

## **MECHANIZATION LEVEL OF CASSAVA PROCESSING IN CROSS RIVER STATE, NIGERIA**

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### **ABSTRACT**

*Cassava is a crop that is of great importance in Nigeria. The Nigerian government of Buhari-Osinbajo led has shown concerns about diversifying the country's economy, and agriculture is one of the major sectors considered for the diversification of the economy. The National Centre for Agricultural Mechanization (NCAM), Ilorin, for this sole purpose in 2018 carried out a National Mechanization survey exercise in Cross River State to ascertain the present level of agricultural mechanization obtainable for cassava processing, to identify areas in the processing operation of cassava roots into various products like garri and flour that needs urgent attention in the State. The Snowball technique of data collection was used to identify active cassava processing centres and structured questionnaires were administered to the respondents in the study areas. Descriptive statistical analysis involving frequency counts and percentages in a Statistical Package for Social Sciences (SPSS) was used to analyze the data obtained. Survey results indicated that there are nine (9) cassava processing unit operations involved in the processing of cassava roots into various products; cassava peeling, washing and garification unit operations were dominated by manual processing methods with values of 98.25, 73.88 and 71.93% in all the cassava processing units visited in the State. It was also observed that the sum of 39.76% was recorded for the mechanical processing method for the nine (9) cassava processing unit operations such as grating, dewatering and milling operations resulting in this figure. This 39.76% value obtained for mechanical involvement for the processing of cassava in the State calls for urgent attention of the cross-river State government to increase the percentage of cassava processing machines used for cassava roots processing for each of the unit operations in the State. It is therefore concluded that cassava processing mechanization in the Cross River State of Nigeria 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 potential to enhance the cassava value chain through collaborations.*

**KEYWORDS:** Cassava, Processing, Mechanization, Level

### **1. 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 the west, east, central and South African countries due to its versatile nature as a result in it is been processed into a 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 economies 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 with an increase in the area of land cultivated rather than an increase in yield (Ikueomonisan, *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 these cassava processing technologies has 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. To achieve this, there was a need to conduct a National Mechanization survey exercise among agro-processors who are into cassava processing in Cross River State of Nigeria; this study, therefore, was aimed at investigating the present status of mechanization for cassava processing in Cross River State, major cassava producing state in the south-south region of Nigeria.

## **2. MATERIALS AND METHODS**

### **2.1 Study Area**

The study was carried out in Cross River States in the south-south of Nigeria. Cross River State, which is one of the 36 states in Nigeria which lies in the south-south axis of Nigeria, It is located on latitudes 4°30' and 7°00'N and longitudes 7°50' and 9°28'E, shares common borders with Akwa-Ibom, Abia and Ebonyi states to the west, Benue state to the north, the Republic of Cameroon to the east, and the Atlantic Ocean to the south.

The state which is tropical-humid with wet and dry seasons, having an average temperature ranging between 15-30 °C, and annual rainfall between 1300 to 3000mm, makes the soil fertile, deep and well drained with a Ph range of 4.5-6.5.

Cross River State is part of the Niger Delta region, occupying an area of about 20,156 km<sup>2</sup>. Its headquarters is located in the ancient city of Calabar. The 2006 National Population Census puts the population of the state at an estimate about 2.8million people. The state is divided into eighteen (18) Local Government Areas (LGAs) (<https://www.britannica.com/place/cross-river-state-Nigeria>).

### **2.2 Research Methodology**

This study involves the use of questionnaires to obtain data from cassava processing centres. A sensitization program was conducted for enumerators drawn from the extension department of

the Cross River State Agricultural Development Programme (ADP) office, who were familiar with the terrain and the cassava processors. Structured questionnaires were designed and approved by the National Centre for Agricultural Mechanization (NCAM), Ilorin, Nigeria, to obtain information on the availability, and actual use of cassava processing technologies at each unit operation of cassava processing. The Snowball technique of data collection was used to identify active cassava processing centres while the questionnaires were administered to the proprietors of the visited centres. A total of 57 questionnaires were administered to 57 respondents across 18 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 percentages. Statistical Package for Social Sciences (SPSS) version 25.0. was used for computing the data captured.

## **3. 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 (51.27%) than the level of mechanized processing (39.76%) and the undecided (8.97%). Although the level of non-mechanized processing had the highest figure. This high figure for manual processing is an indicator of a marginal level of mechanized cassava processing in the area under study. This shows 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% of manual processing in Ogun State of Nigeria.

Table 1 also shows that a total of nine (9) cassava processing operations were carried out in the study area. These operations include peeling, washing, grating, chipping, dewatering, drying, garification, milling and bagging. The result further showed 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 is the process of edible/ industrial starch production from cassava. Cassava starch is a popular cassava product with economic importance for producers, marketers and exporters. Cassava paste moulding and cassava paste frying are usually engaged in the production of ready-to-eat cassava balls (akara-akpu) and Lafun (fermented cassava flour), and the production of ready-to-eat fried cassava balls (akara-akpu) had the lowest level of mechanization in the area under study. The result also indicates a shortfall in the industrialization of fermented cassava products and ready-to-eat fried cassava balls.

Table 1. Results of Level of Agricultural Mechanization obtained for Cassava Processing Operations in Cross River state.

Processing operations	Agricultural Mechanization Level					
	MN		MC		UD	
	A	B (%)	A	B (%)	A	B (%)
Peeling	56	98.25	1	1.75	Nil	Nil
Washing	42	73.68	8	14.04	7	12.28
Grating	11	19.30	43	75.44	3	5.26
Chipping	31	54.39	16	28.07	10	17.54
Dewatering	9	15.79	42	73.68	6	10.53
Drying	21	36.84	28	49.12	8	14.04
Garification	41	71.93	12	21.05	4	7.02
Milling	15	26.31	36	63.16	6	10.53
Bagging	37	64.91	18	31.58	2	3.51
<b>Total</b>	<b>263</b>	<b>N/A</b>	<b>204</b>	<b>N/A</b>	<b>46</b>	<b>N/A</b>
	<b>(51.27%)</b>		<b>(39.76%)</b>		<b>(8.97%)</b>	

**Keynote:** A = Frequency count; B = Frequency count in its percentage value; MN = Manual operation; MC = Mechanical operation; UD = Undecided; N/A = Not applicable

Figure 1 shows that grating, dewatering and milling operations received the highest level of mechanization among all the processes reported. Washing and peeling received a considerably lower level of mechanization. This considerable low level of mechanization for peeling operations may have resulted majorly from the form of peels obtained from the cassava peeling machines. Available peeling machines turn the cassava peels (cortex) into wet mash, making it very difficult to dry and in most cases wasted. Manual peeling however results in sliced and semi-dry cassava peels which are usually used directly for animal feed or sundried and sold in an open market for further processing into animal feed.

Research shows that irregular shapes and sizes of cassava roots are responsible for the difficulties experienced in the design and fabrication of a cassava peeling machine with acceptable output efficiency. This may have resulted in the use of the 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 operations, 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.

Washing, grating, dewatering, garification and bagging are identified with unit operations involved in garri production from cassava. This relatively high level of mechanization for unit operations of garri processing can be attributed to the high demand for garri, both for local consumption and export purposes.

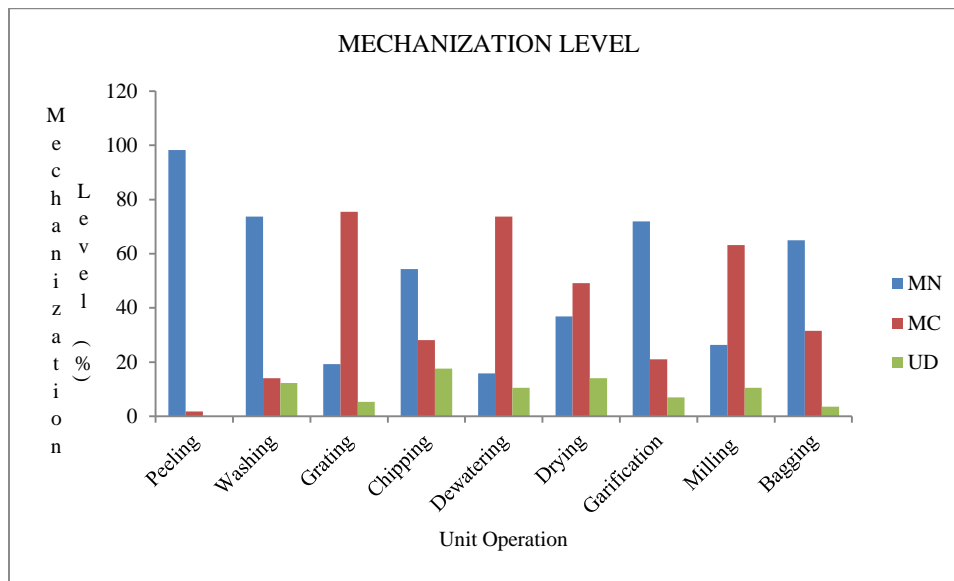


Fig 1. Representation of Agricultural Mechanization Level obtained for Cassava Root Processing in Cross-River State.

#### 4. CONCLUSION

To ascertain Nigeria's readiness towards promoting cassava export products to foreign countries, A National Mechanization survey exercise was carried out in 2018 in Cross River State of Nigeria. The survey revealed that most cassava processing centres visited in the State adopted manual processing methods, especially for peeling, washing and garification processing of cassava tubers. It was also observed that 75.44, 73.68 and 63.16% of the cassava processing centres visited adopt mechanical processing methods for grating, dewatering and milling of cassava roots respectively. However, the sum amount of 39.76% 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 a State like Cross River State.

This study revealed the present level of mechanization for cassava processing in Cross River state of Nigeria. From the study, the level of mechanization of cassava processing was lower. From the study, mechanical cassava grating, dewatering and milling operations were more involved using the machine, thus having the highest level of mechanization. It was further revealed 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 Cross River state of Nigeria 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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