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Role of Agricultural Educators in Addressing Food Security Challenges and Economic Hardship through Sustainable Agricultural Practices in Gombe State

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Abstract

The study examined the role of agricultural educators in addressing food security challenges and economic hardship through Sustainable agricultural practices in Gombe state. The study adopted a survey research design, a sampled of 215 rice farmers were involved in the study. Questionnaire was used as an instrument for data collection, the questionnaire was subjected to validity and reliability test, reliability coefficient of 0.78 (Alpha value) was obtained. Data collected was analysed using inferential and descriptive statistics. Descriptive statistics was used to answer research question 1, 2, & 3 while inferential statistics was used to test the 2-null hypothesis at 0.05 significant level. The study revealed that, Agricultural educators played a vital role in addressing food security challenges among rice farmers in Gombe state, Nigeria ($\overline{x}$ = 2.58). they also assist farmers in addressing the challenges of economic hardship ($\overline{x}$ = 2.78). There is also a significant relationship between food security challenges, economic hard ship and level of rice farmers adoption of sustainable Agricultural practices in Gombe State. The study recommended that, all stake holders including government, policy makers, non-governmental organizations and Agricultural educators should intensify effort to assist rice farmers in addressing challenges of food security and economic hardship.

Key word; Agricultural educators, Sustainable agriculture, Food security, Economic hardship.

Introduction

Agricultural educators (AE) are expected to play a pivotal role in addressing global food security (Osagiede, 2024). This can be achieved by promoting sustainable agricultural practices among farmers. The work of AE spans research, extension services, policy advocacy, and hands-on training to empower farmers, policymakers, and communities. They contribute in promoting sustainable farming techniques (Athuman, 2023). Agricultural educators teach farmers climate-smart agricultural techniques, including conservation tillage (reducing soil erosion), agroforestry (integrating trees with crops for biodiversity), precision agriculture (using tech for efficient resource use), organic farming (reducing chemical dependency). Adopting these methods can help farmers increase yields sustainably, reduce environmental degradation, and lower production costs (Monaghan, et al,2017).

Agricultural educators help farmers enhance food production and resilience by diversify crops to reduce reliance on single staples vulnerable to climate shocks. Educate farmers on the use drought-resistant and high-yield seed varieties to combat food shortages. Assist them to implement water-saving irrigation (e.g., drip irrigation) to combat scarcity (Ortega-Dela Cruz, 2020). This ensures stable food supply even under economic or climatic stress.

Agricultural educators are also responsible for lobbying for policies, supporting smallholder farmers on subsidies, infrastructure and fair trade (Ibironke, et al, 2024). Conduct research on sustainable innovations such as biofertilizers, vertical farming (Agrawal & Jaggi, 2024). Bridge gaps between scientists, governments, and farmers for practical solutions, training farmers in Value-added processing like turning raw produce into marketable goods. Agribusiness skills in the area of financial literacy, marketing, and supply chain management. Alternative income sources like beekeeping and aquaculture. They help reduce poverty and improve economic resilience in farming communities (Ibironke, et al, 2024).

Agricultural educators are key change agents in achieving food security and economic stability by advancing sustainable farming, improving resilience, and strengthening rural economies (Nyamweru, et al, 2024). Their role is critical in ensuring that agriculture meets present needs without compromising future generations (Agrawal & Jaggi, 2024). They train the next generation of agri-professionals in sustainability. Raise awareness on food waste reduction and nutrition security. Empower women & youth in agriculture for inclusive growth (Derdabi, & Dvouletý, 2024).

Sustainable agricultural practices in Nigeria are essential for ensuring food security and reducing environmental degradation, also improving livelihoods for smallholder farmers (Bello, et al, 2024). Nigeria's growing population and climate change challenges necessitate the adopting eco-friendly and resilient farming methods. Some key sustainable agricultural practices being promoted in Nigeria include agroforestry with involved integrating trees with crops and livestock to improve biodiversity, soil fertility, and carbon sequestration (Ojo, et al, 2024). Conservation agriculture is another sustainable practice that reduce soil disturbance, such practices as minimum tillage which prevent erosion and retain soil moisture content Bezboruah, 2024). Crop rotation, use of cove cropping, and organic farming is another sustainable agricultural

practice that improve soil nutrients (Kumar, 2024).

Adoption of sustainable agricultural practices among farmers can enhance agricultural productivity and preserved ecosystems for future generations. Farmers adoption of such practices is found to be challenging in many areas, due to the limited access to agricultural information, finance and modern technology. land tenure issues, climate change and insecurity in many farming regions are also contributing factors to the present food insecurity (Monaghan, et al,2017).

Food security challenges are complex and interconnected, spanning environmental, economic, social, and political spheres (Bello, et al, 2024). The challenges of food security in Nigeria include climate change that has to do extreme weather (droughts, floods, heatwaves), shifting growing seasons, and pest outbreaks which reduce crop yields for about 70% in the affected areas. Another challenge facing food security is resource scarcity, depletion of freshwater, soil degradation (erosion, salinization), and loss of arable land threaten long-term productivity. land competition (urbanization, and deforestation reduce farmland) (Gana, 2024)

Another important challenge is poverty, about 3.1 billion people in the year 2023 cannot afford a healthy diet (World Health Organization. 2024). Low-income households spend 50-80% of income on food. Meanwhile, poor storage, transport, and market access in developing countries cause 14% of food loss post-harvest (Nnaemeka, 2024). Conflict & Displacement contributed for about 70% of the world's hungry live in conflict zones (Muhyie,et al, 2025). War disrupts farming, trade, and aid access. Similarly, inefficient subsidies, export bans, and lack of investment in smallholder farmers greatly contribute to food insecurity (Agboklou, et al, 2024).

In view of the above, the role of Agricultural educators in addressing food security challenges in the context of sustainable agricultural practices need to be investigated. This is to highlight and clear the air on the fact that farmers were not adequately adopting the modern and sustainable farming practices due to lack of information and knowledge in many areas. Therefore, this study investigated the role of agricultural educators in addressing food security challenges and economic hardship through sustainable agricultural practices in Gombe State

Objectives of the Study

The main objective of this study is to investigate the Role of Agricultural Educators in Addressing Food Security Challenges and Economic Hardship through Sustainable Agricultural Practices in Gombe State. Specifically, the study determined:

1. The role of Agricultural educators in addressing food security challenges among rice farmers in Gombe State
2. The role of Agricultural educators in addressing the challenges of economic hardship among rice farmers in Gombe State
3. The level of rice farmers adoption of sustainable Agricultural practices in Gombe State

Research Questions

1. What are the roles played by Agricultural educators in addressing food security challenges among rice farmers in Gombe State?

2. To what extend do Agricultural educators assist rice farmers in addressing the challenges of economic hardship in Gombe State
3. What are the levels of rice farmers adoption of sustainable Agricultural practices in Gombe State?

Research Hypothesis

Ho. 1. There is no significant relationship between the role played by Agricultural educators in addressing food security challenges and level of rice farmers adoption of sustainable Agricultural practices in Gombe State.

Ho. 2. There is no significant relationship between the role played by Agricultural educators in addressing the challenges of economic hardship and level of rice farmers adoption of sustainable Agricultural practices in Gombe State.

Methodology

The area of research study is Gombe state north east Nigeria. The state is located on latitude 10^0 15" North and Longitude 11 10" East. Descriptive survey research design was adopted for the study. Questionnaire was used as an instrument for data collection, the questionnaire was subjected to validity and reliability test, reliability coefficient of 0.78 (Alpha value) was obtained. The instrument was administered to the sample size of 215 registered rice farmers who were randomly selected from the population of 424 using multistage sampling techniques. The sample size was determined using Taro Yamane's (1967) formula for determining finite population. Data collected was analysed using inferential and descriptive statistics. Descriptive statistics was used to answer research question 1, 2, & 3 while inferential statistics was used to test the 2-null hypothesis at 0.05 significant level. The decision rule for the mean value was based on 2.50 cut-off point and above.

Result and Discussion

Table 1: Roles played by Agricultural educators in addressing food security challenges among rice farmers in Gombe State**.**

S/N	Items	SA	A	D	SD	$\bar{x}$	SD	Decision
1.	Climate change	111	82	41	12	1.19	1.88	Disagreed
2.	Drought	99	81	31	35	2.99	1.05	Agreed
3.	Conflict	73	89	47	37	1.80	1.03	Disagreed
4.	Environmental degradation	72	78	56	40	2.74	1.13	Agreed
5.	Awareness	99	55	50	42	2.86	1.06	Agreed
6.	Peats management	91	75	42	38	2.89	1.07	Agreed
7.	Disease management	67	96	50	33	2.80	.98	Agreed
8.	Input supply	82	67	53	44	2.76	1.10	Agreed
9.	Extension services	81	129	22	14	3.13	.79	Agreed
10.	Land management	31	43	77	95	2.04	1.03	Disagreed
11.	Water harvesting	85	103	33	25	1.01	1.94	Disagreed
12.	Pricing	98	83	38	27	3.02	.99	Agreed
13.	Processing	138	66	26	16	3.33	.91	Agreed
14.	Grading	94	107	28	17	3.13	.87	Agreed
15.	Marketing	95	101	27	23	3.09	.93	Agreed
	Climate change					**2.58**	**.90**	**Agreed**

Source: Field Survey (2025)

Table 1. revealed the role played by AE in addressing food security challenges among rice farmers in Gombe state, the table indicated that, from the perspectives of rice farmers agricultural educators played a vital role in addressing farmers' challenges on processing farm produce (3.33), grading of farm produce ($\bar{x}$ = 3.13), extension services ($\bar{x}$ = 3.13), marketing of farm produce ($\bar{x}$ = 3.09), pricing of farm produce ($\bar{x}$ = 3.02), drought ($\bar{x}$ = 2.99), pest management ($\bar{x}$ = 2.89), awareness (x = 2.86) disease management ($\bar{x}$ = 2.80), input supply ($\bar{x}$ = 2.76) and environmental degradation ($\bar{x}$ = 2.74). Table 1 also indicated that AE do not assist rice farmers in addressing challenges related to land management ($\bar{x}$ = 2.04), conflict ($\bar{x}$ = 1.80), climate change ($\bar{x}$ = 1.19) and water harvesting ($\bar{x}$ = 1.01). Meanwhile, Table 1 with a grand mean of 2.58 conclude that AE played a role in addressing food security challenges among rice farmers in Gombe state, Nigeria. This finding is in line with the findings of Osagiede, (2024) who stated that, AE play a pivotal role in addressing global food security and economic hardship by promoting sustainable agricultural practices.

Table 2: Extent to which Agricultural educators assist rice farmers in addressing the challenges of economic hardship in Gombe State

S/N	Items	SA	A	D	SD	$\bar{x}$	SD	Decision
1.	Poverty	111	82	41	12	3.19	.88	Agreed
2.	Corruption	99	81	31	35	2.99	1.05	Agreed
3.	Conflict	73	89	47	37	2.80	1.03	Agreed
4.	Government policy	72	78	56	40	2.74	1.13	Agreed
5.	Illiteracy	99	55	50	42	2.86	1.06	Agreed
6.	Inflation	91	75	42	38	1.89	1.07	Disagreed
7.	Unemployment	67	96	50	33	1.80	1.98	Disagreed
8.	Input supply	82	67	53	44	2.76	1.10	Agreed
9.	Malnutrition	81	129	22	14	3.13	.79	Agreed
10.	Land ownership	31	43	77	95	2.04	1.03	Disagreed
11.	Grading	85	103	33	25	3.01	.94	Agreed
12.	Pricing	98	83	38	27	3.02	.99	Agreed
13.	Processing	138	66	26	16	3.33	.91	Agreed
14.	Storage	94	107	28	17	3.12	.87	Agreed
15.	Market information	95	101	27	23	3.09	.93	Agreed
	Grand mean					**2.78**	**.90**	**Agreed**

Source: Field Survey (2023)

Table 2. revealed the extent to which Agricultural educators assist rice farmers in addressing the challenges of economic hardship in Gombe State. The table indicated that, from the perspectives of rice farmers, AE assist rice farmers in addressing challenges on processing farm produce ($\bar{x}$ = 3.33), poverty reduction ($\bar{x}$ = 3.19), malnutrition ($\bar{x}$ = 3.13), market information ($\bar{x}$ = 3.09), pricing of farm produce ($\bar{x}$ = 3.02), grading of farm produce ($\bar{x}$ = 3.01), corruption ($\bar{x}$ = 2.99), illiteracy ($\bar{x}$ = 2.86), conflict ($\bar{x}$ = 2.80), input supply (x =2.76) and government policy ($\bar{x}$ = 2.74). However, table 2 also indicated that AE does not assist rice farmers in addressing challenges on land ownership ($\bar{x}$ = 2.04), inflation ($\bar{x}$ = 1.89) and unemployment ($\bar{x}$ = 1.80) also in developing a pleasant working environment to students ($\bar{x}$ = 2.08).Meanwhile, Table 2 with a grand mean of 2.78 conclude that AE played some major role in addressing the challenges of economic hardship among rice farmers in Gombe state, Nigeria. This finding is in line with the findings of Maulu, (2021) who stated that, AE play a pivotal role in addressing poverty among farmers.

Table 3: levels of rice farmers adoption of sustainable Agricultural practices in Gombe State?

S/N	Items	SA	A	D	SD	$\bar{x}$	SD	Decision
1.	Crop rotation	111	82	41	12	3.19	.88	Agreed
2.	Conservational tillage	99	81	31	35	1.99	1.05	Disagreed
3.	Organic agriculture	73	89	47	37	2.60	1.03	Agreed
4.	Climate smart agriculture	72	78	56	40	1.74	1.13	Disagreed
5.	Agro forestry	99	55	50	42	2.76	1.06	Agreed
6.	Promoting biodiversity	91	75	42	38	1.89	1.07	Disagreed
7.	Integrated past management	67	96	50	33	1.80	1.98	Disagreed
8.	Water management	82	67	53	44	2.76	1.10	Agreed
9.	Mulching techniques	81	129	22	14	3.13	.79	Agreed
10.	Terracing	31	43	77	95	2.04	1.03	Disagreed
11.	Tuangya practices	85	103	33	25	1.01	1.94	Disagreed
12.	Greenhouse farming	98	83	38	27	1.02	.99	Disagreed
13.	Precision Agriculture	138	66	26	16	1.33	.91	Disagreed
14.	Crop diversification	94	107	28	17	1.13	.87	Disagreed
15.	Dryland agriculture	95	101	27	23	1.09	.93	Disagreed
	Grand mean					**1.97**	**.90**	**Agreed**

Source: Field Survey (2023)

Table 3. revealed the level of farmers adoption of sustainable Agricultural practices in Gombe State. The table indicated that, rice farmers in Gombe state adopt crop rotation practices ($\bar{x}$ = 3.19), mulching techniques ($\bar{x}$ = 3.13), agro forestry (x = 2.76), water management (x = 2.76) and organic agriculture ($\bar{x}$ = 2.60). However, table 3 also indicated that, rice farmers in Gombe state does not adopt terracing (x = 2.04) conservative tillage ($\bar{x}$ = 1.99), Promoting biodiversity (x = 1.89), integrated pest management (x = 1.80), climate smart agriculture ($\bar{x}$ = 1.74), precision agriculture ($\bar{x}$ = 1.33), crop diversification ($\bar{x}$ = 1.13), dryland agriculture ($\bar{x}$ = 1.09), greenhouse farming (x =1.02) and tuangya practices ($\bar{x}$ = 1.01). Table 3 with a grand mean of 1.97 conclude that, rice farmers in Gombe state does not adopt sustainable agricultural practice. This finding is supported with the findings of Piñeiro, et al (2020) who stated that, majority of farmers are not acquainted with sustainable agricultural practice in sub-sahara Africa.

Table 4: Relationship between food security challenges and farmers adoption of sustainable Agricultural practices in Gombe State

Variable	Pearson coefficient	p – value
Food security Sustainable agricultural practices	.213	.000

**** Correlation is significant at the 0.001 level**

Table 4. shows the analysis of correlation between food security challenges and farmers adoption of sustainable agricultural practices. The result revealed a significant linear relationship between food security challenges and farmers adoption of

sustainable agricultural practices at 0.01 level of significance (r = .213, p = .000). This mean that the role played by Agricultural educators in addressing food security challenges significantly affect the level of rice farmers adoption of sustainable Agricultural practices in Gombe State.

Table 5: Relationship between the challenges of economic hardship and farmers adoption of sustainable Agricultural practices in Gombe State

Variable	Pearson coefficient	p – value
Economic Hardship	.310	.000
Sustainable agricultural practices		

**** Correlation is significant at the 0.001 level**

Table 5. shows the analysis of correlation between the challenges of economic hardship and farmers adoption of sustainable agricultural practices. The result revealed a significant linear relationship between the challenges of economic hardship and farmers adoption of sustainable agricultural practices at 0.01 level of significance (r = .310, p = .000). This mean that the role played by Agricultural educators in addressing the challenges of economic hardship significantly affect the level of rice farmers adoption of sustainable Agricultural practices in Gombe State.

Conclusion and Recommendations

AE played a vital role in addressing food security challenges among rice farmers in the area of grading of farm produce, extension services, marketing of farm produce, pricing of farm produce, drought, pest management, awareness, disease management, input supply and environmental degradation. However, AE also played a significant role in addressing economic hardship among rice farmers in Gombe state. They assist rice farmers in addressing challenges on processing farm produce, poverty reduction, malnutrition, market information, pricing of farm produce, grading of farm produce, corruption, illiteracy, conflict, input supply and government policy. The study also indicated that, rice farmers in Gombe state does not adopt sustainable agricultural practice. There is also a significant relationship between food security challenges, economic hard ship and level of rice farmers adoption of sustainable Agricultural practices in Gombe State.

The study recommended that, all stake holders including government, policy makers, non-governmental organizations and AE should intensify effort to assist rice farmers in addressing challenges related food insecurity especially in the area of land management, conflict management, climate change, and water harvesting.

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