



## Determinants of Climate Change on Cassava Production in Oyo State, Nigeria

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**Abstract** – The study examined the determinants of climate change on cassava production in the study area. To achieve this main objective, the study identified the socio economic characteristics of the cassava farmers; identified the constraints faced by farmers in cassava production and finally determined the coping strategies adopted by cassava farmers in adjusting to the impact of climate change in cassava production. A well structured interview schedule was used in collecting data for the study and the data collected were based on the stated objectives of the study. There are ten cells in the block. Simple random sampling technique was used in selecting 18 respondents from each cell making a total number of ninety (90) as the sample size. Results of findings revealed that the mean age of the cassava farmers was 53.22 and most of the farmers had 7 members in their household. About 72.2% of the respondents were male and most of them had one form of formal education or the other. The result of findings revealed that a significant relationship was found between change of farmland (.295\*) and the determinants of climate change. The major constraints faced by farmers in cassava production were lack of storage system and problem of pests and diseases. Therefore, the study recommends that storage facilities should be provided by government to cassava farmers and the cost of pesticides should also be subsidized in order to boost cassava production.

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DETERMINANTS OF CLIMATE CHANGE ON CASSAVA PRODUCTION IN OYO STATE, NIGERIA

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## 1. INTRODUCTION

Agriculture belongs to the main sector of Nigerian economy and it is characterized by a multitude of small scale farmers scattered over wide expanse of land area, with small holding ranging from 0.05 to 3.0 hectares per farm land, rudimentary farm systems, low capitalization and low yield per hectare. The roles of agriculture remain significant in the Nigerian economy despite the strategic importance of the oil sector. Agriculture provides primary means of employment for Nigerians and accounts for more than one-third of total gross domestic product (GDP) and labour force (FAO, 2005; World Bank, 2003). Agriculture in Nigeria is a major branch of the economy providing employment for 70% of the population. The sector is being transformed by commercialization at the small, medium, and large-scale enterprises levels. Major crops include beans, sesame, cashew nuts, cassava, cocoa beans, groundnuts, kolanut, maize(corn), melon, millet, palm kernels, palm oil, plantains, rice, rubber, sorghum, soybeans and yams (Olomola, 2007). Agriculture is the

basic activity by which humans live and survive on the earth and assessing the impacts of climate change on agriculture is a vital task. In both developed and developing countries, the influence of climate on crops and livestock persists despite irrigation, improved plant and animal hybrids and the growing use of chemical fertilizers. The continued dependence of agricultural production on light, heat, water and other climatic factors, the dependence of much of the world's population on agricultural activities, and the significant magnitude and rapid rates of possible climate changes all combine to create the need for a comprehensive consideration of the potential impacts of climate on global agriculture (Rosenweig et al, 1990).

Cassava (*manihot esculenta*) is a native from South America that is extensively cultivated as an annual crop in the tropical and subtropical regions for its edible starchy tuber as root. Cassava has the ability to grow on marginal lands and its one of the most important staple food crops in Tropical Africa with its efficient production of food energy, year round availability and tolerant of extreme environmental stresses which makes it eminently suitable for farming and food system in Nigeria. Cassava production plays a key role in alleviating poverty in Nigeria, as it is virtually impossible that an average household will not consume cassava product in a day. Therefore, cassava is an important factor in food security, poverty alleviation, rural – urban drift and reducing unemployment among others (Okpukpara, 2006). The discovery and exploitation of petroleum, the black gold led to the decline in the importance attached to the golden crop cassava and other important agricultural produce. Nevertheless, Nigeria still has a high percentage in exportation of cassava (Adegeye, 1996). However, Oyo state being one of the cassava producing states in Nigeria is highly sensitive to variation in climatic factors most especially rainfall, temperature and sunshine duration. Several views have been expressed about the impact of irregularity of climate on cassava production. To achieve the main objective, the study identified the socio economic characteristics of cassava farmers, investigated the constraints faced in cassava production and determined the coping strategies adopted by cassava farmers in adjusting to the impact of climate change in cassava production. The study further determined the relationship between the coping strategies adopted in cassava production and effects of climate change in the study area.

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## II. METHODOLOGY

The study was conducted in Ido Local Government Area of Oyo state. Historically, the local government was created in 1989 with the Administrative Headquarters located at Ido. It shares boundaries with Iseyin and Afijio Local Government Area to the North, Akinyele Local government Area to the east, Ibarapa East Local Government Area to the West. It also shares boundaries with Ogun State to the south. This Local Government Area has a land mass of 1,010,954 square kilometers with the 2010 estimated population of 117,129 using a growth rate of 3.2% from 2006 census. A population density of 116 persons per square kilometer. The residents of the local government area are mostly farmers, traders, transporters and civil servants. They are Yorubas and other tribes from various parts of the country. Soil fertility in the area enhances the production of maize, cocoa, oil palm, cassava and vegetables. It has processing industry at Ilaju. The study population comprises of cassava farmers (men and women) in the study area. A simple random sampling technique was used in selecting the respondents for this study. Ido local government is a block under the Ibadan/Ibarapa agricultural zone of the Oyo State Agricultural Programme (OYSADEP). The block is made of up of ten(10) cells from which 50% was selected. Eighteen (18) respondents were selected using simple random technique, thus a total of 90 respondents constituted the sample size. The instrument for data collection was structured interview schedule. The dependent variable is the effect of climate change on cassava production while the independent variables were the coping strategies adopted such as irrigation system, fertilizer application, and change in planting date. Frequency, percentage and mean value were used as descriptive statistics while correlation coefficient was used to determine the relationship between the variables.

## III. DATA ANALYSIS AND INTERPRETATION

### a) Socio – economic characteristics of respondents

The result of the findings in (table 1) revealed that majority (27.70%) of the respondents were between ages 60 and 69. The mean age is 53.22 years. It is inferred that most of the cassava farmers are middle aged and therefore still have the strength to manage their farm effectively. The table also shows that majority (72.20%) of the cassava farmers were male while 27.80% were female. This is an indication that the male components were more involved in cassava production. 83.30% of the cassava farmers were married, while 16.70% were single. The high percentage of married people is an indication of more responsible adults in the study area. Going through the distribution of the educational level attained, one will see that tertiary

education had the highest percentage (30.0%). Primary occupation of 64.40% was farming while 35.60% were generating their major source of income from other occupations. Table 1 further revealed that 61.90% had about 20 years experience in farming. 51.10% had between 6 and 10 members in their household. The mean household size is 6.46 which imply that most of the respondents have about seven members in their household as at the time the research was conducted. This might help in supplying household labour and thereby reducing the cost incurred on payment of labour. It was also revealed that 52.20% were involved in both commercial and subsistence farming and 24.30% of them earned between 151,000 – 200,000 naira in a year.

### b) Constraints encountered by respondents.

It was revealed in table 2 that lack of storage facilities was ranked first among the constraints encountered with a weighted mean score of 1.41, followed by problem of pests and diseases (1.26) and poor transportation (1.00). Also, lack of subsidies ranked fourth (0.90), followed by lack of credit facilities (0.89) and labour availability (0.73). Government policy ranked seventh (0.58) and land tenure system ranked eighth (0.39).

### c) Adoption of coping strategies

The results of the findings revealed that 83.3 per cent adopted change in planting date as their major coping strategy. Followed by fertilizer application (78.9%), adoption of new varieties and change in farm land with 68.9 per cent respectively. Others are improved farming practices (52.2%), marketing policy (27.8%) and post harvest technology (22.2%). This implies that most of the respondents employed change of planting date and fertilizer application as their major coping strategies in adjusting to the effects of climate change.

### d) Determinants of climate change on cassava production

From result of the findings, it was observed that thin stem and tall plant (1.67) was the major determinant of climate change experienced in the study area followed by early growth slowdown (1.56), poor germination of tubers (1.31), leave turning colour (1.29), stunted growth (1.04), late maturity (0.82) and poor seed density (0.18).

### e) Relationship between coping strategies adopted and effect of climate change

From the table below, a significant and positive relationship was found to exist between change in farm land and determinants of climate change at 0.01 level of significance (  $r=0.295$ ,  $P^*=0.01$ ). This implies that adoption of change in farm land is positively related to determinant of climate change. That is the practice of shifting cultivation assisted in adjusting to the negative effects of climate change in the study area.

#### IV. CONCLUSION AND RECOMMENDATION

The study has shown that majority of the respondents were in their late ages and cassava farming was revealed as males' agricultural activity in the study area. The results of the findings also revealed that the large household size favoured the supply of labour for farming activities in the study area and most of the farmland in the study area was owned through inheritance. Lack of storage system and incidence of pests and diseases were still prevalent in the study area as change in planting date and fertilizer adoption were the major coping strategies adopted in the study area. The findings of the study also revealed that thin plant and tall stem were the most serious determinants of climate change on cassava production in the study area. A significant and positive relationship was found between change in farm land as a coping strategy and determinant of climate change in the study area. Therefore, the study recommends that farmers should be educated on the appropriate coping strategies to adopt during climate changes and effort should be geared towards increasing the technical manpower of farmers and also reduce the incidence of pest and diseases in the study area, which will amount to increase in level of production and in turn increase farmers income.

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**Table 1 :** Distribution of respondents by socio-economic characteristics of the respondents. N= 90

Age	Frequency	Percentage
20 – 29	2	2.20
30 – 39	14	15.50
40 – 49	18	19.90
50 – 59	19	21.00
60 – 69	25	27.70
70 and above	12	13.30
<b>Sex</b>		
Male	65	72.20
Female	25	27.80
<b>Marital status</b>		
Single	2	2.20
Divorced	3	3.30
Widow	10	11.10
Married	75	83.30
<b>Level of education</b>		
No formal education	18	20.00
Primary school incomplete	22	24.40
Primary school complete	7	7.80
Secondary school incomplete	11	12.20
Secondary school complete	5	5.60
Tertiary institution	27	30.00
Primary occupation		
Others	32	35.60
Farming	58	64.40
<b>Household size</b>		
0	3	3.30
1 – 5	33	36.60
6 – 10	46	51.10
11 – 15	8	8.90
<b>Scope of production</b>		
Subsistence farming	27	30.00
Commercial farming	16	17.80
Both	47	52.20

Source : Field Survey, 2011

**Table 2 :** Distribution of constraints encountered by respondents

Constraint	Serious constraints	Mild constraint	No constraints	Mean score	Weighted mean score	Rank
Lack of credit facilities	25(27.8)	30(33.3)	35(39.8)	80	0.89	5
Land tenure system	4(4.4)	27(30.0)	59(65.5)	35	0.39	8
Labour availability	11(12.2)	44(48.9)	35(38.9)	66	0.73	6
Lack of subsidies	28(31.1)	25(27.8)	37(41.1)	81	0.90	4
Govt. Policy	8(8.9)	36(40.0)	46(51.1)	52	0.58	7
Problem of pest and disease	39(43.3)	35(38.9)	16(17.7)	113	1.26	2
Poor transportation	34(37.8)	22(24.4)	34(37.7)	90	1.00	3
Lack of storage system	53(58.9)	21(23.3)	16(17.7)	127	1.41	1
Others	5(5.6)	1(1.1)	84(93.3)	11	0.12	9

Source : Field Survey, 2011

*Table 3 :* Distributions of respondents by coping strategies.

Coping strategies	Frequency*	Percentage
Improving farming practices	47	52.2
Changing planting date	75	83.3
Post harvest technology	20	22.2
Marketing policy	25	27.8
Fertilizer adoption	71	78.9
Changing farm land	62	68.9
Adoption of new varieties	62	68.9

\*Multiple responses

Source : Field Survey, 2011

*Table 4 :* Distribution of respondents by the determinants of climate change

Determinants	Serious effect	Mild effect	No effect	MS	WMS	Rank
Stunted growth	20 (22.2)	54 (60.0)	16 (17.8)	94	1.04	6
Poor seed density	13 (14.4)	47 (52.2)	30 (33.3)	73	0.18	7
Late maturity	14 (15.6)	46 (51.1)	30 (33.3)	74	0.82	5
Poor germination of tuber	42 (46.7)	34 (37.8)	14 (15.6)	118	1.31	3
Thin stem and Tall plant	22 (24.4)	61 (67.81)	7 (7.8)	105	1.67	1
Early growth Slow down	27 (30.0)	50 (55.6)	13 (14.4)	104	1.56	2
Leaf turning Colour	34 (37.8)	48 (53.3)	8 (8.9)	116	1.29	4

Source : Field Survey, 2011

*Table 5 :* Summary of correlation analysis between coping strategies adopted and effect of climate change.

Variable	R value	Remark
Improving farming practices	.019	Not significant
Changing planting date	-.046	Not significant
Post harvest technology	.126	Not significant
Marketing policy	-.130	Not significant
Fertilizer adoption	-.080	Not significant
Changing farm land	.295**	Significant

\*\* Correlation significant at the 0.01 level

Calculated from data 2011



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