A Review of the Awareness of Climate Smart Agricultural Practices by Potato Farmers in Ayamelum Local Government, Anambra State

Anarah, S. E., Nwankwo, C. B., Obiajulu, I. S. and Umeukeje, A. P.*

Department of Agricultural Economics and Extension, Nnamdi Azikiwe University, Awka, Nigeria.

KEYWORDS

Agricultural practises,
Awareness,
Climate smart practices
Potato
Review,

***CORRESPONDING AUTHOR**

se.anarah@unizik.edu.ng
+2347066006598

ABSTRACT

The study reviewed the awareness of climate smart agricultural practices by potato farmers in Ayamelum local government, Anambra state. The study looks at the, current level of climate smart practices, demography and challenges of farmers in these particular areas with a view to providing critical information on climate smart awareness on sustainable farming development in the study area. Data were collected from 50 respondents who were selected through multi-stage procedure. In the first stage one (1) Local government area (Ayamelum LGA) was purposively selected from the 6 Local government areas that make up Anambra agricultural zone. In the second stage two (2) communities from the chosen local government area was randomly selected. Stage three twenty five (25) potato farmers from each of the selected communities was randomly selected and this gave a total of 50 respondents. The data were analysed using descriptive statistics and a four scale likert type. The survey reveals a balanced gender distribution (46% male, 54% female) and a predominantly young farming population, with the majority aged 31 to 40 years. The level of education varies and emphasises the need to develop targeted programmes in order to close knowledge gaps. Challenges such as reduced access to information, financial constraints and lack of infrastructure are faced by farmers. Targeted education programmes, financial support initiatives, enhanced information dissemination channels are recommended in order to deal with these issues. There is a widespread climate smart agricultural practice, in particular improved water use and management, integrated pest management, use of quality seeds and planting materials and Biodiversity management. These findings have laid the foundations for information and policy adjustments, as well as a community driven initiative aimed at raising local farmers' resilience and wealth.

INTRODUCTION

Climate change is a worldwide event that poses one of the most serious risks mankind has ever faced, generating floods and droughts and hurting farmers' livelihoods by influencing ecosystems, water supplies, food security, settlements, and human health (Food and Agriculture Organization of the United Nations, 2016). Climate and agriculture are strongly interrelated universal processes and thus variations in climate influence agricultural activities. Improving the accumulations of carbon dioxide (CO2) will have a lot of prospective effects on plants and may also have a lot of indirect threats on herbivores and all other food chain members. Climate conditions such as influential rainstorms, high wind pressures, and high temperatures have much influence on agricultural activities (JAT *et al*., 2019). This is not least in developing countries where unsustainable land management, land degradation and greenhouse gas fluxes in terrestrial ecosystems have all been linked to climate change; resulting in decreased agricultural production which pose a threat to food

security (IPCC, 2019). Similarly, climate change, reflected in more irregular and inconsistent rainfall patterns, severe floods, frequent droughts, increased insect and disease rates and irregular agricultural planting seasons have resulted in higher production costs Van Dijk *et al*., (2018). which have adversely affected crop and livestock output Van Dijk *et al*., (2018).

Potato cultivation experienced a number of difficulties due to the environment, pests, and illnesses before the advent of climate-smart agriculture. Traditional agricultural techniques frequently relied on conventional procedures that weren't always long-term sustainable. In particular, climate change caused challenges because variable weather patterns reduced agriculture output.

Climate-smart agriculture is an approach that aims to enhance food security, adaptation, and mitigation in the face of climate change. It involves the use of innovative techniques and technologies to make agriculture more resilient to climate variations. For potato production, climate-smart practices may include the use of drought-resistant varieties, improved irrigation systems, soil conservation, and integrated pest management.

This climate-smart approach has significantly impacted potato production by making it more sustainable and adaptive. It allows farmers to be better prepared for changing climatic conditions, leading to improved yields and reduced environmental impact.

In Ayamelum local government agriculture is the major occupation of its inhabitants. The awareness of climate problems and the potential benefits of taking action is an important determinant of adoption of climate change mitigating measures. Archie *et al*, (2022) argued that farmer's awareness of change in climate attributes (temperature and precipitation) is important to adaptation and decision making. Innovation adoption is the key to increasing farm productivity. There is, therefore the need to examine the review of the awareness of climate smart agricultural practices on potatoes farmers in Ayamelum L.G.A Anambra State, Nigeria.

Concept of climate smart agriculture

Climate-smart agriculture (CSA) is a comprehensive approach that addresses the pressing challenges of food security and agricultural sustainability in the face of climate change. It encompasses a range of practices and strategies aimed at enhancing productivity, building resilience, and reducing greenhouse gas emissions in agricultural systems. The various approaches of climate smart agriculture:

1. Sustainable Intensification:

Sustainable intensification is a key principle of CSA that focuses on increasing agricultural productivity without compromising the environment. By optimizing resource use, such as water, fertilizers, and energy, farmers can produce higher yields while minimizing negative impacts on natural ecosystems. This approach was highlighted by the Food and Agriculture Organization (FAO) in their report on "Climate-Smart Agriculture Sourcebook" (FAO, 2013), which emphasizes the importance of integrating sustainable practices in farming systems.

2. Adaptation:

Climate change poses significant challenges to agriculture, including increased frequency and intensity of extreme weather events, shifts in precipitation patterns, and rising temperatures. CSA promotes adaptation strategies to help farmers cope with these impacts and maintain agricultural productivity. A study by Anarah *et al*. (2019) discusses various adaptation options for agriculture in the context of climate change, such as the use of drought-resistant crop varieties and improved water management techniques.

3. Mitigation:

Agriculture is a significant contributor to greenhouse gas emissions, mainly through methane from livestock and nitrous oxide from fertilizer use. CSA seeks to mitigate these emissions by adopting practices that reduce the carbon footprint of agriculture. Thornton *et al*. (2015) highlight the role of climate-smart practices in reducing emissions while ensuring food security.

4. Resilience:

Building resilience in agricultural systems is crucial to withstand climate-related shocks and stresses. Climate-smart agriculture emphasizes the integration of adaptive and risk management strategies to enhance

the resilience of farming communities. The study by Thornton *et al*. (2017) discusses the importance of mixed crop-livestock systems as a means to enhance resilience in agriculture.

5. Social Equity:

Ensuring that CSA benefits smallholder farmers, women, and marginalized communities is a fundamental aspect of this approach. Social equity in CSA is about empowering vulnerable groups to participate in decision-making processes and gain access to resources and knowledge. FAO's Climate-Smart Agriculture Sourcebook (2013) discusses the importance of social inclusion in implementing climate-smart practices.

6. Knowledge Transfer:

Effective knowledge transfer is critical for the successful awareness of climate-smart agricultural practices. Farmer extension programs, capacity building, and the sharing of best practices play a crucial role in disseminating knowledge about CSA. Anarah *et al*. (2019) discuss the significance of proper education on climate variability should be made available to farmers through environmental experts and extension agencies to curtail various effects of these vagaries of weather on production potentials.

Statement of problem

The awareness of climate-smart agricultural (CSA) practices by potato farmers in Ayamelum Local Government, Anambra State, Nigeria, is crucial for enhancing agricultural productivity, reducing climate change vulnerability, and ensuring sustainable food security. However, despite the potential benefits of CSA practices, their awareness rate among potato farmers in the study area is reviewed. The department of Agricultural economics and extension department over the years through the technical and research team organizes a yearly out reach on the farmers to sensitizes the communities on the issues of climate change, adaptation method and mitigation . This research aim to review the awareness of climate smart agricultural practices in Ayamelum local government area.

Objectives of the research;

i. assess the current level of awareness of climate smart agricultural practice;

ii. examine socio-economic factors influencing the awareness of climate smart agricultural practices and

iii. identify the barriers faced by potato farmers in Ayamelum Local government.

Sampling and sampling procedure

Purposive sampling methods were employed for the selection of the respondents from the major farming location in the local government of the selected study area. Purposive sampling is a valuable tool for researchers who are interested in understanding the experiences and perspectives of a particular group of people.

A multi stage selection procedure was used to select the respondent.

Stage one: In the selected agricultural zone, one (1) Local government area (Ayamelum LGA) was purposively selected from the 6 Local government areas that makes up Anambra agricultural zone

Stage two: two (2) communities from the chosen local government area were randomly selected.

Stage three: twenty five (25) potato farmers from each of the selected communities were randomly selected and this gave a total of 50 respondents that was serving as the sample size for this study.

Data collection

Primary data that was used for the study was collected with well validated open and close ended questionnaire and personal observation by the researcher.

Data analysis

The tools of analysis that was used in this study are; descriptive statistics such as the mean, frequency distribution and percentages.

The Likert scale which gives the average mean score from a four-point was used to analyse the constraints faced by Potato farmers.

Objective (1) and (2) were achieved using descriptive statistics such as mean, frequency, distribution and percentage. Objective (3) was achieved by using the Likert scale which gives the average mean score from a four-point scale which was used to analyse the constraints of potato farmers. A four-point Likert type of scale is specified as follows:

Strongly agree (SA) 4-point; Agree (A) 3-point; Disagree (D) 2-point and strongly disagree (SD) 1-point.

The mean response to each item will be interpreted using the concept of point. The numerical value of the scale points will be as follows:

- Strongly Disagree (SD) =1point
- Disagree (D) = 2points
- Agree (A) =3points
- Strongly Agree (SA) = 4points 4+3+2+1=2.5

Therefore, any constraint with a mean score greater than 2.5 is significant while the one less than 2.5 are not significant.

RESULTS AND DISCUSSION

Data in Table 1 revealed that use of animal manure is mostly used and aware off by respondent in the study area with 90% followed by inter cropping 80%, organic farming practiced 76% , crop rotation and Drought-resistant crop varieties 70% respectively. Use of crop- livestock integration shows 68%, Soil conservation techniques 60% and Weather forecasting 60%. These are level of awareness in the study area. The result shows the respondents are fully aware of climate smart agricultural practices in the area.

Table 1. Level of awareness of climate smart agriculture in the study area.

S/N	Level of awareness (CSA practices)	Frequency	%
1.	Drought-resistant crop varieties	35	70
2.	Rainwater harvesting	25	50
3.	Crop rotation	35	70
4.	Intercropping	40	80
5.	Soil conservation techniques	30	60
6.	Organic farming practice	38	76
7.	Irrigation	28	56
8.	Weather forecasting	30	60
9.	Use of animal manure	45	90
10.	Agro forestry	26	52
11.	Soil water conservation	31	62
12	Crop diversification	28	56
13	Crop-livestock integration	34	68

Source: Field survey, 2023. Multiple response**

Table 2 showed that 46% of respondents in the area are male and 54% are female. The majority of the farmers' age range from 31 to 40 years (40%), followed by those from 41 to 50 years (30%), those above 51 years (20%). The mean age of 25.00 implies that the farmers are young. On marital status, 40% of respondents are married while 28% are single. Their level of education showed that 52% attended secondary school, 24% attended primary school, and 16% obtained tertiary education while only 8% attended postgraduate studies. The household size of majority of respondents is 0 to 5 persons (56%), followed by those having 6 to 10 persons (28%) and those having 11 to 15 persons (16%) in their household. The mean household size of 5 implies that the respondents have no large family size. Those that have 6 to 11 years farming experience are 44%, those that are 11 to 15 years are 30% while those above 0-5 years are 16% with mean of 5.5.

Table .2 Demographic characteristics of the respondents in Ayamelum LGA.

Socioeconomic characteristics	Frequency (n = 50)	Percentage	Mean
Sex			
Male	23	46.00	
Female	27	54.00	
Age			
21-30yrs.	5	10.00	25.00
31-40yrs.	20	40.00	
41-50yrs.	15	30.00	
51 yrs.and above	10	20.00	
Marital status			
Single	14	28.00	
Married	20	40.00	
Divorced	6	12.00	
Widow/widower	10	20.00	
Level of education			
Primary	12	24.00	
Secondary	26	52.00	
Tertiary	8	16.00	
PGD	4	8.00	
Farming experience (yrs.)			
0-5	8	16.00	5.50
6-10	15	30.00	
11-15	22	44.00	
16 andabove	5	10.00	
Household size			
0-5	28	56.00	5
6-10	14	28.00	
11-15	8	16.00	

Source: Field Survey, 2023

Constraints faced by farmers in the study area.

Most constraints faced by farmers in Ayamelum L.G.A are shown in Table 3. A number of variables identified to be highly used by the respondents are ranked from the greatest to the least. Those with are Limited access to information ($\bar{X}$ = 4.90), Financial constraint ($\bar{X}$ = 4.72), Lack of infrastructure ($\bar{X}$ = 4.65), Limited access to credit ($\bar{X}$ = 4.37), Sticking traditional practices ($\bar{X}$ = 4.31) and the least Others ($\bar{X}$ = 1.80).

Table 3 constraints faced by potatoes farmers in Ayamelum L.G.A

S/N	Constraint	SD	A	D	SD	$\bar{X}$	Std.	Rank
1	Limited access to information	25.00	10.00	5.00	10.00	4.90	2.887	1st
2	Financial constraint	35.00	5.00	10.00	5.00	4.72	2.696	2nd
3	Lack of infrastructure	20.00	20.00	1.00	9.00	4.65	2.084	3rd
4	Limited access to credit	40.00	3.00	7.00	0.00	4.37	1.549	4th
5	Sticking traditional practices	31.00	5.00	9.00	5.00	4.31	0.837	5th
6	Pest and disease	20.00	10.00	10.00	20.00	4.26	0.564	6th
7	Market access	23.00	10.00	6.00	11.00	3.56	0.695	7th
8	Social and gender barrier	10.00	23.00	10.00	7.00	2.28	0.586	8th
9	Climate change	0.00	10.00	8.00	32.00	1.97	0.682	9th
10	Others	10.00	10.00	5.00	25.00	1.80	0.231	10th

Source: Field Survey, 2023

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

This chapter summarized the findings of the study. Conclusions and recommendations based on the findings made.

Summary of findings

Major findings of the study show that 46% of respondents in the area are male and 54% are female. The majority of the farmers' age range from 31 to 40 years (40%), followed by those from 41 to 50 years (30%), those above 51 years (20%). Animal manure is mostly used and aware off by respondent in the study area with 90% followed by inter cropping 80%, organic farming practiced 76% , crop rotation and Drought-resistant crop varieties 70% respectively. Use of crop- livestock integration shows 68%, Soil conservation techniques 60% and Weather forecasting 60% respectively. Result showed the level of awareness of the climate smart practice is high in the study area, and this is as result of the yearly outreach by the fourth year students and technical staff of the department of agricultural economics and extension in Ayamelum L.G.A

Conclusion

They presence of faculty of Agriculture in Ayamelum L.G.A has a significant effects on the populace and the community through the industrial training done by the student in the study area. The climate change awareness and climate smart agricultural practices awareness through the outreach, demonstration farm and rural development have help the potatoes farmers in the study area.

Recommendations

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

1. Addressing the limited access to information could involve creating and promoting effective channels for disseminating agricultural knowledge. This might include workshops, community meetings, or utilizing technology such as mobile apps for easy access to relevant information.

2. The community should have a synergy with the University for Collaboration.

3. Climate smart agricultural should be encourage through incentive by the government. Since financial constraints were identified as a significant challenge, efforts can be made to provide financial support and improve access to credit for farmers. This could involve collaborations with financial institutions, government agencies, or NGOs to create tailored financial solutions for the agricultural community.

4. Considering that a significant percentage attended only secondary or primary school, there is an opportunity for educational and training programs to enhance farmers' knowledge and skills. This could cover aspects such as sustainable farming practices, improved water management, and advanced agricultural techniques.

5. Given the evolving nature of agriculture and climate challenges, continuous research and innovation are crucial. Support for research initiatives and the development of new technologies tailored to the local context could enhance the resilience and productivity of farmers.

REFERENCES

Archie, T., Hayward, C. N., Yoshinobu, S., andLaursen, S. L. (2022). Investigating the linkage between professional development and mathematics instructors' use of teaching practices using the theory of planned behavior. PLOS ONE, 17(4), e0267097

FAO. (2013). Climate-Smart Agriculture Sourcebook. Food and Agriculture Organization of the United Nations. Retrieved from http://www.fao.org/3/a-i3325e.pdf

Food and Agriculture Organization (FAO 2016). Smallholders and family farmers. Retrieved from http://www.fao.org/smallholders/en/

Jat, M. L., Dagar, J. C., Sapkota, T. B., Singh, R. K., Sharma, D. K., andJat, R. K. (2019). Climate-smart agriculture interventions improve farmers' knowledge and decision-making ability: evidence from Indo-Gangetic Plains of India. **Journal of Cleaner Production,* 231, 1328-1337.

Thornton, P. K., and Herrero, M. (2015). "Adapting to climate change in the mixed crop and livestock farming systems in sub-Saharan Africa." *Nature Climate Change, 5(9), 830-836.

Thornton, Philip K., *et al*. (2017). "Climate-smart agriculture in eastern and southern Africa: what difference are we making?" *Outlook on Agriculture, 46*(2), 117-125. DOI: 10.1177/003072701770077.

Van Dijk, M., andEskander, S. (2018). "Risk, attitudes, and adoption of new technologies: Evidence from a field experiment in Bangladesh." *World Development, 104*, 1-18.

Inter-governmental Panel on Climate Change (IPCC) (2019). Contribution of working Group II to the Fourth Assessment Report of the IPCC Summary for Policy.

SE Anarah, CI Ezeano,OOsuafor(2019) Perceived Effects of Climate Variability on Cassava Production among Small Scale Farmers in Anambra State, Nigeria Journal of Agricultural Studies https:// doi.org/10.5296/jas.v7i2.14758 27-43