

## Perceived Effects of Climate Change on Cassava Production and Farmers Coping Strategies in Ahoada – East Local Government Area of Rivers State, Nigeria

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**Abstract:** The importance of cassava in rural household economy cannot be over emphasized. Farmers in Ahoada – East L.G.A depend greatly on cassava for its nutritional importance, capacity to curb hunger and generate income. Cassava production however is beset with myriads of constraints; notable among them is climate change. The study assessed the effects of climate change and coping measures used by cassava farmers in Ahoada – East L.G.A of Rivers State, Nigeria. Multi-stage sampling technique was used to select respondents for the study. Data were analyzed using simple descriptive statistics (percentage, frequency and mean). The result of the study showed that 65 percent of the respondents were female, majority were married (53 percent). A large proportion of the respondents had formal education (83.3 percent) and they are mainly subsistence farmers. Reduced yield of cassava and reduction of family income were among the major effects of climate change on cassava production. Crop diversifications, use of tolerant varieties were among the most widely used coping strategies by respondents. Based on the results of the study it was recommended that improved extension services that can provide the needed farming inputs (cassava cutting, fertilizers e.t.c.) as well as useful and relevant information on climate change and coping strategies should be made available to the people.

[Perceived Effects of Climate Change on Cassava Production and Farmers Coping Strategies in Ahoada – East Local Government Area of. *Rep Opinion* 2017;9(12):20-24]. ISSN 1553-9873 (print); ISSN 2375-7205 (online). <http://www.sciencepub.net/report>. 4. doi:[10.7537/marsroj091217.04](https://doi.org/10.7537/marsroj091217.04).

**Key words:** Climate change, effects, cassava production, coping strategies

### Introduction

A good number of climate effects and productivity response studies in Nigeria and other developing countries predict declines in the productivity of major staple crops, especially cassava due to climate change. Cassava is well known for its low input requirement and natural strength and high resilience to unpleasant production conditions. It has a high output of energy per area cultivated. This implies that cassava is a strategic crop for overcoming hunger and economic recession (Nweke, 2004), and it is easy to cultivate on marginal lands (Sanginga and Mbachu, 2015; Jarvis, Ramirez – villegas *et al*, 2012 and SESRTCIC, 2007). In addition, cassava has a lower risk of crop failure (compared to crops like rice, maize, groundnut, tomatoes, peppers and other vegetables), and serve as a potential feedstock for many industries (through the use of starch for pharmaceutical, textile and adhesive purposes) and its export potential. Some traditional crops are central to the culture and survival of a community of people. And any improvement in the production of such crops will surely enhance the standard of living of such people. Cassava (*Manihot esculenta*) is a woody shrub of the spurge family, *Euphorbiaceae*. It is extensively cultivated as an annual crop in tropical and subtropical regions for its edible starchy tuberous root, a major source of carbohydrates. Cassava, when dried

to a powdery form is called cassava flour, its fermented wet paste is called akpu (Fufu, Loi – loi, Santana and Mr. White), flakes version is named *garri* and the white and crunchy peel called tapioca.

Cassava is the third-largest source of food carbohydrates in the tropics, after rice and maize. Cassava is a major staple food in the developing world, providing a basic diet for over half a billion people. It is one of the most drought-tolerant crops, capable of growing on marginal soils. Nigeria is the world's largest producer of cassava, while Thailand is the largest exporter of dried cassava.

Over the past 100 years, the earth's average surface temperature has risen by about 0.74°C (Direct Gov., 2010). Most researchers agree that global temperatures will rise further (by how much depends on future emissions of green house gases) and if the temperature rise is high, changes are likely to be so extreme that it will be difficult to cope with them (Ozor, 2009). Eboh (2009) noted that countries in Sub-Saharan Africa, including Nigeria are likely to suffer the most because of their geographical location, low incomes, and low institutional capacity, as well as their greater reliance on climate-sensitive agriculture. In Ahoada East, agricultural production is largely non-mechanized; therefore weather/climate assumes significance in every stage of production. Cassava farmers depend on climate signals as major drivers of

their farming activities. This makes climate very significant in cassava production. Unfortunately, climatic conditions are no longer predictable as they used to be in the past. Cassava farmers had encountered series of loses as a result of change in climate (Apata, Samuel and Adeola, 2009; Ozor, 2009; IPCC, 2007). Though, Cassava is known to tolerate drought to a reasonable extent, is still adversely affected by the variability in climate. All stages of cassava production are affected by the variations in climate. Unfortunately, scientists have it that variations in climate may not be avoided entirely because of inability of countries like Nigeria to stop the emission of green house gases. Therefore the basic way to mitigate it is by building up resilience or adaptation strategies to help farmers cope with the effect of this change. Bearing the commercial and nutrition importance of cassava in the study area, it becomes very imperative to inquire on the extent and aspect these variations in climate affect the production of cassava as well as identify the climate – smart coping strategies used by these cassava farmers. This will surely help them to cope with the variability in climate thereby enhancing their production activities. It is against this background that this paper assessed the perceived effects of climate change on cassava production in Ahoada East L.G.A of Rivers State and the climate - smart measures used by the cassava farmers. Specifically, the paper determined the cassava farmers' perception of climate change and identified climate change coping strategies used by farmers in Ahoada East L.G.A of Rivers State. Mitigation and adaptation are ways of improving farmers ability to cope with change in climate conditions across time scale from short term (e.g. seasonal to annual) to the long-term (e.g decades to centuries) (Okezie and Simonyan, 2011).

In Ahoada East L.G.A where this study was conducted, the cassava farmers were forced to begin early harvesting of their root crops and particularly cassava and yam in order not to lose all their produce to the flood that submerged the area in October and November 2012 (Amadi 2013). Farmers in Ahoada East L.G.A are experiencing climate change even though they have not considered its deeper implications. This is evident in the late or early commencement of rainfall, flooding and drying up of streams. These farmers have to a larger extent, been able to develop their livelihood strategies in a way which enables them to constantly cope with and adapt to an erratic change in climate (Apata, Samuel and Adeola, 2009).

## **Materials And Methods**

### **Area of Study**

This study was conducted in Ahoada East Local Government Area of Rivers State. Ahoada East L.G.A is one of the 23 local government areas in Rivers State, Nigeria. Ahoada East L.G.A is in the tropical rainforest with two seasons, wet and dry. The major occupation of the people of Ahoada East L.G.A is farming. There are 3 clans in Ahoada - East L.G.A (Akoh, Upata and Igbuduya). In Ahoada East L.G.A there are 28 Communities, Akoh clan has 8 communities, Upata clan has 10 communities and Igbuduya has 10 communities. Two communities were randomly selected from each clan giving a total of 6 communities. A proportionate sampling technique was employed to select 10 farmers each from the selected communities. This is to ensure an equal number of respondents from each of the selected communities. This gave rise to 60 farmers used in this study. A field survey was conducted to find out the effects of climate change on cassava production and the cassava farmers coping strategies in Ahoada East L.G.A of Rivers State.

Data were collected from cassava farmers to determine the perceived effects of climate change on cassava production and farmers coping strategies. A well structured questionnaire was used to collect primary data, since majority of the farmers cultivating cassava cannot read or write, the questions were read out and explained to them while answers were filled in by the researcher personally. Information was also collected from secondary sources; these include published and unpublished literature materials. All farmers' respondents were asked questions relating to their socio-economic characteristics, knowledge of climate change, perceived effects of climate change on cassava production and their adaptation practices undertaken as well as the constraints faced in adapting to climate change. Data collected were analyzed using simple descriptive statistics (Tables, percentages frequencies and arithmetic means).

## **Results And Discussion**

### **Socio economic Characteristics of Farmers' - respondents**

The result of socio- economic analysis of the respondents as presented in Table 1 shows the sex, age, marital status, educational level, household size, farming experience, and scope of operation of the respondents. It shows that 65% of the respondents were female while 35% were male. This implies that females were relatively more involved in cassava production than males in the study area; this is not a surprise as cassava production in most part of Rivers State is done mostly by women. The age distribution revealed that the mean age is 47 years and it implies

that majority farmers are young and still within their useful ages. A large percentage (53%) of the cassava farmers was married. Most (53%) of the respondents have large household size ranging between 6- 10, which implies that many of them have responsibility to discharge and this may reduce the cost of hired labour if the farmers engage their families in the activities on the farm. The result of the farming

experience shows that 65% of the farmers had more than 20years experience. Further analysis of the Table 1 shows that majority of the farmers (83.30) went through school, which implies that they can read and write and also majority (86.70) are subsistence farmers which means they produce mainly for family consumption and a little for the market.

**Table 1: Socio–Economic Characteristics Of Farmers’–Respondents.**

Variables	Frequency	Percentage
<b>Sex</b>		
Male	21	35.00
Female	39	65.00
<b>Total</b>	<b>60</b>	<b>100.00</b>
<b>Age</b>		
20-29	03	5.00
30-39	10	16.00
40-49	15	25.00
50-59	25	42.00
60 and above	07	12.00
<b>Total</b>	<b>60</b>	<b>100.00</b>
<b>Martal Status</b>		
Single	13	22.00
Married	32	53.00
Divorced	10	17.00
Widowed	05	8.00
<b>Total</b>	<b>60</b>	<b>100.00</b>
<b>Education</b>		
No formal education	10	16.70
Primary level	18	30.00
Secondary level	21	35.00
Tertiary level	11	18.30
<b>Total</b>	<b>60</b>	<b>100.00</b>
<b>Household Size</b>		
1-5	21	35.00
6-10	32	53.30
11-15	07	11.70
<b>Total</b>	<b>60</b>	<b>100.00</b>
<b>Farming Experience</b>		
1-10	10	16.70
11-20	11	18.30
>20	39	65.00
<b>Total</b>	<b>60</b>	<b>100.00</b>
<b>Scope Of Production</b>		
Subsistence farming	52	86.70
Commercial farming	08	13.30
<b>Total</b>	<b>60</b>	<b>100.00</b>

Source: Field work, 2016

#### **Other Crops Cultivated By Cassava Farmers In The Study Area.**

Table 2 shows the other crops cultivated by cassava farmers. These crops are maize which has a

frequency of 60, Fluted pumpkin with a frequency of 60, yam 15, pepper 56, okra 55, Plantain 43, melon 46 and cocoyam 25. This implies that maize and fluted pumpkin farming are major alternative sources of

income to the cassava farmers in Ahoada – East Local Government Area since many of the respondents indicated that they cultivate them.

**Table 2: Other crops cultivated by cassava farmers in the study area.**

Crops cultivated	Frequency
Maize	60
Yam	15
Fluted pumpkin	60
Okra	55
Plantain	43
Cocoyam	25
Pepper	56
Melon	46

Source: Field work, 2016

\*Multiple responses recorded

### Perceived effects of climate change on cassava production

The Table 3 shows that reduced yield of cassava (3.60) and reduction of family income (3.16) were the major effects of climate change on cassava production. Also, increase in the cost of cassava cutting (3.30), ineffectiveness of soil nutrient (2.58), discoloration of cassava leaves (2.84) were also shown to be significant effects of climate change. Respondents also agreed that stunted growth (2.67) and weed infestation (2.80) are significant effect of climate change.

**Table 3: Perceived effects of climate change on Cassava production**

	Effect of climate change	Mean
1.	Reduced yield of cassava	3.60
2.	Reduction of family income	3.16
3.	Stunted growth of cassava	2.67
4.	Thin stem and tall plant	3.25
5.	Pest and diseases incidence	2.65
6.	Ineffectiveness of soil nutrient (fertilizer/manure) due leaching	2.58
7.	Late maturity	2.93
8.	Discoloration of cassava leaves	2.84
9.	Increase cost of cassava cuttings	3.30
10.	Loss of land due floods	2.76
11.	Weed infestation	2.80
12.	Washing of crops down slope by erosion	2.98

Source: Field work, 2016

### Coping strategies used by cassava farmers

There are coping strategies the farmers have employed to minimize or cushion the devastating effects of rainfall variability and other extreme climatic conditions. The people were asked to indicate the coping strategies they had employed in the face of variations in rainfall, temperature and other climate

conditions. Table 4 shows the coping strategies adopted by cassava farmers in the study area. These strategies are crop diversification (planting different varieties of crop on the same farm land), mixed farming, and use of tolerant crop varieties, mulching to reduce water loss, and switching to other income generating enterprises. Also due to variability in rainfall patterns, farmers adopted early or late planting.

**Table 4: Coping strategies used by cassava farmers**

Coping Strategies	Freq.	%
Crop diversification	54	90.00
Early planting	49	81.70
Late planting	47	78.30
Early and late harvest	45	75.00
Mixed farming	50	83.30
Use of tolerant species	60	100.00
Mulching to reduce water loss	49	81.70
Switching to other sources of income	50	83.30

Source: Field work, 2016, \*Multiple responses recorded

### Conclusion and Recommendations

The findings of this study showed that Ahoada – East Local Government Area of Rivers State had been experiencing climate change which had been affecting cassava farmers and cassava production. Based on the findings of this study, the following recommendations were given to help tackle this menace of climate change that is gradually eating up the farmers' source of livelihood and nutrition. The Government and relevant agencies should help build weather station in Ahoada – East L.G.A and all local government areas within Rivers State with the responsibility of keeping weather data and making them available to farmers to enable them make proper adjustment as touching climate change. Also, farmers should be encouraged to form co-operative societies that will help them pool resources together to fight more vigorously the challenges/threats of climate change.

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12/25/2017