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Research Paper

Mechanization Level of Cassava Processing In Rivers State, Nigeria.

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Abstract
Cassava is a crop that is of great importance in Nigeria. The Nigerian government has shown increasing concerns in diversifying the country economy. For this sole purpose, a research exercise was carried out in Rivers State to ascertain the level of mechanization obtainable for cassava processing, in order to identify areas in the processing operation of cassava tubers into different 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 collected. The results indicated that only nine (9) cassava processing unit operations involved in the processing of cassava tubers into various products was captured; cassava peeling, dewatering, garification and bagging unit operations were dominated by manual processing method with values of 84.00, 82.00, 80.00 and 80.00% in all the cassava processing sites visited in the State. It was also observed that the sum of 34.67% was obtained for mechanical processing method for all the cassava processing unit operations such as grating and milling operations which resulted into this figure. This 34.67% value obtained for mechanical involvement for the processing of cassava in the State calls for urgent attention from the Rivers State government to increase awareness, participation and the numbers of cassava processing machines used for cassava roots processing for each of the unit operation in the State. It is therefore noted that cassava processing mechanization in Rivers 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.
Keywords; *Cassava, Processing, Mechanization, Level, manual, processing, rivers state*

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I. Introduction

Cassava (*Manihot esculenta*) is a staple root crop, viewed as the most important crop in Africa. Cassava grows well in west, east, central and South African countries due to its versatile nature as a result it is being processed in to varieties of different products (Adenle *et al*., 2012). Cassava plays a pivotal role in the agricultural economy of developing countries, especially in sub-Saharan Africa. Nigeria is the highest producer of cassava globally (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 very low performance in the world cassava export market has been associated to poor 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. Thus

it has become ultimately necessary to investigate the level of our readiness in promoting cassava exports and it's by products to the world markets. In order to achieve this, there was a need to conduct a research on Cassava Mechanization level among agro-processors who are into cassava processing in Rivers State of Nigeria; this study therefore was aimed at investigating the status of mechanization for cassava processing in Rivers State.

II. Materials and Methods

2.1. Study Area

The Study was Carried out in Rivers State in south-south of Nigeria. Rivers 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 $4^{o}45'$ N and longitude $6^{o}50'$E, shares common borders with Imo state and Abia state to the north, Akwa-Ibom to the east, Bayelsa and Delta states to the west. Rivers State is part of the Niger Delta region, occupying an area of about 11,077 km^2. Its headquarters is located in the city of Port Harcourt.

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 at an estimate of 5.19 million people .The state is divided into twenty-three (23) Local Government Areas (LGAs) (https://www.britannica.com/place/Rivers-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 fifty (50) questionnaires were administered to fifty (50) respondents across twenty-three (23) 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.

III. 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 62.00% than the level of mechanized processing 34.67% and those involved in both methods 3.33%.Although the level of non-mechanized processing had the highest figure. This high figure for manual processing is a pointer to a marginal level of mechanized cassava processing in the area under study. This calls for serious concerns by the agricultural mechanization stakeholders to make adequate efforts to mechanize cassava processing in the area under study. This correlate with the report of Oyelade *et al*. (2019) who reported a low level of cassava processing mechanization of 31.39% compared to 58.19% manual processing in Ogun State of Nigeria and Obiakor *et al*. (2021) who also reported a lower level of cassava processing mechanization of 37.33% compared to 59.11% manual processing in Bayelsa 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 paste molding and cassava paste frying operations among others were not carried out either mechanically or manually in any of the processing centers visited in the state. The result also indicates a short fall in industrialization of fermented cassava products in Rivers State.

Table 1. Results of Level of Agricultural Mechanization obtained for Cassava Processing Operations in Rivers State.

PROCESSING OPERATIONS	MN		MC		BM	
	A	B (%)	A	B (%)	A	B (%)
Peeling	42	84.00	8	16.00	0	0.00
Washing	30	60.00	14	28.00	6	12.00
Grating	6	12.00	42	80.00	2	16.00
Chipping	34	68.00	16	32.00	0	0.00
Dewatering	41	82.00	9	18.00	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	34	68.00	16	32.00	0	0.00
Garification	40	80.00	9	18.00	1	2.00
Frying	0	0.00	0	0.00	0	0.00
Milling	12	24.00	34	68.00	4	8.00
Bagging	40	80.00	8	16.00	2	4.00
TOTAL	**279**	**NA**	**156**	**NA**	**15**	**NA**
	62.00%		**34.67%**		**3.33%**	

Keynote: A = Frequency count; B = Frequency count in 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. Dewatering, garification, bagging and peeling received considerably lower level of mechanization. Studies 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 visited centers, the manual peeling is usually contracted to locals alongside washing operation, and then taken to the processing centre for further processing as previously report in a study by Obiakor *et al*. (2021). Due to the fact that most of the locals have no mechanical cassava washing machine, thus most of the washing is consequently done manually.

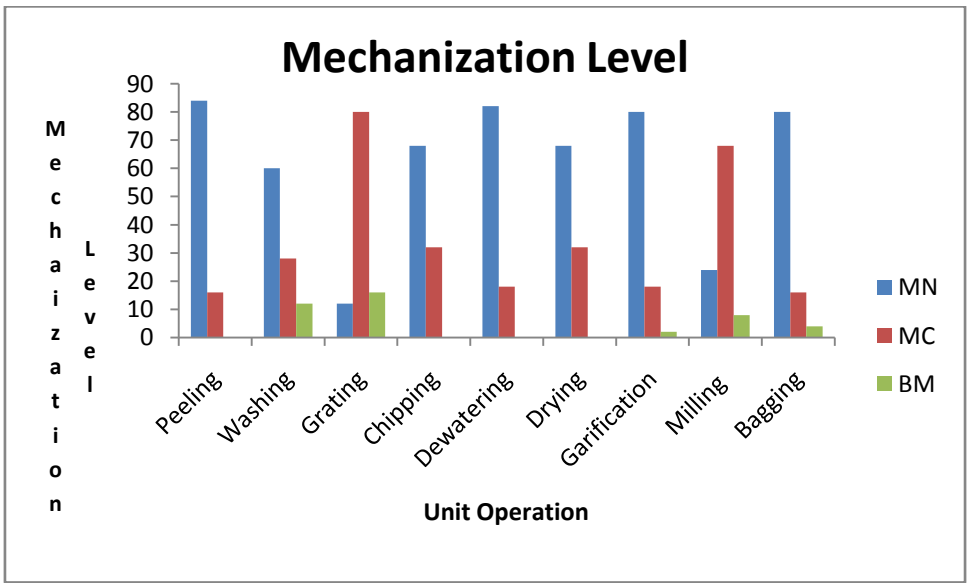

Fig 1.0: Representation of Agricultural Mechanization Level obtained for Cassava Root Processing in Rivers State.

IV. Conclusion

Nigeria's preparedness towards enhancing cassava export products to foreign countries was ascertained through a Cassava Mechanization study carried out in 2018 in Rivers State of Nigeria. The survey showed that most cassava processing centers visited in the State adopted manual processing method, more especially for peeling, chipping, dewatering, bagging and the garification processing of cassava tubers. It was also discovered that 80.00% and 68.00% of the cassava processing centers visited adopt mechanical processing method for grating and milling of cassava roots respectively. However, the total amount of 34.67% obtained for the utilization of machines in the nine (9) unit operations involved in cassava processing which was obviously on the low side for an oil rich State like Rivers State. This study revealed that the present level of mechanization for cassava processing in Rivers state of Nigeria was quite low, furthermore from the study, mechanical cassava grating and milling operations were more involved using machines, thus having the highest level of mechanization involvement. It was further discovered that, Cassava paste molding and cassava paste frying operations were not carried out in any of the processing centers in the study area. It is therefore concluded that cassava processing mechanization in Rivers state of Nigeria as at the time of this study was very low.

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