Bima Journal of Science and Technology Vol. 2 No. 2 June, 2018 ISSN 25366041

ASSESSMENT OF CLIMATE CHANGE AWARENESS AND ADAPTATION BY SUGARCANE FARMERS IN GANYE LOCAL GOVERNMENT AREA, ADAMAWA STATE, NIGERIA

Yohanna L[1]., Ezra A[2]., Sini E. D[3] and Yakubu L. T[4]

[1,2]Department of Geography, Modibbo Adama University of Technology Yola.
[2]Department of Basic Science, Adamawa State College of Agriculture Ganye.
Corresponding Author. Yohannaluka2 @gmail.com. 08063201219

Abstract

The study assessed the awareness and adaptation strategies by sugar cane farmers in Ganye Local Government area Adamawa State. A multi-location sampling technique was used to select 50 Sugar cane farmers from the local government area. Primary data collected from the farmers included: the socioeconomic characteristics of the farmers such as gender, age and educational qualification as well as climate change awareness and adaptation strategies. The data were analysed using descriptive statistic. The result shows that majority of the farmers in the state are aware of the climate change despite the low level of education by the farmers and submitted that climate change has severe effect on their farming activities. The effect identified include reduce crop yield, high temperature, drought while excessive rainfall and high winds directly destroy crops. The farmers are trying their efforts to adapt to climate change in some ways such as planting fast growing trees surrounding their sugar cane farm to reduce effects of wind and flooding which have greater effect on sugarcane farming, planting early maturing varieties and crop diversification among others. In other to improve sugarcane farming in the study area, farmers literacy programme should be introduce among the sugarcane farmers, this will help in understanding the contemporary issues on climate threat to agriculture, government should provide functional market system to the rural community. This will ease the cost of transport and damage of the crops, also provision of modern farm implements that will aid in sugarcane farming and also information on adaptation measures should be provided to the farmers.

Key word: Sugarcane, climate change, adaptation, strategies and awareness.

Introduction

Climate affects agriculture cultivation in many ways; land preparations, selection of crops, crop growing and harvesting. He also stated that, agricultural production is the most important of all primary economic activities pursued throughout the world and is mostly dependent on atmospheric condition (Adebayo, 2010). Climate determines the type of crop a farmer can grow the yield of the crop and hence the farmers profit (Adebayo, 1998). The quality of crop produce from field to storage and transported to market depends on climatic factors; bad weather may

affect the quality of crop produce and also transportation and storage of the crop (Stigter, 2004). According to Ayoade (1983), agriculture largely depends on climate to function. Hence, precipitation, solar radiation, wind, temperature, relative humidity and other climatic parameters affect and solely determine the global distribution of crops and livestock as well as their productivity. Kurukulasuriya and Rosenthal (2003) described the ways in which climate affect agricultural production; changes in temperature and precipitation directly affect crop production and can even alter the distribution of agro-ecological zones. David and Mark (2007) reported that climate is fundamental to crop growth. They stated that, moisture and temperature stimulates seed to germinate and the time emergence and that, the rate of growth of roots stems and leaves depend on the rate of photosynthesis which in turn depends on Sun light, temperature, moisture and carbon dioxide (CO_2).

Climate is one of the main threats to sugar cane agro-ecosystem, affecting the productivity of the growers and forcing them to implement adaptation measures. Agricultural system in generally are highly vulnerable to climate change and sugarcane agro ecosystem are not different in suffering from the adverse effect of this phenomenon (Ogeda et al, 2007). Iso (2013) indicate that sugar cane cultivation is highly sensitive to effects of climate change as a result of variation in temperature and precipitation.

Intergovernmental panel on climate change (IPCC, 2007) and Altieri and Nicholls (2009) have suggested that prepared growers and those moving to this end can through a series of measures and actions implemented in their agro-ecosystem reduce the effect of these phenomena. (Fraser, 2007) reported that among such measures are the adoption of new varieties or the combination of different crop types, adoption of technology such as irrigation, adjusting planting and harvesting dates to changes in temperature and rainfall, and use of varieties that are better suited to new weather condition (i.e. more resistant to heat and drought). Although relatively expensive changes, such as shifting planting date or switching to an existing crop varieties, may indicate negative impacts, the biggest benefit will likely result from more costly measures including the development of new crop varieties and expansion of irrigation (Adebayo, 1998)

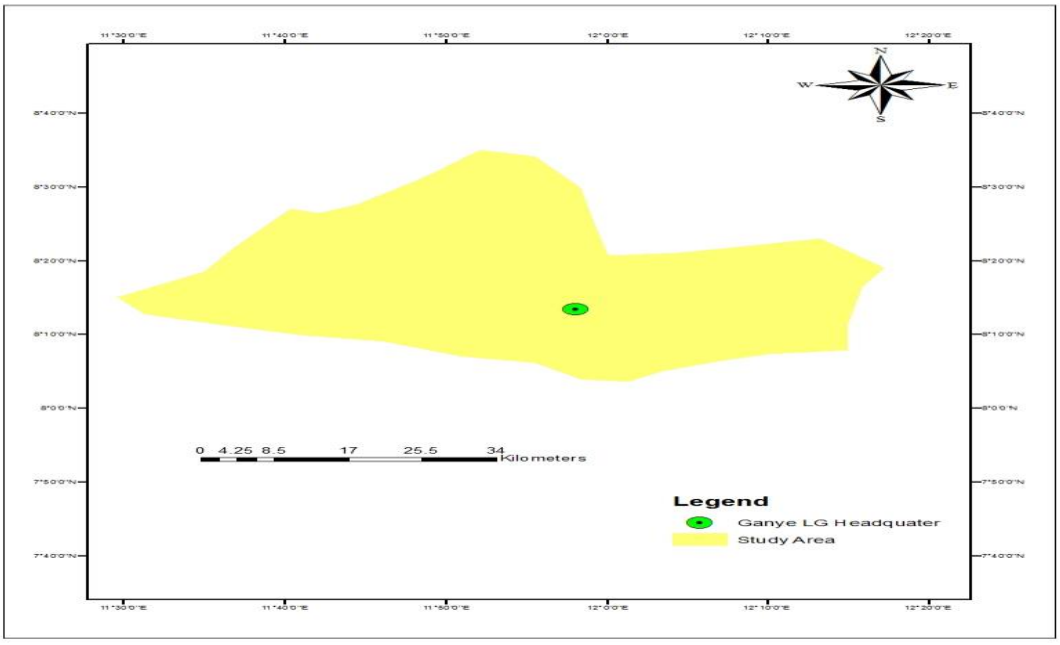
Sugarcane agro ecosystem in Ganye is one of the most important agricultural activities, due to their rural economic and social relevance providing economic activities to most farmers in the local government areas. Production of these crops covers several hectares of land which supply sugar cane to the neighboring areas and the state capitals.

Methodology and Study Area

A multi-location technique was used to select farmers for this study. Five different locations where sugarcane is grown mostly were administered with 10 questionnaires to the experience farmers in each location, the location include: Sangasumi, Gangkoen, Dawasa, Sandoka and Babara

in Ganye local government area Adamawa state. The questionnaires constitute questions on the socioeconomics characteristics of the sugarcane farmers, climate change, awareness, weather experience during sugarcane farming and adaptation strategies.

Ganye local government area is located about 150 kilometres south west of Yola, it has a total land area of about 2291.4 square kilometre. It shares international boundary with Cameroun republic to the east, and to south west by Sardauna and Bali local government areas of Taraba state. It also sheared the boundary in the north with Jada and Mayo-Belwa local government respectively. The area is located between latitude 8^0 15'N and 8^0 30'N and longitude 12^0 00'E and 12^0 15' . It has a total population of about 164,087 people with a density of 150 persons per square kilometre concentrated in seven wards (2006 population census). Land used pattern is dominated by agricultural activities, apart from these, the rest of the land used are residential, recreational, commercials, religions and a few government reservation area. The vegetation of the area is savannah type, it is characterised by finer tall grasses during rainy season and has fairly thick vegetation cover. The climate, Ganye falls within the northern guinea climatic zone characterised by two main seasons annually. The dry season lasting from November to February and wet seasons falls from March to October and has a mean annual rainfall of about 1300-1400 mm the maximum temperature varies between 29^0C and 41^0C while the minimum temperature is 14^0C (Adebayo et al, 1999).



Map of Study Area

Results and Discussion

Socioeconomic Background of the Sugar cane Farmers

Age

The age distribution of the respondents is presented in Table. The tables revealed that both young and old people are involved in sugarcane farming. The distribution shows that 76% of the respondents were at the age of 31-40 years, while 14% were between 41-50 years. Respondents that were over 50 years of age constitute of 10%. This implies that most of the respondents about (98%) were relatively young and physical active. This shows that there is availability of able man power for agricultural production. Also age influences the ability to seek and obtain off-farms jobs and income and could help cope with adverse change in climate.

Education Level

This is an important factor that determines the ability of an individual to understand policies and programmes relating to climate change adaptation. The education of the respondents measured by years of formal education is presented in Table 1. The table reveals that 50% 0f the respondents had attained primary education, while 34% attained secondary education. Only 8% attained tertiary education and also 8% for others. This study revealed that literacy level is low among the respondents and this could have implication for sugarcane production and also for adaptation to change in the climate. Adoption of measures that could result in climate change adaptation is also easier and faster among the educated farmers than the uneducated farmers.

Table 1: Socio-Economic Characteristics of Respondents

S/N	Characteristics	Respondents	Percentage (%)
1	Age		
	31-40	38	76
	51-40	7	14
	Above 50	5	10
	Total	50	100
2	Education		
	Primary	18	36
	Post primary	20	40
	Tertiary	8	16
	Others	4	8
	Total	50	100

Farmers Awareness and Assessment of Climate change

Awareness of Climate Change

Awareness of climate change help famers plan their production activities and reduces risk and uncertainty associated with farming. The distribution of the respondents' responses on climate change is presented in Table 2. The distribution shows that majority of the respondents 76% are aware of climate change while only 24% seem not to be aware of climate change.

Assessment of Annual Rainfall

Average annual rainfall of the local government has been fluctuated due to the effect of climate change (Adebayo, 2010. The distribution of the respondents according to their assessment of rainfall in the area is presented in Table 2. Majority of the respondents 50% claimed that rainfall has been decreasing, while 40% pointed that rainfall has been on the increase only 10% of the respondents claimed not to have noticed any change in rainfall in the area. Again this opinion corroborated the previous research findings on general decline in annual rainfall in many part of Nigeria (Adebayo, 2011).

Assessment of Onset Date of rains

The onset date of rains was assessed among respondents and the distribution is presented in Table 2. The distribution shows that majority of the respondents 70% claimed to have noticed delayed in the onset date of rains in the area, while 26% claimed to have noticed early onset date of rains. However 4% of the respondent claimed not to have noticed any change. This study have revealed that climate change has brought about delayed in the onset date of rains in the area. Again this farmer's observation has been confirmed by expert findings (Adebayo, 2010).

Assessment of Dry Spells

The frequency of dry spell in the area was assessed by the respondent and the distribution is presented in Table 2. 56% of the respondents noticed an increase in the occurrence of dry spell, while 44% observe a decrease in the number of dry spells. Increase in the frequency of dry spell during the growing season is a serious problem facing farmers. In the local government and other northern Nigeria, this farmer observation corroborated the findings of Sawa and Adebayo (2011) that dry spell of 10 and 15 days are on the increase in the Sudano Sahelian zone of northern Nigeria

Assessment of cessation dates of rains

The cessation dates of rains were assessed among respondents and the distribution is presented in Table 2. The distribution shows that half of the respondent 52% claimed to have noticed early cessation dates of rains in the area, while 40% claimed to have noticed delayed cessation in the dates of rains. 8% of the respondents claimed not to have noticed any change. This study has revealed that climate change has brought about early cessation dates of rains in the area (Adebayo, 2011).

Effects High Temperatures on Sugarcane Farming

High temperature resulting from climate change has affected agricultural production in the local government area. The distribution of the respondents according to the effect of high temperature is presented in Table 2. The distribution shows that majority of the respondents 74% stated that high temperature has brought about wilting of their crops, 26% had their farm products spoilt. The evidence of this result shows that high temperature brought about by global warming has affected agricultural production in the local government area

Table 2: Assessment of Farmers Awareness of Climate Change

S/N	Climatic event	Awareness	Percentage (%)
1	Awareness of climate change		
	Yes	38	76
	No	12	24
	Total	50	100
2	Annual rainfall		
	Increasing	20	40
	Decreasing	28	56
	Don't know	2	4
	Total	50	100
3	Onset dates of rains		
	Early	13	26
	delayed	35	70
	don't know	2	4
	total	50	100
4	Dry spell		
	Increasing	30	60
	Decreasing	20	40
	Don't know	00	00
	Total	50	100
5	Cessation date of rains		
	Early	26	52
	Delayed	20	40
	Don't know	4	8
	Total	50	100
6	High temperature		
	Wilting of crops	37	74
	Spoilage of farm products	13	26
	Don't know	00	00
	Total	50	100

Weather condition Experience by sugarcane farmers

Drought and flooding are the major weather affecting agricultural production in Nigeria. But in the case of sugarcane farming in Ganye local government area flood and wind are the major weather hazard. In Table 3.Majority of the respondents about 60% claimed that flood has greater effect on sugarcane farming, while 8% respondent to drought and 32% respondent to wind. According to this findings flood and winds are the major weather condition affecting sugarcane farming in Ganye.

Type of Farming Practicing

Most of the farmers in Northern Nigeria are practicing irrigation and rain fed farming depending on the types of crops they produce. Table 3. Reveals that 34% depend on rainfall for their sugarcane farming, while 22% used irrigation and 44% used both rain feed and irrigation. This study reveals that farmers in the study area used both rain fed and irrigation for farming sugarcane. The used irrigation during dry season, but once during rainy season they depend on rainfall. In the case of any long dry spell during rainy season, they supply water to sugarcane using irrigation.

Minimizing the Situation of Weather abnormalities

Minimizing the situation of weather abnormalities is an important measure to be made by the farmers in the study area in order to prevent feature occurrences of such weather abnormalities. In Table 3 The distribution shows that 30% respondents to stop deforestation, 16% respondent to reforestation while 54% respondent to all of the above. These studies have revealed that farmers are trying their effort to minimize weather abnormalities by putting more effort on planting more trees and stop deforestation.

Adaptation Measures

Climate change adaptation is the adjustment in natural or human system in response to actual or expected stimuli or their effects, which moderates harm or exploits beneficial opportunity.

Adaptation measures embarked upon by the respondents to minimize the effect of climate change in the local government area is presented in Table 4. The distribution shows that 30% of the respondents used seed tolerant variety, while 26% alter their planting schedule. Also 24% of the respondent's plant early maturing seed and 20% diversify their crop. This study further revealed that some farmers have switched from yam farming to sweet potatoes due to crop failure arising from early cessation of rainfall.

Table 3: Weather Hazard Experience by Sugarcane Farmers

S/N	Weather hazard	Respondents	Percentages (%)
1	Weather		
	Drought	4	8
	Flood	30	60
	Wind	16	32
	All of the above	00	00
	Total	50	100
2	Damage		
	Severely	27	54
	Moderately	20	40
	All of the above	3	6
	Total	50	100
3	Types of farming practices		
	Rain fed	17	34
	Irrigation	11	22
	All of the above	22	44
	total	50	100
4	Minimizing weather abnormalities		
	Stop deforestation	12	24
	reforestation	8	16
	all of the above	30	60
	total	50	100

Adaptation Effort to Climate Change

On whether there were efforts made by farmers to adapt to climate change, Table 4 reveals that majority of the respondents about 66% stated that they have made effort to adapt to climate change, while only 44% claimed not to have made any effort to adapt to climate change. This reveals that most of the respondents in the study area have made effort to adapt to climate change.

Adequacy of Adapting Information

The respondents were ask on whether they had adequate information on how to adapt to climate change and the responses is presented in table 4. The distribution shows that more than half of the respondents about 58% claimed not to have enough information on how to adapt to climate change, while 42% claimed to have enough information on how to adapt to climate change. This corroborates the findings of Ishaya and Abaje (2008) in Jemaa local government area of Kaduna State, Nigeria.

Table 4: Climate Change Adaptation Measures by Sugarcane Farmers

S/N	Adaptation Measures	Respondents	Percentage (%)
1	Measures taking to adapt		
	Tolerant seed variety	15	30
	Planting early maturing seed	12	24
	Crop diversification	15	30
	Altering planting schedule	8	16
	Total	50	100
2	Effort to adapt to climate change		
	Yes	34	68
	No	16	32
	Total	50	100
3	Information to adapt		
	Yes	30	60
	No	20	40
	Total	50	100

Conclusion and Recommendation

Majority of the farmers in the local government area are aware of the climate change and they submitted that climate change has affected their farming activities in the recent years. The effect mention include reduce crop yield, frequent dry spell. Similarly high temperature causes wilting of crops, while excessive rain fall lead to destruction of farm land and properties by flooding. The farmers are making effort to adapt to climate change in various ways such as planting tolerant varieties, altering planting schedules, planting early maturing verities and crop diversification. They however lack adequate information on how to adapt to climate change

The following recommendations are proffered towards effective mitigation and adaptation to climate change effects by sugarcane farmers.

- A relative appropriate and sustainable sugarcane farming practices should be encouraged among the farmers and potential farmers. This could be achieved by government and non-governmental agencies ensuring the availability and accessibility of adaptable farming inputs to climate variation at subsidized rate and extent credit facilities to the farmers.
- Government should provide rural infrastructure and functional market system to rural community in order to motivate sugarcane farmers to stay in the enterprise.
- Appropriate information should be provided to the farmers on adaptation measures or strategies.
- Policy makers should incorporate farmer's literacy programme in to extension service. This will avail the farmers the opportunity to understand non cultural soil

technology like trip cropping, compost, agro-forestry along with increase in the probability of adoption.

- Government should provide dams and taps to ease farmers with the shortage of water for their crops as in the case during dry season.

References

Adebayo, AA. (1998) The incidence of dry spell during the growing season in Yola. Ukpong I.E. (ed) Geography and the Nigerian Environment. *Nigerian Geographical Association*, Pp 250- 260.

Adebayo A. A. (1999) Climate I. sunshine, temperature, evaporation and relative humidity in

Adebayo A. A. and Tukur, A. L. (Eds) *Adamawa state in maps Geography* FUT. Yola Pp 20- 25.

Adebayo, A. A. (2010) Climate; Resource and resistance to agriculture. *Eight Inagural lecture* F U T Y.

Adebayo, A. A. (2011) Adamawa State Climate Change Action Plan paper presented at the state Holder workshop on state climate change action plan organised by UNDAF Adamawd State and bright light Education science, Yoga.

Altieri, M. and Nicholas C. (2009) climate change effects on sugarcane growers Mexico.

Ayoade J.O (2002). *Introduction to Agroclimatology.* Vintage, Publisher, Ibadan, Nigeria.

David H. W, and Mark S. H, (2007). Climate and it Effect on Crop Production and Management.

Fraser, E. (2008) Crop yield and climate change retrieved on Sept. 16, 2010 International Institute of Tropical Agriculture (2001) Annual report 2001. 24- 30.

Ishaya, S and Abaje I.B. (2008) Indigenous people perception to climate change and adaptation Strategies. In Jemma local government area of Kaduna state Journal of Geography and Regional planning.

Iso (International Sugar Organisation) (2013) MECAS 07, P 30. Gulf of Mexico

Kurukulasuriya P & Rosenthal S (2003). Climate Change and Agriculture:

A review of impacts and Adaptations. Paper No 91 in Climate Series, Agriculture and Rural Development Department and Environmental Department, World Bank, Washington, D.C.

Ogeda, Adger, W. N, Rodriguez Assessment of adaptation practices, options, constraints And capacity in P. J. Van der linden and C. E. Hanson (Eds) climate change 2007, Impacts, adaptation and vulnerability Pp. 717-743. Contribution from working group II to The fourth assessment report of the intergovernmental panel on climate change

Cambridge University press, Cambridge University.

Sawa B. A. and Adebayo A. A (2011) and perception effectiveness indices in

Northern Nigeria. Research Journal of Environmental Sciences Vol. 3(5), 2011.

Stigter, C.J., (2004). The Establishment of needs for Climate Forecasts and other Agrometerological Information for Agriculture by Local, National and Regional Decision-Makers and Users Communities. Pp. 73–86.