EFFECT OF CLIMATE CHANGE ON THE PERCEPTION OF OKRA PRODUCTION TO IMPROVED INCOME GENERATION AMONG FARMERS IN NIGER STATE, NIGERIA.

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ABSTRACT
The research titled "Effect of Climate Change on the Perception of OkraProduction to Improved Income Generation among farmers in Niger State" Nigeria.Multi-stage sampling techniques were used for the study, a total of 100 okra farmers were sampled.Descriptive and inferential statistics were used for the analysis. The result revealed that okra farmers with age range between 51 years and above perceived the effect of climate change (50%). Farming activities in the study area were dominated by the male farmers (80%). Respondents with secondary education were the majority (50%), The result showed that okra farmers of 51 years and above were the highest (50%). The greater proportion of the farmers belong to farmer's cooperative (70%). Majority (75%) received extension massage through the individual methods. Similarly, majority(85%) does not have access to credit. Most of the farmers (60%) generate higher income between N101, 000 – 200,000. Human factor such as deforestation (60%), over grazing (30%) contributed to the causes of climate change. Producers noticed droughts and high temperature (75%). Measure adapted by farmers to mitigate against climate change effects were inadequate information on the perceived effect of climate change (90%), high cost of farming equipment (70), were constraints. The correlation analysis revealed the relationship between the perceive effect of climate change on okra production and selected socio – economic variables, education was found to be significant at 1% level of probability with r = 0.0192, Regression coefficients of factor affecting climate change, revealed that education (4.838%), income (-4.262), mitigation strategies (4.899%) and cooperative membership (5.041%) were significant at 1% level of probability. Okra farmer should be taught by extension agents the mitigation measures against flooding, intense wind, storms, and hurricane such as planting of trees, cover crops and construction of dams and canals.

Keywords: Farmers perception, Effect, Climate change, Okra production

INTRODUCTION

Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions, climate change is caused by factors that include oceanic process (such as oceanic circulation), variation in solar radiation received by the earths tectonic plates and volcanic eruptions and human induced alterations of the natural worlds, these effects are currently causing global warming and climate change is often use to describe human specific impacts by Intergovernmental Panel on Climate Change (IPCC, 2017). Climate change is modifying fish distribution and productivity of freshwater species. This has effect on the sustainability of fisheries and aquaculture on the livelihoods of communities that depend on fisheries. The effects of changing rainfall patterns and water have impact on fresh okra farming.Several international agencies including the World Bank and the Food and Agriculture Organization (FAO) have programmes to help countries and communities adapts to climate change(World Development Report, 2010).

Statement of the research problem

Okra has become a major source of vitamins and fibres in Nigeria and improved people's diets. However, Okrafarmers are still faced with many problems and the climate still pervade in the country.The loss of productivity of flooding, drought and salinity are indicators of climate change and these have led to the decrease in okra production. These problems hindered okra farmers in Niger State from okra production, it also caused global warming which is affecting okra production negatively, there has been low rainfall, flooding, drought and standard of living of these okra production has been affected in the study area, hence this work is intended to find out the effect of these problems to see how it can be ameliorated. However, with better knowledge and understanding of the effect of climate change, appropriate measures could be taken in order to adapt to these changes. Hence there is need to study the economic and other effect of climate change in trying to find possible solutions to the problem of climate change as it relates to okra production in the study area.

Aim and Objectives of the study

The aim of the study was to examine the Effect of Climate Change on the Perception of OkraProduction to Improved Income Generation among farmers in Niger State" Nigeria.The specific Objective of the study were to:

i. describe the socio-economic characteristic of the okra farmers in the study area;

ii. describe the extent to which okra farmers perceived the effect of climate change;
iii. identify the measures adopted by the okra farmers to mitigate against climate change effect;
iv. determine the influence of socio – economic characteristics on the perception of okra farmers on the effect of climate change, and
v. identify the constraints to adaptation and mitigation measures of climate change by okra farmers in the study area.

Hypotheses of the study

i. There is no significant relationship between effect of climate change on the perception of okraproduction to improved income generation among farmersand measures adopted to mitigate climate change and its effect in the study area;

Justification of the study

In recognition of the role of okra most especially, as major source of vitamins and its economic value that the study is of great importance to look into. This study is expected to provide and add valuable information to the existing knowledge about the climate change effect on okra production in the study area. Agricultural research system focuses on boosting productivity which is the primary engine of economic growth in the horticultural sector. The study will also help the extension agents to give useful information to okra farmers on the effect of climate change and how to reduce the occurrence of this menace. This study also aimed at opening the new dimension to okra farmers and policy makers on how to increase okra production in Niger State through extension agent in order to address food production problems in Nigeria through the use of modern and appropriate modern farming equipment. Finally, the result of the study will also be useful to policy makers as a guide in designing appropriate policies needed to improve and guide future researchers on okra production.

METHODOLOGY

This study was conducted in Niger State, Nigeria. The State was created in 1976. It is located in Guinea Savannah Region and lies between latitude 6^0 8^1E and 8^0 44^1 N of the equator. The State covers land area of 74,244sq km of 7,424 million hectares covering 8% of the land area of the countries. It has a population of about 3,950,249 people [National Population Commission (NPC), (Census, 2006)] The State experiences distinct dry and wet seasons with annual rain fall ranges from 1,100mm in the north to 1,600mm in the south and mean rain fall of 1350mm. the raining season last between 120 and 190 days and temperature ranges between 35 and 37.5 ^{0}C with relative humidity between 60 and 80% in the month of July and 40 and 60% in January.

Sampling Technique and Sample Size

The State is divided into 3 agricultural zones namely: Zone 1, Zone 11 and Zone 111.

Multi-stage sampling techniques were used for the study. The first stage involves purposive selection of three Local Government Areas (Wushishi, Mokwa and Shiroro) for the study because of prior knowledge of higher concentration of fishing activities in the study area. The second stage involves the use of simple random sampling technique to select 3 fishing villages from each selected Local Government Area. The third stage involved the use of Yamane formula equation for appropriate sample size determination as reported by Eboh (2009) as shown in equation 1

$$N = \frac{N}{1 + N\,(e)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where n is the sample size, N is the population size and e is the level of precision which is 0.05%, 1 = Constant.

Analytical Techniques

Descriptive statistic such as frequency, percentages and mean was used to achieve objective 1, 2, 3 and 5 while objective 4 was achieved using multiple regression model

RESULTS AND DISCUSSION

Socio – economic characteristics of okra farmers

Age: The result of Table 4.1 showed that age range 51years and above had the highest percentage of 50%, Elder okra farmers may have more experience on climate change effect because of long time experience they had in okra farming than the younger one.

Sex: Sex distribution of the okra farming showed that majority of (80%) were male while (20%) were female, this implies that most of okra farmer in the study area were dominated by the male folks, perhaps too strenuous for the female folks to fully participate. This result disagrees with assertion by Adewale, *et al.*, (2003) that gender is no barrier to active involvement in farming activities.

Household size of the okra farmers: The result indicated that majority 60% of the respondents had 6 – 10 household size while 30% had house hold size of less than 6. The implication is that most of the okra farmers with large house hold size would perceive more on effect of climate change and adopt mitigation strategies on effect of climate change than small household size.

Level of education of the okra farmers: The result also revealed that 60% of the okra farmers had secondary certificates, this would provide knowledge and skills to perceived the effectof climate change than the primary certificates holders (20%) in the study area, implying that there is high prospect of adopting new technology.

Year of farming experience: The result in Table 4.1 showed that 31.8% of the okra farmers had farming experience of 15 years and above followed by 50% & 30% of the respondents who had 6 – 10 years and 11 – 15 years of farming experience respectively. The more the number of years of okra

farmingexperience the more likely the respondents would have perceived and experienced the effects of climate change in the study area.

Major occupation of the okra farmers: The result showed that the majority (70%) of the okra farmers had farming as major occupationswhile 20% engaged in crop production This implies that okra farmers who engaged in farming on full time basis will have more knowledge on effect of climate change than part time okra farmers.

Table 4.1: Distribution of respondents according to socio – economic characteristics

Age (years)	Frequency	Percentage
20 – 30	55	
31 – 40	1515	
41- 50	30	30
51 and above	5050	
Sex		
Male	80	80
Female	20 20	
Household size		
< 6 people	60	60
6 – 10 people	3030	
11– 13 people	55	
> 13 people	5 5	
Educational level		
Primary	2020	
Secondary	5050	
Tertiary	1010	
Quranic	2020	
Years spent in school		
< 6 years	2020	
6 – 10	3030	
11– 15	4040	
>15 years	1010	
Years of farming experience		
< 6 years	5 5	
6 – 10 years	5050	
11 – 15 years	3030	
Socio-economic characteristics continue		
>15 years	15 15	
Socio-economic characteristics continue		
Major occupation		
Crop production	2020	
Okra production	70 70	
Civil servant	1010	
Total	**100**	**100**

Source: Field Survey, 2018

4.2: Distribution of okra farmers according to their cooperative membership, extension methods contact, labour, access to credit, incomeand output obtained from farming activities.

Co-operative membership of okra farmers:

Table 4.2 indicated the various types of cooperatives to which okra farmers belong to. The results showed that the greater proportion of the farmers(70%)belong to okrafarmer's cooperative, while (20%) belong to okra marketer's cooperative. This implies that membership of the respondents of cooperative association could enhance social capital formation, increase access to farming equipment's, access to credit and capacity building,

Extension teaching methods: Result in also showed that several methods were employed by extension workers to reach the okra farmers and disseminate information on new practices to them. It indicated that majority of the okra farmers (75%) received extension massage through individual methods, followed by group methods 20%. This implies that okra farmers obtained enough information and knowledge on improved technology of modern farming equipment's and use of adaptive strategies to mitigate the perceived effect of climate change in the study area.

Number of extension contact: The result indicated that (60%) of the okra farmers had less than 4 extension contact with extension agents per month.

Similarly, 30% of the farmers had between 4 – 6 extension contacts with extension agents.

Types of labour used by the okra farmers: Table 4.2 further revealed that a greater proportion (90%) of the okra farmersused family labour in their farm while (10%) depended on hired labour. This may be because respondents do not pay for family labour. This agrees with finding of Adewale et al., (2003) who find that family labour is cheap and enables farmers to minimize cost and maximize profit.

Access to credit: Theresult showed the distribution of okra farmers according to access to credit, the result revealed that majority (85%) do not have access to credit and only 15% had access to credit. The implication is that inadequate credit would reduce the use of adaptive strategies to mitigate the perceived effect of climate change in the study area.

Income generated from okra farming activities: The result indicated that 20% of the okra farmers generated income of between < 100, 000, while 60% of generated income between N101, 000 - 200, 000. This implies that majority (60%) of the farmers generate income of between N101,000 – 200,000.

Table 4.2: Distribution of respondents according to their cooperative membership, extension methods/visit, labour, access to credit, input and output obtained from okra farming activities.

Co - operative's types	frequency		percentage
Consumer cooperative	10	10	
okra farmer's cooperative	70	70	
okramarketer'scooperative	20	20	
Extension Methods			
Individual Methods	75	75	
Group Methods	20	20	
Mass Media Methods	5	5	
Extension Visit			
< 4 times	60	60	
4– 6 times	30	30	
>6 times	10	10	
labour			
Family labour	90	90	
Both family and hired labour	10	10	
Accesses to credit			
No	85	85	
Yes	15	15	
Total	**100**	**100**.	
Income			
≤ N 100,000	20	20	
N 101,000 - 200,000	60	60	
N 201,000 – 300,000	20	20	
Total	**100**	**100**	

Source: Field Survey, 2018

4.3: Perception of the okra farmers on the causes of climate change

The result in table 4.3 indicated that among human factor that causes climate change (60) of the okra farmers perceived deforestation as the leading causes of climate change and ranked 1st. similarly, 40 % of the okra farmers perceived bush burning as another causes of climate change and ranked 2nd, while increase in carbon dioxide level 30% ranked 3rd and over grazing 20% ranked 4th. The implication of deforestation, bush burning as the causes of climate change, these exposed the soil surface to extreme heat which latter lead to wind and water erosion.

Table 4.3: Perception of respondents on the causes of climate change

Human factor *	Frequency	Percentage	Rank
i. Deforestation	60	60	1st
ii Bush burning	40	40	2nd
v Over grazing	20	20	4th
vii Increase in carbon dioxide level.	30	30	3rd

Source: Field Survey, 2018

Note: * multiple responses

4.4Awareness on the effect of climate change on okra farmers.

The result showed the level of awareness of the effect of climate change on okra farmers. The result in Table 4.4 indicated that the okra farmers were aware of droughts, desiccation and dryness (80%), rise in temperature (75%) and Fluctuation in precipitation(60)as sign of climate change.

Table 4.4: Awareness on the perceived effect of climate change on okra farmers.

Variables *	Frequency	Percentage
Droughts, desiccation and dryness	80	80
Rise in temperature	75	75
Fluctuation in precipitation	60	60

Source: Field Survey, 2018
* Multiple responses

4.5 Constraints to adaptation strategies to mitigate the effects of climate change on okra farmers.

Table 4.5 showed majority (90%) of the respondents had problems of inadequate information. The result also revealed thatLack of fund (30%) prevents okra farmers from buying modern farmingequipment that will reduce income as well as sources of livelihood. Similarly,inadequate credit facilities (70%) of the okra farmers were problem too.

Table 4.5:Constraints of adaptation strategies to mitigate the effects of climate change on okra farmers.

Problems in adaptation strategies *	Frequency	Percentage
Inadequate information on effect of climate change	90	90
Inadequate Fund	30	30
Poor credit facilities	70	70

Source: Field Survey, 2018
* Multiple responses

4.6: Regression analysis of factors affecting perception of okra farmers on climate change effect.

Table 4.6 revealed that the coefficient of determination $R^2$of the model is given as 0.3360 implying that the variables in the model accounted for 33.6% of variation in the perceived effect of climate. It can be seen that education, income, mitigation strategies, cooperative membership were all significant at 1% level of probability (ie $p \leq 0.001$).

Table 4.6: Regression analysis of factors affecting perception of okra farmers on climate change effect.

Variables	Coefficients	Standard Error	Z – value
Constant	15.407	0.296	52.042***
Age	0.002	0.005	0.364 ^{NS}
Educational level	0.052	0.011	4.838***
Income	- 7.988E-7	0.000	- 4.262***
Mitigation strategies	0.057	0.012	4.899***
Cooperative	0.662	0.131	5.041***

Source: Field Survey, 2015
R^2 = 0.3360
Adjusted R^2 = 0.3110
*** = 0.001
NS = Not significant

4.8 Test of hypothesis1

Chi - square result were used to determine the relationship between mitigation measures adopted by the okra farmers and perceived effect of climate change. The result in Table 4.8 revealed that there is significant relationship at 1% level of probability between mitigation measures adopted by the okra farmers and perceived effect of climate change. Both effect of climate (88.277) and mitigation strategies (124.205) were significant at 1% probability level. This implies that since relationship exist, we there by reject null hypothesis and accept the alternative hypothesis.

Table 4.8 Test of Hypothesis 1

Hypothesis	Chi – square	Df
Perceived effect of climate change	88.277***	2
Mitigation measures	124.205***	4

Source: Field survey, 2015 Df = Degree of freedom

RECOMMENDATIONS

i Okra farmer should be taught by extension agents the mitigation measures against flooding, intense wind, storms, and hurricane such as planting of trees, cover crops and construction of dams and canals.

ii Adequate and timely information on climate change should be provided by extension agents and NGO to enable okra take adequate adaptation and mitigation measures against effect of climate change in the study area.

REFERENCES

Adewale, J.G., Oladejo, J.A., & Ogunniyi, L.T. (2013). "Economic Contribution of Farm Children to Agricultural Production in Nigeria." *Journal of Social Science*, 10(2), 149 – 152.

Eboh, E.C. (2009). Social and Economic Research: Principles and Methods. Enugu, *Nigeria*. *Africa Institute for Applied Economics.* 2nd Edition, 256. Ibadan Nigeria.

IPCC. (2017). Climate change 2017: synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the intergovernmental panel on climate change [Core Writing Tea Pachauri RK and Reisinger A eds]. IPCC, Geneva, Switzerland.

NPC, (2006). National Population Commission, Census Head Count, 2006. `

World Development Report (2013) Development and Climate Change, Chapter 3, 10