



Appraisal of the Level of Awareness and Adaptation to Climate Change on Cassava Production in Ondo State, Nigeria

B. O. Akinwalere¹, M. L. Adeleke² and A. O. Ojo^{1*}

¹*Department of Agricultural Extension and Communication Technology, Federal University of Technology, Akure, Nigeria.*

²*Department of Fisheries and Aquaculture Technology, Federal University of Technology, Akure, Nigeria.*

Authors' contributions

This work was carried out in collaboration between all authors. Author BOA designed the study, supervised the running of the project and revised the manuscript for important intellectual content. Author MLA managed the literature searches. Author AOO analyzed and performed the statistical analyses. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JSRR/2016/23466

Editor(s):

(1) Leszek Labeledzki, Institute of Technology and Life Sciences, Kujawsko-Pomorski Research Centre, Poland.

Reviewers:

(1) Ernest Baafi, CSIR-Crops Research Institute, Kumasi, Ghana.

(2) Levent Son, University of Mersin, Turkey.

(3) Mtaita Tuarira Abduel, Africa University, Zimbabwe.

Complete Peer review History: <http://sciencedomain.org/review-history/13894>

Original Research Article

Received 1st December 2015

Accepted 5th January 2016

Published 28th March 2016

ABSTRACT

The study carried out an appraisal of the level of awareness and adaptation to climate change on cassava production. Both primary and secondary data were used. One hundred and twenty (120) respondents were randomly selected and interviewed with the aid of well structured questionnaire and interview schedule. The socio-economic characteristics of the respondents were descriptively analyzed. Variables related to the awareness and adaptation to climate change on cassava production was analyzed using Likert scale.

Results from the analysis showed that 76% of the respondents were aware of climate change while 80% were male implying that the respondents are dominated by males. Sixty-seven percent had farming experience of 16 years and above, 30% had primary school education while 15% had no formal education. Various coping strategies such as the use of improved cassava varieties and shifting cultivation method were adopted by the farmers. The study therefore, recommends training on climate change in to agricultural extension curriculum.

*Corresponding author: E-mail: bakinwalere@yahoo.com;

Keywords: Awareness; adaptation; climate; cassava.

1. INTRODUCTION

Cassava (*Manihot esculenta*) cultivation along the coastal parts of Nigeria began in 1667 and is traceable to the Portuguese explorers and emancipated slaves from Bonny and Koko port. Cassava became generally accepted and fully integrated into the farming systems of Southern Nigeria a little over 130 years ago [1]. Nigeria is the world leading producer of cassava since the beginning of 1990s with an estimated contribution of 49 million metric tonnes per annum and an average yield of 10.2 tonnes per hectare [1]. It is one of the most important carbohydrate sources. According to [2], cassava ranks very high among crops that convert the greatest amount of solar energy into soluble carbohydrates per unit of area. Among the starchy staples, cassava gives a carbohydrate production which is about 40% higher than rice and 25% more than maize, with the result that cassava is the cheapest source of calories for both human nutrition and animal feeding. A typical composition of the cassava root is moisture (70%), starch (24%), fiber (2%), protein (1%) and other substances including minerals (3%). Eventually demand for processed forms of cassava flour had developed. The importance of cassava in the economy of Nigeria cannot be over emphasized. Earnings from cassava have made this sub-sector an area of interest to policy makers especially due to its contributions to total Gross Domestic Product (GDP) and being a good foreign exchange earner as an agricultural commodity.

Natural resources that are most essential for cassava production are land, water, solar radiation, carbon dioxide, temperature and soil conditions. Among the natural resources, climate is the predominant factor that influences cassava production. Climate is the state of atmosphere, which is created by weather events over a period of time [3]. Climate change phenomenon affects agriculture in a number of ways. For example uncertainties in the onset of the farming season due to changes in rainfall characteristics can lead to an unusual sequence of crop planting and replanting which may result in food shortages due to harvest failures. Extreme weather events such as thunder storms, heavy winds and floods devastate farm lands and can lead to crop failure. Pest, crop and diseases migrate in

response to climate changes and variations [4]. Cassava is reasonably sensitive to changes in climate from hours of sunshine to rainfall and application of water, soil condition and particularly to temperature due to effects on evapo-transpiration. Climate change could also alter rates of development of cassava pests and pathogens modify host resistance and results in changes in physiology of host-pathogen or pest interaction. This lead to crop loses which, will impact on socio-economic variables such as farm income, farm level decision making, marketability and farmers' livelihoods. The production of cassava has been characterized with a lot of problems such as drought, cassava blight and generally low productivity as a result of climate change induced conditions [5,4]. Hence, the research questions that this study answered are as follows: (i) what are the effects of climate change on cassava production? (ii) which categories of cassava farmers are most aware of climate change and (iii) what coping strategies were adopted by cassava farmers in sustaining crop failure and crop yield losses? This study examined the level of awareness to climate change and adaptation strategies implore on cassava production in Ondo state, Nigeria. Specifically, the objectives of the study were to (i) examine the socio-economic characteristics of the respondents in relation to climate change awareness and; (ii) examine the coping strategies of cassava farmers to climate change.

2. METHODOLOGY

This study was carried out in Ondo State, South West Nigeria. A Multi-stage sampling technique was used to purposely select three local government areas from each of the senatorial districts of the state. The local governments were Owo, Ondo East and Okitipupa Local Government Areas (LGAs). The selection was based on the large concentration of cassava farmers in the area. A random sampling technique was used to select two villages from each of the LGA, and 20 respondents from each village. Structured questionnaire was administered on a total of 120 respondents in the study area. Descriptive statistics was used to analyse the socio-economic characteristics of the respondents. Likert scale was used to describe the awareness level of climate change in the study area.

3. RESULTS AND DISCUSSION

The study shows that 80% of the respondents were male, while 20% were female as presented in Table 1. This implies that cassava production is dominated by males and the females engaged in other agricultural activities like processing, packaging and marketing. Eighty-seven percent of the respondents were married, 10% single, and 3% were separated. This implies that most of the farmers were married and have the responsibility to keep their home by providing the daily needs of their household. About 73% of the respondents fall between the age ranges of 31-50 which are the active age group. The implication of this is that the respondents are more agile to carry out their production and farming activities due to the strength available to people of such age bracket. Religion to some extent affects the perception of the respondents to climate change. For instance, those who practice traditional religion were of the opinion that there is no climate change because they can induce rain by themselves while the Christians and Muslims were of contrary opinion. Forty percent of respondents in the study area generally keep an average household size of above 11 which could depict availability of family labour. The fact that the respondents have one form of education or another has great effect on their level of awareness and adaptation to climate change.

The level of experience contributes directly to production. From this study about 67% of the respondents had over 16 years farming experience, 18.3% had five years experience, while 15% had farm experience between 11 and 15 years. For the reason that greater percentage of the respondents had over 16 years of farming experience, there is a high probability of them being able to observe the various change in the climatic variables which will definitely result in climate change. They will be able to give records of the various changes that took place over the period of 20 years and above.

3.1 Level of Awareness of Climate Change in the Study Area

Fig. 1 shows that 96% of the respondents were aware of climate change while 4% were not aware. This result agrees with [6] who with 94.8% of the respondents were aware of climate change in the Niger Delta Region of Nigeria.

Table 1. Socio-economic characteristics of the respondents in the study area

Gender	Frequency	Percentage
Male	96	80.0
Female	24	20.0
Total	120	100.0
Marital status	Frequency	Percentage
Single	12	10.0
Married	104	86.7
Separated	4	3.3
Total	120	100.0
Religion	Frequency	Percentage
Christianity	86	71.7
Islam	20	16.7
Traditional	14	11.7
Total	120	100.0
Level of education	Frequency	Percentage
Formal education	12	10.0
Adult school	8	6.7
Primary school	36	30.0
Secondary school	38	31.7
Tertiary education	8	6.7
None	18	15.0
Total	120	100.0
Farm experience	Frequency	Percentage
<10 yrs	22	18.3
11-15 yrs	18	15.0
16 yrs and above	80	66.7
Total	120	100.0
Household size	Frequency	Percentage
1-5	39	32.5
6-11	33	27.5
Above 11	48	40.0
Total	120	100.0
Age (years)	Frequency	Percentage
<20	2	1.7
21-30	12	10.0
31-40	50	41.7
41-50	38	31.7
51-60	6	5.0
>60	12	10.0
Total	120	100.0

Source: Field data 2011

3.2 Change and Effect of Climatic Variables in the Study Area

Majority of the respondents 92% reported that there are change in rainfall pattern and considerable changes in the atmospheric temperature in recent years. These fluctuation in rainfall pattern and temperature will have adverse effect on the production and yield of the cassava products. This implies that they were aware to a considerable extent of the effect of the climatic variables on their environment and

cassava production, since 90% of the respondents perceived the effect to be on yield. On the contrary, less than half of the respondents (49%) believed that the effect of climate change does not affect the planting season of cassava, because cassava can thrive in any soil condition depending on the variety.

3.3 Perceived Effect of Climate Change on Cassava Yield

Fig. 3 shows the perceived effect of climate change by the respondents. Five percent perceived that climate change increases cassava yield while 87.5% reported climate change decreases cassava yield. The implication of this is that people believe that when it comes to the

concept of climate change, it is only the negative or adverse effect that is out to play, they do not see any good part of the phenomena.

3.4 Coping Strategies of the Respondents

The coping strategies of the respondents are presented in Table 2. About thirty-eight percent respondents adopted improved varieties of cassava, 2.5% practiced animal husbandry, 2.5% were into input marketing and animal husbandry, 10% belong to cooperative societies, 15% practiced shifting cultivation while 5% adopted the use of pesticides. A total of 27.5% were indifference to the coping strategies to use and this could be as a result of lack of adequate knowledge of climate change.

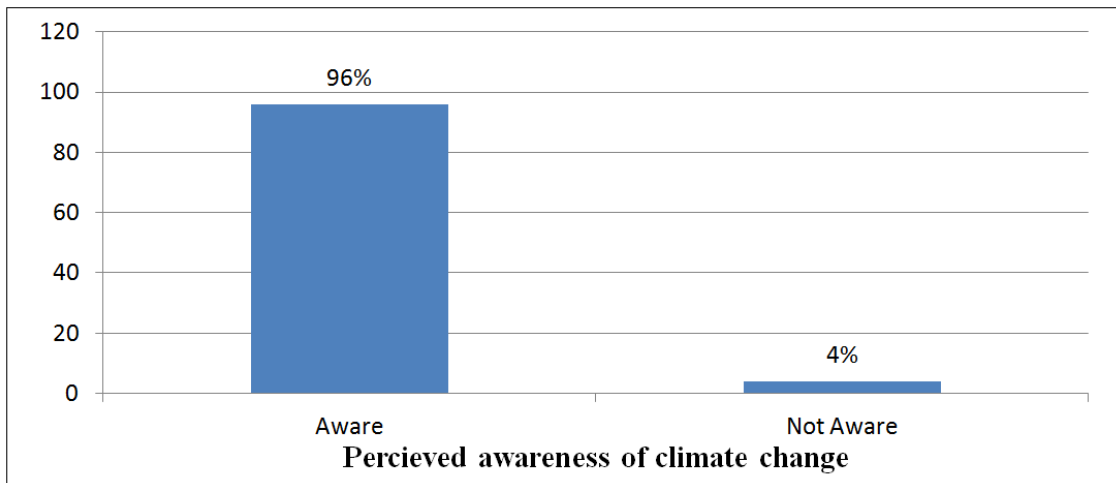


Fig. 1. Level of awareness of climate change
Source: Field data 2011

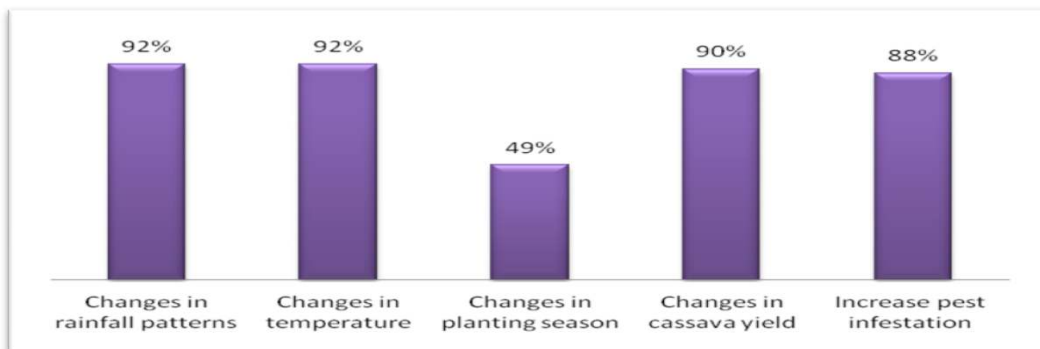


Fig. 2. Change and effect of climatic variables
Source: Field data 2011

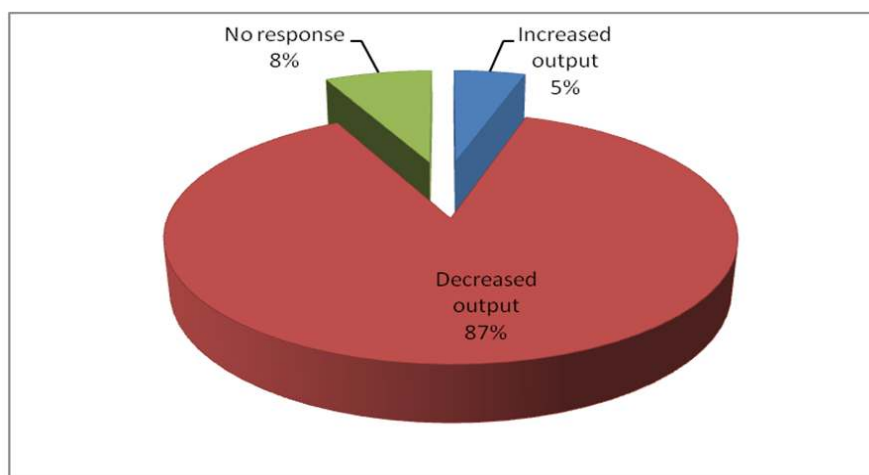


Fig. 3. Perceived effect of climate change on cassava yield

Source: Field data 2011

Table 2. Coping strategies of respondents to climate change

Coping strategy	Frequency	Percentage
Indifference	33	27.5
Improved variety of crop	45	37.5
Improved variety of crop and animal husbandry	3	2.5
Input marketing and animal husbandry	3	2.5
Cooperatives	12	10.0
Shifting cultivation	18	15.0
Use of pesticides	6	5.0
Total	120	100.0

Source: Field data, 2011

Table 3. Climate change effects and adaptive strategies in the study area

Climate change effect on:	Adaptive strategy/ies	Frequency	Percentage
Crop growths	i. Different varieties of crop species ii. Irrigation system	38	31.7
Availability of soil water	i. Water supply ii. Irrigation system	36	30.0
Soil fertility	i. Water supply ii. Irrigation system	20	16.6
Soil erosion	i. Fertilizer application ii. Tillage method and iii. Other field operations (ridges)	33	27.5
Incidences of pests and diseases	i. New crops varieties, ii. Seasonal changes and sowing dates	32	26.6
Total		159*	

* Multiple responses, Source: Field data, 2011

3.5 Climate Change Effects and Adaptive Strategies in the Study Area

In the study area there were various adaptive strategies employed by the cassava farmers to

combat the effect of climate change. The type of strategy employed in the study area depended on the effect of climate change on cassava production as presented in Table 3. The effect of climate change on cassava growth shows that

the farmers combat the effect by planting tolerant or climate-robust variety, fertilizers application and adequate supply of water. New crop varieties, seasonal changes and sowing dates were the adaptive methods employed against incidences of pest and diseases. Fertilizer application, tillage methods and other field operations like ridge making are the adaptive methods used to reduce the effect of soil erosion on cassava farms. Water supply and irrigation system were used to control soil water and fertility in the study area.

4. CONCLUSION AND RECOMMENDATIONS

The study was carried out in order to analyze level of awareness and adaptation to climate change on cassava production in Ondo State. The socio-economic characteristics of the respondents revealed that majority of them are educated which is a significant factor. This is because the more educated a farmer is, the easier it becomes for the farmer to understand the concept of climate change. Majority of the farmers were within the active age range. Sixty-seven had experience for over 16 years. The cassava farmers in the study area were aware of climate change. The perceived effects of climate change on cassava in the study area are crop failure, decreased cassava yield, increased labour cost and increased incidence of pests and diseases, and increased weed population.

The respondents devised some coping strategies to combat climate change effects through adoption of improved varieties of cassava. The following are the recommendations of the study:

- (1) Government should carry out appropriate monitoring and evaluation of on-going agricultural programmes and farmers activities regularly so that timely intervention can be put in place to assist the farmers, since the issue of climate requires quick response to prevent adverse effects.

- (2) Extension agents should be trained on issues relating to climate change to facilitate effective information dissemination to farmers so that they would be able to apply the appropriate strategy when the need arises.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Akinagbe OM. Constraints and strategies towards improving cassava production and processing in Enugu North Agricultural Zone of Enugu State, Nigeria. *Bangladesh Journal of Agricultural Resources*. 2010;35(3):387-394.
2. Okenwa S. Nigeria: Food crisis looms as climate change threatens cassava production; 2010. Available:<http://www.allafrica.com/stories/20/00/140479.html>. (Retrieved on 26th April, 2011 at 3.15 AM)
3. Hulme M, Mitchell J, Ingram W, Johns T, New M, Viner D. Climate change scenarios for global impacts studies. *Journal of Global Environmental Change*. 1999;9(4): 3-19.
4. Hulme M, Barrow EM, Arnel NW, Harrison PA, Johns TC, Downing TE. Relative impacts of human-induced climate change and natural climate variability. *Nature*. 1999;397:688-691
5. FAO. Adaptation to climate change in agriculture forestry and fisheries: Perspective, framework and priorities; 2007.
6. Nzeadibe TC, Egbule CL, Chukwuone NA, Agu VC. Climate change and awareness and adaptation in the Niger Delta region of Nigeria. *African Technology Policy Studies*. Network Working Paper Series 57; 2010.