Journal of Agriculture and Food Sciences
Volume 15 Number 1, April 2017 pp. 39 - 53.

FARMERS' PERCEPTION ON THE EFFECTS OF CLIMATE CHANGE ON GROUNDNUT PRODUCTION IN OBI LOCAL GOVERNMENT AREA OF BENUE

[1]J. A.C. Ezihe, [2]A.O. Ejiogu,. and [3]R. O.Alobo
[1] & [3]*Department of Agricultural Economics, University of Agriculture, Makurdi*
[2]*Department of Agricultural Economics, Extension and Rural Development, Imo State University, Owerri*
Corresponding author:ezihejac@yahoo.com
+234 7031895655

ABSTRACT

The study analyzed farmer's perception on the effect of climate change on groundnut production in Obi Local Government Area of Benue State, Nigeria. Despite the fact that efforts have been made towards combating climate change, research and policies directed towards understanding of local perception are useful in understanding the true implications of changing climate. This study was therefore conducted against this backdrop based on groundnut production in the study area. Data were collected by using structured questionnaire and administered on 100 farmers randomly selected. Results were analyzed using descriptive statistics and spearman's correlation. About 61.0% of the farmers were female, while 34.0% of them were between 31 and above 40 years old. While 26.0% had no formal education, 74.0% had various levels of formal education. About 77.0% of the farmers had many years of farming experience ranging from less than 10 years to 20 years. Most farmers (70.0%) had farm size of less than 20.50.0% had household size of between 6-16 persons; 49.0% and 34.0% had less than ₦5,000 monthly income and less than N50,000 annual income respectively . All the farmers (100%) were aware of the effects climate change in the area. The correlation result showed a significant relationship at 0.01 between effect of climate change and groundnut production. Farmers perceived high rainfall, temperature and spread of pests and diseases among others, as the greatest adverse effects of climate change. Some of the strategies adopted to combat the adverse effects included; use of fertilizer, use of improved crop varieties and conservation of soil, among. While barriers encountered were lack of information, high cost of fertilizer, lack of government responsiveness to climate change.

Keyword: Farmers Perception, Effect, Climate Change, Groundnut Production.
https://dx.doi.org/10.4314/jafs.v15i1.5

Journal of Agriculture and Food Sciences
Volume 15 Number 1, April 2017 pp. 39 - 53.

INTRODUCTION

Background of Study

Agriculture places heavy burden on the environment in the process of providing humanity with food and fiber, while climate is the primary determinant of agricultural productivity (Apata*et al.,* 2009). Concern has been expressed by federal agencies and others regarding the potential effects of climate change on agricultural productivity, because the effectiveness of rainfall for crop and animal production is a function of the temperature values which affect evaporation and transpiration (Apata *et al.,* 2009).

Smith *et al.,* (2002) asserted that climate plays a dominant role in agriculture having a direct impact on the productivity of physical production factors, for example the soil's moisture and fertility. Adverse climate effects can influence farming outputs at any stage from cultivation through the final harvest. Even if there is sufficient rain, its irregularity can affect yields adversely if rains fail to arrive during the crucial growing stage of the crops (Molua and Lambi, 2006; Rudolf and Hermann 2009). Interest in this issue has motivated a substantial body of research on climate change and agriculture (Lobell *et al.,* 2008).Climate change is expected to influence crop and livestock production, hydrologic balance input supplies and other components of agricultural systems. However, the nature of these biophysical effects and the human responses to them are complex and uncertain. It is evident that climate change will have a strong impact on Nigeria particularly in the areas of agriculture, land use, energy consumption, biodiversity health and water resources (Apata *et al.,* 2009).

Nigeria like all the countries of sub-Saharan Africa is highly vulnerable to the impacts of climate change (NEST, 2004, IPCC 2007 and Apata *et al.,* 2009). Though climate change is a threat to agriculture and non-agricultural socio-economic development, agricultural production activities are generally more vulnerable to climate change than other sectors (Kurukulasuriya, *et al.,* 2006).Ole *et al.,* (2009) asserted that analysis of 9000 farmers in 11 African countries predicted falling in farm revenues with current climate scenarios. It seems clear that the combination of high climatic variability poor infrastructure, economic poverty, drought, excess rainfall, poor livestock health, reduced crop yields, low productivity and a range of other problems associated with climate variability will constitute important challenges for Africa countries in particular (Adger *et al.,* 2007).

Most researches on people's perception on climate change were carried out in the developed countries of the world which dominate the uppermost northern region of the earth where the relationship between scientists and indigenous people is high (Jan and Anja, 2007). Though the hope in this devastating scenario of climate change lies with the indigenous peoples themselves, who are very successful at preventing deforestation and managing natural environment, those in the developing countries are rarely considered (Jan and Anja, 2007). Despite the fact that efforts have been made towards fighting climate change from scientific views, research and policies directed towards indigenous knowledge and perception are

highly needed. Understanding of local perception is useful in understanding the true implications of changing climate.

To approach the issue appropriately, one must take into account local communities' understanding of climate change, since they perceive climate as having a strong spiritual, emotional, and physical dimension. It is therefore assumed that these communities have an inborn, adaptive knowledge from which to draw and survive in high-stress ecological and socio-economic conditions. Thus, the human response is critical to understanding and estimating the effects of climate change on production and food supply for ease of adaptation Bryant *et al*. (2008). Accounting for these adaptations and adjustments is necessary in order to estimate climate change mitigations and responses (Apata, Samuel and Adeola, 2009).

Africa is generally acknowledged to be the continent most vulnerable to climate change. West Africa is one of the most vulnerable to the vagaries of the climate, as the scope of the impacts of climate variability over the last three or four decades has shown (IPCC, 2007).Climate change leads to land degradation which reduces the quality and productivity and manifest throughout the country while in the southern part of Nigeria, the problem is coastal erosion and flooding, in the sahelien zone of north, the most pronounced climate changed-related reforms of land degradation are wind erosion and related sand dune formation, drought and desertification, sheet erosion which results to the complete removal of arable land is Nigeria's biggest threat to agriculture especially in the sandy soil regions of south-eastern Nigeria.

Climate change has serious consequences on food security, the success of which is dependent on the age long ability of farmers to predict when to plant their crops. Unpredicted changes in the onset of rains in the last 20 to 30 years have led to situation where crops planted with the arrival of early rains get smothered in the soil by an unexpected dry spell that can follow early planting. There is the need to gain as much information as possible, and learn the positions of rural farmers and their needs, about what they know about climate change, in order to offer adaptation practices that meet these needs (Royal Society, 2005;Apata *et al.,* 2009;Lobell*et al.,* 2008; Hassan and Nhemachema, 2008).

Groundnut farmers in Obi Local Government of Benue State Nigeria produce the bulk of groundnut that is consumed locally. The local farmers are experiencing climate change even though they have not considered its deeper implications (Apata*et al.,* 2009).This study therefore analyzes the farmers' perception of the effect of climate change on groundnut production.

OBJECTIVES OF THE STUDY

The general objective of the study is to examine farmers' perception on the effect of climate change on groundnut production in Obi Local Government Area of Benue State. The specific objectives are:

i. describe the socio-economic characteristics of groundnut farmers in the study area;
ii. determine the groundnut farmers' level of awareness of climate in the study area;
iii. estimate the relationship between the effect of climate change on the output of groundnut in the study area;
iv. ascertain the copping and adaptive strategies used by the farmers in the study area;
v. identify constraints encountered by groundnut farmers in adapting to the effect of climate change in the area.

Hypothesis

H_0: There is no significant relationship between effect of climate change and groundnut output.

LITERATURE REVIEW

Conceptual Framework

Researchers have suggested the importance of rainfall for general economic growth in Africa. O'connell and Ndulu (2000) included a measure of the number of dry years in a cross-country growth regression of Africa countries and found that this variable has a significant negative effect on economic growth rates. Using climatic data from the intergovernmental panel on climate change (IPCC), Master and Sachs (2002) showed the effect of rainfall on a sample developing and developed countries. Another early contribution to this literature is by Sherlund *et al.,* (2002) who incorporated rainfall, soil fertility model for rice in the cote d'Ivoire more recently, Alem *et al.,* (2010) using random effects to bit adoption model and panel data from a sample of producers located in the central highlands of Ethopia, concluded that increased rainfall in the previous year is associated with greater fertilizer application in the current year, while higher rainfall variability leads to a lower probability of using fertilizer and also decreases the intensity of fertilizer use. These results imply that the connection between good weather along with lower rainfall variability and the use of fertilizer have significant effect on productivity and farm investment. Schlenker and Lobel (2010) re-estimated the impact of climate change including temperature and precipitation, on yield maize, sorghum, millet, groundnut, and cassava.

Scientific literature has established empirically that climate conditions have a measurable impact on agricultural output and productivity. According to the Master and Wiebe (2000), the most direct impact of climate change in Africa stems from growing water shortages or drought, leading to an increasing dependence on imported foodstuffs (Boubacar, 2010). A recent IPPC report (Boko*et al.,* 2007) concluded that changing climate conditions are likely to impose additional pressure on water availability, reducing the length of the growing season and forcing regions of marginal agriculture out of production. The same report predicts a 50% reduction in yield by 2020 and 90% reduction in crop net revenue by 2100 in areas that are already classified in Africa.

Hassan (2010) stated that given the vulnerability of African countries to global warming more disaggregate studies in terms of geography; agro-ecological zones and the type of farming of climate change on agriculture are needed. Moreover, the African Centre for Technology Study (ACTS) has concluded that agriculture is highly susceptible to changes in climatic condition and that one of the factors limiting productivity is precipitation (Orindi and Eriksen 2005).

METHODOLOGY

Study Area

The study was conducted in Obi Local Government Area of Benue State. Obi Local Government Area is one of the 23 Local Government Areas of Benue State which is located in central agricultural zones of Benue state (Zone C) and it falls within the Middle Belt zones of Benue state of Nigeria located between latitude $07^0 5'$ and 7^0 15′N and longitude 9^0 and 9^0 6′E. The location has estimated land area of 2229km^2 and a population of about 168,491 (National Planning Commission, 2006). The area experiences tropical climate with annual temperature of about 27^0C (Benue Sate Government, 2006), with two identifiable seasons wet and dry season. The rainy season which start from April to October with total annual amount ranging between 12,000-2000mm while dry season sets in November and ends in March. Temperature is high ranging between 28^0-32^0C and sometimes to 37^0C.

Obi Local Government is bounded to the South by Oju Local government, to the East by Konshisha Local Government, to the West by Ado Local Government and to the North by Otukpo local government. The main topographical features are a long range of highland especially of hill. It is predominantly inhabited by Igede people with few Igbos around Uwokwu district. Council wards in Obi Local Government Area are Obeko, Orihi, Adiko, Ogore, Obarike, Itogo, Odapa, Irabi, Adum West, Ikokwu, Okwougbe, Okpo. The occupation of these people is mainly farming because they are endowed with fertile agricultural land. The major root crops produced in order of importance are yam, cassava and cocoyam, Other crops grown in the area include, rice, maize, corn, millet, groundnut, beniseed, soybean and orange, livestock specially ruminants are also reared extensively in the area on small- scale (Ministry of Information, 2001). Hunting and fishing together with local craft as subsidiary occupation is also carried out.

Data Collection

Out of the twelve council wards, ten were randomly selected and ten farmers from each council ward. The study used primary data in obtaining information necessary for analysis. Primary data was collected by the use of structured questionnaire which was administered to the respondents with the help of the Benue State Agricultural and Rural Development Authority staff.

Journal of Agriculture and Food Sciences **J. A.C. Ezihe, A.O. Ejiogu,. and R. O.Alobo**
Volume 15 Number 1, April 2017 pp. 39 - 53.

Analytical Technique and model specification

The data for this study was analyzed using both descriptive and inferential statistics. Objectives 1, 2, 4, and 5 were analysed using descriptive statistics such as frequency distribution, tables and percentage In analyzing objective 3 spearman correlation analysis was used.

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)}$$

Where **d** is the difference between the ranks, **n** is the number of observations.
The ranking is done in ascending order.

RESULT AND DISCUSSION

Socioeconomic characteristics of the respondent

The result on Table 1 shows that 39.0% of the respondents represented the males while 61.0% of the respondents represented the females. This is not surprising since generally, women in the Benue State engage in farming activities more than the men .This is in agreement with the work of Ugwoke et al (2012), who noted that 56.67% of the females were engaged in farming more than the males

The age of the respondents reveal that 34.0% of the respondents fell within the age range of 31-40years; the age ranges of 21-30years and 41-50 years were each represented by 26.0%; also 20% and 1.0% fell within more than 60 and less than 20 years respectively. Most of the farmers were in their active and productive years and should therefore inform and be informed about perceptions on climate change.

Also majority (68.0%) of the respondents were married, 33.0% of the respondent had secondary school education while 24.0% had tertiary education. This finding implies that majority of the respondent are fairly literate and they likely to have idea about climate change and are also likely to readily adopt climate change adaptation and mitigation measures. Majority (82.0%) of the respondent from the study area were mainly farmers. The modal farming experience is between 11-20 years while the mean is 15 years. This likely indicates that majority of the farmers have been in farming for many years.

The result on farm size shows that majority (74.0%) of the respondents had a farm size that was less than 2 hectares, 19.0% had a farm size of between 2.1-3.99 hectares, and 7.0% had a farm size of more 4 hectares. The mean farm size of respondents in the study area was 1.19 hectares. This finding implies that a large proportion of the respondents were farming on a small scale which could be due to insufficient fund, un-availability of land and availability of labour.

Majority (50.0%) of the respondent had a household size of between 6-7 persons, 22.0% had a household size that was less than 5 persons, 19.0% and 4.0% had a household size of between 11-15 persons and 16-20 persons respectively. This indicates a large household size which determines the amount of labour that could be produced by the family.

The result on annual income shows that the respondents who earned less than ₦50,000 and those who earned between ₦50,001 to ₦100,000 were each represented by 34%; 16.0% earned between₦100,001-₦150,000; 7.0% earned between₦150,001-₦200,000; 5.0% of the respondent earned between₦200,001-₦250,000 while 4.0% earned an annual income that was above ₦250,000. This is an indication that the farmers in the study area operate on small-scale.

Level of Awareness of Climate Change of the Farmers

The result on Table 2 reveals that all the farmers were aware of climate change and 50.4% observed the change through direct experience; 21.0% of the farmers got information on climate change through mass media; 16.0% of the farmers got information from social organization and extension services. The implication is that there is a wide dissemination of information on climate change through social organization and extension services to farmers. This is buttressed by the fact that majority of the famers (100%) seems to be aware of what causes climate change.

Farmers Perception on Farmers Climate Change

Table 3 shows that majority (50.0%) of the respondents perceived very high rainfall as one of the effects of climate change on groundnut production; 34.0% perceived moderate rain fall, while 16.0% perceived low rainfall. This finding implies that farmers in the study area are aware of the changes that are associated with climate change. This awareness will help them to prepare on the adaptive strategy to use in groundnut production which is better adapted to moderate rainfall.

Table 3 further shows that 40.0% of the respondents perceived high temperature to have a negative effect on groundnut production; 41.0% perceived moderate temperature to have a positive effect on groundnut production; 14.0% of the respondents perceived the effect of temperature to be low while few 5.0% stated that they did not know its effect on groundnut production.

Spread of pest and disease was perceived by 36.0% of the respondent to have a negative effect on groundnut production because if the temperature is very high pests that are adapted to high temperature spread more and cause more damage to groundnut production, 39.0% perceived it to be moderate, 20.0% perceived low while 5.0% don't know.

Also the result for drought shows that 42.0% of the respondents perceived that drought was low and as a result the effect was not severe on groundnut production. Soil erosion was

perceived by most (45.0%) of the respondents to have a high effect on groundnut production. The effect of wind on groundnut production was also perceived to be low (42.0%). And majority (52.0%) of the respondent also perceived flooding to have allowed effect on groundnut production.

The Relationship between Climate Change and Output of Groundnut

The correlation result shows a significant relationship between farmer's perception on the effect of climate change and groundnut output in the study area at 0.01 level of significance. Therefore the null hypothesis is rejected.

This finding shows that climate change affect the production of groundnut output in Obi local government because if the climatic condition is not favourable groundnut output will be very low and vice versa.

Coping and Adaptive Strategy Use by Farmer in the Study Area

The result on Table 5 presents the strategies used by the farmers in adapting and coping with climate change. The result shows that 9.5% of the respondents adapt to climate change by using cover crops during very high temperature, while 21.6% of the respondents use fertilizer as one of the coping strategies This could be an attempt to improve soil fertility by the farmers. The result also revealed that 5.0% used land fragmentation. 9.8% used planting of trees as a technique, 17.8% of the respondents used improved seed. 9.5% used multiple planting dates, 10.1% used change in farm size, and 6.5% used mulching while 10.4% used conservation of soil as coping strategies in coping with the effect of climate change to enhance groundnut productivity.

Constraint Encountered by the Farmers in Coping and Adapting to Climate Change

Table 6 reveals that 14.0% encountered lack of information on coping strategies as a constraint of climate change coping strategies. This implies that farmers carry out their activities based on personal experience. 12.7% encountered the constraint of high cost of fertilizer. This implies that the farmers could not afford fertilizer and therefore find climate change adaptation strategy to be expensive using fertilizer. 12.2% of the respondents don't have access to weather forecast technology 11.0% of the respondents experienced delay in government responsiveness to climate change. The result further shows that10.0% of the respondents' encountered lack of access to improved varieties as a constraint, 8.4% lacked access to market for sales of groundnut. The result also shows that 5.7% encountered lack of storage facilities to store their produce during harvest.

CONCLUSION

Farmers perceived that climate change has great effects on groundnut production in the study area. The level of awareness is high and different coping strategies were adopted by the farmers.

Recommendation

The following recommendations are made based on the findings of the study:

- Farmers should be trained on more coping strategies
- Subsidy on fertilizer should be made available to farmers.
- Farmers should be educated on the proper time of planting groundnut to avert pests and disease attack.

REFERENCES

Apata, T. G., Samuel, K. D. and Adeola, A. O. (2009). Analysis of climate change perception and adaptation among arable food crop farmers in SouthWestern Nigeria. Paper presented at the conference of International Association of Agricultural Economics. Pp. 2 – 9.

Adger, W.N., Arnell, N.W. and Thompkins, E.L. (2005).Successful adaptation to climate change across scales.*GlobalEnvironmentalChange*15: 77- 86.

Ayoade, J.O. (2004). *Introduction to Climatology for the Tropics*. Revised edition. Spectrum books limited,

Boubacar, I.(2010). The effects of drought on crop yields and yield variability in Sahel. Selected paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Orlando, FL, February 6–9.

Boko, M., I. Niang, A. Nyong, C. Vogel, A. Githeko, M. Medany, B. Osman-Elasha, R. Tabo and P. Yanda, (2007). Africa. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge UK, 433-467.

Hassan, R. M.(2010). Implications of climate change for agricultural sector performance in Africa: Policy change and research agenda. *J. Afr. Econ.* 19, 77–105.

Hassan, R. and Nhemachena, C. (2008) Determinants of African Farmers' Strategies for adaptation to climate change African Journal of Resource Economics 2 (1) pp 83-104.

IPCC**.**(Intergovernmental Panel on Climate Change) (1996). Impacts, adaptations and mitigation of climate change: Scientific-technical analyses. Cambridge University Press, Cambridge, UK.

IPCC. (2007), Climate Change: Synthesis Report. Cambridge University Press.

Jan, S. and Anja, B. (2007). *"Indigenous Peoples and Climate Change."* University of Oxford and Missouri Botanical Garden.

Kurukulasuriya, P. and Ajwad, M. I. (2007). Application of the Ricardian technique to estimate the impact of small holder farming in Sri Lanka. *Climate Change2007*; 81: 39-59.

Masters, W. A., and Wiebe, K. D. (2000). Climate and agricultural productivity. Paper presented at the Conference on Biophysical Constraints in Tropical Agriculture, Harvard University.

Müller, C. (2011). Agriculture: Harvesting from Uncertainties. *Nature Climate Change* 1 (5): 253–254. doi:10.1038/nclimate1179.

Masters, W. A., and Sachs, J., (2001). Climate and development. Paper presented at the annual meetings of the AEA, New Orleans, LA.

Molua, E. L. and Lambi, C. M. (2007). Economic Impact of climate change on agriculture in Cameroon. Policy Research paper No 4364 World Bank, Washington, D. C.pp. 51-55.

Ole, M., Cheikh, M. Anette, R. and Awa, D. (2009). Farmers perceptions of climate change and agricultural strategies in rural Sahel. *Journal of Environmental Management* 4(3) 804-816.

O'Connell, S. A., and Ndulu, B.J., (2000). Africa's growth experience: A focus on sources of growth. Paper presented at AERC Workshop on Explaining African Economic Growth, Nairobi, Kenya.

Orindi, V. A., and Eriksen, S. (2005). Adaptation to climate change in the development process in Uganda. Research on African Centre for Technology Studies (ACTS), Kenya. http://www.acts.or.ke/dmdocuments/ecopolicy15.pdf

Rudolf, W. and Hermann, W. (2009). Climate risk and farming Systems in Rural Cameroon. Institute of Development and Agricultural Economics. University of Hannover, Germany pp. 21-24.

Smith O (2000). Adaptation to Climate change in agriculture workshop *Canadian Agri-Food*

Smith, B. and Skinner, M. (2002) Adaptation options in Agriculture to climate change: A typology, mitigation and Adaptation Strategies for Global Change. *African Journal of Agriculture and Resource Economics* 3(5) pp.78-82.

Sherlund, S. M., Barrett, C. B., Adesina, A. A., 2002. Smallholder technical efficiency controlling for environmental production conditions, *J. Dev. Econ.*69/1, 85–101.

Ugwoke, F. O., Nnadi, F. N., Anaeto, C. F., Aja, O. O., and Nwakwasi, R. N. (2012). *Journal of Agricultural Extension* Vol. 16 (2):212-223

Journal of Agriculture and Food Sciences
Volume 15 Number 1, April 2017 pp. 39 - 53.

Table 1: Distribution of respondent by socioeconomic characteristics

Variable	Frequency	Percentage
Sex		
Male	39	39.0
Female	61	61.0
Age(years)		
<20	1	1.0
21-30	26	26.0
31-40	34	34.0
41-50	26	26.0
51-60	11	11.0
>60	2	2.0
Marital status		
Single	24	24.0
Married	68	68.0
Divorced	6	6.0
Widow/widower	2	2.0
Level of education		
Primary	17	17.0
Secondary	33	33.0
Tertiary	24	24.0
None	26	26.0
Major occupation		
Farming	82	82.0
Civil servant	18	18.0
Years of farming experience		
<10	38	38.0
11-20	39	39.0
21-30	22	22.0
>30	1	1.0
	0	0.0
Farm size		
<20	74	74.0
2.1-3.99	19	19.0
>4	7	7.0
Household size		
<5	22	22.0
6-15	50	50.0
11-15	19	19.0

Journal of Agriculture and Food Sciences
Volume 15 Number 1, April 2017 pp. 39 - 53.

16-20	4	4
21-25	4	4.0
26-30	1	1.0
>30	0	0.0
Month income		
<5000	49	49.0
5001-10000	26	26.0
10001-15001	10	10.0
15001-20000	5	5.0
>20000	10	10.0
Annual income		
<50000	34	34.0
50001-100000	34	34.0
100001-150000	16	16.0
150001-200000	7	7.0
200001-250000	5	5.0
>2500000	4	4.0

Source: Field Survey, 2015

Table 2: Distribution of respondent according to awareness of climate change

Variables	Frequency	Percentage
Awareness of climate change		
Yes	100	100.0
No	0	0.00
Source of awareness		
Mass media	21	19.6
Social organization	16	15.0
Personal observation	54	50.4
Extension services	16	15.0
Awareness of the causes of climate change		
Yes	24	24.0
No	76	76.0

Source: Field survey, 2015.

Table 3: Distribution according to how the farmers perceived climate change

Variables	Frequency	Percentage
High rainfall		
Very high	50	50.0
Moderate	34	34.0
Low	16	16.0
Don't know	0	0.00
Temperature		
Very high	40	40.0
Moderate	41	41.0
Low	14	14.0
Don't know	5	5.0
Spread of pest and disease		
Very high	36	36.0
High	39	39.0
Low	20	20.0
Don't know	5	5.0
Drought		
Very high	2	2.0
Moderate	15	15.0
Low	42	42.0
Don't know	41	41.0
Soil erosion		
Very high	9	9.0
High	45	45.0
Low	38	38.0
Don't know	0	0.00
Wind		
Very high	19	19.0
High	33	33.0
Low	42	42.0
Don't know	6	6.0
Flooding		
Very high	6	6.0
High	24	24.0
Low	52	52.0
Don't know	17	17.0

Source: Field survey, 2015

Table 4: Correlations

Variable	N	Correlation coefficient	Significant
Value	100	0.430**	0.000
GNUTP	100	0.430**	0.000

**correlation is significant at 0.01 level (2tailed).

Source: Field survey, 2015

Table 5: Distribution of Respondent by Their Adaptive and Coping Strategies

Variables	Frequency	Percentage
Adaptive and coping strategies by farmers		
Cover cropping	32	9.5
Fertilizer use	73	21.6
Land fragmentation	17	5.0
Planting trees	33	9.8
Use of improved seeds	60	17.8
Multiple planting date	32	9.5
Change in farm size	34	10.1
Mulching	22	6.5
Conservation of soil	35	10.4

Source: Field survey, 2015

Table 6: Distribution of respondent according to the constraint encountered when using the adaptive and coping strategies

Variables	Frequency	Percentage
Lack of improved varieties	56	10.1
Lack of information	78	14.0
Lack of access to weather forecast technology	68	12.2
Illiteracy of crop farmers	60	10.8
Government responsiveness to climate change	61	11.0
Tedious nature of climate change	28	5.0
Adaptive strategies		
High cost of fertilizer	71	12.7
Lack of market for farm produce	47	8.4
No access to water	23	4.1
Lack of storage facilities	32	5.7
Change are expensive	33	5.9

Source: Field survey, 2015.