



ISSN: 0975-833X

RESEARCH ARTICLE

FACTORS INFLUENCING THE INCLUSION OF ROOT AND TUBER CROPS IN THE CROPPING SYSTEMS OF FARMERS IN OYO STATE, NIGERIA

*Adeola, R. G. and Ariwoola, S. A.

Department of Agricultural Extension and Rural Development Ladoke Akintola University of Technology,
P M B 4000, Ogbomosho Oyo state, Nigeria

ARTICLE INFO

Article History:

Received 20th October, 2012
Received in revised form
14th November, 2012
Accepted 17th December, 2012
Published online 25th January, 2013

Key words:

Root and tuber,
Cropping system,
Inclusion,
Productivity.

ABSTRACT

Root and tuber crops form the major subsistence staples in larger parts of sub-Saharan Africa. However, in Nigeria, root and tuber production relies mainly on smallholders that have multiple practices to choose from while considering crops to be included in their cropping systems. This study examined factors influencing the inclusion of root and tuber crops in the cropping systems among farmers in Oyo state. Data were collected from 360 farmers randomly selected using a structured interview schedule. Frequency counts, percentages and Chi-square were used for the data analysis. The study revealed that factors such as age ($\chi^2 = 337.600, P < 0.01$), high yield potential ($\chi^2 = 122.500, P < 0.01$), availability of planting material ($\chi^2 = 544.150, P < 0.01$), compatibility with the cropping systems ($\chi^2 = 124.576, P < 0.01$), low risk involvement ($\chi^2 = 90.000, P < 0.01$) and low capital requirement ($\chi^2 = 168.500, P < 0.01$), farm size ($\chi^2 = 96.100, P < 0.01$) and ease of management ($\chi^2 = 96.100, P < 0.01$) significantly influenced the inclusion of root and tuber crops in the farmers' cropping systems in the study area. The extension administrators should also intensify efforts at educating the farmers on the importance of root and tuber crops in the cropping systems.

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INTRODUCTION

Root and tuber crops (cassava, yam, Irish and sweet potatoes, cocoyam and taro) are the African's main staple foods which account for 20% of calories consumed in many parts of Sub-Saharan Africa on (Keyon *et al.*, 2006) Roots and tubers are important sources of employment and income for the teeming population of the developing countries considering the intensity of labour involved in their production and processing. As important primary crops in the developing world these crops play significant roles in the global food system with an estimated value of more than US\$41 billion in 1995-1997 realized from their production in developing countries (Scott *et al.*, 2000). More than 2 billion people meet their energy and nutrition requirements through roots and tubers in the developing worlds. Root crops and tubers account for two-thirds of staples grown in Nigeria and the production of these crops stand at 83.3 million tonnes in 2010. However, there has been a sharp decline in production growth from 8.9% to 2.5% per year during 1990 -1999 and 2000 - 2010 respectively (FAOSTAT, 2013).

Improving roots and tuber production were considered to be one of the strategies for food security in Nigeria and this has led to the establishment of Root and Tuber Expansion Programme (RTEP) by the Federal Government of Nigeria.

One of the objectives of the programme includes the development of sustainable cropping systems through the testing, multiplication and release of appropriate root-and-tuber varieties (FMANR, 2006). The introduction of the programme has led to the development of wide varieties of root and tuber crops such as potatoes, yam, and cassava among others. The programme is expected to help farmers to increase their production using improved varieties. However, farmers' decisions concerning the inclusion of these varieties in their cropping systems depend on whether these varieties fit in the framework of the production systems. Hence, the need to investigate factors that influence the inclusion of root and tuber crops in the cropping systems of farmers in Oyo State of Nigeria.

MATERIALS AND METHODS

The study was conducted in Oyo state which is one of the major roots and tuber crops producing states in the southwest, Nigeria. Oyo state covers an area of 27,249 square kilometres of land mass and it is bounded on the south by Ogun State, in the north by Kwara State, in the west it is partly bounded by Ogun State and partly by the Republic of Benin, while in the East by Osun State Oyo State has an equatorial climate with bimodal rainfall and relatively high humidity. The dry season lasts from November to March while the wet season begins from April and ends in October.

*Corresponding author: Adeola, R. G.

Department of Agricultural Extension and Rural Development Ladoke Akintola University of Technology, P M B 4000, Ogbomosho Oyo state, Nigeria.

A multi-stage sampling procedure was used to select a sample of farmers in this study. The first stage includes the purposive selection of two agricultural zones, namely Ibadan/Ibarapa and Ogbomoso. These are the major root and tuber crops producing areas in Oyo state. Secondly, three Local Government Areas (LGAs) were selected from each zone by random sampling. The selected LGAs were Ogo-Oluwa, Orire and Surulere in Ogbomoso zone; Akinyele, Ido and Ona Ara in Ibadan/Ibarapa zone. The third stage includes a random selection of six villages from each LGA making a total of thirty-six (36) villages. Thereafter, ten (10) farmers were randomly selected from each village to arrive at a sample of three hundred and sixty (360) farmers. A structured interview schedule was used to obtain data from the respondents.

RESULTS AND DISCUSSION

The statistical summary of the personal characteristics of the farmers is presented in Table 1. The mean age of the farmers was about 48 years with the majority (66.7%) falling and belong to the productive age group which is likely to enhance productivity. About 79% of the farmers were males. The average farm size of the respondents was 3.5 hectares with the majority (56.8%) holding between 3 - 5 hectares of land for cultivation. Hence the respondents can be said to be smallholders. The majority (64.2%) of the respondents had farming experience within the range of 10 - 29 year with a mean of 25.7 years (Table 1). Root and Tuber Expansion Programme (RTEP) was a popular programme in the study area with the majority (84.2%) of the respondents became aware of it (Table 2). This may be due to their access to information relating to RTEP from ADP extension agents in the study area.

Table 1. Distribution of Respondents by personal Characteristics n = 360

Characteristics	Frequency	Percentage
Age in years		
≤ 30	45	12.2
31 – 39	75	20.8
40- 49	136	37.8
50 and above	104	28.9
Total	360	100.0
Gender		
Male	285	79.2
Female	75	20.8
Total	360	100.0
Farm size (Ha.)		
1 – 2	125	34.7
3 – 4	105	29.6
4 – 5	98	27.2
> 5	32	8.9
Total	360	100.0
Farming experience (Years)		
≤ 10	102	28.3
11 -19	63	17.5
20 – 29	66	18.3
30 and above	129	35.8
Total	360	100.0

Source: Field survey, 2013

Table 2. Distribution of respondents by Awareness of Root and Tuber Expansion Programme (RTEP) n = 360

Awareness	Frequency	Percentage
Aware	303	84.2
Un-aware	57	15.8
Total	360	100.0

Source: Field survey, 2013

Crops intercropped with root and tuber crops

The respondents indicated the inclusion of root and tuber crops in the cropping systems that involved the following crops in descending order of Maize > Leafy vegetables > Pepper > Tomato > Groundnut > Cowpea > Sweet orange > cashew (Table 3).

Table 3. Summary Statistics of Crops Intercropped with Roots and Tuber Crops n=360

Crops	Mean	SD	Rank
Maize	0.85	0.358	1 st
Leafy vegetables	0.63	0.485	2 nd
Pepper	0.42	0.494	3 rd
Tomato	0.27	0.443	4 th
Groundnut	0.26	0.438	5 th
Cowpea	0.19	0.394	6 th
Sweet orange	0.14	0.349	7 th
Cashew	0.13	0.334	8 th

Source: Field survey, 2013

Root and tuber crops included in the cropping system

Approximately 93% of the respondents indicated the inclusion of cassava in their cropping systems with various crops while, more than two-thirds included yam in their cropping systems. However, less than twenty five percent of them included sweet potatoes in their cropping systems (Table 4). These findings signify the importance of cassava as an important crop among the smallholders. Yam was also included in the cropping system by the majority probably due to the importance value attached to it by the Nigerian populace (FAOSTAT, 2012).

Table 4. Distribution of respondents by root and tuber crops included in the cropping n = 360

Root and tuber crops included	*Frequency	Percentage (%)
Yam	318	88.3
Potatoes	81	22.5
Cassava	336	93.3

*Multiple Responses

Source: Field survey, 2013

Table 5. Chi-Square Analysis of Factors Influencing the Inclusion of Roots and Tuber Crops in the Cropping Systems

Variables	Chi square	Df	P value	Decision
Age	337.600	31	0.000	Significant
High Yield potential	122.500	1	0.002	Significant
Availability of planting materials	544.150	12	0.000	Significant
Low capital requirement	168.500	13	0.001	Significant
Compatibility	124.576	1	0.000	Significant
Farm size	234.300	13	0.002	Significant
Ease of management	96.100	1	0.001	Significant
Low risk involvement	90.000	1	0.000	Significant

Significant level = P < 0.01

Source: Field survey, 2013

Further findings revealed that, age ($\chi^2 = 337.600$, $P < 0.01$), high yield potential ($\chi^2 = 122.500$, $P < 0.01$), availability of planting material ($\chi^2 = 544.150$, $P < 0.01$), compatibility with the cropping systems ($\chi^2 = 124.576$, $P < 0.01$), low risk involvement ($\chi^2 = 90.000$, $P < 0.01$), low capital requirement ($\chi^2 = 168.500$, $P < 0.01$), farm size ($\chi^2 = 234.300$, $P < 0.01$) and ease of management ($\chi^2 = 96.100$, $P < 0.01$) were factors that significantly influenced the inclusion of root and tuber crops in

the cropping systems among farmers in the study area. The majority of the respondents belong to active and productive age group and would be willing to take risks in order to increase productivity. Hence, age becomes an important factor for the inclusion of root and tuber crops in their cropping systems. The significant influence of availability of planting materials on the inclusion of root and tuber crops signified the importance of input availability as a motivating factor for technology adoption. Farm size had a significant influence on root and tuber crops inclusion in the cropping systems possibly because of the small-holdings of the respondents. Thus, the majority of the farmers with small size of land would like to maximise their resources through multiple- cropping systems in order to minimise the risks. Root and tuber crop varieties with high yielding potential probably become a significant factor because of the farmers' desire to increase productivity. This was previously asserted by (Langyinto *et al.*, 2001) that, productivity will remain low as farmers continue to use low yielding inputs and technology.

Conclusion

It is evident from this study that age; high yield potential, availability of planting materials, compatibility with the cropping systems, low risk involvement, low capital requirement, farm size and ease of management were the factors that influenced the inclusion of root and tuber crops in the cropping systems among farmers in the study area. Efforts should be intensified at making available improved root and tuber varieties to the farmers for proper integration into the local farming systems. Researchers and extension staff should work together to ensure that farmers' needs are adequately met through effective linkage to facilitate feedback from farmers.

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