



Perceived effects of climate change on the Profitability of Water Melon Production in Ibarapa East LGAs, Oyo State, Nigeria.

Adeoye, A¹.; Oyeleye, A.A².; Atoyebi, J.O³.;
Daud, S.A².; Omotoso, A.B²

¹Department of Agribusiness, Oyo State College of Agriculture and Technology, Igboora.

²Department of Agricultural Extension and Management, Oyo State College of Agriculture and Technology, Igboora.

³ Agricultural Technology Departments, Osun State College of Technology, Esa Oke.

ARTICLE INFO

Article No.: 010423001

Type: Research

Full Text: [PDF](#), [PHP](#), [HTML](#), [EPUB](#), [MP3](#)

Accepted: 04/01/2024

Published: 03/02/2024

*Corresponding Author

Adeoye, A

E-mail:

adeoyeadelayo2017@yahoo.com

Phone: 08035881241

Keywords: Gross margin analysis, Water melon, perceived effect of Climate change, Awareness, profitability.

ABSTRACT

Climate change is one of the prevailing environmental problems in the world and has gained universal discourse in recent time because its effects are multi-faceted. It affects agricultural production and consequently affects the price of its products, supply, demand, profit and welfare of the farmers. Therefore, this study attempts to examine the perceived effect of climate change on the profitability of water melon production among farmers in Ibarapa East local government, Oyo State, Nigeria Using a well-structured questionnaire this study employed a multistage sampling procedures to sample 120 water melon farmers. The objectives were analyzed using descriptive statistics budgetary and gross margin analysis and ordinary least square regression. Descriptive analysis showed that 55.40% of the respondents were male, 58.30% of the respondents were married and nearly all the farmers (91.61%) had access to credit in the study area. Majority of the farmers were aware of the climate change in the study area while majority of the farmers sourced their information via mobile phones and radio. Majority of the farmers' perceived sunshine as the climate change parameter that influences water melon production while 29%, 14% and 8% of the farmers perceived rainfall, temperature and wind respectively. Perceived Climate change index and farm size had negative effect on profitability while age and years of farming experience have positive effect on the profitability of water melon profitability in the study area. Since the result revealed that high perceived effect of climate change reduce farmer's profit, therefore, water melon farmers should be encouraged and be trained on how to diversify their farming activities in order to increase their profit as well as their income, also farmers must be encouraged to be able to get more access to the use of mobile phones since majority were identified to receive climate change information and awareness through mobile phones. This will not only increase water melon profitability but also enhance rural economy development in Nigeria.

INTRODUCTION

The agricultural sector is an engine room for sustaining growth and mainstay of the economy of most African States, and Nigeria in particular (Joshua *et al.*, 2011; Mgbenka *et al.*, 2015). Agriculture in Nigeria has been described as a unique instrument of growth, development and poverty reduction (FAO, 2007). It also contributes immensely to the country's total Gross Domestic Product (NBS, 2021), Yusuf *et al.* (2018) reported that agriculture is an important sector in the Nigerian economy that provides job opportunities, poverty alleviation, food production, and contributes to the development of the entire economy (FAO, 2015). Prantilla and Laureto, (2013) reported that agriculture has the potential of interacting with the environment. It interacts with the environment in the process of improving the lives and livelihoods of millions who depend on it for food and subsistence (Yakubu, *et al.*, 2021; Prantilla & Laureto, 2013). Climate change which is one of the environmental parameter such as water for irrigation, amount of solar radiation for plant growth, rainfall, temperature and prevalence of pests can affect agricultural crop yield and types of crops that can be grown in some areas (Dhaka *et al.*, 2010).

Climate change has been a major threat to the agriculture sectors. Its refers to a change in weather condition of a place over time which can be due to either natural variability or as a result of human activity (Adeagbo *et al.*, 2021; Knox *et al.*, 2012). Its effect has resulted into decline in agricultural activities, drought, migration, health problems, flooding, erosion, hunger and poverty among others (Yusuf *et al.*, 2018). Studies identified increase in annual rainfall during wet season, unpredictability of rainfall, longer dry season, rise in temperature and drought, excessive dryness during dry season changes in harmattan period as evidences of climate change (Yakubu *et al.*, 2021). Climate change also affects the key developmental issues such as food security as a result of reduction in crop output. Food insecurity related diseases are likely to emerge at a rapid pace due to the changes in climate conditions. The direct impact of climate change on agricultural systems are changes in rainfall and temperatures which could impact on ago-climatic conditions, altering growing seasons, planting and harvesting calendars, water availability, pest, weed and disease population.

In Nigeria, watermelon is mostly cultivated in the Northern part because it is a warm loving plant and this makes its production seasonal in the Southern part of the country (Adeoye *et al.*, 2011). However, there is a high level of wastage in the production due to excess water especially in its early developmental stage (Adekunle, 2007). The high demand of this watermelon fruit is not met in many part of Nigeria because of the excessive rainfall in every months of the year. The production of watermelon all year round in all parts of Nigeria is expected to improve nutrition, attainment of food security for the country as well as increase

revenue of the farmers and create employment opportunities thereby improving on the efficiency of utilization of labor (FAO, 2015). This study became imperative considering the significant contributions of watermelon production to farmers, the consumer and the entire nation which can be negatively affected if climate change of the area is not well perceived (konya *et al.*, 2013). Therefore, this study was set out to examine the perceived effect of climate change on the profitability of water melon production among farmers in Ibarapa East local government, Oyo State, Nigeria. The study estimated cost and returns and profitability of the water melon farmers in the study area. It also identified the sources of agricultural information on the perceived effect of climate change available to farmers in Ibarapa East local government.

METHODOLOGY

The study was carried out at Ibarapa East local government area of Oyo state. It consists of two towns Eruwa and Lanlante, the rainfall pattern in the areas follow a tropical type with an average annual rainfall pattern of 300mm and fairly high temperature with land mass area of 408,424sq/km. There two major planting seasons in the area. The early season usually beginning from March and end toward end of June, and the late season planting ends around December. The vegetation of the area is largely rainforest and savannah and this make it possible to cultivate a wide array of crops ranging from tree crops and arable crops. The common crops grown in the area include cocoa, oil palm and cashew while the arable crops include cassava, maize, yam and vegetables. Multi stage random sampling technique was used in selecting 120 water melon farmers in the study area. The local government was politically divided into two major towns i.e. Eruwa with 6 wards and lanlate with 4 wards. Ibarapa East local government area was purposively selected, in the first stage, due to its high watermelon-farming population. In the second stage, a simple random selection of 4 wards in Eruwa and 2 wards in lanlate while the third stage involved the random selection of 20 watermelon farmers from each wards, giving a total number of 6 wards, and one hundred and twenty respondents that were used for this study. The selections were proportionate to numbers of water melon farmers in each ward.

Analytical procedures

The data collected were analyzed using descriptive statistics such as frequency distribution, means and percentages to examine the socio – economic characteristics and to identified major sources of the information available to the farmers, budgetary techniques was used to determine the cost and returns of input and the profitability of the water melon farmers

and Benefit Cost Ratio analysis while ordinary lease square regression was used to examine the perceived effect of climate change available to farmers in Ibarapa East local government. Descriptive statistics which included frequencies table, percentages, mean and standard deviation was used to describe the socioeconomic characteristics of the farmers. Budgetary / gross margin analysis was used to estimate the profitability of the water melon farmers while ordinary lease square regression was used to analyse the perceived effect of climate change on water melon production

Profitability analysis

The budgetary technique was used to determine the Profitability of water melon production in the study area. Gross margin was estimated using the Model below

$$GM = \sum TR - \sum TVC \text{----- (i)}$$

$$TR = P_y Y_i \text{----- (ii)}$$

$$TC = TVC + TFC \text{----- (iii)}$$

Where,

GM = Gross Margin (₦), TR = Total Revenue (₦/ha) (Unit Price x Quantity), TVC = Total Variable Cost (₦/ha), TC = Total Cost (₦/ha), P_y = Unit Price of Output Produced (₦),

Ordinary lease square model was used to determine the perceived effects of climate change on watermelon profitability.

The model is specified as:

$$Y = \beta_0 + \beta_1 X_1 + e, \beta_0 = \text{constant},$$

β_1 = Coefficient to be estimated and, e = error term

Where; Y = Gross margin/ profit

X_1 = perceived effects of climate change index, X_2 = Household size, X_3 = Level of education, X_4 = Farming Experience, X_5 = Access to credit, X_6 = Cooperative society, X_7 = farm size, X_8 = mobile phone, X_9 = Age, X_{10} = Sex of the farmers, X_{11} = marital status,

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondent

Table 1 showed that the mean age of the respondents was 40 years which implies that majority of the marketers are still in their very active age group, which usually has physical fitness prone to expended energy in water melon production. This was similar to the report of Cordelia and Edwin (2020) that most of the farmers in Ebonyi state were young farmers. Majority of the farmers were male, full time farmers with average household size of 4 people per household and 9 years of farming experience. Furthermore, the result also shows that more than 70% of the farmers were literate, at least having one form of formal education or the other, married, had access to credit facility and were members of water melon cooperative. Education has been known to influence innovation by the farmers. Education is believed to be able to provide farmers with better managerial skills needed to improve their rice productivity thereby earning more income and to remain non-poor (Olorunsanya *et al.*, 2011; Oladeebo and Masuku 2013). In addition, more than 80% of the water melon farmers in the study area were aware about weather variation. This is similar to Idrisa *et al.* (2018) report that majority of farmers were aware of climate change in a study conducted in Sahel savannah agro-ecological zone of Borno State, Nigeria.

Table 1a: Distribution of Socio-economic characteristics of the respondent

Variable	Frequency	Percentage	Mean
Sex			
Male	66	55.00	
Female	54	45.00	
Age			
<30	43	35.83	40.2 ± 13.7
31-50	55	45.83	
51-70	19	15.83	
>70	3	2.50	
Marital Status			
Married	70	58.33	
Single	27	22.50	
Divorced	16	13.33	
Widowed	7	5.8	
Household Size			
1-3	57	47.50	3.72 ± 1.5
4-6	58	48.33	
>6	5	4.17	
Employment			
Full Time	67	55.83	
Part Time	53	44.17	
Educational Level			
No Formal	8	6.67	
Primary	15	12.50	
Secondary	48	40.00	
Tertiary	38	31.67	
Adult	11	9.17	
Years of Experience			
1-10	92	76.67	9.1 ± 8.1
11-20	18	15.00	
21-30	7	5.83	
>30	3	2.50	
Access to Credit			
Yes	110	91.67	
No	10	8.34	
Farm Size			
>20	96	80.00	12.0 ± 15.0
21-40	20	16.64	
Mixed Cropping			
Yes	105	87.50	
No	15	12.50	
Cooperativemember			
Yes	85	70.83	
No	35	29.16	
Awareness			
Yes	105	87.50	
No	15	12.50	
Total	120	100.00	

Source: field survey, 2023

Farmers' awareness about weather variation in the study area

Table 2 reveals that most of the farmers (45.83% and 37.50%) got climate change information through mobile phone and radio, followed by farmers who sourced information through Friends/Neighbour (22.50%). This finding is similar with Maponya (2017) study, who reported that local radio is the major source of information received by small-scale farmers in Africa. It was also revealed that only few of the farmers (8%) sourced information about their climate change through extension agents. The important of extension visit and services in enhancing agricultural profitability and poverty reduction cannot be over emphasize in the rural areas as it serves as the main link between the

farmers, the government and research institutes as well as the major source in which through agricultural information reached the farmers (Waddington *et al.*,2010). This study suggests that water melon farmers in this area will not have access to information and innovation regarding the best technological application for their crop production as well as post-harvest information, pest/disease management, processing, and marketing distribution as well as proper information on the changing climate to increase profitability (Zaid, 2015; Yusuf *et al.*,2013). The information from extension agent through government will be cheaper and easier to get compare to friends/neighbour.

Table 3: Distribution of the farmers according to source of information on climate change

Information Source	Frequency	Percentage
Extension Agent	10	8.33
Friends/Neighbour	27	22.50
Radio	45	37.50
Television	04	3.33
Mobile phones	55	45.83

* Multiple responses, **Source:** field survey, 2023

Perceived climate change Parameters that Influence water melon production in the Study area

Table 3 revealed that majority (40%) of the farmers perceived sunshine as the climate change parameter that influenced water melon production in the study area. this was followed by rainfall, temperature and

wind of 29.16%, 14.16% and 8.33% respectively. The result was similar to the findings of Bareja (2019) that climatic factors such as rainfall and water, sunlight and temperature were the factors that influence plant growth and development. Yakubu *et al.* (2021) also identified changes in rainfall and temperature as perceived climate change.

Table 3: Perceived Climate change Parameters

Climatic Parameters	Frequency	Percentage
Rainfall	35	29.16
Temperature	17	14.16
Wind	10	8.33
Sunshine	48	40.00
Humidity	10	8.33
Total	120	100.00

Source: field survey, 2023

Cost and Returns of water melon production

Budgetary analysis was used to measure cost and return in the study area. $GM = TR - TVC$, $TVC = ₦ 3,90765$, $TR = ₦ 4,727467$, $GM = ₦ 4727467 - 39,0765$. $GM = ₦ 4,336702$ per annum. Profit = TR-TC, $TC = ₦ 1443127$

PROFIT = 4727467- 1443127= ₦3, 284340per annum. It is profitable. The result is in line with the findings of Yusuf *et al.* (2013) and Oguntola (2006) studies that water melon is a profitable venture.

Perceived effect of climate change on water melon profitability in the Study area

The ordinary lease square model was used to examine the perceived effect of weather variation on watermelon profitability in the study area. Table 5shows F- value of 3.23 and prob>F is 0.000 which revealed that the model as a whole was statistically significant (OLS>1) and has a good fit to the data. The R-squared was 0.4840 that is

48.40% of the water melon profitability in the study area was explained by the selected explanatory variables.

Perceived effect of climate change index was negatively significant to profitability at 1% level. This implies that the more the perceived effect of climate change the less the profit of the water melon farmers. Farm size was also negatively related to the profit of the water melon farmers. This implies that the larger the farm size the less the profit acquired by the farmers. This may be due to inefficiency in the combination of the resources (inputs) used in water melon production and lack of effective management practices. This was similar to the findings of Anyaegbunam (2012) and

Okoye *et al.* (2008) that inverse relationships exist between farm size and crop productivity.

In addition, the age and years of farming experience of the farmers were positively related to the profitability of water melon in the study area. This implies the older the farmers, the higher the profit acquired and the additional years gotten in water melon farming production leads to higher profit. This could be due to the fact that each additional year by the farmer in age and experience lead to accumulation of skill and wealth which could have helped them to manage their resources for optimum profit.

Table 6: Perceived effect of climate change on farmer profitability in the study area

Variables	Coefficient	Standard. Error	t	P> t
Perceived climate change index	-0.524***	0.095	-1.65	0.000
Marital status	-0.3500	0.2536	-1.38	0.171
Farming Exp	0.0800*	0.0388	2.06	0.042
Age	0.0600**	0.0222	2.70	0.008
Education	0.0197	0.0879	0.22	0.823
Household size	0.2635	0.1786	1.47	0.143
Farming association	-0.0134	0.1703	-0.08	0.937
Secondary occupation	-0.1750	0.1462	-1.20	0.234
Farm size	-0.0349*	0.0196	-1.78	0.078
Constant	-0.3270	0.6909	-0.47	0.637

Number of obs = 120 F(13, 106) = 3.23 R-squared = 0.4840
 Adj R-squared = 0.1962 Prob > F = 0.000

Source: field survey, 2023

*** Significant at 1%, ** is significant at 5%, * is significant at 10%

CONCLUSION

Based on the findings of this study, it was concluded that most of the water melon farmers in the study area were male and still in their productive age. Many of them had access to credit facility, aware of the perceived effect of the climate change and mostly sourced climate change information through mobile phone and radio. Water melon production was a profitable business in the study area as the profit ratio was ₦3,284,340 per annum. Perceived climate change and farm size of the water melon farmers negatively affected the profitability, age and years of farming experience positively affected the profitability of water melon farmers in the study area.

RECOMMENDATIONS

Since the result revealed that high perceived effect of weather variation reduce farmer's profit, therefore, water melon farmers should be encouraged and be

trained on how to diversify their farming activities in order to improve their profit and increase their income.

Government and non-government organization should commit more human, financial and logistical resources to improve agricultural extension services. This include construction of roads linking various villages and town in the area, health centers, drinkable well water etc. to boost agricultural profitability, increase household income and poverty reduction. This will not only enhance water melon profitability but also contribute positively to extension performance and services delivery which directly leads to rural development.

This study recommends that the farmers must be encouraged to be able to get more access to the use of mobile phones since majority were identified to receive climate change information and awareness through mobile phones. Therefore, the community leaders, financial institutions and Nigerian Communications Commission (NCC) or network service provider to intensify efforts to provide better enabling environment for the internet services, provision of support services and electronic communication

network, reduction of tariffs in rural areas and subsidize phone prices and cost of internet services for effective access and usage of mobile phone. This will not only increase water melon profitability but also enhance rural economy development in Nigeria.

REFERENCES

- Adeagbo, O.A., Ojo, T.O., and Adetoro, A.A (2021). Understanding the determinants of climate change adaptation strategies among smallholder maize farmers in south- west Nigeria. *7(2):6-12*.
- Adejuwon, S. A. (2004). Impacts of Climate Variability and Climate Change on Crop Yield in Nigeria. Lead Paper Presented at the Stakeholders' Workshop on Assessment of Impacts and Adaptation to Climate Change, Conference Center, Obafemi Awolowo University, Ile-Ife 20-21 September, 2004.
- Adeoye I. B., Olajide-Taiwo F. B., Adebisi-Adelani O., Usman J. M. and Badmus M. A. (2011). Economic Analysis of Watermelon Based Production System in Oyo State, Nigeria ARPN Journal of Agricultural and Biological Science . 6 (7).
- Adekunle, A. A.; Fatunbi, A. O.; Adisa, S. and Adeyemi, O. A. (2007). "Growing watermelon commercially in Nigeria: An illustrated guide". USAID ICS- NIGERIA and IITA.
- Cordelia, N.O and Edwin, O. (2020). Analysis of the factors influencing productivity of rice farms in Ebonyi State, Nigeria. *1(2):316-325*
- FAO, 2017, The state of food and agriculture: Climate change Agriculture and Food Security. Retrieved 20th September, 2018. 4:33pm.
- FAO, 2016, www.fao.org/Climate-Change.
- FAO (2011). FAO statistics. China is the World's Leading Producer of Watermelon. Luxembourg. Belgium. Trinidad and Tobago. United Arab. Emirates.. World. CHART 33: Per capita food supply variability, top 20 countries in 2011
- Food and Agricultural Organization (2007). Adaptation to climate change in Agriculture, Forestry and Fisheries: Perspectives, Framework and Priorities
- Ibarapa Central (2013). About Ibarapa. www.ibarapacentral.com/about.html
- Idrisa, Y.L., M.M. Gwary and H. Shehu, (2018). Analysis of food security status among farming households in Jere L.G.A. of Borno State. *Agro-Sci.*, 7, 199–205
- IPCC (2001) weather variation 2001: The scientific basis contribution of working group 1 to the third Assessment report of the intergovernmental panel on weather variation.
- Joshua, A., Ajiboye, A. and Rashid, H.(2011). Impacts of Climate Change on Rice Agriculture in Nigeria. *Tropical and Subtropical Agro ecosystems.* 14(2):613-622
- Knox, J., Hess, T., Daccache, A., and Wheeler, T. (2012). Climate change impacts on crop productivity in Africa and South Asia. *Environmental Resources Lett.* 7(3): 32-45
- konya, J. S., Syndikus, K. & Kroschel, J. (2013) Farmers' Perception of and Coping Strategies to Climate Change: Evidence from Six Agro-Ecological Zones of Uganda *5(8): 252 – 263*.
- Oladeebo, J. O. and Masuku, M. B. (2013). Effect of Farmer Education and Managerial Ability on Food Crop Production in Nigeria. *Journal of Economics and Sustainable Development.* 4(7):75-82.
- Olorunsanya E.O Falola A and Ogundeji F.S, (2011), Comparative analysis of poverty of rural land urban households in Kwara state, Nigeria. *International Journal of Agricultural Economics and Rural Development.*, 4(2): 44-52.
- Okoye, B.C., Onyenweaku, C.E., Ukoha, O.O., Asumugha, G.N. and Aniedu, O.C. (2008). Determinants of Labour Productivity in Small-holder Cocoyam Farms in Anambra State, Nigeria. *Scientific Research and Essay.*3(11): 559 – 561
- PCC. (2017). Climate change 2017: synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the intergovernmental panel on climate change [Core Writing Team Pachauri RK and Reisinger A eds]. IPCC, Geneva, Switzerland.
- Prantilla, J.N.D. & Laureto, A.S. (2013). Adaptation to Climate Change of Lowland Rice Farmers in Bukidnon, Philippines: A Micro-Level Analysis. Biennial convention of Philippine Agricultural Economics and Development on 'Inclusive and Sustainable Development: Issues and Challenges for Agriculture, Fishery and Natural Resources'. p. 18.
- Waddington, H., Snilstveit, B., White, H., & Anderson, J. (2010). *The impact of agricultural extension services extension program, international initiative for impact evaluation, 3ie Synthetic Reviews – SR009*
- Yakubu, D.H., Akpoko, J.G., Akinola, M.O. and Abdulsalam, Z. (2021). Assessment of perceived effects of climate change on rice production among farmers in North-west zone, Nigeria *Journal of Agricultural Science* 56 (1):48-64
- Yusuf, G.S.F., Lategan, F.S., and Ayinde, I.A (2013). Profitability and Adoption of Watermelon Technologies by Farmers in Moro Local Government of Kwara State, Nigeria. *Journal of Agricultural Science* 5(5): 91-99 www.ccsenet.org/jas
- Journal of Agricultural Science. 5.(5); 2013
- Yusuf, T., Cheah, Y.K., and Rabiul, I. (2018). Impact of Rural Infrastructure on Rice Productivity in Kano State, Nigeria. *European Academic Research* 7 (1): 286-311.
- Zaid, S. A. (2015). *Issues in Pakistan's economy by A political economy perspective (Third Edit)*.