Climate change mitigation practices among arable crop farmers in Saki East local government area, Oyo state, Nigeria

[1]Adekola, O. A., [2]Adesiji, G. B., [3]Eniola, P. O., [3]Ayandele, A. O. and [2]Komolafe, S. E.
[1]Department of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, P.M.B. 2240 Abeokuta, Ogun State, Nigeria
[2]Department of Agricultural Extension and Rural Development, University of Ilorin, P.M.B. 1515 Ilorin, Kwara State, Nigeria
[3]Department of Agricultural Technology, The Oke-Ogun Polytechnic, Saki, Oyo State.
Correspondence details: kemmas04@yahoo.com

ABSTRACT

The study investigated the climate change mitigation practices among arable crop farmers in Saki East Local Government Area of Oyo State. Multiple sampling procedure was used to get a sample size of 120 respondents for the study. Interview schedule was used to collect information from the respondents. The result shows that majority (83.3%) of the respondents were male and average of 17.3±4.71 years of experience in arable crop farming. Majority of the respondents indicated that climate change had caused scarcity of food (85.0%), reduction in crop yield through flood and drought (75.0%), and reduction in water availability (60.0%). Use of drought resistance crop (mean=3.0), mixed cropping (mean=2.7) planting of early mature crop and change of seed rate (mean=2.6) ranked 1st, 2nd and 3rd, respectively as the mitigation practices and adaptation measures adopted for arable crop farming. Also, lack of climate information on mitigation practices (100%), lack of resources and modern technology (85.0%), high cost of fertilizer (75.0%), inadequate of funding support (60.0%) were the major constraints faced in using the adaptation measures. There were significant relationship between sex (χ^2=21.875), age (χ^2=144.875), marital status (χ^2=11.725), education (χ^2=65.456) and effects of climate change on arable crop production. The study concludes that arable crop farmers mainly employed the use drought resistance variety, mixed cropping, and early maturing variety practices to mitigate the adverse effects loss of crops and food insecurity caused by climate change. Thus, extension empowerment programmes to build resilience to climate change of farmers is needed among farmers.

Keywords: Climate change, Crop yield, Food security, Climate information

INTRODUCTION

It is not a gainsaying that agriculture is the mainstay of the preponderance of the populace in the rural community of Nigeria where about 80 percent of the engage in agriculture as their means of livelihood (Komolafe *et al*., 2022). Because the land is suitable for farming, farmers in Nigeria cultivate arable crops including yam, cassava, maize, millet, cocoyam, cowpea, guinea corn, and vegetables among others. However, farmers' interest to reap high yield seems to be jeopadiced by the challenges of insecurity through the herdsmen (Eniola *et al*., 2016), soil degradation, deforestation, high cost of external inputs, and climate change among others (Banjoko *et al*., 2021).

Climate change is exhibited by irregular rainfall pattern, high temperature, frequent flooding incidence during the raining season, reduced crop yield, increased crop diseases and pest infestation, reduced fertility of farm land due to excessive erosion and destruction of soil microbes, and increased drought occurrence (Bolarin *et al*., 2022). These effects had resulted in low harvest, food shortage, hunger, unemployment, low life span, and slow economic growth of country (Gabriel *et al*., 2023). Small scale farmers have become the most vulnerable to climate extremes and related risks (Owusu and Yiridomoh, 2021) due to their unequal access to financial resources, lack of productivity enhancing inputs and limiting institutional and infrastructural barriers on their use of climate information (Ogundeji *et al*., 2022) and low level of education and inadequate access to necessary input to mitigate the effects of climate change (Amare and Balana, 2023).

There are some mitigation practices that are less stressful with minimal cost. These include irrigation management, organic practice, planting of pest resistance crops, planting of drought resistance crops, and planting of early mature crop. Such practices should be used by small scale arable crops farmers (Adetomiwa and Kolapo, 2023). Although some of these mitigation practices have already been put to use by the farmers, thus empirical study is needed to understand prominent climate mitigation practices used by farmers growing arable crops to avert the effects of change in climate.

The broad purpose of this study was to examine climate change mitigation practices among arable crop farmers in in Saki East Local Government Area (LGA) of Oyo State. Specifically, the study (i) described the socio-economic characteristic of arable crops farmers in the study area, (ii) examined the adaptive and mitigation measures used by the farmers, and (iii) identified constraints to adaptive and mitigation measures to climate change effects.

METHODOLOGY

The research was carried out in Saki East local government area Oyo States, Nigeria. The headquarters of the council is Ago-Amodu. It has an area of 1,569km and a population 10232 at the 2006 census with Ago- Amodu, Sepeteri, Ogbooro, Oje-Owode and Ogbonle as the major communities. It is geographical located on longitude 3.32E and latitude 6.35N. The annual temperature is 36-30^c. The lowest temperature is experience in august with 24 to 30^c as mean and the highest in March with a mean of 37^c. The major language spoken is Yoruba and farming is the main occupation in the study area.

The population of the study consists of arable crop farming. Multistage sampling technique was used in this study. The first stage involves random selection of two wards namely ward 4 and 6 having population of 184 farmers and 215 farmers respectively, as retrieved from Oyo State ADP office. The second stage involved a random selected 30% of the population of farmers in the selected wards. Thus, 120 was the sample size.

Primary data for the study were obtained with the use of structured questionnaire. The instrument was designed gather information on the specific objectives and administered by researchers through interview. All the 120 instruments were retrieved. Adaptation and mitigation practices was measured at nominal level as agreed 1, Strongly agreed 2, Undecided 3, Disagreed 4, strongly disagreed 5 and vice versa for the negative questions. Constraint to adaptation and mitigation practices was measured on the scale of yes 1 and no 0. Descriptive statistics including frequency and percentage were used to analyse and present the specific objectives while hypothesis was tested using chi-square analysis at 5.0% significant level.

RESULTS AND DISCUSSION

Socioeconomic characteristics

Table 1 shows that majority (83.3%) of the respondents were male. Average age proportion was 51.0±12.2 years among the respondents. This indicates that a large proportion of the farmers is ageing and may become more vulnerable to climate change effects because of the diminishing strengths to carry-out some adaptation practices (Adetomiwa and Kolapo, 2023).

Majority (83.3%) of the respondents were married with average of 5.3±2.30 persons per household. This indicates the farmers in the study area have household responsibility to at least 5 persons. This number could be considered moderate to manage and could also be utilized to implement climate change adaptation practices that require high labour (Owusu and Yiridomoh, 2021). Regarding educational status of the respondents, larger percentage (45.0%) had no formal education, while others (55.0%) had one form of formal education of at least primary schools education. Formal education is expected to positively influence the use of climate smart adaptation practices in the study area (Anabaraonye *et al*., 2019).

The average monthly income of the respondents was ₦35,833±11,313. This amount is suggested to be low considering the present economic situation and the cost of agricultural inputs. This factor may hinder the effective use of climate change adaptation practices where inputs such as drought tolerance variety, flood tolerance variety and others are needed to be purchase (Amare and Balana, 2023). Furthermore, the average years of experience in arable crop farming was 17.3±4.71 years. This suggests that farmers in the study area have relatively long years of experience in arable crop farming. This attribute is expected to have built farmers' knowledge of the effects of climate change and peculiar working measures to adapt the effects in the study area. Additionally, all (100.0%) of the respondents were aware of climate change phenomenon. This status is expected to help the farmers in preparation for use the adaptation measures to mitigate the effects of climate change on arable crops.

Effect of climate change on arable crop production

Results presented in Table 2 show that majority of the respondents indicated that climate change had caused scarcity of food (85.0%), reduction crop yield through flood and drought (75.0%), and reduction in water availability (60.0%), while appreciable percentage further indicated extreme temperature and precipitation prevents crop from growing (55.0%) and severe storm destruction of crops (45.0%) as other effects of climate change. This shows that the incidence of climate change on arable crops of farmers has mainly caused reduced water available for crop growth, reduced crop yield and then food insecurity in the study area. These findings are consistent with previous studies that reported that climate change reduced crop yield and food insecurity among smallholder farmers (Bolarin *et al*., 2022; Amare and Balana, 2023).

Table 1: Socio economic Characteristics of Respondents

Variable	Frequency	Percentage	Mean±SD
Sex			
Male	100	83.3	
Female	20	16.7	
Age			
20-29	10	8.3	
30-39	10	8.3	51.0±12.2
40-49	30	25.0	
50 and above	70	58.4	
Marital status			
Single	20	16.7	
Married	100	83.3	
Education status			
Non formal	54	45.0	
Primary school	29	24.2	
Secondary school	26	21.7	
Tertiary	11	9.2	
Monthly Income (₦)			
Below 20,000	40	33.3	
20,000-30,000	50	41.7	35,833±11,313
30,001-40,000	10	8.3	
40,001-50,000	10	8.3	
50,001 and above	10	8.3	
Household size (persons)			
1-5	70	58.3	
6-10	50	41.7	5.3±2.30
Years of experience			
1-5	30	25.0	
6-10	10	8.3	17.3±4.71
11-15	10	8.3	
16-20	30	25.0	
21 and above	40	33.4	
Awareness of climate change			
Yes	120	100.0	

Source: Field Survey, 2022

Table 2: Effect of climate change on arable crop production

Effect of climate change on arable crop production	Frequency	Percentage
Scarcity of food	102	85.0
Reduction crop yield	90	75.0
Reduction in water availability	72	60.0
More severe storm destructive	54	45.0
Flood and drought may reduce yield	90	75.0
More extreme temperature and precipitation prevents crop from growing	66	55.0

Source: Field survey, 2022

Mitigation practices and adaption measures

Information on mitigation practices and adaptation measures adopted by respondents in Table 3 shows that Use of drought resistance crop (mean=3.0), mixed cropping (mean=2.7) planting of early mature crop and change of seed rate (mean=2.6) ranked 1st, 2nd and 3rd, respectively as the mitigation practices and adaptation measures adopted for arable crop farming. Other mitigation practices were prompt identification of weather and change of planting space (mean=2.5) and use of renewable energy (mean=2.1). This finding implies that the prominent mitigation practices and adaptation measures adopted by arable crop farmers in the study area were the use of drought resistance crop, mixed cropping, planting of early mature crop and change of seed rate.

Table 3: Distribution of respondents on mitigation practices and adaptation measures

Mitigation practices and adaption measures	SA F %	A F %	U F %	D F %	SD F %	Mean
Irrigation management	-	10 8.3	-	38 31.7	72 60.0	1.6
Use of drought resistance crop	-	56 46.7	34 28.3	10 8.3	10 16.7	3.0
Organic practice	18 15.0	44 36.7	38 31.7	20 16.7	-	2.5
Use renewable energy	18 15.0	82 68.3	10 8.3	10 8.3	-	2.1
Planting of early mature crop	8 6.7	56 46.7	36 30.0	20 16.7	-	2.6
Use of pest resistance crop	36 30.0	46 38.3	28 23.3	-	10 8.3	2.2
Change of planting space	18 15.0	44 36.7	38 31.7	20 16.7	-	2.5
Change of seed rate	8 6.7	56 46.7	36 30.0	20 16.7	-	2.6
Mixed cropping		52 43.3	48 40.0	20 16.7	-	2.7
Prompt identifying of weather	72 60.0	38 31.7	-	10 8.3	-	2.5

Source: Field survey, 2022

Constraints faced in using the adaptation measures

Regarding the constraints to usage of adaptation measures to the mitigate the effects of climate change, Table 4 shows that majority of the respondents indicated that lack of information on mitigation practices (100%), lack of resources and modern technology (85.0%), high cost of fertilizer (75.0%), inadequate of funding support (60.0%) were the major constraints faced in using the adaptation measures, while few others indicated lack of technical expertise (40.0) and insufficient labourers (30.0%). This finding implies that the main constraints to the mitigate the effects of climate change by arable crop farmers in the study area were lack of information on mitigation practices, lack of resources and modern technology, high cost of fertilizer, and inadequate of funding support.

Table 4: Distribution of respondents on constraints faced in using the measures

Constraints	Frequency	Percentage
Lack of technical expertise	48	40.0
Inadequate of funding support	72	60.0
Insufficient labourers	36	30.0
Staff work plan and procedures	84	70.0
Lack of information on mitigation practices	120	100.0
High cost of fertilizer	102	85.0
Lack of resources and modern technology	102	85.0

Test of hypothesis

There is no significant relationship between socio-economic characteristic of the respondents and effect of climate change on arable crop production.

Table 5 shows that there were significant relationships between sex (χ^2 =21.875), age (χ^2 =144.875), marital status (χ^2 =11.725), education (χ^2=65.456) and effects of climate change on arable crop production. This shows that marriage, education, advanced age and increased years of formal education support the employment of adaptation measures against climate change effects on arable crops of the farmers in the study area.

Table 5: Relationship between socio-economic characteristic of the respondents and effect of climate change on arable crop production

Variable	Chi-Square	df	Significance (p)	Remark
Sex	21.875	1	0.000	Significant
Age	144.875	4	0.000	Significant
Marital status	11.725	2	0.003	Significant
Household	4.300	3	0.231	Not Significant
Education	65.456	3	0.005	Significant
Monthly income	6.4678	3	0.072	Not Significant

CONCLUSION AND RECOMMENDATIONS

Results from this study reveal that increasing in temperature, destructive storms and drought in sampled local governments have existed over the many years. This has undermined gradually arable crop production yield and made arable crop farmers more vulnerable to climate change. Thus, the farmers mainly employed the use drought resistance variety, mixed cropping, and early maturing variety practices to mitigate the adverse effects loss of crops and food insecurity caused by climate change. However, they did not make use of irrigation management system because of lack of fund and knowledge. It is therefore recommended that the Federal government, State and local government are encouraged to support arable crop farmers in the provision of irrigation facilities and support services as well as frequent extension training to support farmers.

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