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Training Needs of Arable Crop Farmers on Climate-Smart Agricultural Practices in Ekiti State, Nigeria

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Abstract:- This study examined the training needs of arable crop farmers on climate-smart agricultural practices CSAP in Ekiti State. A three-stage sampling procedure was used to select one hundred and eighty respondents from whom data were elicited using questionnaire, interview schedule and Focus Group Discussions. Data were analyzed using descriptive statistics, Pearson product moment correlation and regression model. The study revealed that majority (72.6%) of the respondents were male farmers, with the mean age of 46.37±12.54 years. They were mostly married (88.8%) and educated (93.9%). The mean household size and annual income were 9.68±8.09 persons and NGN701,550.28±861,081.78, respectively. More than half (53.6%) of the respondents belong to cooperative societies. They mostly accessed information on CSAP through radio ($\bar{x}$=2.17). Financial constraints ($\bar{x}$=2.69) was the most severe constraint militating against CSAP. The training need was high among the majority (52.5%) of the farmers. Sources of information (r=0.182, p=0.015), and constraints (r=0.270, p=0.000) were significantly correlated with the training needs of the farmers on CSAP. The regression analysis revealed that farmers' sources of information (β=0.194 p=0.008) and the constraints militating against CSAP among them (β=0.261, p=0.000) had significant relationships with their training needs. Conclusively, the need for training on climate-smart agricultural practices was high among the arable crop farmers, most especially on integrated pest management and disease control system. Sources of information and constraints significantly predicted the training needs of the arable crop farmers on climate-smart agricultural practices in the study area.

Keywords:- *Arable Crop Farmers, Climate-Smart Agriculture, Focus Group Discussion, Training Need.*

I. INTRODUCTION

Climate change is a global phenomenon and its negative impact on various sectors of the economy cannot be overemphasized. However, agriculture is more vulnerable to the impact of climate change, most especially in Sub-Saharan Africa, where small scale farming systems that are highly susceptible to climate change and variability because they are predominantly rainfed and climate dependent, are practiced with low adaptive capacity (Cohn, et al., 2017; Cudjoe, *et. al*., 2021). Ayinde *et al*., (2010) reported in a study that change in climate has significant effects on agricultural productivity in Nigeria. Climate change has altered rainfall patterns, agroecological zones, cropping calendars, increased the frequency of flooding/drought, diseases and pest outbreaks and infestations, among others (Musafiri *et al.*, 2022). The resultant effects have been poor crop yields, livestock loss, food insecurity, hunger, poverty and severe threat to the well-being of small-scale farmers who bear the brunt of these effects (Chitakira and Ngcobo, 2021). The negative consequences of climate change on food production, food security and the environment have attracted global interest, prompting the need to work with farmers to adopt innovative agricultural practices that will enable them to cope, hence the birth of climate-smart agriculture [CSA] (Waaswa, *et al.,* 2021). FAO developed the concept of Climate-Smart Agriculture (CSA) as a response for the need to increase food security without compromising environmental quality and in support of the Paris Agreement on climate change (FAO, 2018, IPCC, 2019). According to World Bank (2021), Climate-smart agriculture (CSA) is an integrated approach to managing landscapes cropland, livestock, forests and fisheries, that addresses the interlinked challenges of food security and accelerating climate change. Climate-Smart Agriculture (CSA) is the viable alternative to assist farmers to adapt to the multiple effects of climate change on agricultural productivity. Climate-smart agriculture practices (CSAP) seek to mitigate agriculture's contribution to climate change while building resilience and adaptation to the impacts of climate change and increasing the production of food crops. CSA is an approach to identify production systems that can best respond to the impacts of climate change and to adjust these systems to suit local conditions (Gabriel, *et. al, 2023)*. The concept of CSA is new and its adoption among farmers has been reported to be low due to low knowledge. There is a dearth of information in the literature as regards the training needs of the arable crops farmers on CSAP in Ekiti State. Hence, this study examined the areas of CSAP where arable crop farmers are in need of training in Ekiti State, and the extent to which they needed the training.

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II. METHODOLOGY

The study was conducted in Ekiti State, Nigeria. The study area is located geographically on Latitude 70^0 15^i and 80^0 5^i north of the Equator and Longitudes 40^0 5^i and 50^0 45^i East of Greenwich meridian. It lies south of Kwara and Kogi State, East of Osun State and bounded by Ondo State in the East and in the South; with a total land Area of 5887.890sq km. Ekiti has 16 Local Government Councils with one Agricultural Development Programme's (ADP) block each. The State is mostly an agrarian State.

➢ *Population of the Study, Sampling Procedure and Size*

The population of the study consisted of arable crop farmers in the study area. A Multi-stage random sampling procedure was employed to select the respondents for the study. At the first stage, three (3) Local Government areas/ADP blocks out of the sixteen Local Government areas/blocks in the State were randomly selected, while the second stage involved random selection of three (3) towns/communities in each of the selected LGA to make a total of nine (9) towns/communities. At the third stage, twenty (20) arable crops farmers were selected from each of the selected town/community to make a total of one hundred and eighty (180) respondents that constituted the sample size for the study. The identification and selection of the respondents were done through the assistance of the extension agents covering the areas. However, one hundred and seventy nine (179) responses were considered analyzable.

➢ *Data Collection*

The instruments for data collection were questionnaire and interview schedule structured with both open and close ended questions in line with the objectives of the study.

➢ *Focus Group Discussion FGD*

Two (2) FGDs (one with adult men arable crop farmers and one with adult women arable crop farmers) were conducted in two randomly selected towns out of the three selected towns in each LGA/ADP block, to make a total of six (6) FGDs in all. The FGDs were conducted for qualitative data collection.

➢ *Measurement of Variables*

The dependent variable; training needs were considered under six different classifications which include; water management practices, tillage smart and soil health management practices, fossil burning reduction practices, crop-mix practices, Integrated pest management (IPM) and disease control, information and communication technologies and other adaptive devices). The variable was measured on a 4-point scale of not at all = 0, mildly = 1, somewhat = 2 and to a great extent = 3. The mean score was obtained and used to determine the extent to which the respondents required training on CSAP and what type of CSAP training they required in the study area.

The data collected were described using descriptive statistics such as frequency counts, percentage, mean and standard deviation while Pearson product moment correlation PPMC and regression model were used for data analyses.

➢ *Regression Model*

$Y = A + BX_{ni} + \mathcal{E}$

Where y is the dependent variable (Training needs on CSAP (weighted score)

A is a constant

B is the slope and

X is independent variables

X_1 = Sex (Dummy: Male = 1, otherwise = 0)

X_2 = Age (actual)

X_3 = Marital status (Dummy: married = 1, otherwise = 0)

X_4 = Number of years spent in school (years)

X_5 = Respondents household size (actual number of persons)

X_6 = Income per annum (actual amount in Naira)

X_7 = Membership of cooperative society (Dummy: Member = 1, otherwise = 0)

X_8 = Sources of information on CSAP (weighted score)

X_9 = Constraints to CSAP in the study area (weighted score)

$\mathcal{E}$ = error

III. RESULTS AND DISCUSSION

➢ *Socio-Economic Characteristics of the Arable Crop Farmers in the Study Area*

The result of analysis (Table 1) indicates that majority (72.6%) of the respondents were male farmers while (27.4%) were female farmers. This implies that, male are mostly stronger and often have the strength to engage in agricultural practices than female. This is in tandem with the findings of Ibitoye *et al*. (2014), who reported that the males dominated agricultural production in their study. The mean age of the arable crop farmers was 46.37±12.54 years. This implies that majority of the respondents were active and possessed enough strength to engage in farming activities on a large scale. The findings further revealed that majority (88.8%) of the respondents were married. This is in tandem with the findings of Ige, *et al*., (2021) which stated that majority (87.5%) of their respondents were married. The implication is that assistance, useful farming advice and supports could be received from the spouses of the married people. The findings also revealed that higher proportion (48.0%) of the farmers had secondary school education, while 26.8% had tertiary education, 6.1% had no formal education and the mean of years spent in school was 11.06±4.45 years. This shows that the famers mostly had some level of education which may influence their desire to seek for more knowledge on CSAP. The mean household size was 9.68±8.09 persons. This implies that they have an average of 10 persons who could provide necessary assistance in terms of family labour while practicing CSA. This corroborates the assertion of Opeyemi *et. al*, (2021), who noted that a large household increases a household's labour endowment. Furthermore, the findings reveal that mean annual income of the respondents was NGN701,550.28±861,081.78. The annual income could be seen as reasonable, but may not be adequate, considering the households size of the farmers and the prevailing economic situation in the country. Therefore, their production

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may be hampered by inadequate annual income. Finally, the results of the analysis revealed that more than half (53.9%) of the respondents were members of one cooperative society or the other. This could afford them opportunity or access to credit facilities and current information on agricultural innovations, among which CSA is important.

Table 1: Distribution of the Respondents Based on their Socio-Economic Characteristics

Socio-economic characteristics	Frequency	Percentage	Mean
Gender:			
Male	130	72.6	
Female	49	27.4	
Age (Years)			
≤ 20	2	1.1	
21 – 40	61	34.1	
41 – 60	92	51.4	46.37±12.54
> 60	24	13.4	
Marital Status:			
Single	13	7.3	
Married	159	88.8	
Widowed	4	2.2	
Separated	3	1.7	
Educational Qualification			
No formal education	11	6.1	
Primary education	34	19.0	
Secondary Education	86	48.0	
Tertiary Education	48	26.8	
Years spent in school			
< 5	11	6.1	
5 – 9	37	20.7	11.06±4.45
> 9	131	73.2	
Household size (persons)			
1 – 20	172	96.1	
21 – 40	3	1.7	9.68±8.09
41 – 60	4	2.2	
Yearly Income (₦)			
≤ 1000,000	154	86.0	
1000,001 – 2000,000	12	6.7	701,550.28±861,081.78
2000,001 – 3000,000	9	5.0	
3000,001 – 4000,000	2	1.1	
>4000,000	2	1.1	
Membership of cooperative society Association			
Member	96	53.6	
Not a member	83	46.4	

Source: Field survey, 2024

- *Sources of Information on Climate-Smart Agriculture*

The results of analysis of respondents' sources of information on Climate-Smart Agriculture are presented in Table 2. According to the table, radio ranked highest (x̄=2.17) among the list of information sources through which arable crop farmers mostly accessed information on climate-smart agriculture in the study area. This supports the study of Eta, *et al*., (2023) which reported radio as the source through which crop farmers mostly accessed information on CSA. Fellow farmers (x̄=2.15), and family and friends (x̄= 2.04) ranked 2nd and 3rd, respectively.

The findings are corroborated by the statements of some of the farmers during FGD, as stated below:

- *"We Normally Hear it Regularly on Radio and through Fellow Farmers"*

Furthermore, sources such as farmers' associations (x̄=1.93), Television (x̄=1.75) and extension agents (x̄=1.74) ranked 4th, 5th and 6th, respectively, while social media (x̄=1.43) was the least ranked source through which the farmers accessed information on CSA. Access to information on CSA is key to successful practice of CSA. Bahn et al., (2021) opined that farmers' access to certain sets of information will expose them to smart soil fertilization and smart pest control options that are relevant for coping with adverse climate effects and result to increased crop yields. However, these findings show that arable crop farmers mostly accessed information on climate-smart agricultural practices in the study area through radio, fellow farmers and friends/family. This could be as a result

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of the fact that radio, fellow farmers as well as friend and family were readily available and easily accessible to them. Therefore, it becomes imperative for any intervention on CSA intended for the farmers to factor the frequently accessed sources of information into the design of such intervention, while working on the improvement of other sources.

Table 2: Distribution of the Respondents based on their Sources of Information on Climate-Smart Agriculture.

S/N	Sources of information on CSA	Not at all	Rarely	Occasionally	Frequently	Mean	Rank
1	Radio	11.2	13.4	22.3	53.1	2.17	1st
2	Television	19.6	19.6	26.8	34.1	1.75	5th
3	Family and Friends	10.6	20.1	23.5	45.8	2.04	3rd
4	Fellow farmers	8.9	15.6	26.8	48.6	2.15	2nd
5	Extension agents	15.1	20.1	40.2	24.6	1.74	6th
6	Farmers' association	16.2	15.6	26.8	41.3	1.93	4th
7	Social media	34.1	15.6	23.5	26.8	1.43	7th

Source: Field survey, 2024

- *Constraints to Climate-Smart Agriculture among Arable Crop Farmers in the Study Area*

Table 3 presents the results of analysis of constraints to climate-smart agricultural practices. According to the table, financial constraints ranked highest among the constraints militating against CSA with the mean ($\bar{x}$=2.69). Crop pests and diseases ($\bar{x}$=2.47) ranked second among the list of constraints, while lack of climate information ($\bar{x}$=2.39) and water scarcity ($\bar{x}$=2.38) ranked 3rd and 4th, respectively. Constraints such as technical-know-how challenge and soil degradation were believed to be moderately severe with the means of 2.12 and 2.08, respectively. Land tenure issue was the least ranked constraint with the mean of 1.75. These findings show that challenges facing the climate-smart agriculture were enormous, among which financial constraints, crop pests/diseases, water scarcity and lack of climate information were prominent. This partly support the findings of Ige, *et al.*, (2021) who identified major constraints to the various climate adaptation strategies as inadequate finance, poor agricultural extension services, inadequate access to climate information, non-availability of resistant varieties, among others.

Obabire, *et al*. (2021) also noted high rate of disease as one of the prominent effects of climate variation.

The findings are corroborated by the statements of some of the farmers during FGD, as stated below:

"We don't have money to work"
"We have the problem of downy mildew"
"The major problems are the insects and pest that are destroying our crops"

The identified constraints, if not addressed, could reduce the productivity of the arable crop farmers and increase the negative impact of climate change on their production.

Table 3: Distribution of the Respondents based on the Constraints to Climate-Smart Agricultural Practices in the Study Area

S/N	Constraints to Climate-Smart Agriculture	Not severe	Moderately Severe	Very severe	Mean	Rank
1	Water scarcity	14.5	33.0	52.5	2.38	4th
2	Lack of climate information	10.6	40.2	49.2	2.39	3rd
3	Financial constraints	5.0	21.2	73.7	2.69	1st
4	Crop pest and diseases	9.5	34.1	56.4	2.47	2nd
5	Technical know-how challenge	20.1	48.0	31.8	2.12	5th
6	Land tenure issues	46.4	31.8	21.8	1.75	7th
7	Soil Degradation	22.3	46.9	30.7	2.08	6th

- *Training Needs of Arable Crop Farmers on Climate-Smart Agricultural Practices*

Table 4 reveals that use of drought resistant crop varieties was the most crucial training need of arable crop farmers with the highest mean ($\bar{x}$=2.55). Drought is one of the major manifestations of climate change, and the farmers believed that acquiring knowledge through training on how to source and use drought resistant crop varieties could positively impact their production. Use of early maturing crop varieties ($\bar{x}$=2.53) and pest resistant varieties ($\bar{x}$=2.51) ranked second and third, respectively among the training needs of the respondents. In the same vein, timely access to weather information ($\bar{x}$=2.50), use of recommended herbicides ($\bar{x}$=2.45) and water harvesting for future use ($\bar{x}$=2.43), ranked 4th, 5th and 6th among the list of training needs of the arable crop farmers on CSAP, respectively. Use of organic amendments, working with weather data to make informed decision as well as drip irrigation and other improved water-use efficiency had the same rank of 7th with the mean ($\bar{x}$=2.42). This implies that the arable crop farmers are greatly in need of training on the aforementioned areas of climate-smart agricultural practices. Furthermore, the farmers also indicated that they needed training to a great extent on the following areas of climate-smart agricultural practices; minimizing the use of pesticides ($\bar{x}$=2.39), conversion of waste to compost ($\bar{x}$=2.32),

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Conservation/minimum tillage practices ($\bar{x}$=2.26), altering of planting schedule ($\bar{x}$=2.25), forage conservation ($\bar{x}$=2.23), Use of drainage systems on farmlands ($\bar{x}$=2.21) and use of crop residue ($\bar{x}$=2.19), among others. These findings show that arable crop farmers needed training to a great extent on various aspects of climate-smart agricultural practices, with the use of drought resistant crop varieties, early maturing crop varieties and pest resistant varieties as the most prominent areas. This may not be unconnected with the fact that crop rotation, crop diversification, proper timing of farm operations, planting of improved/ pest and disease resistant varieties, mixed farming, intercropping, fallowing and drought resistant varieties among others, are the prominent adaptation strategies and CSAP utilized by crop farmers as reported by Eta, *et al*., (2023) and Obabire, *et al*. (2021).

Table 4: Distribution of the Respondents based on their Training Needs on Climate-Smart Agricultural Practices

S/N	Climate Smart Agricultural Practices	Not at all	Mild	Somewhat	To a Great Extent	Mean	Rank
A	**Water management practices**						
1	Use of drainage systems on farmlands	8.9	14.0	24.6	52.5	2.21	15th
2	Use of drip irrigation and other improved water-use efficiency	4.5	9.5	25.7	60.3	2.42	7th
3	Water harvesting for future use	4.5	10.1	23.5	62.0	2.43	6th
B	**Tillage-smart and soil health management practices**						
4	Conservation/minimum tillage practices	4.5	14.0	33.0	48.6	2.26	12th
5	Use of recommended herbicides	5.0	5.0	30.2	59.8	2.45	5th
6	Use of organic amendments	1.7	6.7	39.1	52.5	2.42	7th
7	Mulching to prevent soil exposure to extreme heat	8.9	14.0	26.8	50.3	2.18	17th
C	**Fossil burning reduction practices**						
8	Use of crop residue	4.5	19.0	29.6	46.9	2.19	16th
9	Forage conservation	5.0	14.5	32.4	48.0	2.23	14th
10	Conversion of waste to compost	4.5	14.5	25.1	55.9	2.32	11th
D	**Crop mix practices**						
11	Mixed cropping	18.4	14.0	25.7	41.9	1.91	20th
12	Crop diversification initiatives	7.8	15.6	32.4	44.1	2.13	19th
13	Agro-forestry	6.7	19.0	27.4	46.9	2.15	18th
E	**Integrated pest management (IPM) and disease control**						
14	Use of drought resistant crop varieties	2.2	5.6	27.4	64.8	2.55	1st
15	Use of early maturing crop varieties	1.1	6.1	31.3	61.5	2.53	2nd
16	Use of pest resistant varieties	2.2	3.9	34.1	59.8	2.51	3rd
17	Altering of planting schedule	3.9	16.2	30.7	49.2	2.25	13th
18	Minimizing the use of pesticides	2.8	11.7	29.1	56.4	2.39	10th
F	**ICT/ other adaptive practices**						
19	Working with weather data and forecasts to make informed decision	2.2	11.7	27.9	58.1	2.42	7th
20	Timely access to weather information through ICT	2.2	7.8	27.9	62.0	2.50	4th

- *Mean Categorization of the Arable Crop Farmers based on their Training Needs on Climate-Smart Agricultural Practices*

The mean categorization of the respondents as presented in Table 5 shows that majority (52.5%) of the arable crop farmers had high needs for training on climate–smart agricultural practices in the study area. This result indicates that the arable crop farmers require a great deal of training on climate-smart agricultural practices in order to successfully practice climate-smart agriculture in the study area. The understanding of their training needs could help in the design of proper training, required by the arable crop farmers to effectively mitigate the effect of climate change on their production.

Table 5: Distribution of the Respondents based on their Level of Training Needs on Climate-Smart Agricultural Practices

Level of Training Needs	Score	Frequency	Percentage
Low training needs	21 – 46.44	85	47.5
High training needs	46.45 - 60	94	52.5
Minimum score	21		
Maximum score	60		
Mean score	46.45		

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- *Relationship between Arable Crop Farmers' Sources of Information on CSAP and their Training Needs on CSAP*

Table 6 reveals a significant relationship between sources of information of arable crop farmers on CSAP and their training needs on CSAP (r=0.182, p=0.015). This result shows that arable crop farmers' access to information on CSAP significantly influenced their training needs on CSAP. The positive relationship indicates that the more the arable crop farmers have access to information of CSAP, the more their needs for training on CSAP.

Table 6: Correlation Analysis of the Relationship between Arable Crop Farmers' Access to Information and their Training Needs on Climate-Smart Agricultural Practices

Variables	R - Value	P-Value	Decision
Access to information and Training needs	0.182	0.015	Significant

- *Relationship between Constraints Militating Against CSA among Arable Crop Farmers and their Training Needs on Climate-Smart Agricultural Practices*

Result of the analysis (Table 7) reveals a significant relationship between constraints militating against CSAP among arable crop farmers and their training needs on CSAP (r=0.270, p=0.000). This finding shows that the constraints militating against the CSAP among the arable crop farmers had significant influence on their training needs. The direct relationship between the constraints and the training needs shows that the increase in the severity of the constraints leads to an increase in the training needs of the farmers on CSAP and vice-versa.

Table 7: Correlation Analysis of the Relationship between the Constraints Militating Against CSAP among Arable Crop Farmers' and their Training Needs on Climate-Smart Agricultural Practices

Variables	R - Value	P-Value	Decision
Constraints and Training needs	0.270	0.000	Significant

- *Relationships between Socio-Economic Characteristics, Sources of Information, Constraints and Training Needs of Arable Crop Farmers on CSAP*

The results of regression analysis (Table 8) shows that arable crop farmers' gender (β=0.133, p=0.076), age (β=-0.098, p=0.184), marital status (β=-0.002, p=0.978), years spent in school (β=-0.073, p=0.330), household size (β=-0.063, p=0.392) and annual income (β=0.044, p=0.553) were not significantly related to their training needs on CSAP in the study area. However, the farmers' membership of cooperative societies (β=-0.148, p=0.048), sources of information on CSAP (β=0.194, p=0.008) and the constraints militating against CSAP among them (β=0.261, p=0.000), had significant relationships with their training needs on CSAP. The implication of these findings are that the farmers' gender, age, marital status, years spent in school, household size and annual income had little or no influence on their training needs. While the farmers' membership of cooperative societies, sources of information and constraints militating against the CSAP among them were the major predictors of their training needs on CSAP. These are the factors that determined the training needs of the arable crop farmers on CSAP in the study area.

Table 8: Regression Analysis of the Relationships between Arable Crop Farmers' Socio-Economic Characteristics, Sources of Information, Constraints and their Training Needs on CSAP

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	33.250	5.554		5.987	0.000
Gender	2.847	1.594	0.133	1.787	0.076
Age	-0.075	0.056	-0.098	-1.333	0.184
Marital Status	-0.062	2.244	-0.002	-0.028	0.978
Years spent in school	-0.157	0.160	-0.073	-0.977	0.330
Household size	-0.074	0.086	-0.063	-0.859	0.392
Income per annum	4.934E-7	0.000	0.044	0.594	0.553
Membership of Cooperative	-2.824	1.419	-0.148	-1.990	0.048
Sources of information	0.359	0.133	0.194	2.697	0.008
Constraints	0.853	0.238	0.261	3.586	0.000

R = 0.404, R Square =0.163, Adjusted R Square = 0.119, Std. Error of the Estimate = 8.98132

IV CONCLUSION

Climate-smart agriculture is a production system that is capable of mitigating the effects of climate change. However, the adoption of recommended climate-smart agriculture has been reported to be low among farmers. This study, having assessed the training needs of arable crop farmers on climate-smart agricultural practices in Ekiti State, concluded that the arable crop farmers mostly accessed information on climate-smart agricultural practices in the study area through radio, fellow farmers and friends/family. Financial constraints as well as crop pests and diseases were the prominent constraints militating against climate-smart agricultural practices in the study area. The need for training of the farmers on climate-smart agriculture was high, most especially on integrated pest management and disease control system, among others. Sources of information and constraints militating against the climate-smart agricultural practices had significant influence on the training needs of arable crop farmers and they also significantly predicted their training needs on climate-smart agricultural practices in the study area. Therefore, there is need for comprehensive training on climate-smart Agriculture for the arable crop farmers in the study area.

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REFERENCES

[1]. Ayinde, O. E. (2010). Empirical Analysis of Agricultural Production and Climate Change: A Case Study of Nigeria. Journal of Sustainable Development in Africa, 12(6): 345 - 253
[2]. Bahn, R.A., Yehya, A. A. K., and Zurayk, R. (2021). Digitalization for sustainable agri-food systems: Potential, status, and risks for the MENA Region. Sustainability 13, 3223. https://doi.org/10.3390/su13063223
[3]. Chitakira, M. and Ngcobo, N.Z.P. (2021). Uptake of climate-smart agriculture in peri-urban areas of South Africa's economic hub requires up-scaling. *Frontier in Sustainable Food Systems*. 5 (706738). doi: 10.3389/fsufs.2021.706738.
[4]. Cohn, A.S., Newton, P., Gil, J. D. B., Kuhl, L., Samberg, L., Ricciardi V., Manly, J. R., Northrop, S. (2017). Smallholder agriculture and climate change. *Annu Rev Environ Resour*. 42(1):347–75. *https://doi.org/10.1146/annurev-environ-102016-060946*.
[5]. Cudjoe, G.P.; Antwi-Agyei, P.; Gyampoh, B. A. (2021).The Effect of Climate Variability on Maize Production in the Ejura-Sekyedumase Municipality, Ghana. *Climate* 9, 145. https://doi.org/10.3390/cli9100145.
[6]. Elum, Z.A., Modise, D.M., Marr, A. (2017). Farmer's perception of climate change and responsive strategies in three selected provinces of South Africa. *Clim. Risk Manage*. 16, 246–257.
[7]. Eta, H. C., Idiku, F. O. and Elemi, G. F. (2023). Crop Farmers' Access to E-information for Climate Smart Agriculture Production, in Cross River State, Nigeria. *Journal of Agricultural Extension* Vol. 27 (3): 26 – 34.
[8]. FAO. The future of food and agriculture – Alternative pathways to 2050. 2018.(p. 228).
[9]. Gabriel, I., Olajuwon, F., Klauser, D., Michael, B. and Renn, M. (2023). State of climate smart agriculture (CSA) practices in the North Central and Northwest zones Nigeria. *CABI Agric Biosci* , 4, 33. *https://doi.org/10.1186/s43170-023-00156-4*.
[10]. Ibitoye, O., Ogunyemi, A.I., Ajayi, J.O. (2014). Constraints to climate variability adaption among arable crop farmers in Ekiti state, Nigeria. *Paper presented at the annual national conference of Nigerian Association of Agricultural Economists (NAAE).* Theme: climate change, agriculture and food security in Nigeria. The Federal University of Technology, Akure. 24th – 27th, February, 2014
[11]. Ige, G.O., Akinnagbe, O.M., Odefadehan, O.O., Ogunbusuyi, O.P. (2021). *Constraints to Farmers' Choice of Climate Change Adaptation Strategies in Ondo State of Nigeria*. In: Oguge, N., Ayal, D., Adeleke, L., da Silva, I. (eds) African Handbook of Climate Change Adaptation. Springer, Cham. *https://doi.org/10.1007/978-3-030-45106-6_103*.
[12]. IPCC (2019). *Climate Change and Land*: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. 2019. (p. 906).
[13]. Musafiri, C.M., Kiboi, M., JMacharia, J., Ng'etich, O.N., David K. Kosgei, D.K., Mulianga, B., Michael Okoti, M. and Ngetich, F.K. (2022). Adoption of climate-smart agricultural 34 practices among smallholder farmers in Western Kenya: Do socioeconomic, institutional, and biophysical factors matter? *https://doi.org/10.1016/j.heliyon.2021.e08677*
[14]. Obabire, I. E., Jimoh, A. S., Oyewusi, I. K., Omotayo, F. S. and Koyenika, O. O.(2021). Adaptation Strategies to Mitigate the Effects of Climate Variability on the Production Practices of Maize Farmers in Ikole Local Government Area of Ekiti State, Nigeria. *Proceedings of 13th Engineering Forum, held at the School of Engineering, the Federal Polytechnic, Ado-Ekiti, Nigeria between* 11th – 14th October, 2021. Pp 366-373.
[15]. Onoja, A.O., Abraha, A. A., Girma, A., Achike, A. I. (2019). Climate-Smart Agricultural Practices (CSA) adoption by Crop Farmers in semi-arid regions of West and East Africa: evidence from Nigeria and Ethiopia. In: Castro P, Azul A, Leal Filho W, Azeiteiro U, editors. Climate change-resilient agriculture and agroforestry. Berlin: Springer; 2019.
[16]. Opeyemi, G., Opaluwa, H.I., Adeleke, A.O., and Ugbaje, B. (2021). Effect of climate smart agricultural practices on farming households′ food security status in Ika north east local government area, Delta State,Nigeria. *Journal of Agriculture and Food Sciences*,19 (2):30-42.
[17]. Waaswa, A., Nkurumwa, A. O., Kibe, A.M., and Kipkemoi, N .J. (2021). Communicating climate change adaptation strategies: Climate-smart agriculture information dissemination pathways among smallholder potato farmers in Gilgil Sub-County, Kenya. *Heliyon*. 7(8):e07873. Doi:10.1016/j.heliyon.2021.e07873.
[18]. World Bank (2021). Climate-smart agriculture. *http://www.worldbank.org/en/topic/climate-smartagriculture*.