ISSN:
Print - 2277 - 0755
Online - 2315 - 7453

Journal of Agricultural Science and Environment

COTTON FARMERS' PERCEPTION ON CLIMATE CHANGE AND ADAPTATION STRATEGIES IN OGUN STATE, NIGERIA

O.A ADEYEYE[1], [2]O.T ONIFADE AND [3]O.A ADESINA

Agricultural Media Resources and Extension Centre (AMREC),
Department of Agricultural Extension and Rural Development,
Federal University of Agriculture, Abeokuta**,** Ogun State, Nigeria

***Corresponding author: topemay2001@gmail.com**.

ABSTRACT

Climate change has been a major threat to agriculture in Nigeria. This study was carried out in Imeko Afon Local Government Area. Purposive selection of all practicing cotton farmers (54) at the time of survey was made from the study area. The mean age of respondents is 56years. The household size is 7persons and the average annual income is N9, 972.00k. The mean score of famers' perception about the climate change and its effects on cotton production is 2.62. Farmers' stated that there is an increase temperature due to change in climatic condition (Ẍ= 3.45, S.D ± 1.152), and fluctuation in rainfall pattern (Ẍ= 4.04, S.D ± 0.999). Adopted coping strategies to cushion effects of climate change include; increase use of agro-chemicals (Ẍ = 3.35, S.D ± 0.677), integrated weed pest management (Ẍ = 3.44, S.D ± 0.839) and application of fertilizer to improve the depleted soil nutrients (Ẍ = 3.19, S.D ± 0.646). Results indicates a significant relationship between respondents perceived effects on climate change and coping strategies (r =0.890**, P< 0.05). The study recommends that government agricultural and meteorological agencies should provide timely information to farmers on the climate and means of ameliorating the effects of climate change.

Keywords: Perception, Climate Change, Adaptation Strategies

INTRODUCTION

Agriculture is the major livelihood activity in the rural areas of Nigeria. It contributes about 40 percent to the Gross Domestic Product (GDP) with crops accounting for 80 percent (Nigeria National Report, 2006). One of the cash crops among main sources of foreign exchange earner in Nigeria prior to oil boom is cotton. Nigeria has earned about $8.9 billion annually from cotton production in early 1980s, this represented more than 25 percent of the nation's Gross Domestic Product (GDP), but there has been a significant drop in the GDP from 25 percent to five percent ($300 million)) annually (The Nation, 2014). Cotton is regarded as the most important fibre crop used in textile industries if its production and processing is adequate.

Cotton (*Gossypium* spp) can only thrive well on favourable growing conditions with respect to temperature, sunshine and soil moisture as well as a marked dry season which is responsible for proper opening of the bolls prior to harvesting. Cotton is produced in the three ecological zones of Nigeria; Northern cotton zones (Kano, Kaduna, Sokoto, Kebbi, and Jigawa), the Eastern cotton zones (Adamawa, Bauchi, Borno, Gombe, Yobe and Taraba) and the Southern cot-

ton zones (Kwara, Niger, Kogi, Oyo, Osun, Ogun, Ondo, and Edo) states with 60-65%, 30-35% and 5% production capacity respectively (Anonymous, 1995). Farmers' involvement in cotton production was formally high but the interest has been dampened as a result of adverse effect of unpredicted climate change which has been a major threat to rural livelihoods (IPCC, 2007a, 2007b; Nhemachena, 2009; Pouliotte, Smit, & Westerhoff, 2009).

Climate change refers to any change in climate over time, whether due to natural variability and/or as a result of human activity (IPCC, 2007a). Climate change is a sort of constraint to development especially among smallholder farmers whose livelihoods depend on rain-fed agriculture (IPCC, 2007b; Tanner & Mitchell, 2008). It has the following effects on cropping activities; increase in temperature which can reduce crop duration, change pest population, hasten mineralization in soil and increase evapotranspiration. One of the effects of climate change on cotton production is the prolonged vegetative growth which may eventually affect the yield due to increase in precipitation with decrease in temperature (Bange et al., 2008). For instance, cotton quality is dependent largely on the efficiency of harvesting and harvesting is related to good weather condition especially temperature.

Climate change has been a major threat to cotton production in Ogun State, in order to cope with the effect of climate change; farmers' have resorted on some adaptation measures. Adaptation refers to adjustments in practices, processes or structures in response to projected or actual changes in climate (Dixon et.al, 2001). Adaptation to climate change also refers to activities that reduce the negative impacts of climate change and/or takes advantage of new opportunities that may be presented. Adaptation could be planned or autonomous adaptation, autonomous adaptation refers to reaction of farmers to changing precipitation patterns, in that there are changes in crops planting, employ different harvest and planting/sowing dates, while planned adaptation measures are conscious policy options or response strategies, often multi-sectorial in nature and aimed at altering the adaptive capacity of the agricultural system in facilitating specific adaptations (Francisco, 2008)

Since the importance of favourable climatic condition on cultivation of cotton cannot be underrated, then farmers need to be proactive to ensure increase in cotton yield. Therefore, the study assessed the following;

1. perceived effect of climate change on cotton production and;
2. adaptation strategies employed by cotton farmers as a means of ameliorating the effects of climate change.

Justification for the Study

This rationale for this study is that it will guide the meteorological department of Ministry of Agriculture in their activities and also assist the State's Agricultural Extension Services to work together in order to effectively disseminate timely information on climate change to farmers. In corollary, farmers will benefit from the forecast by adhering strictly to the suggested guidelines that may be introduced to them from government agencies as means of ameliorating the effects of climate change.

Hypotheses of the study

Ho_1: There is no significant association between cotton farmers' socio- economic characteristics and their perceived effects of climate change on cotton production

Ho_2: There is no significant relationship between the perceived effects of climate

change on cotton production and the adopted coping strategies

METHODOLOGY

The study area

The study was carried out in Imeko-Afon North Local Government Area of Ogun State. Imeko Afon is a Local Government Area in the West of Ogun State, Nigeria. It has its headquarter in Imeko town. Imeko Afon local government area is located within coordinates of $7^{0}38^{1}$N, $2^{0}52^{1}$E and 7.633^{0}N, 2.867^{0}E with land area of about 1,711.43 square kilometres (660.79sqm). Imeko Afon local government area has a total population of 82,952 (NPC, 2006). The Local Government is bounded in the North by Oyo state, in the East by Abeokuta North Local Government Area, South by Yewa North Local Government Area and to the West it shares an International border with Republic of Benin (Ogun State Government, 2011). The people are mostly Yorubas of Ketu origin, but there are significant numbers of Ohori and Egun speaking people as well as large number of Hausa – fulani normads. It is also a border community where other West African people reside. The international border is 93 kilometers (58 miles) from Republic of Benin. It is one of the most accessible stretches of border between Nigeria and Republic of Benin. (Ogun State Government, 2011)

Imeko Afon local government is in the tropical area of Nigeria, with rainy season commencing from March and ending in November. The vegetation is a mixture of savannah belt and sparse forest suitable for cattle rearing because of absence of tse-tse flies (Ogun State Government, 2011).The major livelihood of people in the area is farming and the crops grown include; cassava, tomatoes, pepper, maize, groundnuts, vegetables, cocoa, cotton, cashew, teak and yams. Cotton grown in the area supplies the Yaru, tread and textile industries in Benin Republic.

Sampling technique and sample size

Purposive selection of practicing cotton farmers from five (5) rural communities in Imeko Afon Local Government Area was made. Selection was purposively based on all farmers that planted cotton in the five (5) communities at the time of survey. Therefore, information was elicited from a total of fifty four (54) farmers with the aid of interview guide.

Method of data collection

The data for the study was generated from primary data. Information obtained from beneficiaries with the aid of interview guide include; socioeconomic characteristics, farmers perception about climate change and its effect on cotton production, farmers adaptation strategies

Data analysis

Data collected were analyzed and presented using descriptive statistics such as frequency counts, percentages and Likert scale of measurement. Hypothesis was tested using Chi-square and Pearson Product Moment Correlation analysis.

Measurement of Variables

Farmers' perception about climate change and its effects on cotton production was measured using Likert scale with the rating as; Strongly agreed (5) Agreed (4), Undecided (3) Strongly disagreed (2), and Disagreed (1). Therefore, an assertion with the mean less than 1.5 is strongly disagreed while mean $1.5 \leq 2.44$ is disagreed. Assertions with the mean $2.45 \leq 3.44$ are undecided while assertions $3.45 \leq 4.44$ is agreed. Furthermore, assertions between $4.45 \leq 5.0$ are strongly agreed. Similarly, farmers; adaptation strategies to the effects of climate change was

measured at ratio level with the rating scale as; Not used (1), Rarely Used (2), Often used (3), Always used (4). Therefore, an assertion with the mean less than 1.5 is not used while those with the mean of 1.5 ≤ 2.44 are Rarely Used. Methods with the mean 2.45≤ 3.44 is Often used while those with mean (3.45 ≤ 4.0) are Always used

RESULTS AND DISCUSSION

The socio-economic characteristics results depicted in table 1 shows that 98.1% of the cotton farmers were male, 88.9% were married with an average household size of families in the area being 7.11. With men being more prominent in cotton production (98.1%), this only reflects the picture of farming in Southwest Nigeria as it has been severally found out by researchers in agriculture and rural development (Nhemachena and Hassan, 2007). The marital status tradition is a reflection of rural family setup in most rural settings in Nigeria. Women (and their children) serve as good source of family labour (Ambali et al., 2012). However, the average household size resulting from such reflects the responsibility bestowed on the male who is the household head (in most cases).

Result from table 1 also revealed that more than half (59.3%) of the cotton farmers were 51-60 years. This particular age may have implication on the future of cotton in Nigeria. It is evident from this finding that cotton producers in the study area are ageing and cotton production may suffer setback due to the need for succession by younger generation of cotton farmers. This is evident in declining population of younger farmers as found out in this study that, 25.9% of the cotton farmers were in the age bracket of 41-50 years while few (14.8%) of respondents were between 31-40 years. Age as a factor is synonymous with performances in agricultural enterprise development. More recent studies (Oladoja and Adeokun, 2013; Oluwasola and Ajayi 2013; Onifade, 2013; Chikezie *et al.,* 2012) have stressed the importance of younger farmers' involvement in agriculture towards ensuring food security in Nigeria. Therefore, considering the positive correlation of age with acceptance of innovation and risk taking (Bello, 2000; Chikezie *et al.,* 2012), if younger generation of farmers can be actively involved in cotton production in the area, there is hope for continuity of its production, even on an enhanced scale.

Result showed that very few (11.1%) of respondents had no formal education while only 24.1% had secondary level education. Few (29.6%) of the respondents attained primary level education while 11.1%, 9.3% and 7.4% had quranic education, vocational education and adult education respectively. This is an indication that there is a high preponderance of very low level of education among farmers in the study area. This may have a negative implication on their comprehension ability and adoption of improved farming practices especially when it involves dosages and measurements.

Findings revealed that, most (66.1%) of cotton farmers have been residing in the area for over 10 years, less than one-third (31.5%) had been residing in the area between 6-10 years. This is an indication of stability of the farming population in the area. Therefore, planting of cash crops is quite possible in the study area. It was however revealed that, majority (74.1%) of the respondents have low annual income (N6, 000-N10, 000) from cotton production. Only very few (1.9%) respondents had income between N 16,000 - N 20,000 as their annual income. This may be due to instability or unpredicted climate changes.

A little above one-third (37.0%) was involved in cassava and maize farming as other means of income generation activities. The non agricultural income earning activities involved in are; motorcycling (24.1%) and (5.6%) are involved in charcoal business. Nevertheless, all (100%) of cotton farmers registered as members of National Cotton Association of Nigeria (NACOTAN). Since all respondents are registered member of NACOTAN implies that the group formation may have positive implication on the propensity for reviving cotton production in the area. Also, the group formation may facilitate quick access to input, credit and other form of assistance in the on-going transformation of agricultural sector. On other hands the group formation will also assist easy monitoring of farmers activities as well as their performances.

Perception of cotton farmers toward climate change and its effects on cotton production

Findings in Table 2 show that climate change has had adverse effects on agriculture, especially cotton production in the study area. With the Likhert scale rating of 1-5 based as; Disagreed (1), Strongly Disagreed (2) Undecided (3), Agreed (4), and Strongly Agreed (5). The mean score of famers' perception about the climate change and its effects on cotton production is 2.62. Therefore, respondents' with mean score greater than 2.62 have positive perception about the statements. The result shows that respondents strongly agreed that climate change has brought about frequent incidence of flooding on cotton farm in the study area ($\ddot{X}$ = 4.65, S.D ± 0.705). They agreed on the assertion that there is an increase temperature in recent time due to change in climatic condition ($\ddot{X}$= 3.45, S.D ± 1.152). In addition, respondents agreed that as a result of change in climatic condition, there is now fluctuation in rainfall pattern or distribution ($\ddot{X}$= 4.04, S.D ± 0.999). In corollary, respondents strongly disagreed on the assertion that prevailing temperature has no effect on cotton production ($\ddot{X}$= 1.46, S.D ± 0.605) and instability in weather condition has greatly increased the yield ($\ddot{X}$= 1.17, S.D ± 0.509). Respondents also disagreed that rainfall does start and end at normal period in the past 2 years and that there is early onset of rainfall in the past 5 years due to change in climatic conditions as well as there is increase in yield of cotton production as a result of climate change (mean ≤ 3.0).

Farmers' adaptation strategies with climate change on cotton production.

The rating of farmers' adaptation strategies to climate change in cotton production are ; Always used (AU= 4), Often used (OU = 3); Rarely used (RU = 2) and Not used (NU = 1), Table 3 shows that the only coping strategy that is often used by cotton farmers in the study area are; diversification from agricultural activities to non-agricultural activities ($\ddot{X}$ = 3.43, S.D ± 0.767), increase use of agrochemicals (pesticide and insecticide) to control infestation of diseases ($\ddot{X}$ = 3.35, S.D ± 0.677), integrated weed pest management ($\ddot{X}$ = 3.44, S.D ± 0.839) and application of fertilizer to boost and maintain the soil nutrients as a result of frequent flooding ($\ddot{X}$ = 3.19, S.D ± 0.646). Others include; sourcing and utilization of weather and climatic information from meteorological station, water storage from rain to cushion the effect of climate change during unfavorable condition, practicing crop diversification/ mixed cropping and proper preservation of seeds, use of early maturing varieties of cotton seed and seedlings to mitigate loss of good quality cotton production.

Furthermore, it was gathered that cotton farmers in the area did not enjoy governmental support in combating climate change through adequate provision of infrastructural facilities (Ẍ = 1.04, S.D ± 0.191) and the availability of any crop insurance scheme (Ẍ = 1.41, S.D ± 0.716). It is also depicted from this study that government is not doing enough to put in place infrastructures to combat the effects of climate change for farmers. No crop insurance scheme in place as a means of mitigating the effects of loss due to climate change. Also, farmers themselves are not doing enough in their environment to ameliorate the effects of climate change. As gathered from the study, cotton farmers in the study area have not adopted the planting of cover crops and trees in controlling effect of sun intensity
(Ẍ = 1.02, S.D ± 0.136).

Table 1: Socio-economic status of respondents (n=54)

Variable	Frequency	Percentage	Mean	Standard deviation
Sex				
Male	53	98.1		
Female	01	1.9		
Age(years)				
31-40	08	14.8		
41-50	14	25.9	56	13.377
51-60	32	59.3		
Educational level				
No formal education	06	11.1		
Primary education	16	29.6		
Secondary education	13	24.1		
Tertiary education	04	7.4		
Adult education	04	7.4		
Quran education	06	11.1		
Marital status				
Married	48	88.9		
Divorce	01	1.9		
Widower	05	9.3		
Religion				
Christianity	31	57.4		
Islam	21	38.9		
Traditional	02	3.7		
Household size				
1- 3persons	02	3.7		
4-6persons	18	33.3	7	2.353
7-9persons	34	63.0		
Year of residence				
3-4yrs	01	1.9		
6-10yrs	17	31.5		
>10yrs	36	66.7		
Income (Naira/ annum)				
6000-10000	40	74.1		
11000-15000	13	24.1	9972.22	2307.528
16000-20000	01	1.9		
Major occupation				
Cotton farming				
Other occupation	54	100.0		
*Motor cycle business	13	24.1		
*Charcoal business	03	5.6		
Cotton yield (Kg)				
10-50kg	02	3.7		
51-90kg	52	96.3		

Source: Field Survey 2014

Table 2: Perception of cotton farmers about climate change and its effects on cotton production (n = 54)

Variables	SA (%)	A (%)	U (%)	D (%)	SD (%)	X	S.D
Prevailing temperature has no effect on cotton production	_	1(1.9)	_	22(40.7)	31(57.4)	1.46	0.605
Storm is more frequent now than before as a result of climate change.	18(33.3)	4(7.4)	_	4(7.4)	28(51,9)	2.63	1.866
There is increase temperature in recent time due to change in climatic condition.	6(11.1)	30(55.6)	1(1.9)	13(24.1)	3(5.6)	3.45	1.152
Effect of climate change has brought about frequent incidence of flooding on cotton farm.	40(74.1)	11(20.4)	1(1.9)	2(3.7)	_	4.65	0.705
Rainfall does start and end at normal period in the past 2 years.		17(31.5)	2(3.7)	12(22.2)	22(40.7)	2.26	1.303
Due to climate change, farmers observed that climatic conditions have become worse.	11(20.4)	9(16.7)	_	21(38.9)	12(22.2)	2.74	1.508
There is now a change in planting date due to climate change.	8(14.8)	12(22.2)	2(3.7)	13(24.1)	19(35.2)	2.60	1.523
There is increase in yield of cotton production as a result of climate change	14(25.9)	2(3.7)	1(1.9)	20(37.0)	17(31.5)	2.57	1.611
As a result of change in climatic condition, there is now fluctuation in rainfall patter or distribution	17(31.5)	30(55.6)	1(1.9)	4(7.4)	2(3.7)	4.04	0.999
Due to change in climatic conditions, there is now extreme of weather	_	1(1.9)	9(16.7)	21(38.9)	23(42.6)	1.79	0.793
There is early onset of rainfall in the past 5 years due to change in climatic conditions	_	10(18.5)	10(18.5)	5(9.3)	29(53.7)	2.04	1.224
Instability in weather condition has greatly increased the yield	_	1(1.9)	_	6(11.1)	47(87.0)	1.17	0.509

D=Disagree, SD=Strongly disagree, U=Undecided A=Agree, SA=Strongly Agree

Table 3: Farmers adaptation strategies with climate change on cotton production (n=54)

Variables	(%) AU	(%) OU	(%) RU	(%) NU	X	S.D
Changing of planting dates to suit the changing weather condition	1(1.9)	14(25.9)	23(42.6)	16(29.6)	2.00	0.801
Planting of acclimatized crop varieties/drought resistant varieties	26(48.1)	1(1.9)	15(27.8)	12(22.2)	2.76	1.273
Practicing crop diversification/ mixed cropping	1(1.9)	14(25.9)	11(20.4)	28(51.9)	1.78	0.904
Use of irrigation method in the absence of rainfall	2(3.7	_	14(25.9)	38(70.4)	1.37	0.681
Proper disposal of waste to avoid flooding during rainy season	1(1.9)	_	31(57.4)	22(40.7)	1.63	0.592
Diversification from agricultural activities to non-agricultural activities	30(55.6)	19(35.2)	3(5.6)	2(3.7)	3.43	0.767
Planting of cover crops and trees in controlling effect of sun intensity	_	_	1(1.9)	53(98.1)	1.02	0.136
Sourcing and utilization of weather and climatic information from meteorological station	1(1.9)	_	49(90.7)	4(7.4)	1.96	0.387
Adoption of crop insurance schemes	2(3.7)	1(1.9)	14(25.9)	37(68.5)	1.41	0.714
Increase use of agro-chemicals (pesticide and insecticide)to control infestation of diseases	24(44.4)	26(48.1)	3(5.6)	1(1.9)	3.35	0.677
Integrated weed pest management	33(61.1)	15(27.8)	3(5.6)	3(5.6)	3.44	0.839
Use of early maturing varieties of cotton seed	14(25.9)	2(3.7)	14(25.9)	24(44.4)	2.11	1.239
Use of indigenous knowledge to combat effect of climate change	_	3(5.6)	31(57.4)	20(37.0)	1.69	0.577
Application of fertilizer to boost and maintain the soil nutrients as a result of frequent flooding	16(29.6)	33(61.1)	4(7.4)	1(1.9)	3.19	0.646
Water storage from rain to cushion the effect of climate change during unfavorable condition	_	13(24.1)	20(37.0)	21(38.9)	1.85	0.787
Erection of contour ridges around farmland as a method of erosion control	_	_	32(59.3)	22(40.7)	1.59	0.496
Proper preservation of seeds and seedlings to mitigate loss of good quality cotton production	12(22.2)	_	5(9.3)	37(68.5)	1.76	1.243
Governmental support to cotton farmers in combating climate change through adequate provision of infrastructural facilities	_	_	2(3.7)	52(96.3)	1.04	0.191

Hypothesis 1: Test of association between the respondents' socio-economic characteristics and their perception about the effect of climate change on cotton production.

Result of Chi- square and PPMC statistical analysis (Tables 4a and 4b) shows no significant association between respondents' sex (χ^2 =0.599, df = 1, P > 0.05), Marital status (χ^2 = 1.344, df = 2, P> 0.05), religion (χ^2 =3.556. df = 2, P > 0.05), educational level (χ^2 = 4.920, df = 6, P > 0.05) and other occupation (χ^2 = 5.724, df = 6, P> 0.05). Furthermore, there is no correlation between respondents age (r = 0.098, p = 0.479, P > 0.01), household size (r = 0.010, p = 0.114, p > 0.01) and income (r = 0.113, p = 0.114, p > 0.01) and their perceived effects of climate change on cotton production. This revealed that, all the respondents' socio-economic characteristics stated have no significant association with their perception of the effects of climate change on cotton production in the study area.

Table 4a: Chi-square showing the socio-economic characteristics of respondents' and their perceived effects on climate change

Variable	χ2	Degree of freedom	P value	Decision
Sex	0.599	1	0.439	Not significant
Marital status	1.344	2	0.511	Not significant
Religion	3.556	2	0.169	Not significant
Education	4.920	6	0.554	Not significant
Other occupation	5.724	6	0.455	Not significant

Source: Field survey (2014)
S: Significant at 0.05 levels (P < 0.05); NS: Not significant at 0.05 levels (P > 0.05); df: degree of freedom; Correlation is significant at 0.05 levels (2- tailed)

Table 4b: Test of relationship between respondents' socio-economic characteristics and the perceived effects on climate change using PPMC.

Variable	r value	P value	Decision
Age	0.098	0.479	NS
Household	0.010	0.114	NS
Income	0.113	0.114	NS

Hypothesis 2: Test of association between cotton farmers' perceived effects of climate change on cotton production and their adaptation/coping strategies to the effects

Table 5, indicates that there is a positive and significant relationship between respondents perceived effects on climate change and their coping strategies (r =0.890**, P< 0.05). This implies that farmers based the methods of amelioration of climate change on their perceived effects of the climate change. Therefore, farmers rely on practices such as changing of planting dates to suit the season of cotton as regard to weather condition, use of agro- chemical such as fertilizer to effect proper germination of cotton especially at its tender stage, which

replenish the soil nutrients as a result of possible flooding, timely weeding of farmland against invasion of pest and disease to cotton plants as a result of high humidity which may be conducive to some disease that may attach themselves to the cotton lint and adversely reduce the quality of cotton lint during harvesting. However, farmers need to be more enlightened on the modern ways of Tesso *et al*. (2012) that access to awareness about climatic conditions and information about future climate change enables farmers more likely to adjust their farming practices in response to climate change.

Table 5: Relationship between cotton farmers' perceived effects of climate change on cotton production and their coping strategies to the effects

Variable	r value	P value	Decision
Relationship between coping strategies and the perceived effects on climate change	0.890**	0.00	S

Source: Field survey, 2014
****Correlation is significant at 0.01 level (2- tailed) S: significant at 0.01 level**

CONCLUSION AND RECOMMENDATION

The effects of climate change have had its toll on agriculture, especially cotton production in Nigeria. Unfortunately, while government is not doing enough to put in place infrastructures to combat the effects of climate change to help farmers mitigate its effects, agricultural development agencies and meteorology divisions are not doing enough to assist farmers as well. Farmers themselves are not doing enough in their environment to ameliorate the effects of climate change. Therefore, this study recommends that farmers in the area should promptly adopt the planting of cover crops and trees in order to control the effects of sun intensity. Moreover, government agricultural and meteorological agencies should provide timely information to farmers on the climate change and means of ameliorating the effects of climate change so as to prevent agricultural production losses.

REFERENCES

Akinola, A.A. (1986). "Nigeria cocoa farmers and their adoption of cocoa spraying chemicals". *Nigerian Journal of Rural Development and Cooperative Studies* .1 (3): 60-79

Ambali, I.O (2012). Analysis of production efficiency of food crop farmers in Ogun state, Nigeria; *Journal of Agricultural and biological*. 7-9

Anonymous M .1995. *Cropping Scheme Meeting Report on Fibre Programme*. Institutions for Agricultural Research (IAR), Samaru ABU Zaria.

Bange M.P, Milroy S.P, Caton S.J (2008). Managing high fruit retention in transgenic cotton (*Gossypiumhirsutum*L.) using sowing date. *Australian Journal of Agricultural Research 59 (In press).*

Bello, M. O. (2000). "Cauterization of potential Adopters for organic-based fertilizer

among vegetable farmers in Ojo Local Government Area of Lagos State. Bachelor of Agriculture Project, University of Agriculture, Abeokuta, Nigeria.75pp.

Chikezie N.P., Omokore D.F., Akpoko J.G. and Chikaire J. (2012): Factors Influencing Rural Youth Adoption of Cassava Recommended Production Practices in Onu-Imo Local Government Area of Imo State, Nigeria. *Greener Journal of Agricultural Sciences Vol. 2 (6), pp. 259-268.*

Dixon, J, Gulliver, A & Gibbon, D, 2001. Farming systems and poverty: Improving farmers' livelihoods in a changing world. FAO (Food and Agriculture Organization), Rome, and World Bank, Washington, DC.
Franscisco Herminia. A.2008. Adaptation to Climate Change: Needs and Opportunities in Southeast Asia. ASEAN Economic Belletin. Volume 25 Number , April 20081

Intergovernmental Panel on Climate Change (2007a). Climate Change*: Impacts, Adaptation and Vulnerability*. Cambridge: Cambridge University Press England.

Intergovernmental Panel on Climate Change (2007b). Climate Change*:* Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva: Intergovernmental Panel on Climate Change.

National Population Census Report, 2006. Ministry of Internal Affairs, Abuja
Nigeria National Report (2006). Nigeria Demographic and Health Survey. Calverton, Maryland: National Population Commission and ORC Macro

Nhemachena, C. (2009). Agriculture and Future Climate Dynamics in Africa*: Impacts and Adaptation Options*.Pretoria: University of Pretoria.

Nhemachena, C. and Hassan, R. (2007). Micro-level Analysis of Farmers' Adaptation to Climate Change in Southern Africa. International Food Policy Research Institute (IFPRI) Discussion Paper No. 00714.Environment and Production Technology Division, IFPRI,Washington, D.C

Ogun State Government, Nigeria. 2011: Mission to Rebuild Ogun State

Ogun State Government, Nigeria 2011. History of Imeko Afon Local Government Area.

Oladoja, M.A. and Adeokun, O.A. (2013): Assessment of market performance of catfish farmers in Sagamu Local Government Area of Ogun State, Nigeria. *Nigeria Journal of Animal Production* 40 (1): 207 -217.

Oluwasola O. and Ajayi D. (2013): Socio-economic and policy issues determining sustainable fish farming In Nigeria. *International Journal of Livestock Production* Vol. 4(1), pp. 1-8.

Onifade, O.T. (2013). Curriculum and Agripreneurship propensity of Undergraduate students in a Nigerian University of Agriculture: Implications for Economic Development. Dissertation submitted for Professional Diploma in Education (PDE), Federal College of Education, Osiele, Abeokuta, Nigeria.

Pouliotte, J., Smit, B., and Westerhoff, L. (2009). Adaptation and development: Livelihoods and climate change in Subarnabad, Bangladesh. Climate Change and Develop-

ment, *1*, 31-46. doi:10.3763/cdev.2009.0001, http://dx.doi.org/10.3763/cdev.2009.0001

Tanner, T., and Mitchell, T. (2008). Entrenchment or Enhancement: Could Climate Change Adaptation Help to Reduce Chronic Poverty? Institute of Development Studies Bulletin Volume *39*(4 September), 6 -15.

Tesso, G., Emana, B and Ketema, M. (2012): Econometric analysis of local level perception, adaptation and coping strategies to climate change induced shocks in North Shewa, Ethiopia. *International Research Journal of Agricultural Science and Soil Science* (ISSN: 2251-0044) Vol. 2(8) pp. 347-363, August 2012.

The Nation, (2014): N54billion cotton farming. A revolution under threat. The Nation Newspaper January 8, pp 8

(Manuscript received: 15th April, 2015; accepted: 29th February, 2016)