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Effect and Constraints of Adoption of Recommended Cassava Production Practices by Farmers in Bwari And Kuje Area Council Abuja, Nigeria

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Abstract
Farming practices have been poor in Nigeria compared to countries like Brazil, Thailand and Indonesia. Stakeholders in agriculture have made all effort in promoting the adoption of recommended cassava production practices (RCPPs). In spite of this, adoption of RCPPs remains low, resulting to poor farm productivity. Consequently, this study examined the effects of adoption of the recommended cassava production practices (RCPPs) on the yield and income benefit among farmers; as well as the constraints faced by farmers in adoption of the recommended practices. The study used a multi-stage sampling procedure to select 120 registered cassava farmers. Frequencies, percentages, means, and Z – test were employed for data analyses. Result of the Z-test revealed that the mean yield of cassava before and after adoption was 3,832t/ha and 6,387 t/ha respectively; with a differential of 67%. The mean income of farmers before and after the adoption was ₦464, 642.00 and ₦714, 833.00 respectively, with differential as 54%. The major constraints for low and non-adoption of some of the recommended cassava production practices were limited scale and uneven distribution of farmland, insufficient funds and complex nature of technologies disseminated to farmers. The study therefore recommended that technology developers should develop technologies that are simple, cost effective and easily adoptable by farmers. On the other hand, promoters of technology adoption should intensify efforts targeted at improving service delivery and the promotion of the adoption of recommended cassava production practices by the farmers, especially those technologies that recorded low levels of adoption. But more than this, it is recommended that the applicable technologies should be appropriate, easy to adopt and sustainable.

Keywords: Income, yield, improved technologies, Z-test

Introduction

Nigeria is one of the world's largest producer of cassava, with annual output at 60 million tonnes produced from close to 6.5 million hectares at the rate (yield) of 9.1 tonnes/ha compared to Ghana's 20 tonnes/ha and Indonesia'24 tonnes/ha (Edamisan *et al*., 2020). Inadequate adoption of contemporary innovations and technologies has constrained cassava productive efficiency to less than 60% in most countries in sub-Saharan Africa including Nigeria (Ajibefun, 2015). Nigeria's production account for 19% of the world output and 34% of Africa's output (Agwu and Anyaeche, 2007). Nigeria occupies the 8th position in terms of its productivity (kg/ha), relative to countries such as Brazil, Thailand, Indonesia, Uganda, India, Ghana and Congo respectively (FAFAO, 2018). This is attributed to a number of production factors, such as; the varieties cultivated and the management practices adopted. These farming practices have been revealed to be poor in Nigeria compared to countries like Brazil, Thailand, Indonesia (FAO, 2018). The International Institute of Tropical Agriculture (IITA), Ibadan, National Root Crops Research Institute (NRCRI), Umudike, and many other research institutions have developed appropriate cassava technology packages aimed at promoting cassava production and improvement on cassava yields. Cassava research by IITA and NRCRI over the years has led to the development of different varieties that are resistance to major diseases and pests. These varieties give over 50% higher yields compared to local varieties (Yahaya, 2007). The persistent problem of food shortage in Nigeria has led to increasing agricultural productivity, which involves the use of improved yielding crop varieties. These have been popularised among farmers through extension services of agricultural development projects (ADPs). The

multiplication, distribution and adoption of TMS varieties by farmers have led to tremendous yields increase over the years.

The economy is basically agrarian, with majority of the people living in squalor and very poor standards. Most of the farmers are subsistence small holders, farming 1.2 hectares of farmland under a traditional system characterized by low technology and production efficiency. Besides, they are also faced by problems of natural resource inputs, especially land, water, labour and management. The poverty among farm families goes beyond material deprivation to include insecurity, vulnerability and exposure to risks, shocks and stress. This poor condition of the rural communities had continued to deteriorate since independence due to severed neglect emanating from poor and inconsistent policy formulation and implementation by successive governments in Nigeria (Okozie, 2003 and Adamu and Umar, 2020). The introduction of technologies to a social system is designed to achieve certain outcome, whether this is achieved or not depend on changes that are noticed among the target groups. Improved farm equipment enables farmers to increase the land area under cultivation and achieve higher income (Philip *et al*., 1990). Berry, 1993 and Sambo *et al*. (2015) noted that income is likely to increase, especially if production expands as a result of increases in yield per hectare and the adoption of cultural practices, which sustain soil fertility over time.

The problem limiting the production of cassava in the Federal Capital Territory (FCT), is the over dependence on traditional methods of production by farmers. The RCPPs is package aimed at improvement on cassava yield. Osuagwu (2002) stated that cassava yield can be increased by adoption of recommended practices or by expanding the land area under cultivation. The process of increasing cassava yield through modernization is dependent on the extent to which farmers become aware of the existence of such recommended practices, develop interest, evaluate them, try them and become convinced of their relevance. It is only then that it can be expected that the farmers would adopt completely all the components of the recommended production practices. Several studies (Okoosi, 1990; Saito, 1994; Okozie, 2003 and Bakut, 2015) revealed that farmers in the study area have access to different improved cassava production practices and cassava hybrid cultivars. The Federal government through the Cassava Multiplication Programme (CMP), Root and Tuber Expansion Programme (R-TEP) and the Abuja Agricultural Development Project (ADP) have all made a lot of commitment in promoting the adoption of these recommended cassava production practices. However, in spite of all efforts, the farmers in the study area are still practicing the traditional cassava production methods (Kuta, 2007). Consequently, the production of cassava in the study area in terms of its yield (1.2 million tones) is relatively low (BAC Annual Report, 2004). Therefore, the need to determine factors militating against the adoption of recommended cassava production practices on yield and income among farmers in Bwari and Kuje Area Council, Abuja, The research seeks to answer the following objectives: The broad objective of this study was determine the effect of adoption of recommended cassava production practices on yield and income among farmers in Bwari and Kuje Area Council Abuja, the specific objectives are to:eexamine the effect of adoption of recommended cassava production practices on income and yield of farmers and; identify the constraints faced by farmers in the adoption of recommended cassava production practices.

Hypotheses of the Study:HO: Adoption of recommended cassava production practices has no significant influence on yield and income of farmers.

Methodology

The Federal Capital Territory (FCT) is centrally located, lying within the latitude 8°25N and 9°20N. and longitude 6°45′E and 7°39′E. Abuja has a boundary with Kaduna State to the North and Kogi State to the South. It is also bounded to the East and West by Nassarawa and Niger States respectively. There are six Area Councils in Abuja namely: Abaji, Bwari, Gwagwalada, Kuje, Kwali and Abuja Municipal Area Councils. Abuja covers an area of 8,000 square kilometres with a total population of 1,899,622 in 2012 (NPC, 2006). Abuja like most parts of the country records its highest temperatures during the dry season months which are generally cloudless. During the dry season, the typical month of which is March, temperatures could be as high as 37°C in the South-West and about 30°C in the North-East (BACFCT, 2020). Rainfall starts from March in the Southern parts of the territory (Abaji and parts of Kuje Area Councils) and from April in the Northern parts (Bwari Area Councils) and ends around October in the Northern parts and November in the extreme South. The duration of the rainy season therefore, varies from 240 days in the Northern parts to 290 days in the Southern parts. (BACFCT, 2020).The people are predominantly peasant producers cultivating crops such as yam, cassava, maize, sorghum, rice, groundnut, beans and vegetables. They embark on small, medium and large-scale livestock marketing, and live mostly in organised settlements, towns and cities (BACFCT, 2020).

Multi-stage sampling technique was used to select the respondents. Two Area Councils (Bwari and Kuje) were purposively selected in the first stage; this selection was based on the intensity and concentration of farming activities particularly cassava production in the study area. In the second stage, two out of the ten districts (Kuduru and Igu) were randomly selected from Bwari using a table of random number technique. Three districts (Rubuchi, Gwagwalada and Gudunkarya) were also selected from the 15 districts of Kuje giving a total of five districts. In the third stage, assigned value number of random selection method was employed to select two villages from Kuduru district (Gutau and Kuduru), three villages from Igu (Igu, Panunike and Tokolo), two villages from Rubochi (Rubochi and Kujekwa), two villages from Gwargwada (Gwargwada

and GidanBawa) and one village from Gudunkarya. In the fourth stage, the list of farm villages and households from ward councilors revealed that a total number of registered farmers in these five districts were 1200. This formed the sample frame for the study. In the fifth stage, 120 of the respondents that is, 10% of this population was randomly taken from the sample frame in the study area.

A well-structured questionnaire was used to collect information from the farmers. Information was collected on the socio-economic, institutional and technological characteristics of the respondents. Interview method, informal observation and pictorial information were also gathered more appropriately as means to elicit adequate information on the study area. The study made use of eight recommended production practices and these are: Recommended planting material; healthy stem cutting with 4 – 5 nodes; recommended planting time - April and June, then August or September; recommended method of planting; planting on ridges at an angle; recommended planting depth (5cm – 10cm); recommended plant spacing(1m x 1m) for sole cropping; recommended fertilizer rate (NPK 15:15:15, 4 – 8 bags per hectare) and weeding (herbicide application); Pre-emergence herbicide - Alachlor (Lasso) at300 ml/ CP15 knapsack pump; Selective post –emergence herbicide - Round-up at 4-5 liters perhectare; harvesting (cassava lifters).

Descriptive statistics was used to analyse the general constraints faced by farmers on adoption of recommended cassava production practices and Z-statistic was used to examine the effect of adoption of recommended cassava production practices on income and yield of the respondents. The Z-test model was used to compare the differences in yield and income of the farmers before and after adoption of recommended practices.

$$z = \frac{\blacksquare - \mu\blacksquare}{\bar{S}X} \ldots\ldots (1)$$

Where, Z = calculated Z value; $\bar{X}$ = Mean of the sample; $S\bar{X}$ = Standard error of the mean

$$s = \sqrt{\frac{\sum(x_1 - \bar{x})^2}{n-1}} \ldots\ldots (2)$$

Where, x_1 = individual observation; $\bar{x}$ = Mean of the distribution;
n = sample size

Results and Discussion

Effect of Adoption of Recommended Cassava Production Practices on Yield and Income

The result in Table 1 shows the effect of adoption on the yield and income of the respondents before and after the adoption of RCPPs. The average yield was estimated to be 3832.4t/ha before the adoption of RCPPs and 6387.33t/ha after adoption with a differential percentage of 67%. The minimum yield before and after the adoption of RCPPs was 1800 and 3000t/ha respectively. The maximum yield before and after the adoption of RCPPs was 9330 and 15550t/ha respectively. The Z- calculated was 21.25; above the Z-critical of 1.96 at 1% level of probability. This implies evidence of significant difference between the yield of cassava farmers before and after the adoption of RCPPs. The results revealed that the yield of farmers after adoption was higher than yield before adoption. The result further showed that, the average income was N464,641.67 before the adoption of RCPPs and N714,833.00 after the adoption. The minimum income before and after the adoption was N260,000 and N400,000 respectively. The maximum income was N1,222,000.00 and N1,880,000.00 in that orrdr; giving a 54% increase. The Z- calculated was 5.38 and was significant at 1% level of probability. These findings revealed that the income of farmers after adoption of RCPPs was higher than income before adoption. The findings was consistent with the report of Anazodo (1986), Dodo and Dutse (2018) who noted that adoption of improved farm practices resulted in an increase in total production by improving yields and income. The mean percentages for both yield and income were higher and this implied that the adoption of cassava recommended practices had significant influence on the yield and income of the cassava farmers.

Constraints Militating against Adoption of Recommended Cassava Production Practices by Farmers

The major constraints faced by farmers in the adoption of recommended cassava production practices as presented in Table 2 showed the ranking of the constraints faced by the respondents on adoption of recommended cassava production practices. Scarcity of farmlands with 77.50% of the respondents ranked first constraint, followed by insufficient extension agents with 27.50% and the least was 6.67% (Problems of root/tuber pests and diseases and poor information network).

Conclusion

The findings of this study have revealed that cassava farmers are handicapped by scarcity of farmland, suggesting their inability to expand the current level of cassava production. Also, inadequate funds were a limiting factor on adoption of Recommended Cassava Production Practices (RCPPs) among farmers. However, the study noted that the adoption of RCPPs increased the yield and income of the farmers. This is reflected in the ability of the farmer to meet up with their socio-economic responsibilities, and improvement in their living conditions. But, in spite of the fact that the adoption of RCPPs had positive and significant effects on yield and income of farmers, and holds great potential, there was low level of adoption of this technology due to the high cost attributed to it. Hence, it is recommended that appropriate technologies, which should be made available to the farmers, must be affordable and timely availed by the agencies and stakeholders involved. Furthermore, since the major

constraint on adoption of recommended cassava production practices was limited scale and uneven distribution of farmlands, it is recommended that appropriate adoptive sustainable technologies that would suit the fragmented nature of farmlands be developed by research institutes and made available for use by the farmers.

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Table 1: Effect of adoption of improved cassava recommended practices on yield and income

Variable	Before	After	Difference	% Difference
Yield (t/ha)				
Mean	3832.4	6387.3	2554.93	67
Maximum	9330	15550	6220	
Minimum	1800	3000	1200	
Standard deviation	180.3	300.5	120.2	
Z-calculated	21.25***			
Z-critical	1.96			
Income (Naira)				
Mean	464,641.67	714,833.33	250191.66	54
Maximum	1,222,000.00	1,880,000.00	658000	
Minimum	260,000.00	400,000.00	140000	
Standard deviation	199,622	307,111.9	107489.9	
Z-calculated	5.38***			
Z-critical	1.96			

Source: Field Survey, 2015. *** P<0.01

Table 2: General constraints faced by farmers on adoption of recommended cassava production practices

Constraints	Frequency	Percentage	Rank
Limited scale and uneven distribution	93	77.50	1
Insufficient extension agents	33	27.50	2
Insufficient capital	19	15.83	3
High cost of farm inputs and affordability	10	8.33	4
Lack of access roads	9	7.50	5
Processing, storage and marketing problems	9	7.50	6
Problems of root/tuber pests and diseases	8	6.67	7
Poor information network	8	6.67	8

Source: Field Survey, 2019