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ADOPTION OF IMPROVED COCOYAM TECHNOLOGIES DISSEMINATED BY NATIONAL ROOT CROP RESEARCH INSTITUTE UMUDIKE IN IKWUANO LOCAL GOVERNMENT AREA OF ABIA STATE, NIGERIA

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Abstract
This paper analyzed the adoption of improved cocoyam technologies disseminated by the National Root Crop Research Institute, Umudike in Ikwuano Local Government Area of Abia State, Nigeria. Data were collected from 120 cocoyam farmers using a structured questionnaire/interview schedule. Data collected were analyzed through the use of percentages and mean. Results from the study shows that about 23% of the respondents were within the age range of 21-30 years, 54.4% had a family size of 6- 10 members and 58.3% were females. Results equally show that 61.7% of the farmers were married. Forty nine percent (49%) attained secondary education; many (57.5%) were civil servants and 29.2 % had farm size of between 1 to 2 hectares. "Manure/fertilizer application", "weed control methods" and "pest/disease control" had mean adoption score of 3.44, 3.38 and 3.18 respectively, indicating that the respondents adopted the techniques in order to enhance cocoyam production. The main methods used by the National Root Crops Research Institute to disseminate cocoyam production technologies include: farmers' cooperative, followed by extension agents, establishment of demonstration farms in the area, encouraging farmers' visits to research farms, promotional campaign to encourage cocoyam production, personal contact method, and radio/television programmme on cocoyam. The study therefore recommends that National Root Crops Research Institute (NRCRI) should organize more promotional campaigns and training workshops geared towards encouraging an increased cocoyam technology adoption and production in Ikwuano Local Government of Abia State.

Keywords: Dissemination, Adoption, Improved, Cocoyam, Technologies

Introduction

Cocoyam *(Xanthosoma & Colocasia spp.)* is an important food crop known for its high yields, and high nutritive value of its tubers and leaves. Prior to the civil war in Nigeria, cocoyam utilization was very high, particularly in the southern part of the country. However, the end of the war came with the flooding of our markets with exotic foods and huge reduction in the use of cocoyam. The National Root Crop Research Institute (NRCRI), Umudike initiated a "Cocoyam Rebirth Programme (2007)" which signifies a crop model in rebranding Nigerian agriculture via Root and Tuber Crops Research for Food Security and Empowerment (Chukwu *et al.,* 2011). The outcome of this programme was the compilation of "Cocoyam - Based Recipes," a collection of confectionaries and non - confectionery Cocoyam - based foods. The essence of this was to make available to people up - to - date information on diverse and new ways of processing and utilizing Cocoyam and to provide opportunity to enhance the shelf-life and competitiveness in both local and export trade (Aniedu and Oti, 2009). There are about nine cultivars of cocoyam identified in (NRCRI) namely NXs 001, NXs 002, NXs 003, NCe 001, NCe 002, NCe 003, NCe 004 and NCe 005. NXs series belong to the *Xanthosoma* species (NRCRI, 2003). According to Nwakor (2015), there is a considerable taxonomical confusion between the general *Xanthosoma* and *Colocasia* species. The *Xanthosoma* specie reaches the height of between 1m and 2m and has short stems and large roots. A cormel is produced at the base of the plant; it is usually tall and often bears more than four cormels (Pucikmett *et al.,* 1970). A field survey by NRCRI, Umudike, Nigeria established some optimum conditions provided by local farmers for production of the two varieties of cocoyam. These are planting on mounds or ridges at the seed rate of 20,000-40,000 seeds per ha and establishing in April-June as the best time for

planting and November to December as the optimum harvest period (Arene and Ene, 1987). Cocoyam requires heavy mulching immediately after planting, and weeding two times during its growing period. The cocoyam matures for harvest at 9-12 months after planting when the leaves turn yellow. The average yield of cocoyam is 3 tons per hectare for Colocasia, and 7 tons per hactare for Xanthosoma (FAO, 2000). Cocoyam is said to be shade loving and require soil rich in sustainable supply of nutrient during growth. Adequate organic matter is therefore a panacea for cocoyam production. The use of inorganic fertilizer alone may hardly suffice as a means of soil amendment in cocoyam production, partly because of different nutrients and partly because of high cost and unavailability. The International Institute of Tropical Agriculture (IITA), and the National Root Crops Research Institute (NRCRI) are responsible for cocoyam research in Nigeria and Africa respectively. However, in spite of the targeted goals of these research institutes, there is still insufficient production of cocoyam. The National Root Crops Research Institute is in Abia State and Ikwuano is the host Local Government Area. And it was expected that the impact of this research institute should be seen in the host communities in the area of cocoyam production as one of the mandate crops. The study therefore assessed the impact of National Root Crop Research Institute in the production of cocoyam in Ikwuano Local Government Area of Abia State. The specific objectives of the study were to:

i. describe the socio-economic characteristics of farmers,
ii. ascertain farmers awareness and adoption of improved cocoyam production technologies,
iii. identify the techniques adopted by the National Root Crops Research Institute Umudike in the transfer, and dissemination of cocoyam production technologies and
iv. ascertain the constraints to cocoyam production

Methodology

The study area is Ikwuano Local Government Area (L. G. A.) of Abia State. Ikwuano Local Government Area of Abia State derived its name from four homogenous and contiguous autonomous community that make it up which are: Oboro, Oloko, Ariam and Ibere. Ikwuano was created on 27th August, 1991 and has its headquarters at Isiala Oboro, about 14km away from Umuahia town. Sampling procedure involved multi-stage random selection of three (3) communities out of the four (4) recognized autonomous communities in the L. G. A. The second stage was the selection of five (5) villages from each of the three (3) autonomous communities randomly selected making a total of fifteen (15) villages. The third stage was the random selection of nine (9) cocoyam farmers' households from each of the fifteen (15) villages making a total of one hundred and thirty five (135) respondents. Data were collected through the use of a well-structured questionnaire and analyzed using means, frequency, percentages. Structured questionnaires were used to collect data from 135 respondents. Data collected were analyzed by descriptive statistics such as frequency tables, percentages and mean.

Results and Discussion

The socio-economic characteristics of the farmers studied are age, gender, household size, marital status, educational level of the respondents and primary occupation. Others are farm size, farm allocated to cocoyam production, cooperative membership. These were presented in Table 1. The result on Table 1 shows that about 23% of the respondents were within the age range of 21-30 years, 8.3% of the respondents were within the rage range of 71-80 and 12.5% of the respondents were within the age range of 61-70 years. The mean age of the respondents was 36.5 years. The table also shows that 54.2% of the respondents had the household size of 6-10 family members, and only 6.7% of the respondents had a household size of 11-15 family members. Most of the respondents had a household size range of 6- 10 family members. This implies that most Cocoyam farmers pull their family weight into the business in order to have more hands to work. Also, result from the table shows that 58.3% of the respondents were females, while only 41.7% of the respondents were males. This shows that most of the respondents were females. This pattern of distribution has shown that there are more females in the Cocoyam farming venture within the study area than male. However, the disparity is not so large. The situation may be attributed to the fact that women are more disposed to the more mild tasks of traditional Cocoyam farming in their traditional homes than men who take to other more tasking jobs, even away from their traditional homes for more remuneration (Nwakor, 2015). The table also shows that 61.7% of the respondents were married, whereas 24.2 % of the respondents were single. Only 2.5% of the respondents were separated from their marriage mates. This result implies that Cocoyam farmers in the study area were predominantly married and enlargement of household is possible and common among the married people because they are still in the business of child bearing (Agbarevo and Okringbo, 2020). About 49.2% of the respondents had secondary school education. Three percent (3%) had no formal education and 29.2% of the respondents had tertiary education. The table indicates that many (57.5%) of the respondents were civil servants and 30% farmers. About 60.8% of the respondents were members of cooperative organization, while 39.2% were not members. Forty percent (40%) of the respondents belong to Farmers Association; 29% to a cooperative society, while 12.5% belong to a thrift society.

Awareness of Respondents on Improved Cocoyam Production

The awareness of respondents on improved cocoyam production is displayed on Table 2. Table 2 shows that 89.2% of the respondents were aware of improved cocoyam technologies. This indicates that the

respondents were not ignorant of new technologies that can help them improve their production while about 75% being a third of the respondents adopted cocoyam technologies.

Cocoyam Technologies Disseminated in the Study Area

Table 3 shows the distribution of respondents according NRCRI cocoyam dissemination techniques they benefited from. The result shows that the prevalent method of NRCRI cocoyam technologies dissemination include; farmers' cooperative, followed by extension agents (mean = 2.72), establishment of demonstration farms in the area (mean = 2.65), encouraging farmers visits to research farms (mean = 2.61), promotional campaign to encourage cocoyam production (mean = 2.45), personal contact method (mean = 2.40), and radio/television programmme on cocoyam(mean = 2.37). This finding is in tandem with Agbarevo and Okringbo (2020) who reported that the National Root Crops Research Institute, Umudike was effective in staff visits ($\overline{X}$=3.0), cocoyam technology ($\overline{X}$=3.0), sweet potato technology ($\overline{X}$=2.9), pro- vitamin A cassava ($\overline{X}$=2.5), agro-processing ($\overline{X}$=3.4), turmeric technology ($\overline{X}$=3.0), ginger technology ($\overline{X}$=3.0), and value addition ($\overline{X}$=3.3).

Level of Adoption of Cocoyam Production Techniques

Table 4 shows the distribution of respondents according to their level of adoption of cocoyam production techniques. Results from the study shows that manure/fertilizer application, weed control methods and pest/disease control had mean scores of 3.44, 3.38 and 3.18 respectively. Cocoyam minisett had a mean score of 1.66, while 55% of the respondents adopted weed control and manure fertilizer application. Only 5% of the respondents adopted ridge planting techniques, thus indicating that many of the respondents did not adopt the technology. This finding is consistent with Nwaobiala and Uchechi (2016) who noted that the levels of utilization of cocoyam production technologies showed that the women utilized weed control, manure application, harvesting technologies, crop mixture and time of planting, with a utilization index of 60.4%. Also, Agbarevo and Okringbo (2020) indicated that farmers adopted the following technologies with the following means: yam-minisett technology ($\overline{}$=3.0), cocoyam technology ($\overline{}$=3.0), sweet potato technology ($\overline{}$=2.9), pro- vitamin A cassava ($\overline{}$=2.5), agro-processing ($\overline{}$=3.4), turmeric technology ($\overline{}$=3.0), ginger technology ($\overline{}$=3.0), and value addition ($\overline{}$=3.3).

Constraints Associated with Cocoyam Production

The constraints associated with cocoyam production within the study area are revealed on Table 5. The result in Table 5 shows the constraints associated with cocoyam production result from the study shows that 64.2% of the respondents indicated that limited land was a constraint to cocoyam production and 61.7% indicated that root decay during storage was a problem associated with cocoyam production. Results from the study shows that the major constraints associated with cocoyam production are limited land and root decay during storage. Only 25% of the respondents indicated that low knowledge of processing cocoyam techniques were their constraint. This implies that most of the farmers were acquainted with cocoyam processing techniques and this is not a major problem limiting its production.

Conclusion

Result from the study shows that more than half of the respondents adopted cocoyam technologies and also more than half of the respondents do not belong to any cooperative group. The prevalent method of NRCRI cocoyam technologies dissemination include; farmers' cooperative, followed by extension agents, establishment of demonstration farm in the area, encouraging farmers visits to research farms, promotional campaign to encourage cocoyam production, personal contact method, and radio/television programmme on cocoyam. Most of the respondents were aware of cocoyam technologies and have adopted these technologies indicating that the location of NRCRI in Ikwuano has certainly an influenced the adoption of improved cocoyam technologies in the area with enhanced production of the crop. The following recommendations are made; NRCRI should generate technologies that that will help farmers to store their produce very well, and then make efforts to disseminate such technologies to the farmers who will adopt it to enhance cocoyam production. NRCRI should organize more promotional campaigns and training workshops geared towards encouraging an increase in cocoyam production in Ikwuano Local Government of Abia State. NRCRI should intensify their efforts at disseminating new cocoyam production technologies so as to help more rural farmers in the study area to harness improved cocoyam yield.

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Table 1: Distribution of Respondents by Personal and Socio-economic Characteristics

Variable	Frequency	Percent
Age	28	23.3
31-40	27	22.5
41-50	30	25
51-60	10	8.3
61-70	15	12.5
71-80	10	8.3
Mean age =36.5 years		
Household size		
1-5	47	39.2
6-10	65	54.2
11-15	8	6.7
Gender		
Male	50	41.7
Female	70	58.3
Marital status		
Married	74	61.7
Single	29	24.2
Widowed	14	11.7
Separated	3	2.5
Educational level		
No formal education	4	3.3
Primary education	17	14.2
Secondary education	59	49.2
Tertiary education	35	29.2
Others	5	4.2
Primary occupation		
Farming	36	30
Trading	15	12.5
Civil service	69	57.5
Farm size		
1 ha	22	18.3
2 ha	35	29.2
3-4ha	29	24.2
5-6ha	10	8.3
6ha and above	24	20
Farm size allocated to cocoyam production		
½ha	45	37.5
2 ha	44	36.7
2ha and above	31	25.8
Cooperative membership		
No	47	39.2
Yes	73	60.8
Cooperative group		
Cooperative Society	35	29.2
Thrift Society	15	12.5
Farmers Association	49	40.8
Others	100	83.3
Total	**120**	**100**

Source: Field Survey, 2018

Table 2: Distribution of Respondents by their Awareness of Improved Cocoyam Production

Variable Awareness	Frequency	Percent
Yes	107	89.2
No	13	10.8
Adoption		
No	29	24.2
Yes	91	75.8
Total	**120**	**100**

Source: Field Survey, 2018

Table 3: Distribution of Respondents according to NRCRI cocoyam technologies dissemination technique benefited from

Activities	Very little	Little	Moderate	Much	Mean	Total score
Personal contact method	37(30.8%)	19(15.8%)	45(37.5%)	18(15%)	2.40	288
Extension agents	16(13.3%)	35(29.2%)	38(31.7%)	31(25.8%)	2.72	326
Establishment of demonstration farm in *the* area	19(15.8%)	34(28.3%)	39(32.5%)	28(22.5%)	2.65	318
Radio/televisionprogrammme on Cocoyam	34(28.3%)	31(25.8%)	34(28.3%)	21(17.5%)	2.37	284
Encouraging farmers visits to research farms	27(22.5%)	17(14.2%)	54(45%)	22918.3%)	2.61	313
Promotional campaign to encourage cocoyam production	25(20.8%)	37(30.8%)	41(34.2%)	17(14.17%)	2.45	294
Farmers' cooperatives method	24(20)	25(20.8)	28(23.3)	43(35.8)	2.77	332

Source: Field Survey, 2018.*Decisionmean, 2.5

Table 4: Distribution of Respondents according to their stages in Adoption of Cocoyam Production Techniques

S/No	Technology	Unaware	Aware	Interest	Evaluation	Trial	Adopted	Mean ( )	Total score
1.	Cocoyam minisett	32(26.7%)	51(42.5%)	10(8.3%)	0(0%)	7(5.8%)	20(16.7%)	1.66	199
2.	Intercropping	23(19.2%)	28(23.3%)	21(17.5%)	11(9.2%)	10(8.3%)	27(22.5%)	2.32	278
3.	Mound planting techniques	18(15%)	25(20.8%)	20(16.7)	18(15)	13(10.8)	26(21 .7)	2.51	301
4.	Ridge planting techniques	9(7.5%)	33.27.5)	26(21.7)	27(22.5)	19(15.8)	6(5%)	2.27	325
5.	Corn planting techniques	14(11.7%)	27(22.5%)	14(11.7%)	20(16.7%)	15(12.5%)	30(25%)	2.71	325
6.	Pre sprouting techniques	32(26.7%)	22(18.3%)	14(11.7%)	15(12.5%)	15(12.5%)	15(12.55)	2.21	265
	Time of planting	11(9.2%)	35(29.2%)	12(10%)	15(12.5%)	11(9.2%)	36(30.0)	2.73	328
8.	Weed control methods	6(5%)	23(19.2%)	9(7.5%)	19(15.8%)	8(6.7%)	55(45.8%)	3.38	413
9.	Manure/ fertilizer Application	13(10.8%)	15(12.5%)	9(7.5%)	7(5.8%)	21(17.5%)	55(45.8%)	3.44	405
10.	Pest/ disease control	7(5.8%)	37(30.8%)	4(3.3%)	5(4.2%)	13(10.8%)	54(45%)	3.18	382

Source: Field Survey, 2018

Table 5: Distribution of Respondents view on Constraints Associated with Cocoyam Production

Variables	Frequency	Percent
Limited land	77	64.2
High cost of planting materials	49	40.8
Low soil fertility	51	42.5
High cost of labour	72	42.5
Lack of fund to invest	47	39.2
Poor knowledge of cocoyam techniques	29	24.2
Lack of extension contacts	39	32.5
Low knowledge of processing cocoyam techniques	30	25
Low price of products	33	27.5
Root decay during storage	***74***	***61.7***

****Multiple responses***
Source: Field Survey, 2018