



## **EFFECT OF ANNUAL FLOODING ON CASSAVA PRODUCTION AND COPING STRATEGIES IN KOLOKUMA/OPOKUMA LOCAL GOVERNMENT AREA OF BAYELSA STATE, NIGERIA**

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### **ABSTRACT**

The study examined the effect of flooding on cassava production in Kolokuma/Opokuma Local Government Area of Bayelsa State, Nigeria. The specific objectives were to: ascertain the effect of annual flooding on cassava production and assess the coping strategies employed by the farmers in combating the effects in the study. Multi-stage sampling procedure was employed to select one hundred (100) cassava farmers for the study. Primary data were collected with the aid of structured questionnaire. The data collected were analyzed using frequency counts, percentages and mean scores, while ordinary least square simple regression analysis was used to test the null hypothesis at 5% level of significance. The result revealed that land erosion ( $\bar{x} = 3.05$ ), pre-mature harvesting of crops ( $\bar{x} = 2.99$ ), loss of crops ( $\bar{x} = 2.96$ ), reduced soil fertility ( $\bar{x} = 2.93$ ) and shortened farming season ( $\bar{x} = 2.71$ ) were notable effects of annual flooding on cassava production. Furthermore, planting quick maturing varieties of crops (92.2%), digging of drainages/embankments before flood season (89.0%), planting early and harvesting before the onset of flood (85.0%) and conserving food and water (80.0%) were the major coping strategies employed by cassava farmers in combating the effects of annual flooding on cassava production. The ordinary least square regression analysis revealed that flooding (-45.285) at  $P \leq 0.01$  significantly and negatively influenced the output of cassava farmers at 1% level of significance. The study concluded that flooding negatively influenced the output of cassava farmers. The study therefore, recommended that there is need to support farmers in the study area with information on how to combat flooding menace so as to restore soil fertility, reduce land erosion/loss of crops thus ensuring food abundance during flooding.

**Keywords:** Cassava, Coping, Effect, Flooding, Production, Strategies.

### **INTRODUCTION**

Over the years, flooding has become a universal threat in the face of dynamic weather patterns. However, floods are outcomes of immoderate weather conditions such as rainfall (e.g., prolonged rainstorm and melting snow from snowfall), which are influenced by the geographical region and human induced activities of a particular location (Atu & Okon, 2018). Flood incidents also occur as a result of activities such as erecting structures on natural waterways, land obtrusion, poor land management planning, obstruction of hinterland water channel with poor drain water channels. Similarly, Soheli & Rayhanul (2015) noted that unapproved structures built over water channels have adverse implications on rural residents and farm production. Regions prone to flooding are lower than nearby regions, but Nigeria, southern region are likewise vulnerable attributing to the extreme rainfall happening for extended periods, moreover, between March-October and as early as February-November in the case of Rivers and Bayelsa States (Amadi & Aleru, 2019).



Flood appears in Southern Nigeria in diverse forms such as coastal flooding, flash floods, urban flooding, river flooding and dam spills. However, the type predominant in Kolokuma/Opokuma Local Government Area is river flooding. Amadi & Aleru (2019) posited that during flooding, standing crops such as cassava, yam, maize among others is damaged as flood water is usually on the increase to its highest form on farm, thus, negatively affecting crop production through interruption of farming activities and the degeneration of cultivated lands. Flooding thus places cassava farmers at a very high risk of enormous crop losses every year. The phenomenon of flooding is of great concern even as locations of relevance to human, meanwhile, settlements, cultivable lands in addition to food contribution structures are grossly overwhelmed (Eli & Bariweni, 2020). From the foregoing, it thus appears that flooding exerts certain negative effects on crop production, however, whether this is the case or not in Kolokuma/Opokuma Local Government Area is subject to investigation, hence the study. The specific objectives were to: ascertain the effect of annual flooding on cassava production in the study area and assess the mitigating strategies employed by the farmers in combating the effects of annual flooding. The study hypothesized that flooding had no significant effect on output of cassava farmers.

## **MATERIALS AND METHODS**

### **The Study Area**

The study was carried out in Kolokuma/Opokuma Local Government Area of Bayelsa State. The headquarters of the local government are in the town of Kaiama. Its coordinates are latitude 5°08'N and longitude 6°18'E, and it covers a land area of 361 km<sup>2</sup> of which a large portion of it is occupied by the Bayelsa National Forest. Kolokuma/Opokuma local government area is bounded on the Southwest by Yenagoa Local Government Area, on the Northeast by Sagbama Local Government Area, and in the South by Southern Ijaw Local Government Area.

### **Sampling Procedure**

Multi-stage sampling procedure was employed in selecting respondents for the study. In the first stage, 10 communities that are known to be flood prone were purposively selected in the study area. The second stage involved the random selection of 10 cassava farmers in each of the selected communities which gave a total of 100 cassava farmers. Data collected through structured questionnaire were analyzed with descriptive statistics, while simple regression analysis was used to test the hypothesis.

### **Method of Data Analysis**

Effect of annual flooding on cassava production and coping strategies employed in mitigating the effect of annual flooding in the study area were realized using frequency, percentages and mean scores. Data were generated by presenting the respondents with items rated on a four-point rating scale, which was based on the question options of: 'strongly agree' = 4; 'agree' = 3; 'disagree' = 2 and 'strongly disagree' = 1. In using the four-point rating scale, a mid-point was obtained by adding 4, 3, 2 and 1 which gave 10 and when divided by 4 gave a mean score of 2.50. For the purpose of decision making, any mean score response above 2.50 was adjudged as "severe impact of flood" while any mean score response less than 2.50 was considered as "mild impact of flood".

The effect of flooding on the output of cassava farmers in the study area was implicitly ascertained using the simple regression model:

$$Y = b_0 + b_1x + e$$

Where Y = dependent variable (cassava output)

x = independent variable (annual flooding)



b = intercept or slope  
o = co-efficient  
e = error term.

## RESULTS AND DISCUSSION

### Effect of Annual Flooding on Cassava Production

The result in Table 1 shows that land erosion ( $\bar{x} = 3.05$ ), pre-mature harvesting of crops ( $\bar{x} = 2.99$ ), loss of crops ( $\bar{x} = 2.96$ ), reduced soil fertility ( $\bar{x} = 2.93$ ) and shortened farming season ( $\bar{x} = 2.71$ ) were notable effects of annual flooding on cassava production in the study area. These mean ratings were above the bench mark mean score of 2.50. This implies that land erosion ( $\bar{x} = 3.05$ ), pre-mature harvesting of crops ( $\bar{x} = 2.99$ ), loss of crops ( $\bar{x} = 2.96$ ), reduced soil fertility ( $\bar{x} = 2.93$ ) and shortened farming season were some of the most prevalent effects of annual flooding on cassava production in the study area. This finding is similar to those of Ikemike (2020), Ezenwa *et al.* (2018) and Ogidi *et al.* (2017) who stated that flooding exerted certain effects on crop production such as crop damage, land degradation, environmental degradation, reduction of soil fertility, destruction of farm lands, and altering of farming season.

**Table 1:** Mean score responses of cassava farmers on the effect of annual flooding on crop production in Kolokuma/Opokuma Local Government Area

Effect of flooding	SA	A	D	SD	Weighted sum of responses	Mean score	Remark
Soil fertility is reduced	36	38	9	17	293	2.93	Severe
Causes land erosion	40	36	13	11	305	3.05	Severe
Loss of crops	24	52	20	4	296	2.96	Severe
Scarcity of food during flooding	12	63	11	14	273	2.73	Severe
Damage to individual property	35	30	21	14	286	2.86	Severe
Surface and drinking water pollution	19	55	14	12	281	2.81	Severe
Causes pre-mature harvesting of crops	21	61	14	4	299	2.99	Severe
Shortens the farming season	21	44	20	15	271	2.71	Severe
<b>Grand mean score</b>						<b>2.84</b>	Severe
<b>Number of respondents</b>						<b>100</b>	
<b>Decision mean cut-point</b>						<b>2.50</b>	

Key: SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree.

Source: Field survey data, 2021

### Coping Strategies by Cassava Farmers in Combating Effects of Annual Flooding

The result in Table 2 shows that planting quick maturing varieties of crops (92.2%), digging of drainages/embankments before flood season (89.0%), planting early and harvesting before the onset of flood (85.0%), conserving food and water (80.0%) and assistance from government (79.0%) were the major coping strategies employed by cassava farmers in combating the effects of annual flooding on cassava production in the study area. This implies that the most employed coping strategy by cassava farmers for mitigating the effect of annual flooding in the study area was planting of quick maturing variety of crops which was ranked first according to priority while getting assistance from government was the least employed coping strategy for mitigating the effect of annual flooding on cassava production by cassava farmers in the study area. The finding is in consonance with those of Nemine (2015), Ikemike (2020), and Eli and Bariweni (2020) who noted that early planting, getting premium insurance



covering flood damage, selling of firewood, early harvesting of crops, digging of trenches and planting of early maturing crops were some of the coping strategies adopted by farmers in flood prone areas.

**Table 2:** Distribution of the respondents by the coping strategies employed in mitigating the effect of annual flooding in the study area

Coping strategies	Frequency	Percentage	Ranking by priority
Planted quick maturing variety of crops	92	92.0	1st
Digging of drainages/embankments before flood season	89	89.0	2nd
Planting early and harvesting before the onset of flood	85	85.0	3rd
Conserve food and water	80	80.0	4th
Got assistance from government	79	79.0	5th

Source: Field survey data, 2021

### Effect of Flooding on Output of Cassava Farmers

The result in Table 3 showed that the coefficient of simple determination ( $r^2$ ) for the model estimating the effect of flooding on output of cassava farmers was 0.996, suggesting that 99.6 percent variation in cassava farmer's output was explained by flooding. The F-statistic value of 2050.719 was significant at 1% level suggesting that the model is well specified. The coefficient (-0.829) of flooding was significant at 1% and negatively related to output of cassava farmers. This implies, rise in annual flooding gives a corresponding decline in the output of cassava farmers in the study area and vice versa. This further suggests that flooding reduces cassava farmers' output in the study area. This finding corroborates to that of Ikemike (2020), and Eli and Bariweni (2020) who reported that flooding damages cassava in the farm by increasing the rate at which it decays, thereby reducing the potential output of the farmers.

**Table 3:** Result of the Ordinary Least Squares (OLS) simple regression of the effect of flooding on output of cassava farmers in the study area

Variable	Coefficient	Std. error	t-statistics	Prob.
Constant	39.826	2477.748	7.523***	0.000
Log (annual flooding)	-0.829	0.018	-45.285***	0.000
R-squared	0.996			
Adjusted R-squared	0.995			
F-statistic	2050.719***			

Note: \*\*\* = significant at 1% level.

Source: Field survey data, 2021

### CONCLUSION AND RECOMMENDATIONS

The study concluded that flooding significantly and negatively influenced the output of cassava farmers through soil fertility reduction, land erosion, loss of crops, scarcity of food during flooding, pre-mature harvesting of crops and shortened farming season. It further concluded that planting of quick maturing variety of cassava was the most employed coping strategy by cassava farmers for mitigating the effect of flooding on cassava production in the area of study. The study therefore recommended that there is need to support farmers in the



area of study with information on how to combat flooding menace so as to restore soil fertility, reduce land erosion and reduce loss of crops thus ensuring food abundance during flooding.

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