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Influence of Agricultural Education on Famers' Adoption of Sustainable Farming Practices in Gombe Metropolis, Gombe State

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ABSTRACT
The study assessed the "impact of agricultural education on famers adoption of sustainable farming practices in Gombe metropolis, Gombe state" four (4) objectives guided the study. four (4) research questions were answered. The population of the study comprised of all registered maize farmers in the study area with a total of six thousand eight hundred (6800) farmers a sample size of 450 farmers were selected using random sampling technique, A structured Questionnaire was administered to farmers to gather information , mean and standard deviation were used for the analysis. The study showed a grand mean of 1.69 which indicates that agricultural education has low impact on farmers' adoption of crop rotation practice in Gombe metropolis, The study also showed a grand mean of 1.85 on a impact agricultural education on farmers' adoption of cover cropping practices in Gombe metropolis which equally implies low impact among others, based on the findings the study concluded that agricultural education has low impact on famers' adoption of crop rotation practices, conservation of tillage practice and Agro-forestry among others therefore made the following recommendations among others: extension agents should gear efforts towards improving the impact of agricultural education on farmers adoption of crop rotation practices through seminars and workshops, ministry of education should organize a follow up visits to farmers to ensure that they utilize all the acquired knowledge appropriately especially on adoption of conservation of tillage.

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INTRODUCTION

Agricultural Education (AE) is a vocational and professional program prepared to provide a learner with skills in agricultural production such as: crop, livestock, agribusiness, soil science and agro-technology and competencies in teaching, preparing them to become teachers, researchers, and agriculturalist by theory and practice**.** It combines knowledge of science with methods of training to produce graduates who have the ability to teach agricultural science at schools, train farmers, and contribute to national food security and economic development. Agricultural Education is the process of training agricultural sciences integrated with educational pedagogy, aimed at producing skilled manpower for schools, agro-allied industries, and rural development AUDA-NEPAD *(2021).*

Sustainable farming practices in agriculture means producing food and fiber in ways that meet current needs without compromising the ability of future generations to meet theirs. It balances profitability, environmental health, and social equity, ensuring long-term resilience of farming systems Food and Agriculture Organization of the United Nations (FAO, 2014). Crop rotation, Agro forestry, Organic farming, Conservation tillage, integrated pest management and Climate-smart agriculture are

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the component of sustainable agriculture. The principles of sustainable farming practices include Productivity & value addition, Natural resource protection, Maintain soil fertility, conserve water, and preserve biodiversity, Ensure fair income distribution and inclusive growth, Help communities adapt to climate change, pests, and market shocks (USDA,2020).

Sustainable farming is essential for food security, climate resilience, and poverty reduction (World Bank, 2021). Sustainable agriculture balances environmental protection, economic viability, and social equity International Institute for Sustainable Development (IISD, 2013). Sustainable farming practices aim to balance productivity, environmental health, and social equity. According to the FAO (2014), this approach ensures that agriculture meets current needs while safeguarding upcoming generations. Agricultural education increases awareness and knowledge of sustainable practices, but it does not always change what farmers actually produce, based on the above this study intends to assess the influence of agricultural education on famers' adoption of sustainable farming practices in Gombe metropolis in Gombe state.

STATEMENT OF THE PROBLEM

Gombe Metropolis is one of the country's major agricultural hubs. However, it's agricultural sector faces numerous challenges, including: Low productivity; Environmental degradation and Climate change. Farmers in Gombe Metropolis struggle with low yields, poor crop quality, and limited access to markets. Unsustainable farming practices have led to soil erosion, deforestation, water pollution, and loss of biodiversity (Onyeneke, 2021). Similarly, rising temperatures, changing rainfall patterns, and increased frequency of extreme weather events threaten agricultural productivity and sustainability therefore if the above problem is left unattended it will continue to create a serious problem to agricultural production in the study area therefore, there is a need for longitudinal studies to assess the long-term influence of agricultural education programs on adoption of sustainable farming practices in Gombe state.

Purpose of the Study

The main objective of this study was to examine the influence of agricultural education on adoption of sustainable farming practices specifically to determine:

1. The influence of agricultural education on farmers adoption of crop rotation practice
2. The influence of agricultural education on farmers adoption of cover cropping practice
3. The influence of agricultural education on farmers adoption of conservation of tillage practices
4. The influence of agricultural education on farmers adoption of agro-forestry practice

Research question

1. What is the influence of agricultural education on farmers adoption of crop rotation
2. What is the influence of agricultural education on farmers adoption of cover cropping
3. What is the influence of agricultural education on farmers adoption of conservation of tillage practices
4. What is the influence of agricultural education on farmers adoption of agro-forestry

METHODOLOGY

A survey research design was employed for this study, the design was used for descriptive, explanatory and exploratory purpose (Kabir, 2016) therefore the design is considered appropriate for this study because it allows collection of data for the purpose of describing a given phenomenon which is impact of agricultural education on sustainable farming practices in Gombe metropolis, Gombe state.

This study was conducted in Gombe Metropolis, which is located in north east, Nigeria and lies between longitudes 11°14'07"E and 11°4'42"E, and latitudes 10°16'48"N to 10°17'24"N. The area is bounded to the east yamaltu deba L.G. A, kwami to the north, Akko

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L.G.A to the west and south.The area has a total of eleven wards The area is further divided into two zones viz: Gombe north and Gombe south respectively. land mask of 1900 square kilometers.

The population for this study comprised of all registered maize farmers in the study area with a total of six thousand eight hundred farmers furthermore the study considered the whole eleven (11) words in Gombe metropolis as the population of the study. Out of the entire population a sample size of 450 farmers were selected using simple random sampling technique, the sample size was determined using Yamane's formula of determining sample size of finite population.

A structured Questionnaire was administered to farmers to gather information on their farming practices, and level of agricultural education and the influence of agricultural education on sustainable farming practices. The instrument was developed by the researcher titled *influence* of Agricultural education on adoption of sustainable farming practices (IAEASFP). The instrument has Section A, B, C, & D, Section A consist influence of agricultural education on farmers adoption of crop rotation Section B impact of agricultural education on farmers adoption of cover cropping Section C

Section D influence of agricultural education on farmers adoption of agro-forestry, in order to establish the degree of agreement or disagreement in each of the item statements, values were used to establish cut off points, which was used as basis for judgment (decision). true limits of real numbers which is upper and lower limit was used for research question 2, 3 & 4. Thus, when the mean falls from 4.00 - 3.50, it was described as very high influence; when the mean ranges from 3.49 - 2.50, it was described as high influence and when the mean falls from 2.49 -1.50, it was described as low *influence*. Nevertheless, when the mean is less than < 1.50, it is described as as very low *influence* while agree (A) strongly agree(SA) disagree(DA) strongly disagree(SD) for objective 1 respectively.

The instrument was subjected to face validation by three experts from the Department of Vocational Education federal college of education (Technical) Gombe. In order to ensure the internal consistency of the research instrument, the researcher conducted a trial testing of the instrument. Thirty (30) copies of the questionnaires on impact of agricultural education on sustainable farming practices in Gombe metropolis which is outside the study area. The data collected from the pilot test was coded and subjected to split halve method where odd and even numbers on the instrument was analyze using Statistical Package for Social Sciences (SPSS) Cronbach Alpha reliability method was used to determine the internal consistency of the items.

For the researcher to have access to the respondents, an introductory letter was obtained from the office of the Head of Department of Agricultural Education, Federal College of education (Technical) Gombe to various despondence for permission to help in filling the questionnaire. The letter introduced the researcher and the purpose of the study. The letter also solicited for any kind of assistance the researcher may require. The instruments for data collection were administered to the respondents, a period of two weeks were given to the respondents to fill the questionnaire before retrieval to enable them read thoroughly and understand the items on the questionnaire before responding to them, finally the filled instruments were retrieved from the respondents and utilized

On completion of the questionnaire, responses was converted to numerical values and analyzed using mean and standard deviation for research question 1,2, 3 & 4 respectively. in order to establish the degree of agreement or disagreement in each of the item statements, values were used to establish cut off points, which was used as basis for judgment (decision). true limits of real numbers was used for research question 2, 3 & 4. Thus, when the mean falls from 4.00 - 3.50, it was described as very high influence when the mean ranges from 3.49 - 2.50, it was described as high influence and when the mean falls from 2.49 -1.50, it was described as low influence. Nevertheless, when the mean is less than < 1.50, it was described as very low influence

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RESULTS

Research question one

What is the influence of agricultural education on farmers' adoption of crop rotation?

Table 1: Mean of the influence of agricultural Education on Famers Adoption of crop rotation Practice

S/N	ITEMS	4	3	2	1	X	REMARK
1.	I receive training from specialist on Crop rotation practices	3	7	410	30	1.96	LI
2.	I use my experience to practice crop Rotation	300	100	10	40	3.47	HI
3.	I practice crop rotation because is the Most common practice in our community	40	10	30	270	1.42	LI
4.	I practice crop rotation because of the radio Programmes i listens	8	12	300	130	2.6	HI
5.	I adopt crop rotation after my Interactions with friends	250	110	45	4.5	3.25	HI
6.	I started adopting crop rotation after I was taught in school	20	30	40	360	1.35	VL
7.	I engage in crop rotation practice Because of its simplicity over other practice	190	210	20	30	2.87	HI
	Grand mean					1.69	LI

The results presented in Table 1 showed that the mean and standard deviation of the of the influence of agricultural education on farmers' adoption of crop rotation practice, out of the seven questionnaire items presented to the respondents three of the items were accepted as agree whose mean fall within the range of high impact while four of the items were rejected or disagreed and the mean fall within the range of low influence, therefore, the grand mean shown that the impact of agricultural education on sustainable farming practice is very low.

Research Question Two

What is the influence agricultural education on farmers on farmer's adoption of cover cropping?

Table 2: Mean of the influence of Agricultural Education on Adoption of cover cropping? N=450

S/N	ITEMS	4	3	2	1	X	REMARK
1.	I Practice cover cropping system after Attending a training from specialist in Agriculture	2	8	370	70	1.87	LI
2.	I Practice cover cropping after my Interaction with co-famers	307	103	30	10	3.57	VHI
3.	I Practice cover cropping system Because of the tradition of us Community	287	93	50	20	3.44	HI
4.	I Practice cover cropping system as The result of the knowledge i acquire From school I attended	30	20	307	93	1.97	LI

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S/N	ITEMS	4	3	2	1	X	REMARK
5.	I Practice cover cropping system to Improve the fertility of soil	10	30	310	90	1.86	LI
6.	I Practice cover cropping because my Land is not fertile	287	90	23	20	3.10	HI
7.	I Practice cover cropping system to Minimize farm production expenses	215	96	100	39	2.65	HI
	Grand Mean					**1.85**	**LI**

The results presented in Table 2 showed that the mean and standard deviation of the impact of agricultural education on farmers adoption of cover cropping practice, out of the seven items presented to the respondents, three of the items were accepted as agree whose mean fall within the range of high impact, three of the items were rejected or disagreed and the mean fall within the range of very low impact

What is the impact of Agricultural Education on farmers Adoption of conservation of Tillage Practices?

Research Question Three

What is the influence agricultural education on farmer's adoption of conservation of tillage practice?

Table 3: Mean of the influence of Agricultural Education on farmer's adoption of conservation of tillage practice

S/N	ITEM STATEMENTS	4	3	2	1	X	Remark
1.	I practice conservation of tillage because It minimizes soil erosion	9	21	172	248	1.53	DA
2.	I practice conservation of tillage because It improves crop yield	260	85	80	25	2.78	A
3.	conservation of tillage is just a farming practice in our community	230	128	50	42	3.11	A
4.	I practice conservation of tillage because It facilitates plant growth	199	87	100	64	2.93	A
5.	conservation of tillage conserve water	59	191	110	90	2.49	A
6.	I practice conservation of tillage because It improves crop yield and soil fertility	40	62	208	140	2.00	DA
7.	conservation of tillage improves topography of the land	97	210	50	93	2.69	A
	Grand Mean					**1.75**	**DA**

The results presented in table 3 showed that the mean and standard deviation of the impact of agricultural education on famers' adoption of conservation of tillage practices. Out of the seven items presented to the respondents, four of the items were accepted as agree whose mean fall within the range of high impact, three of the items were rejected or disagreed and the mean fall within the range of low impact, the grand mean revealed that the AE has low impact on sustainable farming practice.

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Research Question four What is the impact agricultural education on farmer's adoption of Agro-forestry practice?

Table 4: Mean of the influence of Agricultural Education on farmer's adoption of Agro-forestry practices

S/N	ITEM STATEMENT	4	3	2	1	X	Remark
1.	Agro-forestry facilitate plant growth	50	79	216	105	1.8	DA
2.	Agro-forestry improve soil fertility	60	83	198	109	1.99	DA
3.	Agro-forestry mitigate soil erosion	10	73	179	188	1.77	DA
4.	Agro-forestry makes farming easier	67	176	143	84	2.59	A
5.	I practice Agro-forestry for economic gain	124	256	49	21	3.07	A
6.	I practice Agro-forestry due to shortage Of land to grow each crop separately	99	188	70	93	2.96	A
7.	Agro-forestry minimizes minimize Production expenses	133	199	43	75	2.87	A
	Grand Mean					**1.72**	**DA**

The results presented in Table 1 showed that the mean and standard deviation of the impact of agricultural education on farmers' adoption of agro-forestry practice, out of the seven items presented to the respondents four of the items were accepted as agree whose mean fall within the range of high impact, three of the items were rejected and the mean fall within the range of low impact, the grand mean also indicated that AE has low influence on sustainable farming practice,

CONCLUSION

Based on the findings of this study, it was concluded that agricultural education has low influence on famers' adoption of crop rotation practices in Gombe metropolis, low influence of agricultural education on famers' adoption of cover cropping practice, conservation of tillage and on agro-forestry.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. Extension agents should gear efforts towards improving the impact of agricultural education on farmers' adoption of crop rotation practice through seminars and workshops
2. Farmers should endeavor to consult the ministry of agriculture in order to be updated on the influence of agricultural education for adoption of cover cropping practices
3. Ministry of education should organize a follow up visit to farmers to ensure that they utilize all the acquired knowledge appropriately especially on adoption of conservation of tillage
4. *Farmers should be given training and retraining for adoption of agro-forestry practice*.

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