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FARMERS AWARENESS AND PERCEPTION OF CLIMATE CHANGE IN SOUTH WEST NIGERIA

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ABSTRACT- Climate change is a global environmental phenomenon that is characterized by unpredictable rainfall, drought and increased temperature. However, perception of the farmers differed based on their background and awareness level of the concept of climate change. Therefore, this study seeks to examine level of farmers' awareness of climate change and their perception. The study adopted a descriptive survey type. A sampling technique involving purposive, stratified, simple random and systematic sampling techniques was used to select 300 cocoa farmers from a population of 3000 registered cocoa farmers in Ondo, Osun and Ekiti States. Data were collected through interview schedule technique and were analyzed using descriptive Statistics. The findings of the study revealed that the respondents mean age was 60.8 years, 91.3% were male, 89.3% were married and average annual income of ₦ 398,660. Radio was ranked first as the main source of information with mean of 2.60. This is followed by television with (mean=2.21). Awareness of climate change was high as majority (90%) were aware.Perceptionof climate change were categorized by their knowledge as majority categorized as heavy thunderstorm and is ranked first with mean of 4.46 followed with perception that rainfall pattern was unpredictable and decrease in rainfall pattern over the years with mean of 4.37 and 3.87 respectively. The study therefore recommended farmers workshop on climate change for cocoa farmers in the southwest Nigerian in order to equip them on the way out.

Keywords: perception, awareness, cocoa farmers, climate change

1.0 Introduction

Cocoa production was a major source of foreign exchange in Nigeria before the discovery of petroleum and has remained a relevant source of income in the agriculture sector till now. In 2021, Nigeria exported approximately 344.6 thousand metric tons of cocoa beans [1].Cocoa boosts Nigeria's GDP by an average of US$313.33 million each year between 1980 and 2017, the product's contribution to Nigeria's GDP increased by an average of 2% annually. Nigeria's cocoa export value climbed from 243.39 million dollars in 1980 to 598.19 million dollars in 2017 [2]. Income from cocoa also play a significant role in reducing poverty among the rural dwellers as cocoa contributes about 70-100 percent of the annual household income of smallholder cocoa farmers [3]. Moreover, reports from many authors revealed that consumption of cocoa products has health implications [4;5].

Cocoa beverages, like chocolate and other products prevent heart disease, helps the circulatory system to function well, prevent diabetes, serves as cough suppressant, prevent diarrhea, act as strong antioxidants in food systems, improves blood flow, decreases blood pressure and increase libido in man [6; 7; 8].Despite the importance of Cocoa production to human existence and to nature generally, it is highly significant that the challenges that may not allow its existence should be eliminated. Researchers have identified many problems facing its productivity, such as pest and diseases, soil degradation, lack of farm input and climate change [9,10,.11] asserted that Cocoa production in Nigeria is vulnerable to climate change and it has been noted that climatic elements such as temperature, rainfall and relative humidity and other weather variability have been identified to have direct impact on farmers' yield.

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[12 13] revealed that rainfall, relative humidity and temperature contribute 4%, 6.6% and 35.5% respectively to cocoa yield. This proves that climate change can also affect cocoa production meanwhile; also, it has been projected that the temperature will increase by 4.5^{o}C by 2081-2100 [14].This research stemmed out of the Intergovernmental Panel on Climate Change [15]. recent demand for the incorporation of the indigenous knowledge in curbing the menace of climate change as scientific method alone has not been able to proffer solution to it. The importance of indigenous knowledge has been realized in the design and implementation of sustainable development projects, little has been done to incorporate this into a formal climate change adaptation strategy [16].

The need for this study therefore grows out of the recognition that awareness of climate change and farmers perception vary from region to region and this has great effects on the adaptation strategies used by the farmers. Also, scientific adaptation and mitigation alone, have not been able to resolve the challenges of climate change. It is widely acknowledged that stringent mitigation efforts will not be adequate to avoid significant impacts of climate change [17]. It is therefore imperative to create stability between awareness and perception of climate change and measures to cope with its adverse effects. Currently as climatic factors such as rainfall, temperature and sunlight intensity are exogenous and an uncontrollable factor, only adaptation with the changing nature is the way to cope with the problem.

Research Questions

I. What are the socio economic characteristics of cocoa farmers in the study area;
II. What is the cocoa farmers' level of awareness of climate change;
III. What are the sources of information about climate change
IV. What is the level of perception of cocoa farmers about the climate change

Aim & Objectives of the study
The general objective was to examine the level of farmers awareness and perception of climate change in south west

Specific objectives were to;
i. describe socio economic characteristics of cocoa farmers in the study area;
ii. examine cocoa farmers' awareness of climate change;
iii. identify sources of information about climate change;
iv. assess perception of cocoa farmers about climate change.

Awareness of climate change by cocoa farmers
The awareness in the context of climate change refers to ability of farmers to be conscious of changing in climate, which is changing in rainfall pattern, in temperature, solar energy and other climatic elements [18]. Studies have shown that farmers' level of awareness of climate change differs from one place to another. The study conducted on the state of awareness and adaptation of farmers to climate change in communities in the Niger Delta region of Nigeria show that farmers' awareness to climate change is still low but some farmers have designed some means of adaptation [19].

Farmers' level of awareness depends on their level of understanding of the concept of climate change. [20] found that farmers understanding of the climate change phenomenon include change in weather; poor yield; while from others awareness of climate change includes: heavy rainfall, excessive sunshine, increased incidence of drought; high wind and heat waves. Studies also reported that source of information about climate change to farmers include: extension workers, friends, farmers, co-operatives, politicians; internet, newspaper, radio/television, researchers.

Scientific Innovation Research Journal (SIRJ), Maiden (Special) Edition.
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Knowledge of climate change impacts is related to availability and accessibility of information on the incident. The research work on 'Climate Change Awareness and Adaptation in the Niger Delta Region of Nigeria' showed that the mass media (radio/TV and newspaper) was the largest source of information on the climate change phenomenon followed by newspaper and friends. [21]

Perception of climate change by cocoa farmers

Farmers have divergent views about climate change. Some see climate change as delayed in rainfall, while some perceived it as high temperature, some says it is flood, other sees it as unusual rainfall while some perceived it as undefined season [22]. The empirical research and studies have shown the benefits of projected mind set as regard to climate change and whether variability expectations fall below reality in determining the intermediary costs connected with climate change. The authors' conception on adaptations also makes it clear that people perception is a necessary prerequisite for adaptation.

According to [23], he reported that research was conducted in ten counties with six having similar result with exception of Senegal and Kenya with contrary opinion. The result show that the largest percentage of farmers perceived rainfall to have decreased compare to olden days, while significant percentage indicated a change in the timing of the rains and occurrence of drought frequency has also changed. This general overview of African farmers has shown that majority of them have special skills in detecting climate change which is a basic precondition for adaptation. However, an attempt should be made to authenticate these findings before general conclusion that African farmers are as perceptive to changes in climate as they claim. This is necessary because some farmers might obligingly suggest they had witnessed particular forms of climate change when in reality they had not. This can be done by by considering whether the responses coincide with the meteorological evidence and through close examination of the attributes of those who claim to have witnessed changes.

[24] notes that the experienced farmers are more likely to claim that temperature have increased while the perceptions of rainfall has reduced or not changed at all However this scenario and variation in perception varied from one country to other and this has affected the adaptation strategies adopted by the farmers in the area. He also reported that the diversification of different adaptation strategies which dependent on policies of one country to another, their customs and their institutions. For instance, countries such as Kenya, Egypt and south Africa adapted to climate change with use of irrigations based on their perception while country likes Senegal and Niger used offering, ritual and prayer [25]
Moreover, there are countries that used shade and sheltering and other soil conservation techniques to adapt to climate change, Countries like Burkina Faso and Niger fall within this categories [26-27] . However, there are some adaptations strategies that are not specified for particular location but based on the farmers' perception and crops under examination. Therefore, there is a need to examine the perception of farmers in the south west Nigeria .as this will affect their adaptation strategies in the short and long run. .

2.0 Methodology

2.1 STUDY AREA

The study was carried out in the southwest geo-political zone of Nigeria. The Southwestern Nigeria comprises Oyo, Osun, Ogun, Ondo, Ekiti and Lagos States. This zone lies between longitude $2^0 42^1$ and $6^0 03^1$ East of Greenwich and latitude $5^0 49^1$ and $9^0\ 77^1$ North of the equator [28]. The region is bounded in the North by Kwara and Kogi States. The population for this study consists of all cocoa farmers in the South West, Nigeria. The farmers were those who engaged in the Cocoa Growth Enhancement scheme of Agricultural Transformation agenda of the Federal Government in the selected Local Government Area of the three States.

2.2 Data collection

Scientific Innovation Research Journal (SIRJ), Maiden (Special) Edition.
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The study used a structured questionnaire comprising open-ended and closed-ended questions completed during personal interviews with respondents to collect primary data.

2.3 Sampling Procedure and Sample Size

A four-stage sampling procedure was used for the study. At the first stage Osun, Ondo and Ekiti States were purposively selected for the study because of their important contribution to cocoa production in Nigeria and being the major and minor cocoa producing states in Nigeria. At the second stage a stratified sampling techniques was used to select 10 Local Government Areas (LGAs) in the three states in the Southwest This selection was due to level of cocoa production in each state. This implies that four LGAs were selected in Ondo out of 18 LGAs and Osun States out of 28 LGAs respectively, while two LGAs out of 16 LGAs were selected from Ekiti, State. These LGAs include Ife East, Ife South, Ife central and Atakumonsa West in Osun State and Idanre, Ondo West, Ileoluji/Okeigbo and Odigbo in Ondo State. Also, in the same vein, Ise-Orun and Gbonyin in Ekiti State were selected for the study.At the third stage, three communities were randomly selected from each of the 10 LGAs based on the record of their performance in cocoa production history in the communities giving a total of 30 communities. The names of the community are:more, aaye, Ifetedo ,okerewe, ilode, yekemi. Akararabata,Moore, ojaja, Osu, okeibodi, itagunmodi, ,Idole-logbosere, Ala-Elefosan, Alade, Bamkemo, Ileoluji, Okeigbo, Ore, Oniparaga, OdigboEnuowa, Obolalu, Ajagba Alafia, Aisegba. Ekiti Imesi, ijan, Aba Ebira, Aba. At fourth stagea systematic sampling technique was used to select 10 cocoa farmers from each community and this give us a total of 300 cocoa farmers which is equivalent to 10% of total (3,000) registered cocoa farmers in the study area.

3.0 RESULT AND DISCUSSION

3.1 Socio economics characteristics of the cocoa farmers

The data in Table 1 shows the distribution of respondent by age, gender, marital status and farming experience. The result shows that 49.7 percent are in the age range of 60 years and above, 30.3 percent were between 51-60 years while 20 percent were between 40-50 years. The mean age of cocoa farmers in Southwestern is 60.8 years with standard deviation of 11.06. The study revealed that majority of the cocoa farmers were above 50 years of age and still in their active years of life in which they could still be productive and contribute meaningfully to the socio-economic wellbeing of the society. However, not many young people are actively involved in cocoa farming and this could be dangerous for sustainability of cocoa production in the future.

The study observes that the majority (91.3%) of the cocoa farmers were male while 8.7 percent were female. Cocoa farming operations such as land clearing, planting, weeding, pruning, spraying, harvesting, transporting, fermenting, drying, packaging, bagging and selling are tedious and strenuous task. It requires a lot of strength; as a result, women may not be able to raise the crop from land clearing to bagging. Consequence, they may not be able to notice changes in temperature and rainfall pattern over the years and not be able to be involved in the indigenous adaption strategies used by their husband on the farm. This finding corroborates previous findings by [29] that population of male farmers involved in cocoa production in Ondo, Osun and Ekiti States were higher than female.

Majority (89.3%) of the respondents were married in the three states, while 3.3 percent were single, 1% were married but later separated, 1% divorced while 5.3% were widowed (Table 4.1). This implies that majority of the respondents were expected to be responsible people because they were married, simply because marriage is associated with responsibility. Traditionally, married people are highly valued, accorded respect in the society. This implies that climate change challenges can be solved by responsible people who will initiate indigenous adaptation strategies and take responsibility in suggested mitigation procedure in order to reduce the impact of climate change.

Scientific Innovation Research Journal (SIRJ), Maiden (Special) Edition.
138 - 146, Volume 1, Issue 1. October 2024
DOI: XXXXXXXXXXXXXXX

Table 1 revealed that 9.3% had no extension contact at all while 58.7% had 1-5 contact and the remaining 32% had between 6 to 10 extension contact. The level of extension contact that a farmer enjoys is expected to reflect in the levels of his involvement in the indigenous knowledge or modern technology of climate change adaptation. The extension agent is expected to stimulate the awareness of farmers concerning the modern technology. Level of extension contact may also impact on the farmers' perception of climate change.

Table 1 revealed farmers' income per annum almost half (46%) of the cocoa farmers income were between N 10,000 to N 100000, 14.7% were between N 100001 to N 200000, 14% between N 200001 to N 300000 , 5.7% between N 300001 to N 400000, 4% between N 400001 to N 500000 while 15.7% were above N 500000 (Table 4.3) **.** The average annual total income of the respondents was N 398,660.

Table 1 Socio-economic characteristics of the respondents

Socio-economic characteristics	**Frequency**	**Percentage**
Age (years)		
≤50	60	20
51-60	91	30.3
61-70	100	33.4
≥ 71	49	16.3
Mean		60.8
S.D.		11.1
Gender		
Male	274	91.3
Female	26	8.7
Marital status		
Single	10	3.3
Married	268	89.3
Divorced	3	1
Separated	3	1
Wido	16	5.3
Extension contact		
No contact	28	9.3
1-5	176	58.7
6-10	96	32
Farmers income per year		
10000-100000	138	46
100001-200000	44	14.7
200001-300000	42	14
300001-400000	17	5.6
400001-500000	12	4
> 500000	47	15.7

3.2 Awareness about climate change among cocoa farmers

Table 2 revealed the awareness about climate change among the respondents. Results shows that the majority (90%) of respondents were aware of the changing climate in the study area while the remaining 10% were unaware of any change. This result indicates that cocoa farmers in the study area are gradually becoming aware of climate change. This would help farmers adapt to climate change mitigation measures and help create

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awareness among other cocoa farmers. [30,31 and 32] reported similar results on farmers' awareness of climate change.Majority (90%) of the respondent were aware that there was a change in the rainfall pattern while the remaining 10% were not aware of any change in the rainfall.About 40 percent of the respondent were aware that there was incident of flood as result of heavy rainfall pattern while the remaining 60% were not aware of any incident of flood. This implies that some area witness flood while some area did not. Majority (90%) of the respondents were aware that there was a incident of erosion as result of heavy rainfall pattern. This implies that some area witness farm erosion while some area did not. The implication of this is that the areas where erosion is rampant, the soil nutrients will reduce drastically because the top soil of the area must have been washed away. The overall effect is that productivity of the area will reduce as the nutrient continue to decline as a result of erosion. Majority (80%) of the respondents were aware that there was a incident of drought as result of prolong dryness while the remaining 20% were not aware of any incident of droughts. This implies that some area that witness drought, the production for that year will drop compared to the drought-free area. Majority (89%) of the respondents were aware that there was an increase in temperature while the remaining 11% were not aware of any incident of increase in temperature. This implies that some cocoa farmers perceived high temperature.Cocoa production can only thrive well under a favourable temperature range, any temperature greater than 32^0 C may have adverse effect on production and this will tell on the yield of cocoa farmers for that year.

Table 2: Cocoa farmers awareness of climate change in the study area

Awareness variables	Aware		Not aware	
	Freq	%	Freq	%
Change in climate	**270**	90	30	10
Change in the rainfall	**270**	90	30	10
Incidence of flood	**120**	40	180	60
Incidence of erosion	**270**	90	**30**	10
Incidence of drought	**240**	80	**60**	20
Temperature change	**267**	89	33	11

3.3 Source of information about climate change

The data in table 3 revealed the mean rank of the respondent according to the source of the information available to them. The result showed that radio was ranked first with mean of 2.60. This is followed by television with the mean of 2.21. Next is relative and friends (1.94) . Others are in the following other: religion leaders (M=1.86), newspaper (M=1.79), extension agent (M=1.78), development agency (M=1.65), social group (M=1.62), spouses (M=1.49) while NGO's ranked least with mean score of 1.32. This implies that information dissemination of the mass media (radio and television) are the most effective means of informing the cocoa farmers about the climate change followed by relative and friends and religion leaders. This implies that radio and television are very important in disseminating information about climate smart agriculture.

3.4 Perception about climate change

The data in the table 4 revealed that rainfall with heavy thunderstorm is ranked first with mean of 4.46. This was followed with rainfall pattern unpredictable and decrease in rainfall pattern over the years with mean of 4.37 and 3.87 respectively. Next to it is perception of increase in temperature with mean score of 3.82 and perception of decrease in temperature with the mean score of 3.67. Others are in the following orders : yearly rain starts earlier than before (3.56), yearly rain stops earlier than before with mean score of 3.54, yearly rain start late than before with mean score of (3.41), perception that there is increase in the rainfall pattern over

Scientific Innovation Research Journal (SIRJ), Maiden (Special) Edition.
138 - 146, Volume 1, Issue 1. October 2024
DOI: XXXXXXXXXXXXXXX

the years was ranked second to the last with the mean score of 3.24 while the perception that yearly rain stops late than before was the least with mean score of 2.51.The perception statement with mean greater than 3 are regarded as high perception while those perception statement with mean lower than 3 are regarded as low perception and the only statement that yearly rainfall stops late than before fall to this category This

Table 4: Distribution of Respondents According to the Perception about Climate Change

Perception Statement	**S A**	**A**	**UD**	**D**	**SD**	Mean	Std. Deviation
Rain fall with heavy thunderstorm	2.75	1.61	0 .00	0.09	0.00	4.46	0.73
Rainfall pattern is unpredictable	1.83	2.53	0 00	0 00	0.00	4.37	0.48
There is decrease in rainfall pattern over the years	1.33	2.06	0.20	0.25	0.03	3.87	1.03
There is increase in temperature	0.25	0.37	0.22	1.11	0.23	3.82	1.05
There is decrease temperature	0.32	2.84	0.30	0.18	0.04	3.67	0.87
Yearly rain starts earlier than before	1.68	1.09	0.32	0.36	0.10	3.56	1.38
Yearly rain stops earlier than before	0.15	1.12	0.16	0.81	0.24	3.54	1.21
Yearly rain start late than before	1.07	1.40	0.37	0.53	0.05	3.41	1.23
There is increase in rainfall pattern over the years	0.85	0.97	0.20	0.57	0.30	3.24	1.52

result has revealed farmers perception about rainfall and temperature which are the major determinant of agricultural production in Sub Saharan Africa especially Nigeria who only depends on rain fed agriculture. Their perception was that rainfall has reduced compared to 30-40years back while temperature has increased more than what it was 30 -40 years in the southwest Nigeria. The results on perceived changes in temperature and rainfall by cocoa farmers are in line with the findings of [33,34]. This result further established the fact that climate change is real [35].

4.0 CONCLUSION

Ninety percent (90%) of the respondents were aware of changes in climatic conditions, change being noticeable as change in temperature, rainfall and as occurrence of erosion. About Eighty-percent of the respondents were aware of changing in climatic conditions being noticeable as occurrence of drought. Forty percent (40%) of the respondents were aware of changes in climatic factor being noticeable in form of flood. The study revealed that rainfall with heavy thunderstorm is ranked first with mean of 4.46. This was followed with rainfall pattern unpredictable and decrease in rainfall pattern over the years with mean of 4.37 and 3.87 respectively. The perception statement with mean greater than 3 are regarded as high perception while those perception statement with mean lower than 3 are regarded as low perception and the only statement that yearly category. This result has revealed farmers perception about rainfall and temperature which are the major determinant of agricultural production in Sub Saharan Africa especially Nigeria who only depends on rain fed agriculture. Their perception was that rainfall has reduced compared to 30-40years back while temperature has increased more than what it was 30 -40 years in the southwest Nigeria. This result further established the fact that climate change is real.

Scientific Innovation Research Journal (SIRJ), Maiden (Special) Edition.
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DOI: XXXXXXXXXXXXXXX

Recommendation

I. Youth should be encouraged into cocoa production through training , capacity building and incentives such as agricultural loans and mechanization

II. information dissemination should be decentralized using various local languages through religion and local leaders to reach small scale farmers in their community

III. Weather forecast and broadcast time tables should be made available to farmers before the start of growing season so that they can plan ahead of time and also train farmers how to use it planning their operation on the . Moreover, subsequent weather update should be made available to farmers especially during the raining seasons in orde to plan their spraying execise.

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