



Analysis of Constraints to Cocoyam Production in Kaduna State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author SA designed the study, wrote the protocol and wrote the first draft of the manuscript. Author BM managed the literature searches, analyses of the study performed the spectroscopy analysis and author AA managed the experimental process and identified the species of plant. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Aims of the study were to describe socio-economic characteristics of cocoyam farmers and ascertain the constraints associated with cocoyam producers in Kaduna state.

Study Design: Primary data were collected from cocoyam producers through the use of structured questionnaires.

Place and Duration of Study: "This study was carried out in three local government areas in Kaduna state", Nigeria between August and November 2014 cropping season.

Methodology: Multistage purposive and random sampling techniques were employed for data collection.

Results: The study showed that 34% of the respondents fall within the age range of 30 and 39 years. The majority of the farmers (50%) had no formal education. The household size ranged from 6-10 persons, whereas (73%) were not members of cooperative society. Results indicated that pest and disease was the most severe constraint of cocoyam producers with about 91.13% of cocoyam

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farmers attesting to this fact.

Conclusion: The findings of the study ascertained the causes of decline in cocoyam production among farmers in Kaduna State. The study showed that cocoyam production is yet to be maximized since several constraints still limit its production. The most severe problems included pest and disease, unavailability of improved seed, inadequate capital, high cost of input, labour shortage and access to market. These constraints constitute serious impediments to cocoyam production and need to be addressed adequately before cocoyam production can be improved in the area. It was obvious from the study therefore that cocoyam production was declining as a result of the majorly agronomic and marketing constraints. It is recommended that agro based industries should be encouraged by the government to support research and production of cocoyam products for commercial purposes and timely and adequate supply of fertilizer should be made available to farmers at affordable price in order to enhance the production of cocoyam.

Keywords: Cocoyam; constraints; agronomic; production; Kaduna state.

1. INTRODUCTION

Nigeria's domestic economy is partly determined by agriculture which accounted for 40.9% of the Gross Domestic Product (GDP) in 2010 [1]. Agriculture has been an important sector in the Nigerian economy in the past decades and is still a major sector despite the oil boom. Basically, it provides employment opportunities for the teeming population, eradicates poverty and contributes to the growth of the economy. Despite, these however, the sector is thus characterized by low yields, low level of inputs and limited areas under cultivation [2]. Nigeria is an agrarian economy with 70% of its people dependent on agriculture [3]. The Government of Nigeria has been trying to achieve food security at both house hold and national level through its mechanized approach.

Root and tuber crops which are among the most important groups of staple foods in many tropical African countries [4] consistute the largest source of calories for the Nigeria population [5]. Cassava (*Manihot esculenta*) is the most important of these crops in terms of total production, followed by yam (*Dioscorea* spp), cocoyam (*Colocasia* spp and *Xanthosoma* spp) and sweet potato (*Ipomoea batatas*) [5].

Cocoyam (*Colocasia esculenta* and *Xanthosoma mafafa* (L) Okeke) are important carbohydrate staple food, particularly in the southern and middle belt areas of Nigeria [6]. Nutritionally cocoyam is superior to cassava and yam in the possession of higher protein, mineral and vitamin contents in addition to having more digestible starch [7,8]. Cocoyam which ranks third in importance and extent of production after yam and cassava is of major economic value in Nigeria [9]. Edible cocoyam cultivated in the

country is essentially species of *Colocasia* (taro) [10] and *Xanthosoma* (tannia). The average production figure for Nigeria is 5,068,000 mt which accounts for about 37% of total world output of cocoyam [11]. Small scale farmers, especially women who operate within the subsistence economy grow most of the cocoyam in Nigeria.

It is highly recommended for diabetic patients; the aged, children with allergy and for other persons with intestinal disorders [12]. According to [13], boiled cocoyam corms and cormels are peeled, cut up, dried and stored or milled into flour. The flour can be used for soups, biscuits, bread and puddings for beverages. The peels can also be utilized as feed for ruminants.

Despite the importance of cocoyam, more research attention have been given to cassava and yam [14,15]. [16], observed that research on cocoyam has trailed behind cassava and yam as root crops in Nigeria and other countries. Ezedinma [17] noted that the totality of published scientific work on cocoyam is insignificant when compared with those of rice, maize, yam and cassava. However, Skott et al. [16] asserted that it was only in the last decade that policy makers and national agricultural research systems began to show systematic interest in the crop because of concern over biodiversity. There is a declining trend in cocoyam production as well as a shortage of its supply in domestic markets as a result of a number of technical, socio-economic and institutional constraints, which need to be addressed. Cocoyam farmers are generally found on a small scale and their production has been undermined.

Arising from the forgoing, there is need to have a look into the production of cocoyam, one of the

major roots and tuber crops in Nigeria which is fast becoming an extinction crop. This is due to the general belief that most families no longer consume it because it is not readily available for consumption even during its season, as a result of reduction in its production level. This study therefore measured the technical efficiency of cocoyam producers in Kaduna state.

Production of cocoyam has not been given priority attention in many countries probably because of its inability to earn foreign exchange and its unacceptability by the high income countries for both consumption and other purposes [18]. Most of what is produced is consumed locally [19]. The production is labour intensive with most operations carried out manually at the traditional level. There is a dearth of information on the economics of cocoyam production in Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

This study was conducted in Kaduna state of Nigeria. Kaduna state lies in the north western part of the country's geopolitical zone, about 200 km away from Abuja the federal capital. The state lies between latitudes 9°N and 12°N of the equator and between longitudes 6°E and 9°E of the prime meridian. Kaduna state shares boundaries with Katsina and Kano state to the north. Plateau to the north east, Nasarawa and Abuja to the south and Niger and Zamfara state to the west [20]. The state occupies an area of approximately 68,000 square kilometers or 7% of Nigeria's land mass. The state has 23 Local Government Areas [21]. The mean annual rainfall shows a marked decrease from South to North (1,524 mm to 635 mm). Two distinct seasons occur in the state; the rainy season and the dry season. The relative humidity is constantly below 40% except in few wet months when it goes up to an average of 60%. The duration of dry season is 5-7 months which normally starts from October. The state is agrarian and well suited for the production of arable crops such as maize, yam, millet and sorghum because of a favourable climatic condition. Livestock production is also practiced in the state. Rearing of goats, sheep, cattle and different classes of poultry as well as marketing of their products is practiced in the state. The people of the state live mostly in organised towns and cities [22]. A large variety of non-agricultural occupations also exist.

The total population of the state is 6.11 million [21]. Based on annual population growth rate of 3.2%, the projected population of the state was about 7.33 million people in 2012. Within the state there are a number of establishments ranging from companies, research institutes, higher institutions and colleges.

2.2 Sampling Procedure

Multistage sampling techniques were used to select respondents for this study. The first stage involved a purposive selection of the three (Giwa, Kudan and Ikara) local governments based on predominance of cocoyam production among the farmers. Secondly, 9 villages were purposively selected, Three (Giwa, Yakawada, Guga; Gimbawa, Kwasallawa, Malikanchi and Musawa, Hunkuyi, Kudan) from each local government area based on their intensity of cocoyam production. Finally, a simple random sampling was employed in selecting farmers from each of the villages. Fifty percent (50%) of the sample frame (248) was used as the sample size. In all, 124 farmers were randomly selected for the study.

2.3 Data Collection and Analysis

Primary data were used for this study. These were collected with the aid of structured questionnaires. The information collected includes labour input, fertilizer input, seed, farm size and farmer's socio-economic characteristics such as age, household size, educational status, amount of credit received, number of extension contacts, years spent on the cooperative and credit and constraints associated with cocoyam production. Finally, descriptive statistics was used for the analysis.

3. RESULTS AND DISCUSSION

The socio-economic characteristics of the respondents are presented in Table 1. The study revealed that 34% of the respondents fall within the age range of 30 and 39 years. The mean age of the farmers was 40 years; this implies that the majority of the farmers were younger, who can contribute positively to agricultural production for the next two decades. This result is consistent with the findings of [23] who observed that youth constitute the majority of the cocoyam farmers

and younger farmers are more flexible to new ideas and risk; hence they are expected to adopt innovations more readily than older farmers. The majority of the farmers (50%) had no formal education. This indicates that the farmers' educational level is low. According to [24], education has a positive and significant impact on farmers' efficiency in production. The literacy level greatly influences the decision making and adoption of innovation by farmers, which may bring about an increase in production of the crop. The educational level of farmers does not only increase their productivity but also increase his ability to understand and evaluate new techniques. The majority of the farmers (30%) had household size with 6-10 members. The average household size was 13 persons implying that there is appreciable source of family labour supply to accomplish various farm operations. According to the report of [25], there is a positive and significant relationship between household size and farmers' efficiency in production. However, the absolute number of people in a certain family cannot be used to justify the potential for productive farm work. This is because it can be affected by some important factors namely; age, sex and health status. This shows that a reasonable number of the respondents have a large household size. Higher household size provides enough persons for family labour and less money will be needed to pay for hired labour. About (73%) of cocoyam farmers do not participate in any cooperative association. According to them, their non-membership is due to being small scale and unawareness of any association while 27% participated with average of 2.4 times per year. The effect of this result is that most of the cocoyam farmers in the study area do not enjoy the assumed benefits accrued to co-operative societies through pooling of resources together for a better expansion, efficiency and effective management of resources and for profit maximization. Zalkuwi et al. [26] stated that membership of cooperative societies have advantages of accessibility to micro-credit, input subsidy and also as avenue in cross breeding ideas and information. (85%) of cocoyam farmers in the study area have no access to extension service while (15%) have access to extension service with average of 0.4/year. This could be attributed to low extension agent-farmers' ratio in the study area.

Table 1. Socio-economic characteristics of cocoyam farmers

Variable	Frequency (N = 124)	Percentage
Age (years)		
20-29	32	25.8
30-39	42	33.8
40-49	17	13.7
50-59	20	16.0
60 above	13	10.4
Mean	40	
Educational status		
No formal education	62	50.0
Primary education	11	8.9
Secondary education	34	27.4
Tertiary education	17	13.7
Household size		
1-5	28	22.5
6-10	37	29.8
11-15	23	18.5
16-20	19	15.3
21 above	17	13.6
Mean	13	
Membership of cooperative society		
Non members	90	72.6
1-5	21	16.9
6-10	4	3.2
11-15	4	3.2
16 above	5	4.0
Mean	2	
Extension contact		
No contact	105	84.7
1-3	16	12.8
4-6	3	2.4
Mean	0.4	
Access to credits		
Personal savings	116	93.5
Borrowing	8	6.5

N = Number of respondents

3.1 Constraints to Cocoyam Production in the Study Area

The result in Table 2 showed that three constraints factors were critical in the decline of cocoyam production in the study area.

Table 2. Production constraints of cocoyam farmers

Constraining factors	Frequency*	Percentage	Rank	Coping strategy
Pest and diseases	113	91.13	5	Use of wood ash, neem plant extract and insecticides.
Lack of improve seed	53	42.74	4	Recycle seed from previous harvest
Inadequate capital	53	42.74	4	Personal savings and borrowing from friends.
High cost of inputs (seed, fertilizer, and farm land)	13	10.48	3	Use of family land and purchase of fertilizer
Shortage of labour	08	6.45	2	Use of family labour to augment hired labour
Access to market	04	3.23	1	Use of nearby market immediately after harvesting
Total	191	100		

*Multiple responses, ranking according to severity 1=least severe, 2=moderately severe, 3=severe, 4=more severe and 5=most severe

The extracted factor include; agronomic (pest and disease, unimproved seed and shortage of labour), marketing (high cost of inputs and access to market) and socio-cultural (inadequate capital) problems. These were ranked according to their severity as stated by the farmers (Table 2). The problem of pest and disease was the most severe constraint of cocoyam producers with about 91.13% of cocoyam farmers attesting to this fact. Cocoyam leaf patches, shrinking of the seed and seed dormancy were responsible for pre-harvest and post-harvest losses by cocoyam producers. Unavailability of improved seed was more severe (42.74%) by cocoyam farmers in the study area. According to the respondents they make use of seeds from their previous harvest which is not reliable and can jeopardize improved and sustainable productivity. This finding is in line with [27], opined that most farmers have little or no access to improved seeds and continues to recycle seeds that have become exhausted after generations of cultivation.

About 42.74% of the respondent was also more severe with lack of capital to expand their production. This affects cocoyam production in the study area, because the meager savings the farmers might have made or the funds generated from relatives is not sufficient to satisfy various activities in cocoyam production. Credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity. It agrees with findings of [28] who noted that access to micro-credit could have prospect in improving the productivity of farmers and contributing to

uplifting the livelihoods of disadvantaged rural farming communities.

Farmers also perceived that high cost of input like fertilizer and farm land was severe by 10.48% of the respondent. According to the respondents fertilizer is made available when farmers are far into the production period, sometimes at the middle of the raining season.

About 6.45% of the cocoyam farmer indicate a shortage of labour as moderately severe constraints in the study area. Family labour was predominant in the study area and that is why there was acute shortage of labour. According to the farmers, during active period of production-every household would have been engaged in his family farm work. The demand for labour is normally very high and expensive during the peak period of land clearing, ridging, harvesting, processing and weeding while 3.2% of the respondents said access to cocoyam market is the major constraint faced in the study area.

4. CONCLUSION

The paper ascertained the causes of a decline in cocoyam production among farmers in Kaduna State. The study showed that cocoyam production is yet to be maximized since several constraints still limit its production. The most severe problems included pest and disease, unavailability of improved seed, inadequate capital, high cost of input, labour shortage and access to market. These constraints constitute serious impediments to cocoyam production and need to be addressed adequately before

cocoyam production can be improved in the area. It was obvious from the study therefore that cocoyam production was declining as a result of the major agronomic and marketing constraints.

5. RECOMMENDATIONS

Pest and disease are the most severe constraint affecting cocoyam production. Therefore, it is recommended that agro-based industries should be encouraged by the government to support research and production of cocoyam products for commercial purposes. Also, timely and adequate supply of fertilizer should be made available to farmers at affordable price in order to enhance the production of cocoyam.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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