Impact of Technology on Improving Cassava Yield and Value

Suika Martha Ngong[1*], Tohnain Nobert Lengha[2], Tankou Christopher M.[3]

[1,2]University of Dschang, Department of Rural Socio-Economics and Agricultural Extension
[2]University of Dschang, Department of Crop Science, Research Unit of Genetics, Biotechnology, Agriculture and Plant physiology
*Corresponding author

Abstract— *Many cassava farmers suffer from low production and low profit because of little or no support in terms of improved technology to improve yield and add value to their produce. In this paper we examined the available improved production and processing technologies among cassava farmers and how they are propagated and used in Momo Division. Descriptive survey research design was used, and primary data was collected using the purposive and random sampling techniques from a sample size of 350 respondents. Data were extracted through excels and computed using the SPSS.20 software. The results of this study revealed that most producers (35%) were in Mbengwi Sub Division, the majority (76%) were women, most of them (71.2%) were married; have had primary education (51.8%); fell within the active age range of 31- 50 years. Households with children were majority (93.64%) and relied on family labor. Hypothesis testing results attested that some techniques like the use of improved varieties and planting distances were well propagated, while the use of mechanized equipment, fertilizers and pesticides were very minimal. All categories of the variables studied, occurred with equal probabilities with one sample Chi – Square test at 0.05% level of significance. Suggestions were made to all actors, to ameliorate the situation by improving on the social amenities, road infrastructure; farm cultivation and processing equipment, seed material, and capacity building of farmers to make them more self-sustaining.*

Keywords— Cassava, propagation, use, improved technology, production, value chain.

I. INTRODUCTION

Cassava (*Manihot esculenta* Crantz) a perennial food crop, grown throughout the lowland tropics is a useful major source of carbohydrate, starch, vitamins and iron. It is not traded internationally in its fresh state because the tubers deteriorate very rapidly (FAO STAT, 2017). According to Mvondo and Liang (2012), cassava serves as raw material for more than 80 industrial products worldwide and is used for human consumption, animal feed and industries. It is also said to be more productive per unit of land and labor than even the high yielding cereals, (Nweke, 2004). The increased demand for cassava and its products necessitates increased production and yields. Cassava processing as one of the off-farm activities of rural women in this area of study is carried out using local methods with the hand grater, while the use of improved technologies seems to be insufficient. According to IITA (2013), it is necessary to device and propagates improved techniques capable of increasing the income generating capability of cassava producers while promoting the marketability of cassava products. These studies had been conducted in some countries (Sewando et al., 2011; Donkor et al., 2018). Published works on such studies in Cameroon and particularly Momo Division are scanty in literature. We hope that this study shall bring more insight to the cassava value chain. The main objective of this research activity is to evaluate the factors that influence the propagation and usage of improved technologies by cassava farmers, and specifically to characterize cassava farmers in the study area, examine the availability, level of propagation and usage of these technologies and suggest solutions that can better explain the relationship between the variables studied to better explain the results. The results would help to suggest what can be done to fasten farmers' use of these technologies.

II. METHODOLOGY

Momo administrative unit is one of the seven Divisions of the North West Region of Cameroon, with Mbengwi, Ngie, Batibo, Widikum and Njikwa as Sub Divisions. This area covers a surface area of 1790 km^2 and population of 194,080 inhabitants (INS, 2019). It is geographically located between latitude 5^0 45'N and 6^0 15'N and longitudes 9^0 40'W and 10^0 10'W. The climate has two main seasons; a rainy season from mid-March to mid-November and a dry season from mid-November to mid-March. Average daily temperatures for the year range from 09.97 ^{0}C to 24.12 ^{0}C, with maximum and minimum daily temperatures of 26.83 ^{o}C and 08.24 ^{0}C respectively (DDARD Momo Annual report, 2017). The soils play a very important role in the type of crops grown, and are generally volcanic and ferralitic. The growth of cassava among many other crops like perennials, cereals, vegetables, fruits and none timber forest products is highly favored by the good climate, vegetation and rich soil types.

Using the purposive and random sampling and verifying with the Yamane Theory, (1967) formula for sample size determination, a sample size of 350 respondents was taken from a population of 3320 cassava farmers, staff of MINADER, Traders of cassava and cassava products and some stakeholders. Three hundred and fifty questionnaires were administered to the respondents while qualitative information was got from observations, interviews and discussions with farmers during field visits in the five Sub Divisions.

2.1 Data Analysis

Descriptive statistics using percentages, mean and standard deviation were used. The data collected during this study was extracted using excel, and then coded and analyzed with the use of excel and the Statistical Package for Social Sciences (SPSS) version 20. The frequencies and percentages were computed to show the weight of some variables, and the chi square test of significance was used to determine whether there was any significant relationship between the independent and the dependent variables. This also helped to appreciate the links among variables.

III. FINDINGS AND DISCUSSION

3.1 Propagation of improved technologies and characterization of Cassava Farmers

Farmer distribution according to farm location revealed more cassava farms (35%) in Mbengwi Sub division, followed by Batibo with 26%, Widikum with 19%, Njikwa with 17%, and Ngie with 3%. Mbengwi farmers concentrate in cassava production because cassava is their main income generating food crop. Sub Divisions like Ngie have other important economic crops like oil palm, cocoa and coffee that make them to divert from cassava. The soils in Momo and the hilly nature of the land scape tolerate cassava production. This finding confirmed that of Elliott in 2017, that cassava is one of the most drought tolerant crops that can grow on low fertile soils on marginal land.

Findings on gender distribution of farmers revealed that more women (76.59%) were involved in cassava production and processing than men, (23.41%). This agrees with the findings of Mouafor et al. (2015), that 90% of cassava producers are rural poor women. This can be explained by the fact that men concentrate mostly on non- food crop farming activities, and the fact that women are usually patient in house hold and farming activities in this study area. It is also confirmed by (ECAM 111, 2008), that women constitute about 60% of the total labor force. This finding contrasts the result of (Akerele et al., 2018) that majority of cassava farmers are men. Age distribution revealed that most farmers fell within the active and productive ages of 31-40, (29.10%) and ages of 41-50, (32.44%). It can be understood that at this age, they are parents looking for means to sustain their families, and should be more active than the younger ones of 21-30 years (17.39%), who are school goers. Also older people of 51 years and above (21.07%) may be tired and retired from farming activities. Results from Akerele et Al., 2018 confirm the active age bracket of 31-50 years as the normal age for the working population.

Findings showed that the majority of farmers were married (71.24%) meaning that couples can work better as father and mother. Akerele et Al., 2018, also confirm that 46.9% of farmers are married with responsibilities to their families. This indicated that cassava as an economic crop is a source of income for couples to pay their children's school fees, medical costs and other basic family needs. The unmarried (11.71%) and widows (13.71%) who had the double responsibility of being father and mother at the same time, also strived to look for money to take care of their families, while the divorced (1.34%) and widowers (2%) were few in this farming activity. Religion was absent (0%), and this could be explained by the nature of their activities of preaching the word of God hence it did not influence the cassava value chain activities. However, as highlighted by Apata, T. G. (2019), Religion played a greater role as Muslims were majority in cassava farming then the Christians.

Most farmers fell within primary education level (51.84%), and when this number was compared to no formal education level of (11.71%), it meant that many aspects of improved technologies were understood by the majority, even though it could be much better with secondary Education (24.41%), higher education (4.01%) and others (8.03%). This indicated that farmers need more training to build up their capacities to better understand new improved technologies in the cassava value chain activities. Studies by Akerele et al. (2018) revealed that majority of farmers (68%) only attended primary education.

Results of household size indicated that many families had large house hold sizes of close to 7 members in each (66.56%), indicating that family labor in this case could be assured as well as increased yields. This result is also in line with those of Akerele et al. (2018) who had house hold size of between 6- 10. Results of household composition revealed that most households had children 909, followed by households with adults only 676. Though these children could be intercepted by school, some may have dropped out of school to carry out cassava farming activities to earn a living, and also provide labor

for their parents. They could also help during non- schooling hours and during holidays. According to the Cameroon's National Institute of Statistics (NIS, 2015) as quoted by Gildas and Manu, (2015), 41% of children from 5-17 years old are involved in child labor and 85% of them work in the agricultural sector. The number of household's members involved in cassava farming from both households (896), indicated that the majority of members in each of these households were involved in improved cassava production, processing and marketing. From this finding, most households propagated and used improved technologies in their farms and this explains why family labor was mostly used in the various activities of the cassava value chain.

3.2 Propagation and Usage of improved Technologies amongst Cassava Farmers

3.2.1 Available Social Amenities

Social amenities are needed to facilitate cassava production, processing and marketing activities. Electricity is essential for lighting of homes, running motorized processing engines, and other activities like pumping of water which is essential for all farm activities. A good road network is necessary for easy transportation of farm inputs and produce. Good storage facilities and effective preservation methods are also needed. Findings (Table 1) revealed that markets (292), hospitals (283), potable water (224), electricity (214) and regular schools (180), were available, but there was a remarkable insufficiency of electricity in areas like Njikwa and Ngie Sub Divisions. Sub Divisions like Mbengwi (85), Batibo (75), and Widikium (41) had electricity that was subjected to frequent power cuts. In all Sub Divisions, the insufficiency of research institutions was a limiting factor. The presence of public taps with water, regular schools, markets, and Professional schools had a positive impact. According to (GP-DERUDEP, 2015), social amenities like good roads, markets, Bridges, schools, drying platforms and food processing units in the Widikum basin were necessary to enhance crop production.

TABLE 1
AVAILABLE SOCIAL AMENITIES IN THEIR LOCALITIES

Location	Public tap with water	Electricity	Solar Power Plants	Regular school	Professional school	Research institution	Local market	Hospital	Others
Ngie	6	1	2	0	0	0	9	8	2
Mbengwi	75	85	35	46	42	0	104	98	38
Batibo	68	75	5	68	0	1	72	73	12
Njikwa	33	12	19	37	4	3	50	48	4
Widikum	42	41	15	29	0	1	57	56	9
Total	**224**	**214**	**76**	**180**	**46**	**5**	**292**	**283**	**65**

3.2.2 Tools Used in the Farm

Findings in table 2 indicated that, there was insufficient or no mechanized tools like tractors in the study area, as no cassava farmers (0) possessed them. However under others were power tillers, locally made cassava peeling and grinding machines and few food processing machines (170), which indicated the presence of improved technologies. The use of rudimentary tools like cutlasses and hoes (299) were very significant as from all indications, all cassava farmers possessed them. They were mostly used during the harvesting of cassava, in the absence of harvesters.

TABLE 2
TOOLS USED IN THE FARM

Location	Cutlasses	Hoes	Digger	Tractor	Hand Cart	Others
Ngie	9	9	1	0	0	0
Mbengwi	105	105	8	0	1	63
Batibo	76	76	0	0	0	71
Njikwa	51	51	0	0	0	11
Widikum	58	58	10	0	0	25
Totals	**299**	**299**	**19**	**0**	**1**	**170**

3.2.3 Use of Improved Cassava Seed Material (Cuttings)

Most farmers (64%) used improved cassava varieties while (36%) preferred the local varieties mostly in Mbengwi Sub Division. Farmers in the other four localities used more improved cassava varieties which were mostly Team 419, 8034 and TMS 92/0326 provided by IRAD, in collaboration with IITA. Cameroon's National Development project for Roots and

Tubers (PNDRT) 2014, estimated yields between 19-35 tons per hectare for improved varieties, compared to local varieties that are limited to 8 tons per hectare. Interviews with Mbengwi farmers, who processed cassava roots, indicated that they preferred the local varieties, because of the whiter colour of the products, despite the lower yields.

3.2.4 Planting Method

Most of the farmers (96.32%) made ridges before planting meaning that they actually followed the recommendations from the agricultural extension agents as ridging is an improved planting method. This method requires much labor, and that is why cassava production is considered time consuming and tedious. Those that planted on flat surfaces were mainly in Widikum Sub Division because tree roots in this forest area made ridging difficult. Ridging gives the cassava plant a larger surface area on which the roots can freely penetrate deeper to their satisfaction.

3.2.5 Planting Distances

Findings in table 3 show that most farmers (230) maintained planting distances of 51cm to 100cm between rows, and (173) maintained 76cm to 100 cm within rows. This showed that they followed planting distances of 1m by 1m (100cm by 100cm) for cassava, as recommended by the agricultural extension agents. The main reasons for the deviation of 8.9 of the planting distances between rows in Table 4 and of 22.7 within rows on Table 5 could be explained by the fact that farmers usually like to economize land space by shortening planting distances. This technique seems to be well understood by cassava farmers, despite the slight deviation from the normal.

TABLE 3
PLANTING DISTANCES

	Between Rows				Within Rows			
Location	**0-50cm**	**51-100cm**	**101-150cm**	**151-200cm**	**0-25cm**	**26-50cm**	**51-75cm**	**76-100cm**
Ngie	0	2	5	2	0	6	3	0
Mbengwi	0	83	12	10	0	60	18	27
Batibo	6	65	3	2	0	4	0	72
Njikwa	2	38	10	1	0	23	10	18
Widikum	0	42	16	0	0	2	0	56
Totals	**8**	**230**	**46**	**15**	**0**	**95**	**31**	**173**

TABLE 4
DEVIATION OF PLANTING DISTANCES BETWEEN ROWS

Location	No. of farmers	Mean distance between rows/cm	Over all mean distance/cm	Standard deviation
Ngie	9	125	86.6	8.9
Mbengwi	105	90	86.6	8.9
Batibo	76	75.7	86.6	8.9
Njikwa	51	86.5	86.6	8.9
Widikum	58	88.8	86.6	8.9
Totals	**299**	**466**		

TABLE 5
DEVIATION OF PLANTING DISTANCES WITHIN ROWS

Location	No. of farmers	Mean distance within rows/cm	Overall mean distance/cm	Standard deviation
Ngie	9	46.3	69.5	22.7
Mbengwi	105	55.1	69.5	22,7
Batibo	76	85.4	69.5	22.7
Njikwa	51	60.5	69.5	22.7
Widikum	58	86.3	69.5	22.7
Totals	299			

3.2.6 Weeding Techniques

Most farmers (282) weeded their farms by hand picking. The method of weeding was greatly seen to depend on the cost of the herbicide as the minority (47), used herbicides, while 26 used both hand picking and herbicide. This shows that the technique was not actually very well propagated and used.

TABLE 6
TECHNIQUES USE IN WEEDING FARMS ACCORDING TO THE DIFFERENT LOCATIONS

Location	Hand picking	Herbicides	Both hand picking and use of herbicides
Ngie	9	1	1
Mbengwi	100	19	13
Batibo	73	8	5
Njikwa	47	6	1
Widikum	53	13	6
Totals	**282**	**47**	**26**

3.2.7 Quantity of Herbicide Used Per Cropping Cycle

Quantities used between 1 and 9 litres have little variation, showing that the chemical was actually available, but not well propagated. This could also be explained that herbicides are expensive at the level of the farmer. Here the majority of respondents (83.6%) preferred to limit the cost of production by not using at all, as compared to16.4% that used 1 to 9 litres and above. This is therefore one of the least propagated technologies in this area of study.

TABLE 7
QUANTITY OF HERBICIDE USED

Location	1-4 litres	5-8 litres	9 litres and above	None of the above
Ngie	0	1	0	8
Mbengwi	6	11	4	84
Batibo	8	0	0	68
Njikwa	1	2	3	45
Widikum	5	4	4	45
Totals	**20**	**18**	**11**	**250**
Percentages	**6.7**	**6**	**3.7**	**83.6**

3.2.8 Type of Substance Used to Improve Soil Fertility

Findings indicate that most farmers (203) did not apply any input to improve soil fertility. Farmers who used manure (71) were more than those who used chemical fertilizers (58). This could be explained by the high prices of chemical fertilizers in the market, (Annual Report of DDARD Momo 2018), and more accessibility of manure to farmers. Those using both manure and chemical fertilizer were least (32), indicating that farmers actually improved the soil in their cassava farms. Little or no fertilizers were used in Ngie, Njikwa and Widikum as compared to Mbengwi, Batibo and Widikum, where organic fertilizers were mostly used. This indicates that this technology is actually understood, but insufficiently propagated and used.

TABLE 8
TYPE OF SUBSTANCE USED TO IMPROVE SOIL FERTILITY

Location	Manure	Fertilizer	Both	none of the above
Ngie	0	1	0	8
Mbengwi	32	36	20	58
Batibo	19	8	4	53
Njikwa	9	5	3	40
Widikum	11	8	5	44
Totals	**71**	**58**	**32**	**203**

3.2.9 Quantity of chemical fertilizer Used to Fertilize the Soil

Chemical inputs used by cassava farmers varied and the high cost could have been the determining factor because of the fact that few respondents (79), used above 50Kg, (16) below 50Kg, while, the majority (204) did not use any quantities at all. Most of the farmers in the study area, felt that their soils could give better yields, even without adding fertility, but those who added fertility to the soil acknowledged that the yields were higher. Studies carried out by (Kuehne, 2017), confirmed that the main constraints to cassava production were the high cost of fertilizer and agro- chemicals.

3.2.10 Methods Used to Fight Cassava Diseases

Findings in (Table 9) indicated that cassava diseases were common and farmers fought these diseases, by the use of insecticides, fungicides and nematicides at very low levels. The variation between the uses of the three pesticides was not much in this study, but many farmers (231) did not use any pesticide at all, and did not fight against cassava diseases. Findings showed that the high cost of pesticides, was the determining factor here. Another reason was the good cultural practices of keeping the farms clean, in rich soils that enhanced the cultivation of cassava giving good yields even without the use of pesticides. Same studies carried out by Akerele et al., 2016, showed that the adoption of herbicides, fertilizers, pesticides, modern processing and storage techniques in cassava farming were relatively low.

TABLE 9
METHODS USED TO FIGHT AGAINST CASSAVA DISEASES

Location	Insecticides	Nematicides	Fungicides	None of the above
Ngie	1	1	1	8
Mbengwi	17	5	18	81
Batibo	3	16	2	57
Njikwa	6	4	3	44
Widikum	17	1	9	41
Totals	**44**	**27**	**33**	**231**

3.2.11 Source of Labor

Findings show that most of the respondents (93.64%) relied on their families for labor, while 26.09% used hired labor, and 18.73% used both family and hired labor. This was assured by the higher house hold sizes already discussed. Njukwe et al., 2014, also reported that production at house hold level in Cameroon is characterized by small farm sizes, relying on family labor for processing, in order to meet family food requirements and generate income.

3.2.12 Access to Credit Facilities

Findings show that 36% of respondents had access to credit facilities as compared to no access with 64%. This indicated that credit facilities were available, but farmers did not have adequate access to, because of the numerous requirements attached to the acquisition of these credits. Some farmers also did not always pay back their loans on time causing financial institutions to become strict on them.

3.2.13 Farmers who Process Cassava Roots

About 86.62% of respondents processed their cassava while 13.38% did not. Cassava root is a highly perishable food stuff that cannot stay for long if not transformed to other products (FAO STAT, 2017). Farmers confirmed that processing made cassava products easy to store and less bulky to transport.

3.2.14 Processed Products from Cassava Roots

Findings on table 10, showed that garri (224) was the highest processed cassava product, followed by “water fufu”, cassava flour (“Kumkum”), and “bobolo”. Others included products like starch, cassava cake, cassava coki, accra cassava etc. Methods used to process cassava roots into garri which was the main product, involved pilling, washing, grinding, tying in bags, squeezing to remove water, sieving, and frying. Cassava flour “Kumkum”, “water fufu”, “bobolo”, starch and other

products were also processed. As highlighted by Gray Smith 2017, processing helps to eliminate the cyanide substance in cassava, which can be very poisonous if cassava is eaten rough.

3.2.15 Use of Processed Cassava Product

From this study, 85.62% of the farmers processed their cassava mainly for the market, 82.28% processed for consumption, while 82.62% of the farmers processed for both market and consumption. The two reasons for processing cassava roots did not vary much as the distributions were all above 80%, but producing for the market was higher than for consumption, due to the fact that marketing of cassava products gave more income to farmers than the marketing of fresh roots.

3.2.16 Advantages from Processing Cassava Roots

Most farmers (53.85%) processed their cassava roots so as to increase income by selling the products at higher prices, 33.78% processed to give the product a longer shelf life and made storage easier, 29.10% processed to improve on the nutritional state of the cassava, 26.42% processed to sell faster and 4.35% processed to reduce loss from the roots. However 21.40% processed for other reasons, some of which were to ease packaging and transportation.

TABLE 10
PROCESSED PRODUCTS FROM CASSAVA ROOTS

Location	Garri	Water fufu	Kumkum	Bobolo	Others
Ngie	2	2	0	0	0
Mbengwi	86	63	32	5	12
Batibo	60	41	19	1	16
Njikwa	29	17	6	2	2
Widikum	47	34	11	0	3
Total	**224**	**157**	**68**	**8**	**33**

3.2.17 Uses of Cassava Roots by Those Who do Not Process

Farmers who did not process their cassava either consumed or sold the roots. Findings revealed that all respondents from Ngie processed their cassava roots, while nearly all of Batibo processed their cassava roots. The variation was not much as farmers either consumed or sold almost the same quantities of the roots in all the localities.

3.2.18 Method of Preservation

The preservation of products was identified as a problem because over 89% of the producers did not preserve their products as they sold to avoid losses. This was done either immediately after processing, or a few weeks after processing. This indicated the need for research on better storage and preservation facilities for both cassava and cassava products.

3.2.19 Methods of Transportation of Products

Transportation from farm to market was seemingly a big huddle as most farmers (42.3%) carried produce on their heads, (26%) carried in vehicles, (21.4%) carried on bikes, (8.8%) pushed in wheelbarrows and others (14.6%) represented those who did not carry at all, they preferred to sell roots at the farm gate. This indicated that a good road network is needed for better transportation in vehicles as bigger quantities cannot be transported on the head.

3.2.20 Distance Covered from Farm to Market

Farmers covered enormous distances from the farms to the markets with the highest, from 1 to 5 kilometers, and the lowest from 11 kilometers and above, meaning that the markets were not too far from the farms. This may have been the reason why most of the cassava was carried on the head. This stressful and tedious activity due to the bulky and heavy nature of cassava roots, expressed the need for good farm to market roads. Studies by Mouafor et al.(2018) also found out that an average market distance is about 3.91miles from production sites to small village market.

3.2.21 Changes in Yields Witnessed Due to Improved Technologies

Significant changes in yields as a result of improved cassava farming techniques were acknowledged by 89.97% farmers who attested that their cassava yields had increased with the practice of improved farming techniques. These farmers were mostly

those who propagated and used improved planting materials and practised improved production methods, like the correct planting distances. This result confirms the result of Mvondo and Liang (2012), which revealed that farmers who attended farmer field school, adopted improved planting materials and propagated them in their communities, had their yields increased significantly. Most cassava farmers had passed through primary and secondary schools and this a positive impact on the cassava value chain activities in this area of study.

3.2.22 Quantities of Cassava Products Produced over Three Successive Years

The main product from cassava was garri. The quantity of garri produced over three successive years had witnessed a remarkable drop from 2000 kg in 2015/2016 to 1500 kg in 2017/2018 (Figure 1). Water fufu had the same trend, while cassava flour" kumkum" was constant. This drop in production could be explained by the high availability of competitive food stuffs to cassava like maize, beans, rice, solanum potatoes, sweet potatoes, plantains etc., which led to low market prices in local markets. The price of garri (Figure 2) also dropped due to the fact that some buyers were not able to come from towns to buy in the villages because of the insecurity and road blocks which were constraints to farming activities during the last two months of this study. On the other hand as indicated in the Cadre Harmolise, (2019), the prices of local foodstuffs in the towns become higher, as the quantities brought into the towns were limited because of the same road blocks. The increased number of displaced population in towns also brought about price increases.

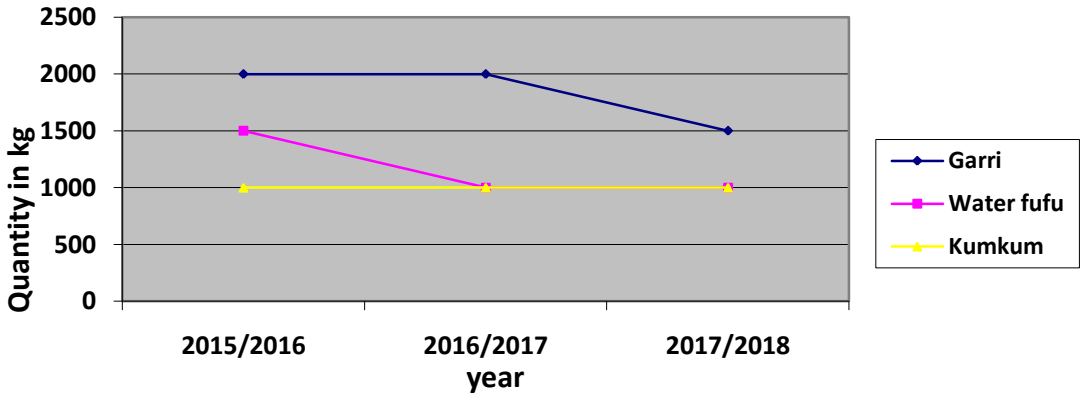

FIGURE 1. Trends in quantities of cassava products produced over three successive years.

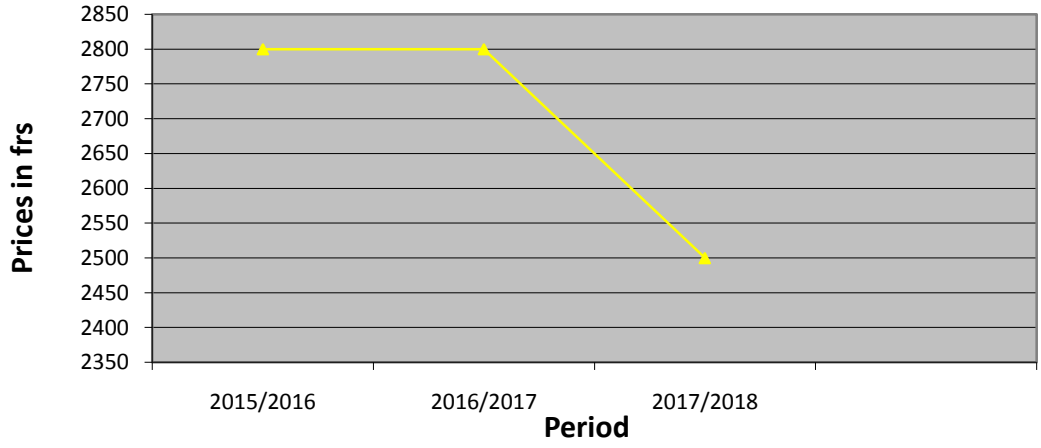

FIGURE 2: Trends in the price of garri in three successive years

3.2.23 Quality Standards during Processing and Packaging

The study revealed that 37.2% of the farmers followed quality standards during processing and packaging of processed cassava roots while 62.8% did not. Farmers expressed the need for proper packaging material which was not readily available, allowing most of the products to be packaged in non-degradable plastic papers and bags. Hypothesis testing showed that all categories of the variables studied, occurred with equal probabilities with one sample Chi – Square test at

0.05% level of significance. This lead us to reject the null hypothesis favouring our assumption to conclude that the availability of improved technologies had impact on the level of propagation and usage among cassava farmers during production, processing and marketing, leading to higher yields and value.

IV. CONCLUSION

The availability, level of propagation and usage of improved technologies among cassava farmers were examined in this work. More women were involved in cassava production, processing and marketing than men. Most of them were married, and have had primary school education. Households with 4-7 persons were highest and mostly households with children. Most of the farmers fell within an active age range of 31 to 50 years and relied on their families for labor, while hired labor was minimal. Findings indicated that the majority of members in each of the households were involved in the cassava value chain activities, attesting that the majority of farmers actually propagated and used improved technologies though some were at minimal levels. The presence of social amenities like local markets, hospitals, portable water, electricity and regular schools were significant, but the insufficiency of good roads, research stations, and mechanized tools need to be addressed. Improved cassava varieties, improved weeding technique using herbicides and fighting of cassava diseases using fungicides, nematicides and insecticides were propagated at minimal levels and needed to be improved. Better preservation and storage methods were limited in the cassava value chain. Quality standards and proper packaging of cassava products also need enhancement, so that cassava products could be upgraded for both local and international markets. Significant increases in yields with the use of improved technologies were achieved by many farmers. Garri being the highest processed cassava product witnessed a drop in quantity produced and price, in three successive years from 2015/16, 2016/17 and 2017/18. This mostly due to the heavy presence of competitive food crops like maize, beans, solanum potatoes, that brought down market prices of local food stuffs. Suggestions made to all actors are to ameliorate the situation by improving on the social amenities, road infrastructure; farm cultivation and processing equipment, seed material, and capacity building of farmers so as to make farmers more self-sustaining.

REFERENCES

[1] FAO, (Food and Agricultural Organization) STAT, (2017) Food Balances.

[2] Mvondo MES and Liang D (2012). Cassava Sector development in Cameroon: Production and Marketing factors affecting price. Agricultural Sciences, 3(5): 651-657. Doi: 10.4236/as.2012.35078.

[3] Nweke, (2004). New Challenges in the Cassava Transformation in Nigeria and Ghana –IFPRI, Washington.

[4] IITA, (International Institute for Tropical Agriculture) (2013) Annual Report.

[5] Sewando, Ponsian T. and Mdoe, N. Y. S. and Mutabazi, K. D. S. Farmers' preferential choice decisions to alternative cassava value chain strands in Morogoro rural district, Tanzania. MPRA Paper No. 29797, https://mpra.ub.uni-muenchen.de/29797/ (2011).

[6] Emmanuel Donkor, Stephen Onakuse, Joe Bogue and Ignacio De Los Rios-Carmenado, (2018) Determinants of farmer participation in direct marketing channels: A case study for cassava in the Oyo State of Nigeria. panish Journal of Agricultural Research 16 (2), e0106, 17 pages.

[7] INS(2019)AnnuaireStatistique du Cameroun, National Institute of Statistics, Yaounde, Cameroon.

[8] DDARD (Divisional Delegation of Agriculture and Rural Development) Momo Division, (2017) Annual Report.

[9] Yamane Taro, (1967): Statistics: An Introductory Analysis 2nd Ed., New York: Harper and Row.

[10] Mouafor BI, TemegneNC,Ngome AF, Malaa D (2016) Farmers Adoption of Improved Cassava Varieties in the Humid Forest Agro-ecological Zone of Cameroon

[11] ECAM 111 (ThirdCameroonian Survey).TroisiemeEnquete Camerounaise aupres des ménages. (2008). Institute National de la Statistique. INS, Juin (2008).

[12] Akerele EO., et al. "Economic Analysis of Cassava Production in Ogun State, Nigeria"Acta Scientific Agriculture 2.8 (2018); 43-50.

[13] Apata, TG. (2019) Analysis of Cassava value Chain in Nigeria: pro- poor approach and gender perspective, Int. J. Value Chain Management, Vol.10, No 3.pp.219-237. NIS, (2015)AnnuaireStatistique du Cameroun, National Institute of Statistics, Yaounde, Cameroon.

[14] GP-DERUDEP (Grassfields Participatory Decentralised Rural Development Project, 2015). Project Manual for face two, North West Region.

[15] DDARD (Divisional Delegation of Agriculture and Rural Development) Momo, (2018) Annual Report.

[16] Kuehne G, et al. (2017) Predicting Farmers' uptake of new agricultural practices: A tool for research, extension and policy

[17] CADRE HARMOLISE MANUAL, MARCH (2019). Identification and Analysis of areas at risk and populations affected by food and nutrition insecurity.