

Constraints Affecting Adoption of Cocoyam Processing Technologies by Women Farmers' in Akwa Ibom State, Nigeria

Idongesit J. Udousung*¹, Iniobong A. Akpabio² and Idaresit U. Umoh¹

¹Department of Agricultural Economics and Extension
Akwa Ibom State University, Obio Akpa Campus, Akwa Ibom State, Nigeria.

²Department of Agricultural Extension and Rural Development
University of Uyo, Akwa Ibom State, Nigeria

*Corresponding Author's Email: udousung23@gmail.com

Abstract

*A veritable search for solution to the soaring problem of food insecurity in Nigeria would need to encompass a renewed focus on cocoyam (*Colocasia spp* and *Xanthosoma spp*) as an important source of human nutrition, cash income and animal feed. This study examined constraints affecting adoption of cocoyam processing technologies by women farmers in Akwa Ibom State, Nigeria. Specifically, the study ascertained the level of adoption of cocoyam production technologies and also identified constraints faced by women cocoyam farmers in adopting recommended innovations. Relevant data were collected with the aid of a structured questionnaire from 90 women cocoyam farmers, purposively selected from a sample frame of women groups affiliated to the Women-in-Agriculture (WIA) programme of the Akwa Ibom State Agricultural Development Programme (AKADEP). Data analyses utilized both descriptive and inferential statistical tools and findings revealed that cocoyam fufu and cocoyam flour ($x = 2.96$; rank 1 respectively) and cocoyam pudding ($x = 2.83$; rank=3) were the major adopted technologies. The least adopted were cocoyam balls ($x=1.88$; rank=13) and cocoyam bread ($x=2.27$; rank=12) and cocoyam fritters ($x= 2.41$; rank =11). Factor analysis, using principal component approach revealed seven major dimensions of factors that contribute to the general level of constraints; the major factors were: Poor technological base (21.28%) and human factors (15.9%). Recommendations have been proffered to enhance adoption of cocoyam processing technologies, based on its inherent positive attributes.*

Keywords: Cocoyam, Constraints, Technologies, Adoption, Women farmers, Akwa Ibom State

1.0 Introduction

The depressing status of food availability, accessibility and affordability in Nigeria is becoming a grave concern. The country is currently regarded as one of the countries with the hungriest population in the world, ranking 109 out of 125 surveyed countries, according to the Global Hunger Index (GHI-2024). It is projected by the World Food Programme (WFP, 2024) that

about 26.5 million Nigerians would face acute hunger in the June-August 2024 lean season. Against this background, the United Nations has called on the Nigerian government to tackle insurgency, currency devaluation, soaring inflation, climate change, pest infestations, and other threats to agricultural productivity; based on the predictions that 82 million Nigerians may go hungry by 2030 (Akasike and Adaji, 2024; WFP, 2024).

One of the means of ensuring food security and concomitant reduction in prevailing high levels of hunger and protein-energy malnutrition may be through a focus on increased production and consumption of currently neglected indigenous staples of high energy content. One of such crops is cocoyam (*Colocasia esculenta* (taro) and *Xanthosoma sagittifolium* (tannia). The crop is cultivated mainly for its corms and cormels. It ranks third in importance after cassava and yam among the root and tuber crops cultivated and consumed in Nigeria. Cocoyam used to be recognized as a cheaper yam substitute, notably during period of food scarcity (hunger season) among many households, especially in southern parts of Nigeria and its production remains part of many smallholder, resource poor farming households in many parts of the southern and middle belt parts of the country.

Cocoyam is the only fully edible root and tuber crop in Nigeria because the corms and cormels are eaten in various forms while the vegetative parts are used as adjunct or spice to garnish and flavour food. It is regarded as nutritionally superior to major competitors like cassava and yam and hence, adjudged to possess superior health attributes as it can be used to manage complications arising from diseases like diabetes, prostate and breast cancer. It also has high economic and trade potentials as raw material for the pharmaceutical, confectionery and livestock industries (NRCRI 2020; CGIAR 2020).

Nigeria is the largest producer of cocoyam in the world and according to the National Root Crops Research Institute (NRCRI-2020) with an annual production of 5.49 million metric tonnes, equivalent to 45.9 % of world production and 72.2 % total output of cocoyam in West Africa. However, despite the global recognition of cocoyam production in Nigeria, the crop has suffered serious neglect, receiving little or no attention from agricultural researchers and government policy makers. This has resulted in a gross household-level underutilization of the enormous potentials of cocoyam for food security, income generation and nutritional enhancement. Cocoyam is mainly grown on a subsistent level and has been variously labelled as a neglected, poor man's food crop; which is often traded only in local markets (Udousung, *et al.*, 2018). In essence, despite cocoyam's immense attributes and potentials, and the fact that its low and affordable trading price can guarantee food security, especially for poor rural households; It has received minimal interest and attention by producers, consumers and even researchers. Many reasons have been proffered for the low recognition status of cocoyam, including; poor research and policy interventions, poor yield due to taro leaf blight (TLB), limited value chain propensity and reduced commercialization (Otekunrin *et al.*, 2021).

Increased cocoyam production is a valuable venture that will surely boost the revenue base of the producing countries and enhance the livelihoods of the smallholder farmers and other actors along the value chain (Udousung *et al.*, (2024a). A first step in this endeavour is to stabilize cocoyam tuber production and greatly enhance its utilization by adding value to its derivatives; through its Women in Agriculture (WIA) unit in the Akwa Ibom Development Programme

(AKADEP) involved in the dissemination of processed cocoyam technologies to women farmer groups. This study sought to ascertain the level of adoption and major constraints affecting the adoption of cocoyam processing technologies introduced to women clientele of AKADEP in Akwa Ibom State.

2.0 Methodology

Data was collected from 90 respondents who were chosen through a multi-stage sampling procedure from 12 of the 23 active WIA women groups, broadly spread around the six zones of AKADEP in the State. Data analyses were with the aid of frequency counts, percentages, mean counts and factor analysis. To ascertain the level of adoption of improved cocoyam processing technologies, respondents were requested to respond to a 13 point list of technologies with the aid of a three (3) point Likert continuum of not adopted (1 point), adopted but discontinued (2 points) and fully adopted (3 points).

On the other hand, factor analytic procedure was utilized to ascertain the major dimensions of the constraints to adoption of WIA- promoted cocoyam processing technologies. A factor loading of 0.50 and above was adopted in analysing the data. A varimax rotated factor matrix was then employed to identify the most important constraining factors to utilization of cocoyam processing technologies. In essence, variables with coefficient greater than 0.50 were considered to have a high loading factor and were considered strong constraining factors while those with less than 0.50 were considered as minor constraint factors to the adoption of cocoyam processing technologies.

3.0 Results and Discussion

3.1 Level of Adoption of WIA Promoted Cocoyam Processing Technologies

Table 3.1 reveals a very high adoption level (92.3 %) of disseminated cocoyam production technologies. In essence, 12 out of 13 disseminated technologies were fully adopted by respondents. Cocoyam fufu and cocoyam flour ($\bar{x} = 2.96$; rank =1 each) and cocoyam pudding ($\bar{x} = 2.83$; rank = 3) were the major adopted technologies while the least adopted were cocoyam fritters ($\bar{x} = 2.41$; rank=11) cocoyam bread ($\bar{x} = 2.27$; rank=12) and cocoyam balls ($\bar{x} = 1.88$; rank=13). It is important to note that this majorly adopted technologies are merely improved forms of familiar (hitherto locally utilized) food types. The semblance to local food types increased the ease of acceptance of these introduced technologies. Generally, respondents gave reasons for high utilization of the major technologies to include; cultural acceptance, ease of preparation and market demand.

Table 3.1 also shows that although ‘cocoyam balls’ technology was ranked as least adopted, about 76.7% of respondents fully adopted the technology, while 33.3% either never adopted or had to discontinue its utilization. Respondents predicated the reason for this trend on lack of acceptability and concomitant poor economic value, arising out of poor market sales. Another important item of potential economic value like cocoyam bread surprisingly recorded a ‘fully adopted’ value of only 40% and a never adopted/used but discontinued value of 60%. Reasons adduced for this trend were revealed to include: lack of funds to procure necessary machinery

and support materials (like drying, grinding, storage and packaging materials) lack of incentive for adoption (because people are used to bread made from wheat;) and limited access to required inputs, especially raw cocoyam corms, which has a limited production potential.

A review of related literature reveals varying levels of adoption of value-added cocoyam technologies. Nwafor (2023) and Apata *et al.*, (2021) reported high levels of adoption of recommended technologies; while Onuekwusi *et al.*, (2017) reported average levels of utilization. On the other hand, Osahon and Odoemelam (2019) and Osahon and Ifenkwe (2019) reported very low levels of utilization of disseminated cocoyam value added technologies. It may be noted that the majorly adopted technologies were not consistent with respect to all the perused scientific reports.

Table 3.1: Level of Adoption of WIA Promoted Cocoyam Processing Technologies*

Items	Statements	Never	Used but Discontinued	Fully Adopted	Mean	Rank	Decision
1	Cocoyam Achicha	6(6.7)	12(13.3)	72(80.0)	2.73	5	A
2	Cocoyam Chinchin	10(11.1)	5(5.6)	75(83.3)	2.72	6	A
3	Cocoyam Strips	12(13.3)	6(6.7)	72(80.0)	2.66	7	A
4	Cocoyam Cakes	2(2.2)	18(20.0)	70(77.8)	2.75	4	A
5	Cocoyam Doughnuts	16(17.8)	7(7.8)	67(74.4)	2.56	8	A
6	Cocoyam Muffins	15(16.7)	15(16.7)	60(66.7)	2.50	9	A
7	Cocoyam Bread	11(12.2)	43(47.8)	36(40.0)	2.37	12	A
8	Cocoyam Fritters	21(23.3)	11(12.2)	58(64.4)	2.41	11	A
9	Cocoyam Balls	10(11.1)	11(12.2)	69(76.7)	1.88	13	NA
10	Ikpan Ikpo	10(11.1)	31(34.4)	49(54.4)	2.43	10	A
11	Pudding	3(3.3)	9(10.0)	78(86.7)	2.83	3	A
12	Cocoyam Fufu	0(00.0)	3(3.3)	87(96.7)	2.96	1	A
13	Cocoyam Flour	0(00.0)	3(3.3)	87(96.7)	2.96	1	A

* Mean (\bar{x}) Cut off Point = 2.0

Source: Field Survey (2022)

3.2 Major Dimensions of the Constraints to Adoption of WIA Promoted Cocoyam Processing Technologies

Nineteen items were initially generated and validated during the instrument construction phase to reflect this objective. Factor analytic procedure primarily analysed the interrelationship among variables (scale items) in terms of their underlying dimensions (factors). The results of the rotated component matrix showing the extracted factors, based on the responses of the respondents to major constraints, deterring adoption of value-added cocoyam technologies are shown in Table 3.2. Based on the item loadings of the conducted factor analysis, seven critical factors were isolated and named. Factor 1 accounted for 21.28% of the variances in data and was named “Low financial/ Technological base”. These were made up of constraint items like lack of drying machine (0.906), lack of funds (0.878), lack of storage facilities (0.644) and lack of

grinding machine (0.581). Factor 2 accounted for 15.9% variance and was named ‘human/institutional related’ factors. This factor was composed of items like ‘lack of enough land for farming’ (0.806), ‘lack of access to credit facilities’ (0.848), ‘lack of interest’ (0.667) and ‘cultural belief’ (0.518). The third major group of factors deterring utilization of cocoyam processing technologies accrued 12.33% of the variances and was termed ‘low incentive to adopt technologies’.

Table 3.2: Rotated Component Matrix on Farmers’ Responses on Constraints to Adoption of cocoyam processing Technologies

Pre-disposing Factors	Components						
	1	2	3	4	5	6	7
Lack of funds to implement technology	.878	-.125	.107	-.126	.083	-.060	-.045
Lack of drying machine	.906	-.032	.021	-.039	-.031	.007	.258
Lack of grinding machine	.581	.340	.397	.313	-.006	.267	.181
Lack of storage facilities	.644	.297	.267	.377	-.045	.203	-.015
Lack of package materials	.305	-.072	.242	.087	.205	-.094	.804
Lack of interest	-.226	.667	.127	-.048	.342	-.150	.063
Lack of extra land for farming	.117	.806	.251	-.199	-.064	.038	-.239
Disease attack	.181	.337	.318	.181	.532	.051	-.535
No transport to access demonstration sites	.152	.454	.014	-.208	-.688	.191	.060
High cost of recommended inputs (technology)	-.051	.244	-.266	.052	-.147	-.837	.087
Failure of extension workers to reach farmers	.147	.226	-.203	-.760	.000	.319	.233
Lack of access to training programme by non-members of WIA groups	.096	.081	.142	-.081	.862	-.034	.168
Unstable market price	.360	-.325	.471	-.549	-.007	.035	-.003
Inadequate supply of cocoyam tubers	.174	-.050	-.082	.829	.067	.091	.152
High cost of innovation	.021	.009	.008	-.036	-.386	.714	-.020
Lack of incentive for adoption of innovations	.003	.205	.802	-.047	-.108	.116	.198
Limited access to credit	.089	.848	.124	.022	-.138	-.098	-.042
Limited access to inputs	.238	.170	.796	.032	.010	.091	-.072
Cultural belief	-.394	.518	-.074	.342	-.022	-.096	.071

Source: Adapted from field survey (2022)

Related literature reveals major constraints to utilization of cocoyam processing technologies to include: lack of funds and inadequate improved varieties (Apata *et al.* (2021); paucity of funds and lack of credit access (Ogada *et al.* (2014); rejection of technologies by farmers on the basis of incompatibility of technologies to farmers’ local practices (Olatunji, Nwakor and Asumugha, 2015); no extension agents to answer their questions, lack of commitment and marketing of products (Onuekwusi *et al.*, 2017).

4.0 Conclusions and Recommendations

Indications are that there is a very high level of adoption of cocoyam processing (value-added) technologies disseminated by the women-in-agriculture (WIA) component of the Akwa Ibom Agricultural Development Programme (AKADEP) to women groups in Akwa Ibom State. Cocoyam fufu, cocoyam flour and cocoyam pudding were the major adopted technologies; mainly due to reasons of cultural acceptance and ease of preparation. It was also revealed that

presumably important technologies like cocoyam bread (especially) and cocoyam balls recorded high levels of either non-adoption or discontinuance; mainly for reasons of high financial implications, lack of acceptability and concomitant poor market demand, resulting to poor economic value. It is important to note, in passing; that most of the adopted technologies are mainly for household utilization, with very limited income earning potentials. In essence, only the very limited culinary (human consumption) aspect of cocoyam (of the wide attributes and versatility of the crop) has been realized in the study area. This situation may portend grave negative implications against sustained adoption. This is because a key motivating factor for sustainable adoption of disseminated technologies is the development of an entrepreneurial spirit and subsequent wealth creation. This should be the focus of policy makers and all other stakeholders' involved in the creation of awareness on the importance of the cocoyam crop. The following recommendations would help in this regard: i) Enhanced creation of public awareness on the attributes and potential benefits of cocoyam; ii) Release of funds by relevant stakeholders to enhance quality research on how to improve production levels, genetic diversity, biotech application and evaluation for adaptation. Finally, a value-chain approach should be embarked upon as to drive productivity, competitiveness, entrepreneurship and growth of small and medium scale enterprises.

References

- Akasike, C. and D. Adaji (2024) 'Food crisis: 82 million Nigerians may go hungry soon, UN warns' The Punch On-line <https://punchng.com/food-crisis-82-million-nigerians-may-go-hungry-soon-unwarns/#:~:text=This%20year's%20results%20are%20alarming,severe%20food%20in%20security%20by%202030.> 6th July. Accessed: 20/07/2024
- Apata, T.G; E. A. Henry; C. Jaiyeoba; O. Igbalajobi, K. Oni, O. Bamigboye; and S. Bamişaye (2021) Value chain analysis of cocoyam enterprise in Southwest Region, Nigeria. *Journal of the Austrian Society of Agricultural Economics* 17 (3): 1-19.
- CGIAR (2020) <https://www.rtb.cgiar.org/news/cocoyam-has-huge-market-but-few-farmers-cultivate-it/> CGIAR Sept. 15, 2020
- GHI (2024) 2023 global hunger index: The power of youth in shaping food system welthungerhilfe (whh); concern worldwide Bonn/ Dublin 2023.
- NRCRI (2020); <https://nrcri.gov.ng/cocoyam-research/> Taro and cocoyam Programme
- Nwafor, E. (2023) Adoption of recommended cocoyam production technologies among farmers in Enugu State, Nigeria. *A PhD thesis submitted to Department of Agricultural Extension and Rural Development, School of Agriculture and Agricultural Technology, Federal University of Technology, Minna, Niger State, Nigeria August, 2023*

- Ogada, M.J, G. Mwabu and D. Muchai (2014). Farm technology adoption in Kenya: a simultaneous estimation of inorganic fertilizer and improved maize variety adoption decisions. *Agricultural and Food Economics* 2(12), 1-18.
- Olatunji, S. O; F. N. Nwakor and G. N. Asumugha (2015). Assessment of transfer of cocoyam technologies in Anambra State, Nigeria. *The Journal of Agricultural Sciences* 10 (3) 168-176.
- Onuekwusi G. C Odoemelam L. E Kanu R. I (2017). Improving rural women income through cocoyam value addition technologies in Abia state. *Nigeria Journal of Agricultural Extension* 21 (3) 116-125.
- Osahon, E.E. and G.E.Ifenkwe (2019). Awareness and Utilization of Cocoyam Value Addition Technologies by Farmers in South-East, Nigeria. *JCCR* 4(2) 127-133.
- Osahon, E.E. and Odoemelam L.E. (2019). Extent of utilization of cocoyam value added technologies among rural households in South-East Nigeria. *Nigerian Agricultural Journal* 50 (2) 233-240.
- Otekunrin, O.A.; Sawicka, B.; Adeyonu, A.G.; Otekunrin, O.A.; Racho N, L (2021). Cocoyam [*Colocasia esculenta* (L.) schott]: exploring the production, health and trade potentials in sub-Saharan Africa. *Sustainability* (13), 4483.
- Udousung, I. J., Akpabio, I. A. and Umoh, C. E. (2018). Perceptions of Constraints Affecting Adoption of Information and Communication Technologies (ICTS) Among Cassava Farmers in Akwa Ibom State, Nigeria. *Journal of Agricultural Extension and Rural Development*, 1(1), 14-23.
- Udousung, I. J., Umoh, I. U and Sylvanus, B (2024a). Indigenous methods of adapting to climate change impact among cassava farmers in Akwa Ibom State, Nigeria. *Journal of Community & Communication Research* Vol. 9 No. 1 Pp.112-120.
- WFP (2024) World Food Programme (WFP) ‘Nigeria Country Brief’ <https://www.wfp.org/countries/nigeria>. Accessed: 20/07/2024