for each of the unit operation in the State. It is therefore concluded that cassava processing mechanization in Bayelsa State of Nigeria as at the time of this study, is marginally lower than manual processing. Therefore; technological innovations through sustainable agricultural mechanization training to farmers will offer great potentials to enhance the cassava value chain through collaborations.

1.0.   Introduction

Cassava (*Manihot esculenta*) is a staple root crop, rated among the most important crop in Africa. It survives a wide range of soils which can produce a high yield of cassava roots; cassava is consumed by over 500million African populace and served as a staple for 40% of the population in Africa (CTA, 2005). Cassava grows well in west, east, central and South African countries due to its versatile nature as a resulted it is been processed in to wide variety of different products. (Next GenCassava, 2013; Adenle *et al*., 2012; Kolawole *et al*., 2010)

Cassava plays a pivotal role in the agricultural economy of developing countries, especially in sub-Saharan Africa. It is a food security crop which is useful as both subsistence and cash crop. Cassava and its various allied products hold an important position in countries economy such as Nigeria and Ghana by positively affecting their gross domestic product , Nigeria is the highest producer of cassava globally (Ezedinma *et al*.,2007; Knipscheer ., 2007; Taiwo and Fasoyiro, 2015).

Over the past years, cassava production in sub-Saharan Africa has risen significantly, however, most of the increases in overall production are associated to an increase in the area of land cultivated rather than an increase in yield (Ikuemonisan, *et al*., 2020; Spencer and Ezedinma 2017). However, Nigeria accounts for only 0.001% of the world cassava export and this poor performance in the world cassava export market has been severally attributed to poor and inadequate cassava processing technologies (Oyelade *et al.,* 2019).

According to Abdoulaye *et al.* (2014), the level of adoption of this cassava processing technologies have been reported as the major factor that can determine the output of cassava products and by-products.

Therefore it is pertinent to investigate the level of our preparedness in promoting the export of cassava products to other countries. In order to achieve this, there was a need to conduct a Cassava Mechanization study among agro-processors who are into cassava processing in Bayelsa State of Nigeria; this study therefore was aimed at investigating the status of mechanization for cassava processing in Bayelsa State.

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2.0.   Materials and Methods

2.1.   Study Area

The Study was Carried out in Bayelsa State in south-south of Nigeria. Bayelsa State, which is one of the thirty-six (36) states in Nigeria which lies in the south-south axis of Nigeria, It is located on latitude 4.7719 ^{o}N and longitude 6.0699 ^{o}E, shares common borders with Rivers state to the east and Delta state to the west, with beautiful waters of the Atlantic ocean dominating its southern borders..

Bayelsa State is part of the Niger Delta region, it as a riverine and estuarine settings, occupying an area of about 10,773 km^2. Its headquarters is located in the city of Yenegoa.

As an oil rich state, it is dominated by the petroleum industry due to the fact being one of the largest crude oil and natural gas deposits in the country. The 2006 National Population Census puts the population of the state to an estimate of about 1.7million people .The state is divided   into   eight   (8)   Local   Government   Areas   (LGAs) (https://www.britannica.com/place/bayelsa-state-Nigeria).

2.2.   Research Methodology

This study involves the use of questionnaires to obtain data from cassava processing centers. Enumerators who were familiar with the terrain among the cassava processors were used. Structured questionnaires were designed, with the aim of obtaining information on the availability, actual use of cassava processing technologies at each unit operation of cassava processing. Snowball technique of data collection was used to identify active cassava processing centers while the questionnaires were administered to the proprietors of the visited centers. A total of twenty-five (25) questionnaires were administered to twenty-five (25) respondents across eight (8) Local Government Areas of the State. The completed questionnaire was verified for validity and the data was collated

2.3.   Data Analysis

Data obtained from the returned questionnaires were subjected to descriptive statistical analysis involving frequency counts and percentage. Statistical Package for Social Sciences (SPSS) version 25.0.was used for computing the data captured.

3.0.   Results and Discussion

The result of the frequency count is presented in table 1. The table showed that the level of non-mechanized cassava processing was generally higher (59.11%) than the level of

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mechanized processing (37.33%) and those involved in both methods (3.56%).Although the level of non-mechanized processing had the highest figure. T his high figure for manual processing is an indicator of a marginal level of mechanized cassava processing in the area under study. This calls for the need for agricultural mechanization stakeholders to make intensive efforts to mechanize cassava processing in the area under study. This agrees with the report of Oyelade *et al*. (2019) who reported a lower level (31.39%) of cassava processing mechanization compared to 58.19% manual processing in Ogun State of Nigeria.

The table 1 also shows that a total of nine (9) cassava processing operations carried out in the study area. These operations include peeling, washing, grating, chipping, dewatering, drying, garification, milling and bagging. The results further revealed that cassava fermentation, Starch extraction/ Homogenization, Cassava paste moulding and cassava paste frying operations were not carried out either mechanically or manually in any of the processing centres visited in the state. Starch extraction/ Homogenization are the process of edible/ industrial starch production from cassava. The result also indicates a short fall in industrialization of fermented cassava products.

4.0. Table 1. Results of Level of Agricultural Mechanization obtained for Cassava Processing Operations in Bayelsa state.
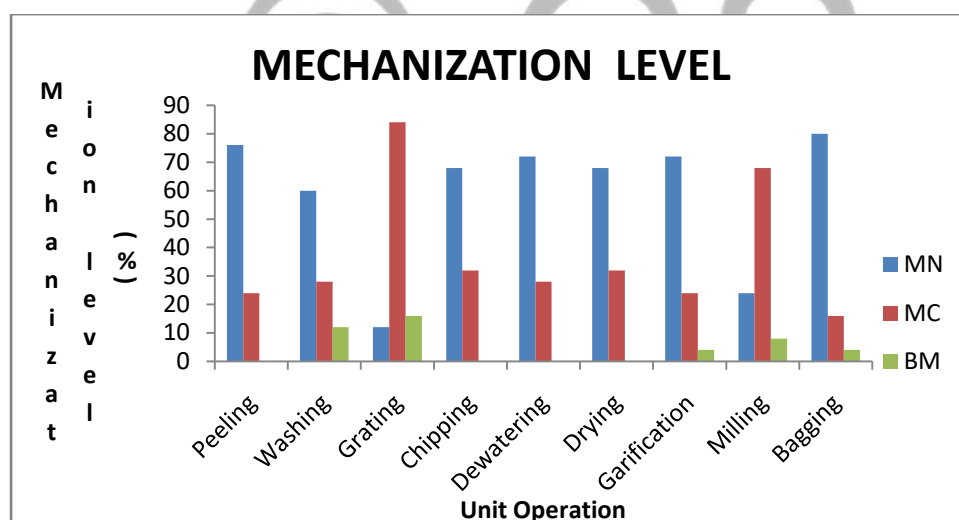
PROCESSING OPERATIONS	MN		MC		BM	
	A	B (%)	A	B (%)	A	B (%)
Peeling	19	76.00	6	24.00	0	0.00
Washing	15	60.00	7	28.00	3	12.00
Grating	3	12.00	21	80.00	1	16.00
Chipping	17	68.00	8	32.00	0	0.00
Dewatering	18	72.00	7	28.00	0	0.00
Fermentation	0	0.00	0	0.00	0	0.00
Starch extraction	0	0.00	0	0.00	0	0.00
Moulding	0	0.00	0	0.00	0	0.00
Drying	17	68.00	8	32.00	0	0.00
Garification	18	72.00	6	24.00	1	4
Frying	0	0.00	0	0.00	0	0.00
Milling	6	24.00	17	68.00	2	8.00

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Bagging	20	80.00	4	16.00	1	4.00
TOTAL	133	NA	84	NA	8	NA
	59.11%		37.33%		3.56%	

Keynote: A = Frequency count; B = Frequency count in its percentage value; MN = Manual operation; MC = Mechanical operation; BM = both methods; N/A = Not applicable.

Figure 1 shows that grating and milling operations received the highest level of mechanization among all the processes reported. Washing, garification, bagging and peeling received considerably lower level of mechanization.

Researches shows that irregular shape and sizes of cassava roots are responsible for the difficulties experienced in design and fabrication of a cassava peeling machine with acceptable output efficiency. This may have resulted in the use of manual method of peeling. According to the information gathered from the centres visited, the manual peeling is usually contracted to locals who render such services in their homes alongside washing operation, then revert to the processing centre for further processing. Since most of the locals have no mechanical cassava washing machine, most of the washing is consequently done manually.

Fig 1.0: Representation of Agricultural Mechanization Level obtained for Cassava Root Processing in Bayelsa State.

5.0.   Conclusion

In order to ascertain Nigeria's preparedness towards enhancing cassava export products to foreign countries, a Cassava Mechanization study was carried out in 2019 in Bayelsa State of Nigeria. The survey revealed that most cassava processing centers visited in the State adopted manual processing method, more especially for peeling, washing, chipping, dewatering, bagging and the garification processing of cassava tubers. It was also observed that 84.00 and 68.00% of the cassava processing centers visited adopt mechanical processing method for

grating and milling of cassava roots respectively. However, the sum amount of 37.33% obtained for the utilization of machines used in the nine (9) processing unit operations involved in cassava processing is obviously on the low side for an oil rich State like Bayelsa State.

This study revealed the present level of mechanization for cassava processing in Bayelsa state of Nigeria was low, also from the study, mechanical cassava grating and milling operations were more involved using machine, thus having the highest level of mechanization. It was further showed that there is no large scale/ limited commercial cassava starch and fried cassava balls (akara-akpu) production in the study area, Cassava paste moulding and cassava paste frying operations were not carried out in any of the processing centres in the study area. It is therefore concluded that cassava processing mechanization in Bayelsa state of Nigeria as at the time of this study is marginally lower than manual processing. It is also concluded that large scale cassava processing operations in the study area are carried out for selected products.

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