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TRAINING NEEDS OF ARABLE CROP FARMERS ON CLIMATE CHANGE ADAPTATION STRATEGIES IN OYO STATE, NIGERIA.

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ABSTRACT

The adverse impacts of climate change on arable crop production necessitated an evaluation of the training needs of farmers on adaptation strategies in Oyo State, Nigeria. Hence, this study assessed the training needs of arable crop farmers on climate change adaptation strategies of Oyo State, Nigeria.
A multistage sampling technique was employed for the selection of respondents for the study. The first stage involved a random selection of 50% of the agricultural zones from the four agricultural zones in the state, which were Ogbomoso and Oyo Agricultural zones. The second stage involved a random selection of 40% of the blocks from the selected zones. Therefore, Oriire and Surulere LGAs were selected from Ogbomoso Agricultural zone, while Afijio and Iseyin Local Government Areas were selected from the Oyo Agricultural zone. The third stage involved selecting 10% of the randomly selected villages. The fourth stage involves randomly selecting (20%) arable crop farmers from the registered list in each village. Thus, a total of 205 respondents were used for the study. Descriptive statistics such as frequency counts, percentages and Weighted Mean Score (WMS) were used to describe the socio-economic characteristics of the arable crop farmers, examine the specific areas of training needs, determine the level of training needs on climate change adaptation strategies, T-test analysis was used to test the hypothesis of the study.
The study concluded that respondents needed training mainly on adjusting crop planting dates. It recommended that training programs recognize and incorporate these indigenous practices while introducing scientifically proven methods to enhance productivity among arable crop farmers.

Keywords: Training Needs; Arable Crop Farmers; Climate Change; Adaptation Strategies

INTRODUCTION

Climate change remains one of the most pressing global challenges, significantly affecting various sectors, including agriculture. In Nigeria, where agriculture plays a central role in the livelihoods of millions, the impacts of climate change are already being felt, particularly among arable crop farmers. Oyo State, recognized as one of the agriculturally productive states in Nigeria, is not exempt from these challenges. The state is increasingly experiencing erratic rainfall, rising temperatures, prolonged droughts, and flooding — all of which threaten crop productivity and food security.

Arable crop farmers in Oyo State are especially vulnerable due to their dependence on rain-fed agriculture, limited access to modern farming inputs, and inadequate infrastructure. These climatic challenges have led to reductions in crop yields, greater prevalence of pests and diseases, and increased unpredictability in farming calendars (Adewumi *et al.,* 2020). As highlighted by former President Muhammadu Buhari in 2023, "Climate change is the biggest threat facing our country today," pointing to its adverse impact on both the economy and the lives of ordinary Nigerians.

Adaptation to climate change is, therefore, a necessity, not a choice. However, effective adaptation hinges on farmers' access to relevant knowledge, skills, and resources. Several studies (Olayide *et al.,* 2017; Ayanlade *et al.,* 2018) have stressed the need for training programs that are specifically tailored to the realities and needs of local farmers. These programs should empower arable crop farmers with practical skills in climate-resilient agriculture, such as crop diversification, water conservation, pest and disease management, and early warning systems. In addition, promoting the integration of indigenous knowledge systems with modern climate-smart practices can further enhance the resilience of farming communities (Adewumi *et al.,* 2020).

Furthermore, stakeholder collaboration — including government agencies, research institutions, NGOs, and farmer organizations — is essential for the design and successful implementation of such training initiatives (Olaniyan *et al.,* 2019). Training efforts must also be supported by improved access to markets, financial services, infrastructure, and technology to ensure sustainability.

Given the limited capacity of many arable crop farmers to independently adopt adaptation measures due to financial and educational constraints, targeted training interventions are critical. Farmers need to be educated on the implications of climate change for crop production and supported in adopting efficient adaptation strategies that are context-specific and cost-effective. These may include the use of drought-tolerant seed varieties, improved irrigation techniques, and sustainable land management practices.

This study, therefore, seeks to identify and evaluate the training needs of arable crop farmers in Oyo State on climate change adaptation strategies. By understanding these needs, the study aims to inform the development of practical, farmer-centred training programs that can enhance resilience, improve productivity, and contribute to sustainable agricultural development.

METHODOLOGY

The study was carried out in Oyo State, Nigeria. Oyo State is located in the Southwest geopolitical zone of Nigeria. Oyo State was one of the three States carved out of the former Western State of Nigeria in 1976. Oyo State consists of 33 Local Government Areas (LGAs) and 29 Local Council Development Areas. The State covers a total of 28,454 square kilometres of land mass and it is bounded in the South by Ogun State, in the North by Kwara State, in the West it is partly bounded by Ogun State and partly by the Republic of Benin, while in the East by Osun State. (Unveiling Nigeria, 2022)

Oyo State has an equatorial climate with dry and wet seasons and relatively high humidity. The dry season lasts from November to March, while the wet season starts from April and ends in October. Average daily temperature ranges between 25 °C (77.00 °F) and 35 ^{0}C (95.0 ^{0}F), almost throughout the year. Oyo State, Nigeria, has an average annual rainfall of 1,050 mm to 1,350 mm with a typical wet season from April to October, though with an August lull. The average daily sunshine hours are around 4 to 12 hours, varying monthly. Sunshine data is often presented in relation to temperature and humidity, which are generally warm year-round. The vegetation pattern of Oyo State is that of the rain forest in the south and guinea savannah in the north. Thick forest in the south gives way to grassland interspersed with trees in the north. The climate in the State favours the cultivation of crops like Maize, Yam, Cassava, Millet, Rice, Plantain, Cocoa tree, Palm tree and Cashew. However, other income generating activities includes: trading, carpentry, blacksmithing, weaving, hairdressing, and so on (Oyo State official site, 2020). A multistage sampling technique was employed in selecting the respondents for this study. There are four (4) ADP zones present in Oyo state which include; Ibadan/Ibarapa; Oyo; Ogbomoso and Saki Agricultural zones.

The first stage involved a Random selection of 50% zones from the state which were Ogbomoso and Oyo Agricultural zones. The second stage involved a random selection of 40% blocks from the selected zones. Therefore; Oriire and Surulere Local Government Areas were selected from Ogbomoso Agricultural zone, while Afijio and Iseyin LGAs were selected from Oyo Agricultural zone respectively. During third stage, 1% of the villages were randomly selected. Twenty per cent (20%) of arable crop farmers were randomly selected from the registered list in each village, which amounted to a total of two hundred and five (205) arable crop farmers that constituted the sample size of the study as indicated in Table 1 below.

Name of the selected Agricultural zone (50%)	Name of the selected blocks (40%)	Name of selected villages (1%)	Number of registered crop farmers per village	Number of arable respondents (20%)
Ogbomoso Agricultural zone	Oriire	Adewole	73	15
		Ago Fulani	91	18
		Alaraba	69	14
		Olorunda	91	18
		Oko ile	73	15
Sub total		**5**	**397**	**80**
	Surulere	Jabata	99	20
		Akataapa	65	13
		Alagbede	68	14
Sub total		**3**	**232**	**47**
Oyo Agricultural zone	Afijio	Ojutaye	37	7
		Isinoye	49	10
		Jobele	37	7
Sub total		**3**	**123**	**24**
		Apempe	57	11
		Bale sagba	50	10
		Arogede	57	11
		Olugbade	34	7
		Sagbo ile	42	8
		Wasimi	34	7
Sub total		**6**	**274**	**54**
Grand Total		**17**	**1026**	**205**

Oyo State Agricultural Development Agency (OYSADA) (2021).

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Age of the respondents

The actual age of the respondents was recorded, with the minimum age of 30 years, and the respondent with the highest age was 80 years old. About 43.41% of the respondents indicated between 30- 40 years of age, 20.02% were between the ages of 41- 50 years, and 36.57 % were 51 years and above. The mean age of the respondents was 48 years. This implies that the respondents sampled are relatively old and may find it difficult to see the need for training on climate change adaptation strategies. However, older farmers might face barriers such as lower literacy, lack of funds and trust with the fear of leaving the farm behind. This result is in line with Aramolaran *et al.,* (2017), where the mean age of the farmers used in their study was 49 years.

Sex of the respondents

The results in Table 1 revealed that more than half (59.02%) of the respondents were male, while 40.98% of the respondents were female. This implies that men practice arable crop farming activities in the study area than their female counterparts. In many agricultural communities, gender roles and access to resources differ between men and women. Women often face greater constraints in accessing information and technology compared to men due to factors such as limited education, cultural norms, manner of approach and unequal access to resources. As a result, women may be less likely to see the need to access information on climate change adaptation strategies. The finding of the study agrees with the findings of Aphunu (2011) that the majority of the farmers in their different studies were males.

Marital status of the respondents

The majority (83.90%) of the respondents were married, 3.41% were single, 0.49% were divorced, while 12.20% were widows. This implies that married people dominate arable crop farming in the study area. However, married farmers may have different access to information regarding climate change adaptation strategies on arable crop farming. For example, married farmers may have support from their spouses in accessing information from different sources. Additionally, married farmers may have shared responsibilities and decision-making processes within their households. This is in conformity with Aphunu and Otoikhian in Akintonde *et al.* (2016), who state that marital status is a factor which is likely to encourage the sustainability of adoption decisions.

Religions of the respondents

About 56% of the respondents were Christian, 40.49% were Muslim, while only 3.41% of the respondents were traditional worshippers. It was observed that more respondents in the study area practice Christianity. It is obvious that all the religions were well represented in the study area, and this could promote unity and exchange of ideas on how to combat challenges associated with crop arable crop production.

Level of Education

About half (51.22%) of the respondents have completed their tertiary education, 23.41% have attained the secondary level of education, 15.10% of the respondents have a primary school certificate, while 10.24% have no formal education.

The mean years spent in school was 12 years. The findings show that respondents sampled in the study area are educated farmers with different levels of education. Higher levels of education are generally important in improving farming activities. Farmers with more years of schooling are likely to be more proficient in accessing and gathering information on climate change adaptation strategies. They may also have a better understanding of the importance of staying informed about climate change and its impacts on agriculture, as the saying information is power. Chikezie (2012) posits that education is an important socio-economic factor that influences a farmer‘s decision because it influences the farmers’ awareness, reception and the adoption of innovation that can increase production

Household size

The results in Table 2 revealed that 55.59% of the respondents had a household size ranging from 5-9 members, 35.61% had a household size ranging from below or equal to 4 members, while 8.8% of the respondents had a household size ranging from 10 members and above. The average household size was approximately 5 members, which is fairly large. This result suggests that large households might have more diverse needs and responsibilities. Larger households may have limited time and resources, which reason why there is a need for training on climate change adaptation strategies for arable crops. The finding was in agreement with Muhammad Lawal *et al.,* (2009) assertions that a range of 4 – 6 members constitutes the modal household size among the rural farmers in Nigeria.

Years of experience

About 15% of the respondents had 30 years or above years of experience in arable crop farming, 22.93% had between 20-29 years, 30.73% had between 11-19 years, while 31.22% of the respondents had below or equal to 10 years of experience in arable crop production. The mean year of experience was 29 years. This result is an indication that the respondents have vast experience in arable crop production, and this is expected to influence the use of any information available on climate change adaptation strategies due to the wealth of experience they have gathered. The result agreed with the findings of Okoye *et al.,* (2009) who reported that more experienced farmers were more efficient in their decision-making processes and were more willing to take risks associated with the adoption of innovation. Similarly, Adah *et al.,* (2007) stated that the higher the years of experience of a farmer, the greater the farmer's ability to manage general and specific factors that affect the business.

Primary Occupation

Few (38.54%) of the respondents indicated farming as their primary occupation, 24.88% indicated trading, 22.44% are civil servants, while 14.15% of the respondents indicated artisan as their primary occupation. This implies that farming is a major economic activity in the study area; therefore, it can be ascertained that the study areas are agricultural zones. Their involvement in other occupations may be considered as a side hustle and another source of income to overcome any challenges from climate change. Hence, the farmers are expected to be well informed about the possible effects of climate change on arable crop production and need to seek mitigating strategies to enhance their level of arable crop production in the area.

Farm Size

Less than half 41.46% of the respondents indicated 2 hectares of land for farming activities, 28.78% indicated 1 hectare which is the least, 10.73% indicated 3, 14.63% indicated 4 hectares, while 4.39% indicated 5 and more hectares of farm size and from this it can be concluded that the study area is indeed an agrarian, which give insight that t farming activities were prominent in the study area.

Contact the extension agent.

The results in Table 2 show that about 53% of the respondents affirmed having had contact with extension agents, while 47% of the respondents have not had contact with extension agents. The result implies that the extension service is not adequate in the area. This nature of contact may necessitate the need for training on climate change among the arable crop farmers in the area.

Membership of the Association

The result in Table 2 shows that the majority (44.39%) of the respondents belong to the All-Farmer Association of Nigeria, 36.58% belong to the Irewolede Farmer Association, 4.87% belong to the Ojo Ola Agbe Farmer Association, while 14.16% do not belong to any association. The result implies that the majority of the respondents belonged to an association, and the possible reason why the majority joined an association could be as a result of satisfying their basic need, which sometimes could be achieved collectively, as opined by Ekong (2010).

n = 205

Socio-economic characteristics	Frequency	Percentage	Mean
Age (years)			
31-40	89	43.41	48
41-50	41	20.02	
Above 50	75	36.57	
Sex			
Male	121	59.02	
Female	84	40.98	
Marital status			
Single	7	3.41	
Married	172	83.90	
Divorced	1	0.49	
Widow	25	12.20	
Religion			
Christianity	115	56.0	
Islam	83	40.49	
Traditional worshippers	7	3.41	
Level of education			
Tertiary	105	51.22	11
Secondary	48	23.41	
Primary	31	15.10	
No formal	21	10.24	
Household size			
≤ 4	73	35.61	
5-9	114	55.59	
Above 10	18	8.8	
Years of experience			
≤ 10	64	31.22	
11-19	63	30.73	
Above 30	31	15.15	
Primary occupation			
Farming	79	38.54	
Trading	51	24.88	
Civil servant	46	22.44	
Artisan	29	14.15	
Membership of association			
Yes	176	85.84	
No	29	14.16	
Contact with extension agent			
109		53.0	
No	96	47.0	
Farm size (hectares)			
1	59	28.78	
2	85	41.46	
3	22	10.73	
4	30	14.63	
5	9	4.39	
Total	205	100	

Source: Field survey, 2024

Specific areas of training needed on climate change adaptation strategies

The responses were multiple and result in Table 3 revealed that majority (97.1%) of the respondents indicated cultivation of improved seed varieties and altering of crop planting date as the specific area of training needs on climate change adaptation strategies, 93.7% indicated ridges across the slope, 89.8% indicated fertilizer application, 89.3% indicated compost application. Other areas of training needs on climate change adaptation strategies include Mulching (64.4%), shifting cultivation (45.4%), crop rotation (42.0%), planting of cover crops (34.2%), irrigation (24.9%), while alley cropping (23.4%). This result is an indication that arable crop farmers are aware of various adaptation strategies to mitigate climate change on crop production in the study area.

The result implies that the respondents would be willing to adopt and use different climate change adaptation strategies if they are available and knowledgeable about their application through extension training. This study corroborates Akintonde *et al.,* (2016) and Bradshaw *et al.,* (2004), where crop diversification, mixed crop-livestock farming systems, using different crop varieties, changing planting dates and harvesting dates, and mixing less productive, drought-resistant varieties and high-yield water-sensitive crops were major adaptation strategies adopted and utilised by the arable crop farmers.

Table 3: Distribution of respondents according to specific areas of training need for climate change adaptation strategies

Climate change adaptation strategies	*Frequency	Percentage
Cultivation of improved seed varieties	199	97.1
Altering of crop planting date	199	97.1
Mulching	132	64.4
Compost application	183	89.3
Fertilization application	184	89.8
Ridges across the slope	192	93.7
Planting of cover crops	70	34.2
Crop rotation	86	42.0
Shifting cultivation	93	45.4
Alley cropping	48	23.4

Source: Field Survey, 2024 * Multiple responses

Source: Field Survey, 2024
*** Multiple responses**

Level of training needs on climate change adaptation strategies

For this objective, the level of training needs was determined and measured on a Likert scale of very high, high, moderate, low and very low. The weighted mean score was captured and computed accordingly. According to the result in the Table 4, ridges across the slope had the highest weighted mean score of 3.08 ranked 1st, next to it was cultivation of improved seed varieties with weighted mean score of 2.83 ranked 2nd, followed by mulching with weighted mean score of 2.34 ranked 3rd, altering of crop planting date was ranked 4th with weighted mean score of 2.17, compost application with weighted mean score of 2.16 ranked 5th. Others include Fertilizer application, planting of cover crops, crop rotation, shifting cultivation, and alley cropping with weighted mean scores of 2.14, 1.76, 1.65, 1.64 and 1.38, ranked 6th, 7th, 8th, 9th and 10th, respectively, while irrigation was ranked 11th with a weighted mean score of 1.25. 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 experts in the utilisation 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.

The finding suggests that there is variation in the level of training needs might due to difference in their 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 "Akintonde" *et al.,* (2016); Hassan and Nhemachena (2007), who affirmed in their study that farmers have varied levels of need for extension training about the use of adaptation strategies to curtail the effects of climate change.

Table 4: Distribution of respondents according to level of training needs on Climate change adaptation strategies

Climate change adaptation strategies	Frequency (Percentage) Level of training needed						
	VH	H	M	L	VL	WMS	Rank
Cultivation of improved seed varieties	25(13.2)	102(57.6)	70(28.8)	2(0.5)	-	2.83	2nd
Altering of crop planting date	18(7.8)	49(28.8)	63(35.6)	69(27.8)	-	2.17	4th
Mulching	10(4.4)	48(33.2)	60(54.2)	14(8.3)	-	2.34	3rd
Compost application	15(6.3)	25(10.7)	104(75.1)	39(7.8)	-	2.16	5th
Fertilization application	15(4.9)	34(9.8)	115(79.5)	20(5.9)	-	2.14	6th
Ridges across the slope	52(30.2)	95(48.8)	40(20.0)	5(1.0)	-	3.08	1st
Planting of cover crops	2(1.0)	23(18.1)	15(37.1)	30(43.9)	-	1.76	7th
Crop rotation	6(3.4)	10(6.3)	26(42.0)	44(48.3)	-	1.65	8th
Shifting cultivation	15(4.4)	17(16.6)	39(19.0)	17(59.0)	5(1.0)	1.64	9th
Alley cropping	8(3.9)	15(14.2)	10(13.7)	6(13.7)	9(15.6)	1.38	10th
Irrigation	10(7.8)	6(15.1)	12(7.3)	9(7.3)	14(35.6)	1.25	11th

Source: Field Survey, 2024.
Figures in parentheses are percentages
WMS: Weighted mean score

CH: Very high
H: High
M: Moderate
L: Low
VL: Very Low

Difference between the levels of training needs on Climate Change Adaptation Strategies among the respondents of the selected zones.

The result of the analysis revealed that significant difference exists between the levels of training need on climate change adaptation strategies among the respondents of the selected zone show in Table 9. The result implies that there is the disparity in the level of training needed among the respondents of the selected zones. This further suggests that the arable crop farmers need training at different level on climate change adaptation strategies. The variation in the level of training need may be due to differences in their access to different sources of information on climate change adaptation strategies frequency of extension contact, arable crops cultivated.

Zones	Mean	Standard deviation	t – value	Sig(2tailed)
Ogbomoso and Oyo	0.6655	0.2052	32.760	0.000

Source: Computed data, 2024

CONCLUSION AND RECOMMENDATIONS

The study concluded that respondents needed training mostly on adjusting crop planting dates. The study recommended that training programs should recognize and incorporate these indigenous practices while introducing scientifically proven methods to enhance productivity among arable crop farmers.

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