

Limitations and Processing Technologies of Sweet Potato Production by Farmers in Anambra State, Nigeria

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Abstract The study examined limitations and processing technologies of sweet potato production by farmers in Anambra State, Nigeria. Multistage sampling techniques were used for the study. Four local governments out of the 21 local governments in the State were purposely selected due to their popularity in sweet potato production. Two communities were selected from each local government to give a total of 8 communities that were used for the study. Fifteen (15) sweet potato farmers were selected from each community using simple random sampling technique and this gave a total sample size of 120 farmers. Data were generated through a structured interview schedule. Out of 120 questionnaires distributed, only 100 were retrieved and used for analysis. Percentage, frequency, mean score and standard deviation were used for data analysis. Results show that 79% of the farmers were female and their mean age was 38 years. Majority (58%) of the farmers were not aware of the technologies introduced to them while, some farmers were aware of the innovation. None of the farmers adopted the technologies. Too much attention on other crops with a weighted mean score 2.74, high perishability of sweet potato with a weighted mean score 2.63, inadequate finance with a weighted mean score 2.60, pest/disease infestation (2.48), high cost of sweet potato processing equipment (2.48) farmers' low knowledge on sweet potato value Chain (2.45), in adequate extension services with a weighted mean score 2.42 were identified by the farmers as the major constraints to sweet potato production technologies in the study area.

Keywords Limitations, Processing, Nigeria and Production

1. Introduction

Nigeria is one of the largest producers of sweet potato (*ipomoea batatas*) in sub-saharan African with annual production estimated at 3.46 million tons per year[5].

According to Okorie and Onyeneke[4], sweet potato is an important food security crop and a short-term crop that can be consumed by boiling and mashing or frying. It could be mono-cropped or intercropping in complex cropping systems with some staple crops like yam, and maize. A brief analysis of potato production in various countries of Africa reveals that Egypt is Africa's number one potato producer, followed by Malawi while Nigeria is known to be the fourth biggest producer of potato in Africa [8]. However despite the global attention given to sweet potato with regard to food security Nigeria is still recorded number one of the world's lowest average potato yield/hectare with a value of 3.1. Potato consumption is also very low with a value of 3.2kg per capita per year. In Nigeria, more than 85% of the potato production is done by farmers who maintain small farms and carry out their operations manually with traditional farm tools such as hoes and cutlass [3]. Despite the important of the sweet potato in Nigeria as a country the crop has received so much little attention in some States due to a paucity of information on the factors limiting sweet potato production. In the light of the above, this study, therefore, designs to investigate the limitations and processing technologies of sweet potato production in Anambra State, Nigeria. Specific objectives of the study were to ascertain the processing techniques being adopted by the farmers in the study area and to identify the challenges to sweet potato production in Anambra State.

2. Materials and Method

The study area for this research was Anambra State. The State is located in the South east of Nigeria. It is bounded by Delta State to the West, Imo State to the South, Enugu State to the east and Kogi State to the North. It has estimated population of 4, 77,828 million people (NPC, 2006) which stretches over about 60 kilometers between surrounding community. The state lies on the longitude $6^{\circ} 35^E$ and 7^E and latitude of $5^{\circ} 38N$ and $6^{\circ} 47^E$ [9]. Anambra State comprises 21 local Governments and is

predominantly occupied by Igbo ethnic groups who are farmers by nature. The target population for this study was all the sweet potato farmers in the state. Multistage sampling techniques were used for this study. Four local governments out of 21 local governments in Anambra State were selected due to their popularity in sweet potato production. Ayamelum local government, Anambra East local government, Anambra west local government and Awka North local government were selected.

In the second stage, two communities each from a local government were selected. Here Omor and Umumbo in Ayamelum Local Government, Nando and Igbariam in Anambra East, Nzam and Igbede in Anambra West, Achala and Uzum in Awka North local government were selected. This gave total of eight (8) communities. Third stage, 15 farmers were selected from each community using simple random techniques and this gave a total sample size of 120 farmers. Out of 120 questionnaires distributed, only 100 were retrieved and used for analysis.

3. Measurement of Variables

To ascertain the processing techniques being adopted by farmers, six steps adoption model were used (Madukwe, 1995, and Udemzue, 2014)[6]. The farmers were asked to show their adoption stage for the different processing technologies of sweet potato production. Total adoption score for each farmer was calculated by summing the adoption score for the variously technologies.

These were the response categories and corresponding weighted values:

Not aware	0
Aware	1
Interest	2
Evaluation	3
Trial	4
Adoption	5

The challenges to sweet potato production in the study area were achieved using three point likert-type scales. The farmers were asked to indicate their levels of the challenges

to sweet potato production. Their response categories were very serious =3, serious =2, not serious =1. These values were added to obtain a value of 6 which were later divided by 3 to get a mean score of 2.0. Variables with mean score less than 2 were seen as not serious while variables with mean score equal to or above 2 were seen as very serious challenges to sweet potato production in the state.

4. Results and Discussion

Table1 shows that 79% the farmers were female while 21% of the farmers were male. This implies that women dominated sweet potato production activities in the study area. This result is in line with Philip[6] who saw women as the dominance of sweet potato production in Ogun State, Nigeria. Majorities (53%) of respondent were married while 10% of the respondents were single and this could be the reasons women and children were available as family labour. The average mean age was 38 years. The indication is that the farmers were predominantly in their active age and this could also enhance their potential for investment, acceptance, adoption and application of both exotic and indigenous technologies for increased productivity. The average mean household size of the respondent was 5. The implication of this is that the farmers enjoyed a relatively large family size which is a source of labour in the farm production. About 66% of the respondents were full time farmers that combined sweet potato production with other farming crops. However, majority (49%) of the respondents acquire land by rent while about 68% of the respondent cultivated 0.1-0.499 hectare of land. The average farm size cultivated for sweet potato production was 0.23 hectare. This shows that sweet potato farmers in the study area were still under small scale farming. This result is in consonance with spore [7] which observed that sweet potato is grown mainly by women on small plots of land. About 63% of the respondents used family labour while 68% of the respondent sourced agro-input from their fellow farmers.

Table 1. Percentage Distribution of farmers According to Socioeconomic characteristics

Variable	Frequency	Percentage	Mean
Sex	-	-	
Male	21	21	
Female	79	79	
Marital Status			
Single	10	10	
Married	53	53	
Widow	15	15	
Divorce	11	11	
Separated	11	11	
Age			
21-30	26	26	
31-40	32	32	
41-50	24	24	38
51-60	15	15	
61 and above	3	3	
House hold size			
1-5	83	83	
6 above	17	17	5.0
Farm size			
0.1-0.499	69	69	
0.5-0.990	20	200	0.23
1.0 and above	11	11	
Occupation			
Full time farmers	66	66	
Trading	23	23	
Civil servant	11	11	
Source of farm land			
Inherited	13	13	
Purchase	24	24	
Sited	14	14	
Rented	49	49	
Source of labour			
Family	63	63	
Hired	37	37	
Source of agro-inputs			
Input dealers	14	14	
AADP	9	9	
NRCRI	9	9	
Fellow farmers	68	68	

Source: Field survey, 2016

Results in table 2 show that majorities (54%) of the respondents did not acquired formal education while 17% of the respondents completed primary school. High number of illiteracy among the sweet potato farmers could deprive them the opportunity to adopt the recommended practice for sweet potato production. The mean year of farming experience was 9. This implies that the farmers had long farming experience and this can increase their knowledge on farming activities. About 73% of the respondents did not have access to credit while 27% of the respondents have access to credit. Majority of the respondents that do not have access to credit could be as a result of their inability to present collateral for loan assessment and this

may be one of the reasons the farmers cultivated small farm size. This finding is in agreement with Matthew and Fatimoh [2] who said that lack of access to credit compelled sweet potato farmers to cultivate small farm size. Similarly, 64% of the respondents did not have access to extension visit while 70% of the respondents belong to social organization. The average annual income from sweet potato production was N 9,597(Naira) while the average annual expense on sweet potato production was N 1,536.5k. Therefore, from gross margin analysis it is pertinent to say that there is gain in sweet potato production, if adequate attention could be given to it.

Table 2. Percentage Distribution of farmer According to Socioeconomic characteristics

Variable	Frequency	Percentage	Mean
Educational level			
Non formal education	54	54	
Primary sch. Completed	17	17	
Secondary sch. Completed	14	14	
OND/NCE	6	6	
B.Sc./HND	9	9	
Farming experience			
1-10yrs	81	81	
11-20yrs	10	10	9.0
21-30yrs	5	5	
31yrs and above	4	4	
Access to credit			
Yes	27	27	
No	73	73	
Access to extension			
Service			
Yes	36	36	
No	64	64	
Social participation			
Member	30	30	
Non member	70	70	
Income from sweet potato			
5000-10,000	67	67	
10,001-1500	10	10	13,597
15001-20,000	6	6	
20,001-25000	2	2	
25001-30,000	3	3	
30,001-35000	2	2	
Expenses on sweet			
potato production			
1000-2000	97	97	
2100-3000	3	3	1,536.5

Source: Field survey, 2016

Table 3. Percentage distribution of the respondents based on their level of adoption of sweet potatoes processing techniques

Not aware	Aware(1)	Interest(2)	Evaluation(3)	Trial(4)	Adoption(5)%
Fufu flour	58	14	19	9	
Four	45	14	25	10	6-
Starch	55	14	8	16	7
Toasted	39	23	38		

Source: Field Survey, 2016

Figures in table 3 show the levels of adoption of processing techniques used by the sweet potato farmers in the study area. According to NRCRI, sweet potato could be processed into the followings: Processing of sweet potato into fermented Fufu flour, Processing of sweet potato into unfermented flour for use in confectioneries, Processing of sweet potato into starch and Processing of toasted sweet potato.

The findings revealed that majority (58%) of the farmers were not aware of processing sweet potato into Fufu flour, 14% of the farmers were aware while 19% and 9% of the farmers were in interest and evaluation stage of the adoption process. About 45% of the respondents were not aware of processing sweet potato into flour for confessionary, 14% of the farmers were aware, 10% and 6% of the farmers were into evaluation and trial stage respectively. Similarly majority (55%) of the farmers were not aware of processing sweet potato into starch while 14% of the farmers were aware. 8%, 16% and 7% of the farmers were in interest, evaluation and trial stage of adoption process. About 39% of the farmers were not aware of processing sweet potato into toast, 23% of the farmers were aware while 38% of the farmers were in interest stage. Majority of the farmers who were not aware of the processing sweet potato into various forms revealed that they were not fully informed about the innovation by the extension workers and this characterizes one extension worker to cover a wide range of farmers at a short time. Inadequate extension services among farmers were assumed to be an impediment to adoption of new technologies disseminated to farmers. The implication of the above is that some of the farmers who said that they were aware of the innovation might not have full knowledge of it due to inadequate extension service and this could be the major reason they stopped at the trail stage of adoption process. On the other hand, another set of farmers complained about the high cost of processing equipment and this could as well be the reasons some of them did not reach trail stage. Therefore, for a farmer to adopt an innovation there should be full dissemination of the technologies by the extension workers. This finding is in agreement with Chinaka and Udemezue [1] who saw inadequate extension services among farmers as an impediment to adoption of new technologies disseminated to farmers.

Figures in table 4 indicate the different levels of constraints militating against sweet potato production. The constraints were categorized into very serious (3), serious

(2) and not serious (1) and later ranked in descending order of the constraints. Too much attention on other crops with a weighted mean score 2.74 was ranked first, high perishability of the crop with a weighted mean score 2.63 was ranked second, inadequate finance with a weighted mean score 2.60, pest/disease infestation (2.48), high cost of sweet potato processing equipment (2.48) farmers' low knowledge (2.45), inadequate storage facilities (2.44) and inadequate extension service with a weighted mean score 2.42 respectively.

Table 4. Constraints to sweet potato production and processing technologies

Variables	Mean	SD
Too much attention on other crops	2.74	0.056
High perishability of Sweet potato	2.63	0.066
Inadequate finance for Sweet potato	2.60	0.075
Pest/disease infestation	2.48	0.067
High cost of sweet potato Processing equipment	2.48	0.81
Farmers' low knowledge on Sweet potato value chain	2.45	0.80
Inadequate storage facility	2.44	0.86
Inadequate ext. service	2.42	0.87
Climatic limitations	1.89	0.078
High cost of farm labour	1.89	0.079
Land tenure system problem	1.70	0.081
Non availability of planting Materials	1.59	0.671

Source: Field survey, 2016

In views of the above constraints, it could be reasonable to infer that high cost of processing material, inadequate finance and inadequate storage facilities could alternatively shift farmers' attention to other crops like cassava, rice, maize among others. Scarcity and high cost of equipment restricts farmers from procuring necessary farm implement in timely manner and adoption of improved varieties may be delayed in due cost. Therefore, inadequate finance, poor storage facility and high cost of processing material greatly limit sweet potato production to a small scale level, thereby impeding the value addition of sweet potato. This result is in line with the findings of Philip *et al*[6] who saw

inadequate finance, high cost of processing material and inadequate storage facilities as an impediment to agricultural productivity in Nigeria. Low knowledge on sweet potato, inadequate extension service and perishable nature of sweet potato were also seen as another constraints working against sweet potato farmers in the study area. Inadequate extension service could make farmers being inaccessible to some innovations because they may see such innovations as an intruder designed to impede their farming system and this could be the reasons some farmers were stagnant and static in adoption process. But with the help of extension service farmers could be persuaded and become more dynamic in decision to adopt an innovation as well as discarding his/her laggard mind in adoption process. This result agrees with Omore *et al* [5] who said that inadequate extension service was a constraint to sweet potato production in Ogun State, Nigeria.

5. Conclusions and Recommendation

Sequel to the findings of the study, 79% of the farmers were female and the mean age was 38years. Majority (58%) of the farmers were not aware of the processing techniques introduced to them while some farmer were aware of the technology In the same vein, none of the farmers adopted the technologies because they were not fully informed about the technologies by extension workers. However, too much attention on other crops, high perishability of sweet potato, inadequate finance, pest/disease infestation, high cost of processing equipment, farmers' low knowledge on sweet potato value chain, inadequate storage facilities and inadequate extension services were identified as the major constraints to sweet potato production and processing in the study area. This study therefore recommends that more land should be put into sweet potato cultivation as to increase the efficiency at which farmers operate. There is also the need to launch initiatives and enlighten the various sectors of the economy on the usefulness of sweet potato industries like flour mills, bakeries, textiles industries among others should be enlighten and encourage to exploit the potentials of sweet potato so that farmers in the local areas would be aware of the profitability and composite use of sweet potato varieties. Farmers should be encouraged to form farmers association and cooperative to increase their chance of obtaining loan from financial institutions and benefit from various farm credit schemes. Government at all levels should make extension services available to farmers in

order to liberate them from the might of sweet potato production as well as disseminating the appropriate production and processing techniques needed for sweet potato. Research effort should be geared towards the development of cheap and cost effective managements as well as post-harvest technologies addressing storage and processing in orders to reduce post-harvest losses. Therefore, researchers should be endeavored to develop less cost management processing equipment to farmers as to reduce the perishability of sweet potato.

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