

Approaches for Improving Cocoyam Production and Utilization Among Rural Farmers in Ogun and Oyo State, Nigeria

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Abstract

This study was informed by the need to establish the approaches for sustainable production of cocoyam which due to production, utilization and preservation challenges has witnessed decreasing producers' patronage; however it commands important economic and health values for rural farmers. The study identified the farmers' socio-economic characteristics, various uses of cocoyam, factors affecting the effective production of cocoyam and approaches for improving cocoyam production. Multistage, purposive and random sampling methods were used to select 350 respondents. Data were collected by means of structured interview schedule, and analyzed using frequencies, percentages, means bar charts, Chi-square and Pearson's Product Moment Correlation. Results showed that majority (66.0%) of the respondents were female, 72.8% were between the age of 31 – 55 years with mean age of 48 years, above half (52.8%) of them had one form of formal education or another, 48.3% were married and 100.0% had farming experienced about cocoyam production. Cocoyam was majorly inter-planted with cassava 89.1%, maize (81.7%), vegetable (61.1%) and least pepper (25.7%). Major constraining factors as indicated by the respondents included high cost of hired labour, lack of fund, incidence of pest and disease, low soil fertility, lack of extension service and unavailability of organic fertilizer. Major approaches for improving cocoyam production were the provision of adequate credit facilities, formation of cooperative societies, availability and regular visit by extension agents and use of resistant varieties. Chi-square result shows that there is significant relationship ($p < 0.05$) between marital status ($\chi^2 = 8.499$), level of education ($\chi^2 = 7.020$) sex ($\chi^2 = 6.835$), religion ($\chi^2 = 8.115$) ethnicity ($\chi^2 = 4.885$) and the factors affecting cocoyam production and its potential. The study concluded that rural farmers inter-planted cocoyam with other crops as cover against crop failure, scarcity of specific crop, and due to food security at all time. It is therefore recommended that there is an urgent need for cocoyam production to be taken as one of the essential crops to focus on in the process of nation's food security attainment.

Keywords: Cocoyam, Approaches, Production, Utilization, rural farmers, Ogun State.

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1.0 Introduction

The world has focused entirely on a comparatively small number of crops to meet the various needs for food and industrial fibre; the total number of economic crops of significance to global trade hovering just above one hundred. However, cocoyam has hitherto suffered stiff competition from yam which is preferred for consumption and from cassava which yields more heavily and required less care (Okoye, 2006). It is widely believed that there has been a declining trend in production as well as shortage of supply of this crop in our domestic market. One of such deserted crops is cocoyam which over the years has received minimal attention from researchers and other stakeholders of interest. It belongs to two members of the *Araceae* family that are staple foods for many people in developing countries in Africa, Asia and the Pacific for their consumption in various forms. It is the most widely grown crop in both western and eastern regions of Nigeria in terms of area cultivated and number of producers, and it is not only a major source of food but also for income generating activities, especially in the most part of rural areas.

Cocoyam are tropical herbaceous tuber crop, cultivated predominantly as annuals, mainly for their edible starchy storage underground stems called corms and cormels. Taro (*Colocasia esculenta*) is the fifth most harvested root crop in the world with production estimated at 9.0 million tonnes for 2011 (FAO, 2012). Nigeria maintains the lead among cocoyam producing nations, with an annual production of 4.55 million metric tonnes in 2012, representing 61.2 and 43.1 % total production in West Africa and Africa, respectively (FAO, 2012). Cocoyam is an important staple food in Nigeria and ranks third in importance after cassava and yam among the root and tuber crops cultivated and consumed (Amusa, Enete & Okon, 2011). It also plays a significant role in bridging the food gap between the time of plenty and scarcity, with all the vegetative parts being used as food in one form or the other. The two varieties of cocoyam mainly grown in Nigeria, according to National Root Crops Research Institute (NRCRI) (2008), are *Colocasia esculenta* (L) Scott (Taro) and *Xanthosoma sagittifolium* (L) Scott (Tannia).

Cocoyam, as a traditional crop, is consumed in all the 36 States of Nigeria, especially in the Southwest and southeast States like Anambra, Oyo and Ogun State, though it is generally regarded as poor man's food. It is consumed in various forms, boiled, fried, pounded or roasted. It can also be processed into chips which have long shelf life and provides food all year round, especially during lean planting season. Cocoyam leaves are also used as vegetable for preparing soup in various parts of the world (Nwabuor, 2001; Asadu 2006 as cited in Onwubuya & Ajani, 2012). It is of interest to note that among root and tuber crops in Nigeria, cocoyam is the only tuber crops that all the parts are edible because the corms and cormels are eaten in various food forms while the leaves and flowers are commonly used as spice to garnish and flavour food (Chukwu, *et. al.*, 2012; Plucknett *et. al.*, 1970). Cocoyam is nutritionally superior to major competitor roots and tubers like cassava and yam, in terms of digestibility, contents of crude protein and essential minerals, such as Ca, Mg and P. Cocoyam corms are of great economic, social and nutritional importance to the people. The corms supply easily digestible starch and are known to contain substantial amounts of protein, vitamin C, thiamine, riboflavin, niacin and significant amount of dietary fiber (Enwelu, Asogwa, Nwalieji & Ezeano, 2014).

Cocoyam is believed to be generally good for the body and has some medicinal values. Consumption of micronutrient rich food such as cocoyam is important for a strong immune system that helps the body to utilize protein, carbohydrates and other nutrients. Cocoyam (Taro) contains some calcium, vitamin C, vitamin E and B vitamins, as well as magnesium, manganese, copper and fiber which aids in the digestive process, makes elimination of stool easy and also helps in cancer prevention (Nwagbo, 2011). Expansion in cocoyam production has the potential of bridging the widening demand and supply gap for the product, and enhancing the income generating activities and standard of living of the rural farmers' families, predominantly the susceptible group. As Nigeria population continues to increase day by day, the importance of cocoyam in ensuring household food security should be given adequate recognition, and efforts to increase production of the crop through encouraging the adoption of modern production strategies and mitigation of production constraints such as climate change, drought, poor cultural practices among cocoyam growers, pest and disease infestations and lack of interest among rural youths in agriculture must be stepped up. Based on this background, the study examined the approaches for improving cocoyam production and its utilization among rural farmers in Ogun and Oyo State, Nigeria with the following specific objectives: describing the socio-economic characteristics of the cocoyam farmers; ascertaining the various uses of cocoyam; identifying factors affecting the effective production of cocoyam; and identifying the approaches for improving production of cocoyam in the area.

1.1 The study hypotheses were to:

Ho1: There is no significant relationship between the socio-economic characteristics of the respondents' and factors affecting the cocoyam production and its potential in the study area.

Ho 2: There is no significant difference between approaches to cocoyam production in Ogun and Oyo State.

2.0 Methodology of the study

The entire southwest lies in the humid tropical zone bordered by a mangrove swamp forest in the south. Major parts of the study area lie in the fresh water swamp forest and rain forest to the south, which turns to moist and dry woodland savannah towards the North. It has a land area of about 114,271 square kilometres (about 12% of total land mass of Nigeria, lying between latitude 4°21' and 9°23' North of the equator and longitude 2°25' and 6°31' East. The three main agro-ecological zones in the area are the swamp on the Atlantic coast, tropical rainforest in the middle and guinea savannah in the north. The area experience both the dry and wet seasons, the rainy season starts from March and continue till October while the dry season commences in November and lasts till February. This study will be carried out in southwest Nigeria, which covers Lagos, Ekiti, Ogun, Ondo, Osun and Oyo State mainly dominated by the Yoruba ethnic group. These groups were the largest ethnic group in the West African coast and one of the largest and longest established ethnic groups on the African continent. The total population of the area is 27,581,992 with Lagos state having 9,013,534; Oyo 5,591,598; Ondo 3,441,024; Osun 3,423,535; Ogun 3,728,098 and Ekiti having 2,384,212; (National Population Census 2006). The study is viewed from the geo-political zones. Agriculture forms the base of the overall development thrusts of the zone, with crop farming as the main occupation of the people in the area. The study area has a number of Universities and Agricultural Research Institutions namely: International Institute of Tropical Agriculture (IITA), Ibadan; Institute of Agricultural Research and Training, (IAR&T), Ibadan; National Institute for Horticultural Research, (NIHORT), Ibadan; Cocoa Research Institute of Nigeria, (CRIN), Ibadan; Forestry Research Institute of Nigeria (FRIN), Ibadan. Federal Institute of Industrial Research, (FIIRO), Lagos; University of Ibadan, (UI), Federal University of Agriculture, Abeokuta (FUNAAB), Olabisi Onabanjo University, (OOU), Ogun State Agricultural Development Programme (OGADEP), Oyo State Agricultural Development Programme (OYADEP), etc.

2.1 Sampling Techniques and Sample Size

The population of the study comprises of cocoyam farmers in Southwest, Nigeria. A multi-stage sampling method

was used in the selection of cocoyam farmers in the study areas. The stages include: Out of the 6 State in Southwest Nigeria based on geo-political classifications, 2 States were purposively selected which are Ogun and Oyo State; this is based on high suitability and large production of cocoyam in the study area. In each selected states, there are four agricultural zones, fifty (50%) of the zones were randomly selected. In each agricultural zone selected and with the assistance of the extension services department, farming communities was compiled, from which Local Government Areas (LGAs) was randomly selected for the study, (there are 20 LGAs in Ogun state and 33 LGAs in Oyo state). 25% of the LGAs was randomly selected from each states (i.e 5 LGAs in Ogun state and 8 LGAs in Oyo state) making a total of thirteen LGAs for the study. In each of the LGAs, 2 wards/communities were purposively selected based on rural farmers' involvement in cocoyam production in the selected areas. From each selected areas fifteen (15) cocoyam farmers were systematic selected, bringing the total sample size to three hundred and ninety (390) cocoyam farmers in the study area. At the end a total of three hundred fifty (350) were used for the analysis of this study.

2.2 Measurement of Variables

Questionnaires were administered to the respondents through personal interview by trained enumerators for primary data collection. To identify factors affecting the effective production of cocoyam in the area, a list of possible factors was compiled and investigated under four point Likert-type scale rating from strongly agree (4), agree (3), disagree (2) and to strongly disagree (1) with a midpoint of 2.5. Mean score equal to 2.5 and above indicated major factor while mean score less than 2.5 indicated minor factor. To describe the possible approaches for improving cocoyam production, a list of possible approaches was compiled and assessed based on a three point rating scale with response options as not serious (1), serious (2) and very serious (3) with a mid-point of 2.0. Mean score equal to 2.0 and above indicated major approach while mean score less than 2.0 indicated minor approach for improving cocoyam production in the area. Data were analysed using descriptive and inferential statistics were used to analyze the data collected. Descriptive statistical tools used were frequency count, percentage, and mean, while inferential statistical tools used were Chi-square, Pearson Product Moment Correlation (PPMC), and t-test.

3.0 RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of the cocoyam farmers

Table 1 gives an insight into the socio-economic characteristics of the respondents. The results showed that majority (66.0%) of the respondents were females while only 34.0% were males. This finding confirms the general believe in rural communities in the area that cocoyam production is an enterprise meant especially for women; and corroborates Okoye, Onyenweaku & Asumugha (2007) that small-scale farmers, especially women, who operate within the subsistence economy grow most of the cocoyam in Nigeria. Majority (72.8%) of the respondents were between the ranges of 31-55 years of age, while 21.4% of the respondents were between the ranges of 56 – 70 years of age. This result implied that the respondents were in their active productive age, and an advantage for improvement in the farmers' productivity if better production strategies were available. Onwubuya & Ajani (2012) reported the participation of farmers in their active age in cocoyam production. The results further indicated that almost half (48.3%) of the respondents were still in marriage, 15.4% were widowed and 13.1% were divorced. This is not an indication that the women were less involved in cocoyam production because they are often perceived as subordinates to the males in male-headed households (Fakoya, Apantaku & Adereti, 2006). On educational attainment of the respondents, above half (52.8%) of the respondents attained one form of formal education or another. This implied that most of the respondents were literate enough to adopt improved cocoyam production approaches to increase their productivity and output if they were made available to them. Furthermore, about almost half 49.7% of the respondents had a household size of 2 – 5 persons and 38.3% of them had between 6 – 10 persons with a mean household size of 7 persons. A large household size is an added advantage for the availability of cheap labour where most of the family members live in the farming communities (Obiekwe and Ugwumba, 2016). On farming experience, majority (74.3%) of the respondents had 10-19 years. The mean farming experience was approximately 16 years. This implied that the respondents were experienced cocoyam producers who could grab any opportunity that would help them increase their productive potentials. Based on multiple responses majority (77.7%) of the respondents depended on family labour, 64.9% hired labour and 66.3% friend labour for their production activities. The use of family labour can reduce cost of production and increase profit (Fakoya *et al.*, 2006).

Table 1: Distribution based on the rural farmers according to socio-economic characteristics (n = 350).

Variables	Frequency	Percentages (%)
Sex		
Male	231	66.0
Female	119	34.0
Age		
31 – 40	124	35.4
41 – 55	131	37.4
56 – 70	75	21.4
71 – 85	20	5.7
Mean age		48.27
Marital status		
Single	81	23.1
Married	169	48.3
Widowed	54	15.4
Divorced	46	13.1
Religion		
Christianity	98	28.0
Islam	211	60.0
Traditional	35	10.0
Household size		
<= 5	164	46.9
6 – 10	134	38.3
11 – 15	40	11.4
16 – 20	12	3.4
Mean household size		6.86
Educational level		
No formal education	117	33.4
Primary education	119	34.0
Secondary education	31	8.9
Tertiary education	34	9.9
Adult education	49	14.0
Farming experience		
Less than 10	42	12.0
10 – 19	260	74.3
Above 20	48	13.7
Mean farming experience		16.4
Kinds of labour		
Family labour	272	77.7
Hired labour	227	64.9
Friend labour	232	66.3

Source: Field survey, 2016

3.2 Various crop inter-planted with cocoyam

The result in Figure 1 showed the various crops inter-planted with cocoyam in the study area. Majority (89.1%) of the combinations were cocoyam inter-planted with cassava. Amusa *et al.* (2011) observed that most farmers diversify production through intercropping because of the risks and uncertainties involved in agricultural production. This was closely followed by cocoyam-maize interplant (81.7%), cocoyam-oil palm interplant (63.1%), cocoyam-vegetables (61.1%), cocoyam-melon (50.3%) and the least, cocoyam-pepper (25.7%). The cocoyam-oil palm interplant was high probably because the oil palm were still in growing stage but later the shading of the farm by palm fronds would definitely retard the yield of cocoyam production.

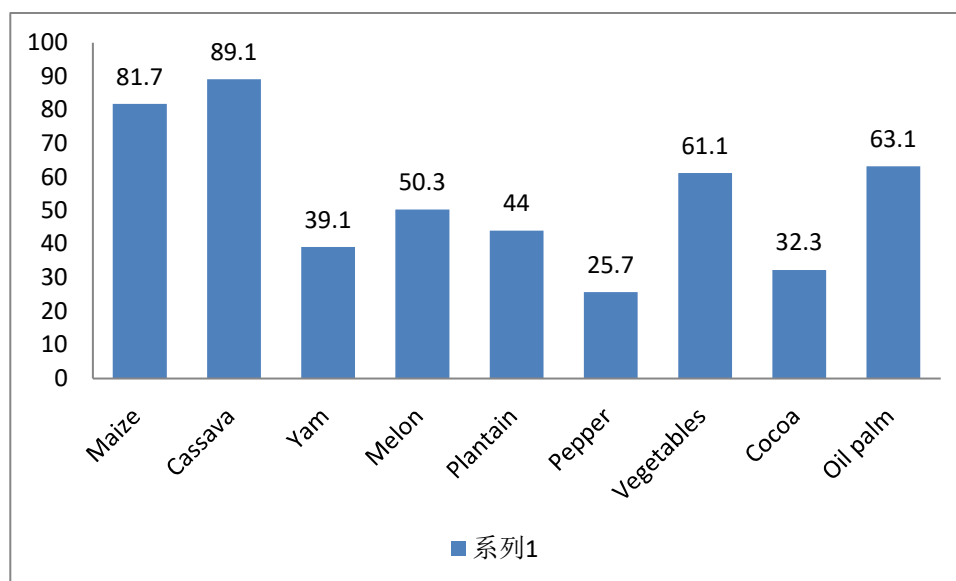


Figure 1: Various crops inter-planted with cocoyam.

3.3 Uses of cocoyam by rural dwellers in the study area.

The role of cocoyam in the livelihood of rural women was made clear during interaction with the respondents sampled for the study. When asked if they could do without cocoyam and some of the utilization of cocoyam against other crops such as plantain, cassava or yam, the respondents overwhelmingly exclaimed that doing without cocoyam production is a recipe for hunger which is practically impossible for them to accept. Their disagreement is hinged on the following points:

1. Cocoyam is not just a food to them but part of their culture and society, and therefore cannot be replaced nor ignored.
2. Cocoyam is more satisfying than yam, cassava and plantain, and it gives them more money than these other crops a times.
3. Cocoyam stores longer even after harvest, and can be left in the ground until needed, thereby providing food for them all year round.
4. Because of the all season availability of cocoyam, it comes in handy in periods of financial. They can easily harvest cocoyam and sell it to meet the needs of their children and themselves like school fees, payment of debt and other needs peculiar to women.
5. Cocoyam is more preferred by the aged people in the communities, and often used by mothers as weaning food for their babies in the absence of commercial baby foods.
6. Cocoyam helps to bring stability to the home and empower women to be financial stable so as not to depend on the man for every bit of financial need in the home.
7. Cocoyam provides a leafy vegetable which cannot be replaced by any other vegetable source. Cocoyam is their means of survival as it is the only crop you can count on during the period of food scarcity. Also, it is the first crop to harvest while they are still waiting for cassava, yam and plantain to mature to their fullness.

3.4 Factors affecting the effective production of cocoyam in the area,

The factors affecting the effective production of cocoyam by the respondents are shown in Table 2. The major constraining factors as indicated by the respondents included high cost of hired labour (Mean= 3.91), lack of fund (Mean = 3.90), incidence of pests and disease (Mean = 3.83), low soil fertility (Mean = 3.75), lack of extension services (Mean = 3.62) and unavailability of organic fertilizer (Mean = 3.54). It could be inferred generally from Table 2 that most of the factors affecting the effective of cocoyam production had links with scarcity of fund, pest and diseases outbreak and high cost of agricultural inputs. According to Idoge (2013) who opined that credit plays a vital role in the economic development of a nation. It is a crucial input required by smallholder farmers to establish and expand farm enterprises with the aim of increasing household income. This also corroborates Amusa *et al.* (2011) that high cost of farm inputs, hired labour, inadequate extension contacts and poor soil fertility are some of the major challenges facing most African farmers. Other problems, though minor ones, influencing against the production of cocoyam were; high cost of inorganic fertilizer (Mean = 3.42), unavailability of agro-chemicals (Mean = 3.30), weed problem (Mean = 3.22), scarcity of improved varieties (Mean = 2.43), poor access to good roads (Mean = 2.26), climate change (Mean = 2.15), and scarcity of technical know-how (Mean = 1.54).

Table 7: Factors affecting the cocoyam production and its potential

Factors affecting	Mean	Ranked
High cost of hired labour	3.91	1 st
Lack of fund	3.90	2 nd
Incidence of pests and diseases	3.83	3 rd
Low soil fertility	3.75	4 th
Lack of extension services	3.62	5 th
Unavailability of organic fertilizer	3.54	6 th
High cost of inorganic fertilizer	3.42	7 th
Unavailability of agro-chemicals	3.30	8 th
Weed problem	3.22	9 th
Scarcity of improved varieties	3.43	10 th
Poor access to good roads	2.26	11 th
Climate change	2.15	12 th
Scarcity of technical know-how	1.54	13 th

Source: Field survey, 2016

3.5 Possible approaches for improving cocoyam production.

Result in Table 3 highlights the identified possible approaches for improving cocoyam production in the study area. The possible approaches were arranged in descending order of importance which comprised the provision of credit facilities (Mean = 2.95), formation of co-operative society (Mean = 2.85), availability and regular visit by extension agents (Mean = 2.75), use of resistant varieties (Mean = 2.60), encouraging farmers' programme in agriculture (Mean = 2.55), subsidizing agricultural inputs (Mean = 2.48), provision of farm machineries (Mean = 2.44), regular weeding of the farm (Mean = 2.25), use of recommended spacing (Mean = 2.15) and availability of improved varieties (Mean = 2.02), and availability of market Mean = 1.35). According to Nenna (2011) stated that extension services bear great potentials for improving the productivity of farmers, and promoting the right attitude among the natural resources managers.

Table 3. Possible approaches for the production of cocoyam

Factors affecting	Mean	Ranked
Provision of adequate credit facilities	2.95	1 st
Formation of farmers' cooperative societies	2.85	2 nd
Availability and Regular visit by extension agents	2.75	3 rd
Use of resistant varieties	2.60	4 th
Encouraging farmers programme in agriculture	2.55	5 th
Subsidizing agricultural inputs	2.48	6 th
Provision of farm machineries	2.44	7 th
Regular weeding of farm	2.25	8 th
Use of recommended spacing	2.15	9 th
Availability of improved varieties	2.01	10 th
Availability of market	1.35	11 th

Source: Field survey, 2016

3.6 Hypotheses of the study

HO1: *There is no significant relationship between the socio-economic characteristics of the respondents' and factors affecting the cocoyam production and it's potential in the study area.*

The result of the Chi-square analysis in Table 9 shows that there is significant relationship ($p < 0.05$) between marital status ($\chi^2 = 8.499$, $df = 4$, $p < 0.019$), level of education ($\chi^2 = 7.020$, $df = 5$, $p > 0.016$) sex ($\chi^2 = 6.835$, $df = 1$, $p < 0.011$), religion ($\chi^2 = 8.115$, $df = 2$, $p < 0.032$) ethnicity ($\chi^2 = 4.885$, $df = 3$, $p < 0.023$) and the factors affecting cocoyam production and its potential. The result of the analysis revealed that all these variables measured have significant relationship with the factors affecting cocoyam production in the study area.

Table 4: Chi-square analysis between the socio-economic characteristics of the respondents' and factors affecting the cocoyam production and it's potential in the study area.

Variables	χ^2 =value	Df	p-value	Decision
Marital status	8.499	4	0.019	S
Educational level	7.020	4	0.016	S
Sex	6.835	1	0.011	S
Religion	8.115	2	0.032	S
Ethnicity	4.885	3	0.023	S
Primary occupation	0.254	5	0.014	S

Source: Field survey, 2016

Note: S= Significant at 0.05 level, NS= Not significant at 0.05 level.

The result of correlation in Table 5 shows that there is significant relationship ($p < 0.05$) between the age ($r = -0.158$, $p < 0.040$), household size ($r = 0.130$, $p < 0.013$), farm size ($r = -0.363$, $p < 0.001$), years of farming experience ($r = -0.196$, $p < 0.011$), income level ($r = -0.301$, $p < 0.001$) of the respondents and the factors affecting cocoyam production in the study area. This implies that age, household size, farm size, years of farming experience and income level have a determinant factors to cocoyam production.

Table 5: Correlation result between the socio-economic characteristics of the respondents' and factors affecting the cocoyam production and it's potential in the study area.

Variables	r-value	p-value	Decision
Age	-0.158	0.040	S
Household size	0.130	0.013	S
Herd size	-0.363	0.001	S
Years of farming experience	-0.196	0.011	S
Average income	0.301	0.000	S

Source: Field survey, 2016

Note: S= Significant at 0.05 level, NS= Not significant at 0.05 level.

H₀₂: There is no significant difference between approaches to cocoyam production in Ogun and Oyo State.

Table 6 shows there is significant difference in the approaches to cocoyam production in Ogun and Oyo State. This indicates that cocoyam farmers perceive the cocoyam production differently in the study area. Therefore, the hypothesis that stated there is no significant difference between approaches to cocoyam production in Ogun and Oyo State. was rejected.

Table 6: Test of means in the approaches to cocoyam production in Ogun and Oyo State

Area	Mean	Standard deviation	df	t-value	p-value	Decision
Ogun State	78.8000	7.51943	79	93.732	0.00	S
Oyo State	80.8125	6.90458				

Source: Field survey, 2016

Note: S= Significant at 0.05 level, NS= Not significant at 0.05 level.

4.0 Conclusion and Recommendation

Cocoyam production is an important diet to many rural farmers and their households in the study area. The rural farmers involved in the production of cocoyam were mostly still in their active years, literate, married with large household size and experienced. The farmers inter-planted cocoyam with other crops as cover against crop failure and scarcity of specific crop, and due to some factors affecting cocoyam production such as high cost of labour, scarcity of fund, high incidence of pests and diseases, low soil fertility, inadequate extension services among others. The importance of cocoyam as household's food components for rural farmers cannot be over emphasized as its seen as part of their culture and most importantly cannot be replaced by other food crops. Hence there is an urgent need for cocoyam production to be taken as one of the essential crops focused on in the process of nation's food security attainment. Therefore, rural farmers should be encouraged to cultivate more of cocoyam to enable its accessibility and affordability. Results from the study also reveal that rural farmers have preference for different forms of processed cocoyam. There is therefore an urgent need to invest into the development of different forms of processed cocoyam to improve their quality and make them available for consumers at large. This is because evidence from the study shows that rural farmers', other households and many people may consume cocoyam often since it is economically affordable and culturally acceptable by many in the study area. Also, there is a need to invest in hybrid cocoyam production in order to boost the quantity and encourage others. Generally, cocoyam should be seen as essential crop as is well accepted at different forms by many people. Therefore, government of the State need to include cocoyam as part of arable crops transformation programme.

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