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TRAINING NEEDS ON CLIMATE CHANGE ADAPTATION STRATEGIES AMONG ARABLE CROP FARMERS IN OYO STATE

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ABSTRACT:

This study examined the extension training needs on climate change adaptation strategies among arable crop farmers in Surulere Local Government Area of Oyo State, Nigeria. Multi-stage sampling techniques was used to select 90 respondents. Interview-schedule and questionnaire were used to collect relevant data. Data were analyzed using both descriptive and inferential statistical tools (Pearson Product Moment Correlation (PPMC)). The result revealed that both sexes engaged in arable farming with a mean age of 50.5 years. About 64.0% of the respondents have farming as their primary occupation and 55.6% of the respondents have between 11-20 years of experience in arable crop production. Almost all (92.3%) of the respondents indicated contact with extension agents. PPMC result revealed that socioeconomic characteristics such as sex, household size, primary occupation and years of farming experience all exhibited significant relationship with the level of need of extension training on adaptation strategies. The study concluded that though arable crop farmers are aware of various adaptation strategies, yet they are in dire need of extension training on their usage. Subject matter specialist should be employed to train arable crop farmers in the use of adaptation strategies to ameliorate climate change effect.

KEYWORDS:

EXTENSION, TRAINING NEEDS, CLIMATE CHANGE, ADAPTATION STRATEGIES, ARABLE CROPS.

1. INTRODUCTION

Climate change can be defined as a change in the average climatic condition of a place. (Anyadike, 2009). It is evidenced that climate change will have a strong impact on Nigeria-particularly in the areas of agriculture; land use, energy, biodiversity, health, and water resources (Akintonde et al., 2016). Food crop farmers in South Western Nigeria provide the bulk of arable crops that are consumed locally, also, major food crop supplies to other regions in the country (Akintonde et al., 2016). The main cause of climate change has been attributed to anthropogenic (human) activities. For example, the increased industrialization in the developed nations has led to the introduction of large quantities of greenhouse gases (GHGs), including carbon (IV) oxide (CO2), methane (CH4) and nitrous oxide (N2O) into the atmosphere. These GHGs are the primary causes of global warming (Intergovernmental Panel on Climate Change (IPCC, 2007). Climate change can retard/impede efforts being made by nations to achieve the sustainable development goals. Niang et al., (2014) documented dramatic and widespread evidence of global warming and other climate changes. Some of these impacts include threats to global food supply citing a decrease of up to 2 percent each decade in yields of staple crops like maize, wheat and rice; freshwater and marine species; ecosystem shift and species extinction; negative impact on agriculture; migration and security; heat waves, flood; shortage of water resources; destruction of homes and infrastructure; increased food insecurity; and violent conflict that lead to the destruction of infrastructure, livelihood opportunities and natural resources.

The consequences of the effect of climate change have brought about the farmers utilizing various adaptation strategies. According to IPCC (2007) and cited in Onwuatudo (2015), adaptation is the adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, to moderate harm or exploits beneficial opportunities. The need for adaptation to climate change presents a serious challenge to government, planners, managers, researchers, extension system, private organizations, communities etc. It calls for a multi-stakeholders' approach to measures, policies, strategies and competency building aimed at addressing climate change phenomenon. Adaptation to climate change requires building competency of all stakeholders in the agricultural sector particularly the extension professionals and farmers.

Agricultural extension is a comprehensive programme of services deliberately put in place for expanding, strengthening and empowering the capacity of the present and prospective farmers, farm families, other rural economic operators (processors, marketers, rural agro-industrialists, farm managers, farm labour force etc.), farmers associations and communities entrepreneurial, managerial and communication skills that they need to succeed in farming and farm related occupations (Onwuatudo, 2014). According to Onwubuya and Obiora (2011) the roles of extension professionals includes; dissemination of useful information needed by the farmers to them, assisting farmers determine their problems, helping them find desirable solution and encourage them to take action, helping the farmers gain managerial skills on their farm like how to handle inputs and output and putting the farmers in a frame of mind to adopt the innovation which are all considered to be training needs of the farmers.

A training needs assessment identifies the "gap" between current performance and the performance required, and explores the causes and reasons for the gap and methods for closing or eliminating it (Ageogun *et al.,* 2013). A needs assessment that takes into account the views of farmers is essential to ensure that the design and development of training curricula meets the needs of those it aims to serve. As Sajeev *et al.,* (2012) note, farmer training is education that usually takes places outside formal learning institutions and is geared towards adult learning and changing behaviors. It therefore requires an approach that takes the route of 'situations', rather than 'subjects'. Unlike conventional education in which the student is required to adjust him or herself to an established curriculum, the curriculum in adult education is built around the students' needs and interests (Sajeev *et al.,* 2012). This emphasizes the importance of getting it right, ensuring that both the subject matter and approach are suitable and relevant to farmers.

Appropriate training programs can play a critical role in bridging this gap, providing farmers with the new skills and technical knowledge necessary to implement improved methods and to make informed decisions about the best options to suit their needs. Effective training of any kind requires comprehensive knowledge of the training needs of the target group. In many cases, the training needs of farmers are identified by organizations or individuals, often at the national level, without taking into account the specific needs and preferences of farmers themselves. In most cases, the training of farmers forms part of agricultural extension, which can be defined as the provision of need and demand-based agricultural knowledge and skills to rural men, women and young people in a non-formal and participatory manner to help improve their quality of life (Qamar, 2005).

Climate change is seriously threatening economy of rural communities, farmers and food security. With reference to sub-Saharan Africa, there is growing interest on the likely impacts of climate change on agriculture, economic growth and sustainable development. In alleviating and reducing the effect of the climate change experienced, various adaptation strategies have been developed by researchers and other stakeholders in agriculture, with these strategies been disseminated to the arable farmers to ameliorate effects of climate change. Nigeria's high vulnerability to climate change is due to limited capacity to adapt which is attributed to low levels of awareness, financial resources, institutional and technological capability. The effectiveness with which farmers adapt to climate change significantly depends on how well it is understood by individual farmers. This situation has identified the missing link in extension role and duties to arable farmers, because use of adaptation strategies for climate change is more than providing the climate change but also demands the requisite training of farmers on the usage of the adaptation strategies provided or recommended.

The study therefore examined the level of training needs of arable crop farmers on use of adaptation strategies on climate change in Oyo State, Nigeria. Specifically, it described the socioeconomic characteristics of the crop farmers; identified the adaptation strategies available to the farmers; identify the extension training needs of the arable farmers on use of adaptation strategies on climate change and investigated the constraints to the use of extension training received on adaptation strategies on climate change in the study area.

2. METHODOLOGY

This study was carried out in Surulere Local Government Area of Oyo State. The study area was divided into ten (10) wards and it has 294 villages. Multistage sampling procedure was employed for this study. The first stage involved the random selection of five (5) wards from the available ten (10) wards in the study area. The second stage involved the random selection of two (2) villages from each of the selected ward in the area, making a total of ten (10) villages that were used for this study. The third stage involved the random selection of nine (9) registered maize farmers from each of the selected village to make a total of ninety (90) maize farmers that were used for this research work. The descriptive statistical tools used in the study include frequency distribution, percentage, mean and ranking; while Pearson Product Moment Correlation was used as inferential tool to test the relationship that exists between the variables.

3. RESULTS AND DISCUSSIONS

3.1 SOCIO- ECONOMIC CHARACTERISTICS

The result in table 1 revealed that above average (56.4%) of the respondents were within the age ranges of 46-55 years, 17.1% were within the age ranges of 36-45 years while 16.2% and 10.3% were above 55 years and not more than 35 years respectively with the mean age of 50.5 years. The above findings indicated that arable crop farmers in the study area are mature, energetic and still in their economic active years. This is expected to inspire them to enquire more on ways to ameliorate effects of climate change on crop production so as to improve their production and gain more financial buoyancy. This is an indication that they might be conversant with climate change adaptation strategies in the study area. This result is in line with the findings of Akintonde *et al.,* (2016), where the mean age of the arable farmers that utilize climate change adaptation strategies was revealed to be 49.43 years.

About 90.0% of the respondents were married while only 10.3% were single. This implies that majority of the farmers are responsible as they have to work hard to get resources and food needs of their households. Married individuals are more concerned with seeking information on climate change and fending for food than singles or divorced individuals who may tend to consider their personal wellbeing alone (Yohanna, 2007). In addition, majority (72.6%) of the respondents were male, while only 27.4% were female. The result implies that males are more involve in arable farming than their female counterpart. Arable crop production was mostly carried out by men. Moreover, more than half (64.1%) were Christians while 35.9% were Muslims. This implies that arable crop production is not subjected to religion bias. On educational level, 40.2% and 31.6% had primary and secondary education respectively while only 28.2% had tertiary education. The result implies that all the respondents in the study area were literate, an indication that their level of educational exposure might influence extension training needs for climate change adaptation strategies for arable crop production. Majority (89.7%) indicated that they have above 3 members in their household while only 10.3% indicated they have not more than 3 members in their household with the mean household size of 5 members. On the primary occupation, most (64.1%) of the respondents indicated farming as their primary occupation while 35.9% indicated civil service as their primary occupation. This result implies that most of the respondents engage in arable farming as primary occupation. More than half (58.1%) of the respondents cultivated between 4-6 acres of land while 22.2% and 19.7% indicated that they cultivated above 6 and not more than 3 acres respectively with the mean farm size of 5.6 acres cultivated for arable crop in the study area. This result implies that arable crop farmers in the study area cultivates majorly for commercial purpose though not on a large scale. Also, 55.6% of the respondents have garnered between 11-20 years of experience while 10.3% and 34.2% indicated above 20 years and not more than 10 years of experience in arable crop production respectively. The mean year of experience in arable crop farming was 15.4 years. This result implies that all the farmers sampled are not novice but had different years of farming experience. The variation in their years of farming experience may be due to age differences and years they venture into arable crop production. It was further revealed that respondents engage the services of both family (37.6%) and hired (12.0%), and combined (50.4%) sources of labour for different activities involved in arable crop production. The result on the contact with extension agents revealed that, almost all (92.3%) of the respondents indicated to have contact with extension agents while only 7.7% do not have access to extension agents. This result is an indication that arable crop farmers are exposed to subject matter specialist who might have exposed them to different trainings on the utilization of adaptation strategies to ameliorate the effects of climate change on arable crop production in the study area.

TABLE 1: DISTRIBUTION OF RESPONDENTS ACCORDING TO SOCIOECONOMIC CHARACTERISTICS N=117

Socioeconomic characteristics	Frequency	Percentage	Mean
Sex			
Male	85	72.6	
Female	32	27.4	
Age			
≤ 35	12	10.3	
36-45	20	17.1	50.5
46-55	66	56.4	
Above 55	12	16.2	
Marital status			
Single	12	10.3	
Married	105	89.7	
Religion			
Christianity	75	64.1	
Islam	42	35.9	

Educational status			
Tertiary education	33	28.2	
Secondary education	37	31.6	
Primary education	47	40.2	
Household size			5
≤3	12	10.3	
Above 3	105	89.7	
Primary occupation			
Civil service	42	35.9	
Farming	75	64.1	
Farm size (acres)			5.6
≤3	23	19.7	
4-6	68	58.1	
Above 6	26	22.2	
Years of experience in farming			15.4
≤10	40	34.2	
11-20	65	55.6	
Above 20	12	10.3	
Source of labour			
Hired	14	12.0	
Family	44	37.6	
Both	59	50.4	
Contact with extension agent			
Yes	108	92.3	
No	9	7.7	

Source: Field survey, 2021

3.2 ADAPTATION STRATEGIES AVAILABLE TO ARABLE CROP FARMERS IN THE STUDY AREA

Table 2 below reveals the climate change adaptation strategies available to the arable crop farmers in the study area. All (100.0%) of the respondents indicated the availability of cultivation of improved seed varieties, application of fertilizer to crops grown, planting of drought resistant varieties of crops, crop diversification, weed control and pest management as adaptation strategies used for crop production in the study area. Furthermore, 82.1% indicated alteration of planting date and other planting activities; 77.8% indicated both harvesting and storage and compost preparation and application; 70.1% indicated mulching while almost 60.0% indicated water management as adaptation strategies used to ameliorate effect of climate change on arable crop production in the study area. Also, above average 55.6% and 51.3% indicated post-harvesting processing and altering of crop planting date as adaptation strategies used respectively while 41.0% indicated use of irrigation system as adaptation strategies used for crop production in the study area. Lastly, 29.9% and 21.4% indicated the utilization of soil fertility improvement and soil conservation measures as adaption strategies used respectively in the study area to ameliorate climate change effect on crop production. This result is an indication that arable crop farmers are aware of various adaptation strategies to check the climate change effect on crop production in the study area. The adaptation strategies used by arable farmers in the study area is similar to the findings of Akintonde *et al.,* (2016) and Bradshaw et al., (2004) where crop diversification, mixed crop-livestock farming systems, using different crop varieties, changing of planting date and harvesting dates, and mixing less productive, drought-resistant varieties and high-yield water sensitive crops were major adaptation strategies adopted by arable crops. The result is also in tandem with the findings of Tarfa *et al.,* (2019), where cultivation of improved crop varieties, portfolio diversification, practicing soil and water conservation, adjusting time of sowing, changing tillage operations, planting trees, irrigation, and farmland management were major climate change adaptation strategies utilized by arable crop farmers.

TABLE 2: DISTRIBUTION OF RESPONDENTS ACCORDING TO ADAPTION STRATEGIES AVAILABLE IN THE STUDY AREA

	Adaptation Strategies	*Frequency	Percentage
a.	Cultivation of improved seed varieties	117	100.0
b.	Application of fertilizer to crops grown	117	100.0
c.	Planting of drought resistant varieties of crops	117	100.0
d.	Crop diversification	117	100.0
e.	Altering of crop planting date	60	51.3
f.	Use of irrigation system	48	41.0
g.	Soil conservation measures	25	21.4
h.	Soil fertility improvement	35	29.9
i.	Water management	70	59.8
j.	Alteration of planting date and other planting activities	96	82.1
k.	Weed control	117	100.0
l.	Pest management	117	100.0
m.	Harvesting and storage	91	77.8
n.	Post-harvest processing	65	55.6
o.	Compost preparation and application	91	77.8
p.	Mulching	82	70.1

Source: Field survey, 2021

*: Multiple responses

3.3 LEVEL OF TRAINING NEEDS ON CLIMATE CHANGE ADAPTATION STRATEGIES

Table 3 below revealed the level of training need on climate change adaptation strategies by arable crop farmers in the study area. Weed control and pest management were ranked first (1st) with a weighted mean score (WMS) of 2.8 each based on the level of training needed for optimal use of the adaptation strategies. In addition, cultivation of improved seed varieties, application of fertilizer to crops grown, planting of drought resistant varieties of crops and water management were all ranked 3rd with each having a WMS of 2.7 each. Also, alteration of planting date and other planting activities (WMS=2.6); soil conservation measures, soil fertility improvement and use of irrigation system with WMS of 2.5 each were all ranked 8th based on the level of training need by the arable crop farmers in the study. Furthermore, crop diversification, altering of crop planting date and compost preparation and application were ranked 11th with each having a weighted mean score (WMS) of 2.4. Lastly, harvesting and storage and post-harvesting processing were ranked 14th with each having a WMS of 2.3. This result is an indication that arable crop farmers in the study area are in need of extension training for optimal utilization of the adaptation strategies available to ameliorate effects of climate change on arable crop production. This result is an indication that crop output will have been more profitable to the arable crop farmers in the study area if they are expertise in the utilization of climate change adaptation strategies. It is imperative from this finding that arable crop farmers are still in need of professional training so as to optimally put into use climate change adaptation strategies to achieve optimal output to curb food insecurity in the study area and Nigeria as a whole.

Also, the variation in the level of training needs might be due to various socioeconomic factors such as age, sex, size of farmland cultivated, type of arable crop cultivated, level of education of the respective farmers, access to information on climate change and the adaptation strategies, financial buoyancy of the farmers amongst other several factors. This result is in line with the findings of Akintonde *et al.,* (2016) and Hassan and Nhemachena (2007) who affirmed in their study that farmers have varied level of need on extension training about the use of adaptation strategies to curtail the effect of climate change.

TABLE 3: DISTRIBUTION OF RESPONDENTS ACCORDING TO LEVEL OF NEED OF EXTENSION TRAINING OF ARABLE CROP FARMERS ON ADAPTATION STRATEGIES

	Level of needs					
	Areas of training needs	High F (%)	Moderate F (%)	Mild F (%)	WMS	Rank
a.	Cultivation of improved seed varieties	79(67.5)	38 (32.5)	-	2.7	3rd
b.	Application of fertilizer to crops grown	79 (67.5)	38 (32.5)	-	2.7	3rd
c.	Planting of drought resistant varieties of crops	79 (67.5)	38 (32.5)	-	2.7	3rd
d.	Crop diversification	54(46.2)	51 (43.6)	12 (10.4)	2.4	11th
e.	Altering of crop planting date	54(46.2)	51 (43.6)	12 (10.4)	2.4	11th
f.	Use of irrigation system	62(53.0)	55 (47.0)	-	2.5	8th
g.	Soil conservation measures	75(64.1)	29 (24.8)	13 (11.1)	2.5	8th
h.	Soil fertility improvement	74 (63.2)	30 (25.6)	13 (11.1)	2.5	8th
i.	Water management	82 (70.1)	35 (29.9)	-	2.7	3rd
j.	Alteration of planting date and other planting activities	69 (59.0)	48 (41.0)	-	2.6	7th
k.	Weed control	92 (78.6)	25 (21.4)	-	2.8	1st
l.	Pest management	92 (78.6)	25 (21.4)	-	2.8	1st
M	Harvesting and storage	48 (41.0)	57 (48.7)	12 (10.3)	2.3	14th
n.	Post-harvest processing	34 (29.1)	83 (70.9)	-	2.3	14th
o.	Compost preparation and application	46 (39.3)	71 (60.7)	-	2.4	11th
p.	Mulching	25 (21.4)	72 (61.5)	20 (17.1)	2.0	16th

Source: Field survey, 2021

F: Frequency

%: Percentage

WMS: Weighted mean score

3.4 CONSTRAINTS TO EXTENSION TRAINING RECEIVED ON CLIMATE CHANGE

It was revealed in Table 4 that all (100.0%) of the respondents indicated high cost of irrigation system while 89.7% indicated scarcity/unavailability of improved crop varieties and scarcity/expensive cost of production as the constraints to extension training received over climate change. Also, 78.6% of the respondents indicated poor extension service, 42.7% indicated no subsidies on improved planting materials while 31.6% indicated both inadequate of information on climate change and climate variability as the constraints encountered by arable crop farmers in the utilization of the known adaptation strategies in the study area. This result implies that crop farmers are faced with adverse constraints which denied them against the use of extension recommendations on climate change adaptation strategies. The result is similar to the findings of Akintonde *et al.,* (2016) in his work assessment level of use of climate change adaptation strategies among arable crop farmers in Oyo and Ekiti states, Nigeria where capital was ranked first as a major constraint faced in the use of extension training received on use of adaptation strategies to ameliorate effect of climate change on arable crop production.

TABLE 4: DISTRIBUTION OF RESPONDENTS BY CONSTRAINTS ENCOUNTERED WITH USE OF EXTENSION TRAINING RECEIVED ON ADAPTATION STRATEGIES TO CLIMATE CHANGE

	Constraints	*Frequency	Percentage
a.	Scarcity/unavailability of improved crop varieties	105	89.7
b.	Scarcity and expensive highest of production	105	89.7
c.	High cost of irrigation system	117	100.0
d.	Poor extension service	92	78.6
e.	Inadequate of information on climate change	37	31.6
f.	Climate variability	37	31.6
g.	No subsidies on improved planting materials	50	42.7

Source: Field survey, 2021

*: Multiple responses

3.5 LEVEL OF SEVERITY OF IDENTIFIED CONSTRAINTS TO EXTENSION TRAINING NEEDS ON CLIMATE CHANGE ADAPTATION STRATEGIES.

The result in the table below revealed the level of severity of the constraints encountered in the use of adaptation strategies to ameliorate the effect of climate change in the study area. Scarcity/unavailability of improved crop varieties was ranked first (1st) based on weighted mean score of 2.8. This was followed by scarcity/expensive cost of production and high cost of irrigation system ranked 2nd with WMS of 2.7 each. Also, climate variability (WMS=2.3); no subsidies on improved planting material (WMS=2.5); poor extension service (WMS=2.2) and inadequate of information on climate change with WMS of 2.1 was ranked least (7th) based on the level of severity of identified constraints encountered by arable crop farmers in the study area. The variation in the ranking order may be due to differences in the perception of farmers on the identified constraints as they affect the use of extension recommendations on climate change adaptation strategies which are being determined by factors such as financial buoyancy, sex, marital status amongst other factors.

TABLE 5: DISTRIBUTION OF RESPONDENTS ACCORDING TO LEVEL OF SEVERITY OF IDENTIFIED CONSTRAINTS TO THE USE OF EXTENSION TRAINING RECEIVED ON ADAPTATION

	Level of severity					
	Constraints	Very Severe F (%)	Severe F (%)	Mild F (%)	WMS	Rank
a.	Scarcity/unavailability of improved crop varieties	91 (77.5)	26 (22.2)	-	2.8	1st
b.	Scarcity and expensive highest of production	79 (67.5)	38 (32.5)	-	2.7	2nd
c.	High cost of irrigation system	78 (66.7)	39 (33.3)	-	2.7	2nd
d.	Poor extension service	28 (23.9)	89 (76.1)	-	2.2	6th
e.	Inadequate of information on climate change	21 (17.9)	84 (71.8)	12 (10.3)	2.1	7th
f.	Climate variability	37 (31.6)	80 (68.4)	-	2.3	5th
g.	No subsidies on improved planting material	54 (46.2)	63 (53.8)	-	2.5	4th

Source: Field survey, 2021

F: Frequency

%: Percentage

WMS: Weighted mean score.

3.6 TEST OF HYPOTHESIS

THE HYPOTHESIS WAS STATED IN THE NULL FORM:

HYPOTHESIS 1 (H01):

There is no significant relationship between selected socio-economic characteristics of the arable crop farmers and the level of need of extension training on adaptation strategies.

The result for Pearson product moment correlation in Table 6 revealed that some of the selected socioeconomic characteristics of the arable crop farmers such as sex (r=-0.261*, p=0.011); household size (r=0.241*, p=0.019); primary occupation (r=0.276**, p=0.007) and years of farming experience (r=0.385**, p=0.000) all exhibited significant relationship with the level of need of extension training on adaptation strategies. This result implies that sex, household size and years of farming experience have inverse significant relationship on the respondents' level of need of extension training on adaptation strategies on climate change meanwhile; primary occupation had a positive significant relationship on the level of need of extension training on adaptation strategies by arable farmers on climate change. This result is an indication that arable crop farmers in the study area have selected socioeconomic characteristic that positions them to be in need of extension training on adaptation strategies, hence it is perceived that arable crop farmers in the study area have the zeal to improve their arable crop production. Therefore, the null hypothesis was rejected, hence alternative hypothesis is therefore accepted.

TABLE 6: TEST OF SIGNIFICANT RELATIONSHIP BETWEEN THE SELECTED SOCIOECONOMIC CHARACTERISTICS OF RESPONDENTS AND LEVEL OF NEED OF EXTENSION TRAINING ON ADAPTATION STRATEGIES USING PPMC ANALYSIS

Socioeconomic characteristics	Correlation Coefficient	P-value	Result	Decision
Age	0.003	0.974	Not Significant	Accept
Sex	-0.261*	0.011	Significant	Reject
Household size	-0.241*	0.019	Significant	Reject
Primary occupation	0.276**	0.007	Significant	Reject
Years of farming experience	-0.385**	0.000	Significant	Reject

Source: Computed Data, 2019

***:** Significant at 0.05 level (2-tailed)

****:** Significant at 0.01 level (2-tailed)

4. CONCLUSIONS AND RECOMMENDATIONS

The study concluded that though arable crop farmers are aware of various adaptation strategies to ameliorate climate change effect on arable crop production, yet they are in dire need of trainings in the use of the available and identified adaptation strategies and based on the findings made on this research work, the following recommendations were made; Subject matter specialist should be employed to train arable crop farmers in the use of adaptation strategies to ameliorate climate change effect. Also, Stakeholders should formulate policies that will enhance and mandate prompt and periodic trainings for arable crop farmers adequately prepare for shocks and natural disaster that inhibit crop production.

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