ANALYSIS OF FACTORS AFFECTING PESTICIDES USAGE AMONG YAM FARMERS IN KWANDE LOCAL GOVERNMENT AREA OF BENUE STATE, NIGERIA

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Abstract
The study analyzed factors affecting pesticides usage among yam farmers in Kwande Local Government Area of Benue State, Nigeria. A sample size of 120 yam farmers was selected using multistage sampling technique. Primary source of data were collected through structured questionnaire. The data were analyzed using descriptive and inferential statistics. Result on socioeconomic characteristics showed that majority (78.3%) of the respondents were males with mean age of 35years, 93.3% were married and spent an average 11years in school, The major (93.3%) of the occupation was farming, with an average household size of 7persons, average farm size was 1.7 hectares and farming experience of 32years. Multiple regression result showed that, quantity of yam harvested and access to credit were significantly influenced yam production at ($p<0.05$).
The study concludes that quantity of yam harvested was significant a factor influencing use of pesticides. The study recommends that government should provide credit support for farmers to expand their production capacity so as to encourage use of pesticides.

Keywords: *Analysis, Pesticides, Usage, Yam Farmers, Factors*

Introduction

In Nigeria, just like in many sub-Saharan African countries, agriculture is the largest employer of labour. One of the popular agricultural produce in Subsahara Africa is yam. Yam (*Dioscorea species*) is an annual root tuber bearing plants with more than 600 species out of which six are socially and economically important in terms of food, cash and medicine (Yusuf and Daramola, 2020). Some of the yam species are water yam (*Dioscorea alata*), white yam (*Dioscorea rotundata*), yellow yam (*Dioscorea cayanensis*), Chinese yam (*Dioscorea esculant*) and three-leaf yams (Peter, 2012)).

Yam production has gone some dramatic changes in many parts of the world. Nigeria has highest annual yam production in the world and one of the three largest producers between 1961 and 2016 (Ogbonna,, 2019). The area harvested in the world has increased from 1.15 million (Ha) in 1961 to 5.04 million (Ha) in 2012. Yield (Hg/Ha) in the world also increased from 72.35 thousand metric tons in 1961 to 116.65 thousand metric tons in 2012 (Nahanga, 2015). Over 58. 8 million tons of yams were produced in the world in 2012, out of which 92.2% were from West Africa. Nigeria accounted for over 65% (38 million metric tons) of the world yam production, valued at $7.75 billion and cultivated about 2.9 million hectares of land in 2016 (FAO, 2018). While trailing second and third positions by a wide margin were Ghana (6.6 million metric tons) and Côte D'Ivoire (5.8 million metric tons) in 2012. The development of yam output could be partly attributed to the use of modern farm inputs, even though, the inputs are not sufficiently available to farmers. Depending on the variety of yam products, its yield potential ranges from 20–50 tons per hectare. During the bad season, the yield could be around 10 tons per hectare. The growth rate of yams output is far from consistent, especially in Nigeria, partly due to the unattractiveness of farming and low prices of yams in the market. However, the majority of the rural population still engaged in farming activities because there are no other job opportunities for them apart from yam cultivation in these regions (Abdulai and Huffman, W., 2014). Why initials here

The increasing demand for food supply due to rapid growth in human populations has triggered agricultural intensification during the last few decades. To address the growing food demands, pesticides are rigorously used in agriculture which accomplishes the gap between food production and consumption (Narita *et al*., 2018). Following Afoakwa *et al.* (2012), West African yams are major source of income, with a high cultural value. A festival is held annually to celebrate its harvest. Consumer demand for yam is generally very high in the sub-region and yam cultivation is very profitable despite high production costs. There are many cultivars of yam throughout the humid tropics. White Guinea yam (*Dioscorea rotundata*), is the most important species – especially in the dominant yam production zone in West and Central Africa. It is indigenous to West Africa, as is the yellow Guinea yam*, Dioscorea cayenensis*. there are over 200 cultivated varieties of white and yellow yam (Negatu *et al*., 2016).

Following Jallow (2017), application of pesticides which includes insecticides, herbicides, fungicides and nematicides are effective ways of managing pest and diseases. It may also include synthetic fertilizers, hormones and other chemical growth agents, and concentrated stores of raw animal manure. Following Narita, *et al*. (2018), Pesticides are vital components and an integral part of modern agriculture. These chemicals quickly gained great popularity as an efficient, labor-saving, and economic tool in pest management in most agricultural sectors. They protect plants against harmful insects, fungi, and weeds, and also prevent some human diseases. Furthermore, Ogbonna, (2019) stated in the last 60 years that farmers have achieved major progress in foodstuff production through efficient application of pesticides, prevention or reduction of pest activities and agricultural losses at a reasonable cost improved crop yields and promoted food availability during all seasons. Following Namshit (2012), Yams are majorly affected by pests like insects and Nematodes which has actually reduced the amount of production of yam globally. Pests and diseases in both field and storage constitute the most important constraint in yam production; pests especially yam beetles create holes in the tubers and reduced the quality of the tubers and also facilitate fungal infection leading to tuber rots (Afoakwa *et al*. 2012). Attack by nematodes affects the quality of tubers too. Infestations by nematodes in yam producing areas increases due to the shortening of fallow (Manyong and Oyewole, 2017). Naskar (2010) reviewed a total of 73 insect species associated with *Dioscorea* species in different parts of the world.

Many farmers retain and use about 25% of the yam harvested as planting materials for next cropping season, pests and diseases in both field and storage constitute the most important constraint in yam production. Pests especially yam beetles create holes in the tubers and reduced the quality of the tubers and also facilitate fungal infection leading to tuber rots. Attack by nematodes affects the quality of tubers too. Infestations by nematodes in yam producing areas increases due to the shortening of fallow (Damalas and Koutroubas, 2016). Matthew (2018) reported that the use of pesticides could possibly tackle the challenges encountered by pest and other militating factors against Yam Production. However, many agrochemicals are toxic, and agrochemicals in bulk storage may pose significant environmental and/or health risks, particularly in the event of accidental spills. In many countries, use of agrichemicals is highly regulated. In anyway being considered, the importance of agrochemicals in agriculture cannot be over emphasized as it helps to control pest and diseases in the farm. The farm is faced with enormous organic and inorganic enemies which could be fought with agrochemicals to achieve the desired output from the farm (Chandler, 1991) too old

Several studies were carried out by other researchers concerning use of pesticides for yam production. For instance, Adeniyi *et al*. (2017) worked on determinants of the extent of pesticides used in Nigeria. Anang and Amikwuzuno (2012) analyzed factors influencing pesticides usage by small holder yam farmers; Nweke (2014) Analyzed on challenges of use of pesticides for yam production. Nothing or little is done concerning the effect of pesticides on yam production in Kwande Local Government Area of Benue State, which this study wishes to address.

Objectives of the Study

The broad objective of this study was to analyze factors influencing pesticides usage among Yam farmers in Kwande Local Government Area of Benue State, Nigeria.

The specific objectives were to;

i. describe the socioeconomic characteristics of yam farmers in the study area
ii. determine factors influencing pesticides usage among yam farmers in the study area

Methodology

The Study Area

The Area in which the research was carried out is Kwande local government area of Benue State, Nigeria. Kwande is a Local Government Area of Benue State, Nigeria. Its headquarters is at Adikpo. Kwande has an area of 2,891 km^2 and a population of 248,697 at the 2006 Census.is bordered by several other LGAs. On the west, it is bordered by Vandeikya Local Government, Ushongo LGA on the north, and Katsina-Ala LGA on the northwest. On the south, it is bordered by Cross River State and in the southeast by the Republic of Cameroon. Kwande LGA also shares a common border with Takum LGA of Taraba State on the east. It has fifteen council wards but sixteen traditional districts.

As a result of its mountainous nature and proximity to the Cameroonian range of mountains, Kwande Local Government usually has cold weather which makes it very conducive to traders and investors. The local government also has very big rivers which usually take care of agricultural and industrial needs.

Kwande LGA was created out of the erstwhile Katsina Ala Division on February 3, 1976 as a result of the nationwide Local Government Reforms of 1976 which was undertaken by the then military government of General Murtala Muhammed as part of its intention to return power to civilians, and a precursor to active comprehensive political action. The reform was also designed to spread government programmes to the grassroots and to institutionalize the local government system in Nigeria. The reform resulted in the creation of 301 local governments across the country of varying populations between 150,000- 800,000. Prior to the 1976 reform, the local government system in the country was less autonomous with the colonial era Native Authorities serving as an avenue of policy implementation directed from Lagos. Towards independence, a system of elected councils was created but after independence the power of the system was minimal.

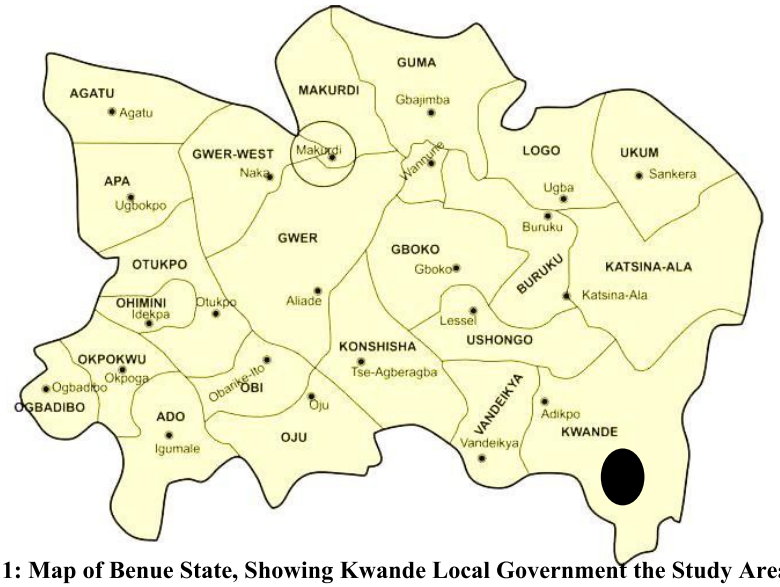


Figure 1: Map of Benue State, Showing Kwande Local Government the Study Area
Source: Wikipedia, 2021

Key

The Study Area

Population and sample size selection

The population of the study comprises all yam farmers in the study area. The study employed multi-stage sampling technique to select a total sample size of 120 respondents. The first stage involved a purposive selection of five council wards out of the 15 wards due to their high participation in yam production. Second stage random selection of one community from council wards to avoid bias. The third stage, the proportionate sampling (2%) and random selection of yam farmers. A sample size of 120 was considered for the study.

Table 1: Sample Size Selection Plan

Council wards	Communities	Sample frame	Sample size(0.02)
Live II	Ikyogen	1209	24
Mbagba	Uzege	1239	25
Mbaketsa	Mbape	1205	24
Tondov I	Mbapev	1083	21
Mbadura	Boagundu	1285	26
Total		6021	120

Source:????????

Method of Data Collection

Primary Data were collected using a structured questionnaire

Method of Data Analysis

Both descriptive and inferential statistics were used for the data analysis. Frequency, percentages and means were used to analyze objective 1. Objective 2 was analyzed using multiple regression.

Model specification

Multiple regression to determine the factors affecting pesticides use by yam farmers is stated as;

$Y=\beta_0+ \beta_1X_1+ \beta_2X_2+ \beta_3X_3+ \beta_4X_4+ \beta_5X_5+ \beta_6X_6+ \beta_7X_7 + \beta_8X_8+ \beta_9X_9 + u_i$

Where;

Y = Pesticides usage (liters of pesticides)

The explanatory variables or independent variables included in the model are as follows.

$\beta_o = \beta_n = regression\ coefficients$

X_1 = Sex of yam farmers

X_2 = Age of yam farmers (years)

X_3 = Years of education (number)

X_4 = Farming size (ha)

X_5 = Farming experience (years)

X_6 = Price of pesticides (litres)

X_7 = quantity of yam harvest (kg)

X_8= Access to extension Agent (i=yes, O if otherwise)

X_9= Access to credit (1=yes, No=0)

u_i= omitted variables

Results and Discussion

Socio-economic Characteristics of Yam Farmers Using Pesticides

The result of socioeconomic characteristics of yam farmers using pesticides is presented in Table 1. Result on sex reveals that, majority (78·3%) of respondents were male, while 21·7% were females. The result indicates that pesticides usage on yam production is mostly done by male farmers. This implies that male farmers were mostly owners of resources and yam farming is male dominated. This result agrees with Etim *et al*. (2013) who reported similarly that male were mostly

yam farmers.

The result on age shows that, majority (80.0%) of respondents were between 41 and 45years, 11.0% were more than 45years, 7.5% were between 36-40years, 1.7% were between 31-35years and less than 30years respectively. The mean age was 35years indicates that respondents were in their productive age. This implies that yam farmers belong to productive age group knowledgeable enough to make use of pesticides in yam production. This finding agrees with Etim *et al*. (2013) who reported that most yam farmers were in their productive age.

The result on marital status showed that majority (93.3%) of the respondents were married; 3.3% widowed/widower, 1.7% were single and 1.7% divorced. This implies that majority of the respondents had families, hence greater involvement in yam production in order to ensure household food security. This aligns with Peter (2012) who reported that most yam farmers were married.

The result of household size revealed that, 43.3% of the respondents had between 9-12 persons, 30.8% had above 13persons, 20.0% had less than 4 persons and 5.8% had between 5-8persons. The mean household size was 7 persons. This indicates that respondents had large household size. This implies high number of family labor per household maybe available for use by farmers in production and pesticides application. The finding confirms Adogwa (2014) who observed that rural households in Nigeria were characterized by large family size with high dependency ratio.

Result on years spent in school presented in Table 1 showed that majority (64.2%) spent between 7 and 12years, 25.0% spent more than 13years and 10.8% spent less than 6years. This shows that there was high level of literacy among farmers in the study area. This agrees with the Peter (2012) who stress that the role of education in increasing the adoption of improved agricultural technologies.

The result on major occupation showed that majority (93.3%) of the respondents were involved in farming, 3.3% were involved in trading and others occupations, respectively. This implies that, as an agrarian environment, most of the respondents were farmers. This is in line with Peter (2012), who reported that most persons in Benue State were farmers.

The result on farm size showed that, majority (80.0%) of respondents cultivate between 0.01 and 1hectare of land, 11.7% cultivate between 1.01 and 2.00hectares, 6.7% cultivate between 2.01 and 3.00hectars and 1.7% cultivate more than 3.0hectares. The average farm size cultivated was 1.17hectares. The result shows that majority of the respondents had small farm size, which could lead to under production in the study area. This is in line with Etim *et al*. (2013) who reported that most yam farmers in Benue State used small portions of land.

The result on the farming experience also revealed that, 53.0% of the respondents had above 35years of farming experience, 20.8% had below 15years, 12.5% had between 21 and 30years, 7.5% had between 31 and 35years and 5.8% had between 16-20years farming experience. The average farming experience was 32years. This implies that majority of the respondents have enough experience in farming, had engaged for a long period of time. The findings of this study agree with Ajani and Agwu (2012) who stated that most of the small scale farmers in Anambra state had been involved in agricultural production for a long period of time.

Table 1: Distribution of Respondents based on Socioeconomic Characteristics of yam farmers (n=120)

variables	Frequency	Percentage	Mean
Sex			
Male	94	78.3	
Female	26	21.7	
Age (Years)			
25-30	2	1.7	35
31-35	2	1.7	
36-40	9	7.5	
41-45	96	80.0	
>45	11	11.0	
Marital Status			
Single	2	1.7	
Married	112	93.3	
Widowed	4	3.3	
Divorced	2	1.7	
Years spent in school			
1-6	13	10.8	11.11
7-12	77	64.2	
13-18	30	25.0	
Occupation			
Farming	122	93.3	
Trading	4	3.3	
Others	4	3.3	
Household size			
1-4	24	20	7.45
5-8	52	5.8	
9-12	37	43.3	
13-16	7	30.8	
Farm size (ha)			
0.01 – 1.00	96	80.0	1.17
1.01 – 2.00	14	11.7	
2.01 – 3.00	8	6.7	
3.01 – 4.00	2	1.7	
Farm Experience			
15	25	20.8	32
16-20	7	5.8	
21-30	15	12.5	
31-35	9	7.5	
>35	64	53.0	

Source: Field Survey (2021)

Factors Affecting Pesticides Usage in the Study Area

The multiple regression results on the factors affecting pesticides use in the study area is presented in Table 3. The result showed the coefficient of determination of 0.3143 which implies that, 31.43% of the variation in pesticides use was explained by the explanatory variables. The F-statistics coefficient if 64.16 is statistically significant at 1% ($p<0.01$) which implies that the explanatory variables jointly explained the use of pesticides among yam farmers. Therefore the null hypothesis which states that, there are no significant factors affecting pesticide use among yam farmers in the study area is rejected.

The coefficient of quantity of yam harvest (-0.0308546) was negative and statistically significant at 5% which implies that increase in quantity of yam harvest will also reduce the use of pesticides by its coefficient. This is not in line with a priori expectation which states that increase quantity of yam increase the use of pesticides in storage to prevent spoilage. Although this may be only true for farmers who harvest and sell at farm gate without storage. . Also Karunammoorthi *et* (2012) showed that more quantity of yam in the barn requires increase quantity of pesticide used.

The coefficient of access to credit (-1.679258) was negative and is statistically significant at 5% which implies that a unit increase in access to credit will reduce the use of pesticides by its coefficient. This is not in line with a priori expectation which states that increase in credit increases use of pesticides. Although, this may be peculiar to situations were farmers hardly obtain credit/loan and credit facilities for farming purposes. According to Ibitayo, (2006) yam farmers when deprived of chances of obtaining credit facilities, they are also deprive of use of credit facilities on the farm.

Table 3: Multiple Regression Results on factor affecting pesticides use by yam farmers

Variable	Coefficient	z	p>(z)
Constant	6.588664***	2.76	0.006
Sex	-0.5797934	-1.12	0.263
Age	-0.0179424	0.52	0.607
Educational level	-0.0888123	-1.09	0.276
Farm size	-0.2906026	-1.00	0.317
Farm experience	-0.0039212	-0.12	0.902
Total price of pest.	0.000015	1.02	0.308
Qty of yam harvest	-0.0308546**	-2.33	0.020
Access to extension agent	0.4956161	0.61	0.539
Access to credit	-1.679258**	-1.92	0.055
R^2	0.6256		
F-statistics	0.3143***		

***, ** = 1%, 5% significance level of probability
Source: Field Survey, 2021

Conclusion and recommendations

Conclusion: The study concludes that both quantity of yam harvested and access to credit were significant factors influencing use of pesticides.

Recommendation The study recommends that government should provide credit support for farmers to expand their production capacity so as to encourage use of pesticides.

References

Abdulai, A., & Huffman, W. (2014). The adoption and impact of soil and water conservation technology. *Journal of Agricultural Economics, 65*(1), 185–207.

Adeniyi, I.A.; Oguntokun,W.F.; Ibiyinka, O. (2017). Determinants of the extent of pesticide use in Nigerian farms. *Afr. J. Soil Sci5*, 347–355.

Adogwa, E.E. (2014). The contribution of yam (*Dioscorea* spps) production to the Nigeria Economy: A case study of Otukpo Local Government Area, Benue State. A project work submitted to the Department of Environmental Science, National Open University of Nigeria

Afoakwa, B.; Asiedu, C. and Nyirenda, C. (2012). Viscoelastic properties and physic-functional characterization of six high yielding cassava mosaic Disease-Resistant cassava (manihot esculenta crantz) Genotypes.

Anang, B.T. and Amikuzuno, J. (2015). Factors influencing pesticide use in smallholder rice production in Northern Ghana. *Agric. For. Fish*. 4, 77–82.

Chandler, P. (1991). The Indigenuos Knowledge of Ecological Processes among peasants in Fujian", *Agriculture and Human Values* 8(1/2): 59-66

Damalas, C. A., and Koutroubas, S. D. (2016). Farmers' exposure to pesticides: Toxicity types and ways of prevention. *Toxics, 4*(1), 1-13

Etim, N.A., Thompson, D. and Onyenweaku, C.E. (2013). Measuring efficiency of yam(Dioscorea spp) production among resource poor farmers in rural Nigeria. *Journal of Agriculture and Food Sciences*, 1(3), pp 42-47.

FAO (2018). Food and Agricultural Organisation, the state of Agricultural market. www.faostat.org

Food and Agriculture Organization of the United Nations (FAO). (2021). International code of conduct on pesticide management. Rome: FAO/WHO.

Heywood, V. H. (2017). Environmental impacts of agricultural pesticides in tropical ecosystems. *Agriculture, Ecosystems & Environment,* 236, 113–122.

Ibitayo, O. O. (2006). *Egyptian farmers' attitudes and behaviors regarding agricultural pesticide use*. ***Middle East Journal of Family Medicine,*** **4**(1), 17–22.

Isegbe, M.; Habib, J.; Ekoro, S. and Solomon, S. (2016). Residues of organochlorine pesticides in Dried Beans (*Vigna ungulculata*) originating from Nigeria. In: I*nternational Journal of Innovative Food, Nutrition and Sustainable Agriculture,* 4(4):25-30, Oct-Dec., 2016 © Seahi Publications, 2016 www.seahipaj.org ISSN: 2354-2934.

Jallow (2017). Pesticides risk behaviours and factors influencing pesticides use among farmers in Kuwait. Retrieved from Researchgate, www.researgate.org on 17th October, 2021

Karunamoorthi, K., Mohammed, M. and Wassie, F. (2012). *Knowledge and practices of farmers with reference to pesticide management*. **Environmental Health Insights, 6**, 55–70.

Manyong and Oyewole, 2017, the effects of education on agricultural productivity under traditional and improved technology in Northern Nigeria: An endogenous switching regression analysis.

Matthews, G. A. (2018). *Pesticide Application Methods* (4th ed.). Wiley-Blackwell.

Nahanga N. (2015), An analysis of yam production in Nigeria-IDEAS/RePEC

Namshit C. (2012), Revised stratigraphy of the blanche town clay, murray Basin; Age constraints on the evolution of paleo lake Bungunnia.

Narita, A., Matsui, Y., Iwao, K., Kamata, M., Matsushita, T., & Shirasaki, N. (2018). *Selection of priority pesticides in Japanese drinking water quality regulation*. ***Science of the Total Environment,*** **644,** 514–521.

Naskar, N. (2010). An antioxidant potential of Hydromethanolic Extract of phoenix dactylitera fruits.

Negatu, B., Vermeulen, R., Mekonnen, Y., and Kromhout, H. (2016). Use of chemical pesticides in Ethiopia: Knowledge, attitude and practice of farmers. *Environment International, 93*, 215–222.

Nweke, F. (2004). New Challenges in the Cassava Transformation in Nigeria and Ghana; International Food Policy Research Institute: Washington, DC, USA

Ogbonna, K. I. (2019). Farmer indigenous experimentation for pest management under yam cultivation farming system in the humid ecological zone of Nigeria. *Global Journal of Agricultural Sciences,* 18:39-46

Okoffo, E. D., Mensah, M., Fosu-Mensah, B. Y., and Gordon, C. (2016). Farmers' knowledge, attitudes and practices of pesticide use in vegetable production in Ghana. *Environmental Systems Research, 5*(1), 1–17.57.

Peter, G. K. (2012). The effects of herbicides on crop production and environmental in Makurdi Local government Area of Benue State, Nigeria. *Journal of Sustainable Development in Africa,* 14(4):1-7

Yusuf, S. A. and Daramola, A. G. (2020). Determinants of safe pesticide use among cocoa farmers in Southwest Nigeria. *Nigerian Journal of Agricultural Economics, 10*(1), 75–87.

Note the following

1. Heywood, 2017- only seen in references and not in the text

2. Anang – 2012 seen in the text but 2015 in the references
3. Isegbe, 2016- only seen in the references
4. Matthews, 2018 -only seen in the references
5. Okoffo, 2016 – only seen in the references
6. Ajani and Agwa, 2012 – only seen in the text
7. Nweke, 2014 in the references but 2004 in the text
8. FAO, 2021- only seen in the references