ASSESSMENT OF ENVIRONMENTALLY FRIENDLY FARMING PRACTICES IN MORO LOCAL GOVERNMENT AREA, KWARA STATE, NIGERIA

O.O. SALAMI, G. K. OLAWEPO, F. O. AGBOOLA*, A. A. WAHAB & F. O. KADIRI
O.O. S., F. O. A. & F. O. K.: Department of Environmental Management and Toxicology, Kwara State University, Malete, Nigeria; G. K. O.: Department of Plant Biology, Plant Ecology and Environmental Botany Unit, University of Ilorin, Nigeria; A. A. W.: Department of Crop Production, Kwara State University, Malete, Nigeria
**Corresponding author's email: agbofavour1998@gmail.com*

ABSTRACT

This study assessed the knowledge and practice of environmentally friendly agricultural practices among farmers in Moro Local Government Area, Kwara State, Nigeria. The research examined the current farming methods, the level of awareness of sustainable practices, and the relationship between farmers characteristics and adoption of eco-friendly agriculture. A multistage purposive and simple random sampling technique was used in selecting the respondents used for the study. A total of 120 farmers were selected from six farming communities. Data were collected through structured questionnaires with a focus on demographics, farming experience, and agricultural practices. It was analysed using descriptive and correlation analysis. Majority of farmers interviewed were males (65%) and aged 39 years or above, with low levels of formal education. Most have significant farming experience, with 60% having over 20 years in agriculture, and 85% are engaged in full-time farming. Manual labour remains predominant, with 95% of farmers using non-mechanized methods. While traditional practices such as crop rotation (75%) and mixed cropping (75%) are common, unsustainable methods like bush burning and chemical control of pests and weeds are still widely used. Chemical fertilizers are heavily relied upon by 80% of farmers, despite 95% of them having heard of organic farming. Higher farmer education levels and larger farm sizes showed the strongest significant correlations ($p < 0.05$) with awareness and adoption of common sustainable practices, while age and gender demonstrated negligible influence. The study concludes that while there is awareness of sustainable practices, the adoption of environmentally friendly methods is low due to factors such as limited education, labour constraints, and the perceived inefficiency of organic farming.

Keywords: Adoption decision, Awareness, Environmentally friendly, Good agricultural practices, Knowledge, Sustainable agriculture.

Introduction

Sustainable agricultural practices are essential for maintaining environmental health, promoting long-term productivity, and ensuring food security. In recent years, there has been growing global recognition of the need for environmentally friendly farming techniques that minimize the negative impacts of agriculture on ecosystems. This shift is particularly crucial in developing countries like Nigeria, where agriculture serves as a major livelihood for rural populations and contributes significantly to the national economy and employment opportunities

GJS is an Open Access Journal and distributed under the terms of Creative Commons (CC) License [CC by 4.0]

(Osabohien *et al*., 2019). The effects of prolonged and over usage of chemicals in crop production has resulted in human health hazard and pollution of environment and groundwater (Alabi *et al*., 2024, Parven *et al*., 2025). In Nigeria, human induced soil degradation is a common phenomenon (James & Ngala, 2015). There should be a balance between environment and farming practices in such a way that farming practices do not harm the integrity of the environment (Rehman *et al*., 2022). Environment-friendly agriculture is mainly aimed to achieve optimum agricultural production without posing any severe problem to our environment (Hussain *et al*., 2024).

Environmentally friendly agricultural practices (EFAP) are a set of farming practices aimed at increasing the provision of agricultural ecosystem services or mitigating critical environmental issues connected to intensive agriculture (Anwar *et al*., 2019). These practices can be directed towards different resources of the farming environment like soil, water, landscape, habitat and biodiversity. Some of these practices include conservation tillage, crop rotation, intercropping, alley cropping, agroforestry, cover cropping, mulching, green manure utilization, compost application, application of formula fertilization, water management, use of solar devices and organic farming (Shanka, 2020).

The need for the usage of environmentally friendly practices among farmers has been of growing concern in Nigeria and worldwide as human activities are fast degrading the soil which may have harmful effect on the flora and fauna (Anabaraonye *et al*., 2018). Environmentally unsustainable farming practices - such as bush burning, excessive application of chemical fertilizers beyond crop requirements, and indiscriminate use of pesticides on agricultural land - can lead to significant ecological degradation. These practices may cause alterations in soil structure following land clearing for cultivation, widespread loss of species and habitats, nutrient and pesticide leaching, soil erosion, and the release of smoke and other pollutants into the atmosphere (Adegbeye *et al*., 2020). These factors are likely to increase the vulnerability of the country to climate change.

Farmers in Moro Local Government Area (LGA) of Kwara State primarily rely on traditional farming methods that are known to result in soil degradation, deforestation, erosion and water pollution. The adoption of environmentally friendly agricultural practices has the potential to address these environmental challenges while improving crop yields and preserving natural resources. However, the extent to which farmers in Moro LGA have adopted sustainable practices remains unclear. Therefore, assessing the level of awareness, knowledge, adoption, and challenges associated with these practices is critical for guiding future policy decisions and supporting sustainable development initiatives. This study aims to evaluate the use of environmentally friendly agricultural practices among farmers in Moro LGA, Kwara State, Nigeria and examine the relationship between farmer socio-demographic characteristics and their awareness/adoption of these practices with a view to provide insights into how sustainable agricultural methods can be promoted to enhance environmental conservation and agricultural productivity in the region.

Experimental

Study area

The study was conducted in Moro Local Government Area, Kwara State, Nigeria, located between latitudes 8°30′ and 8°50′ N and longitudes 4°20′ and 4°35′ E. The area comprises five districts and seventeen major villages and predominantly an agricultural region benefitting from fertile soil and a

favourable climate. Farmers cultivate both food and cash crops, including cassava, yam, maize, beans, groundnut, pepper, and vegetables, all of which are important for local diets and contribute to food security in the region. Additionally, livestock farming, including sheep, goats, and cattle, is widely practiced due to the rich vegetation, which provides ample grazing land. It experiences a tropical savanna climate characterized by distinct wet and dry seasons. The rainy season typically lasts from April to October, with peak rainfall occurring between June and September and the dry season from November to March. This climate is well-suited for both arable farming and livestock production, as the rainy season provides sufficient moisture for crop growth, while the dry season allows for harvests and grazing. However, the variability in rainfall and occasional droughts can pose challenges to farming, particularly for rain-dependent crops.

Data collection

A multistage purposive and random sampling technique was used in selecting the respondents used for the study. The selected communities were Malete, Asomu, Elemere, Igbo Oreku, Okete and Akorede community. These communities were spread across the five districts which were used as clusters for sample collection. From this clusters a simple random sampling technique was then applied, in selecting the villages and subsequently in picking the farmers. In selecting the sample size, 30% of the villages in each district of the five wards in the local government area were purposely selected, bringing a total of 6 villages out of the seventeen. From the villages a total number of 120 farmers were randomly selected for the purpose of questionnaire administration. Data were collected through face-to-face interviews with farmers using a two-page structured questionnaire designed to capture four key variables: awareness, knowledge, and adoption of EFAP, as well as basic socio-demographic and farm characteristics. Awareness was measured through an unaided recall of selected EFAP, while knowledge was assessed using multiple-choice questions on their purpose and application. Adoption was determined by self-reported use, frequency, and land area under each practice in recent seasons. The farmers' consent were obtained prior to data collection. The interviews were conducted by trained enumerators to ensure consistency and data quality. The data collected were analysed using descriptive statistics, including tables and graphical representations. The analysis also employed Pearson's correlation coefficient to examine relationships between farmer characteristics and sustainable agricultural practices with significance set at $p < 0.05$. Statistical analyses were conducted in SPSS v28, with results presented in a correlation matrix.

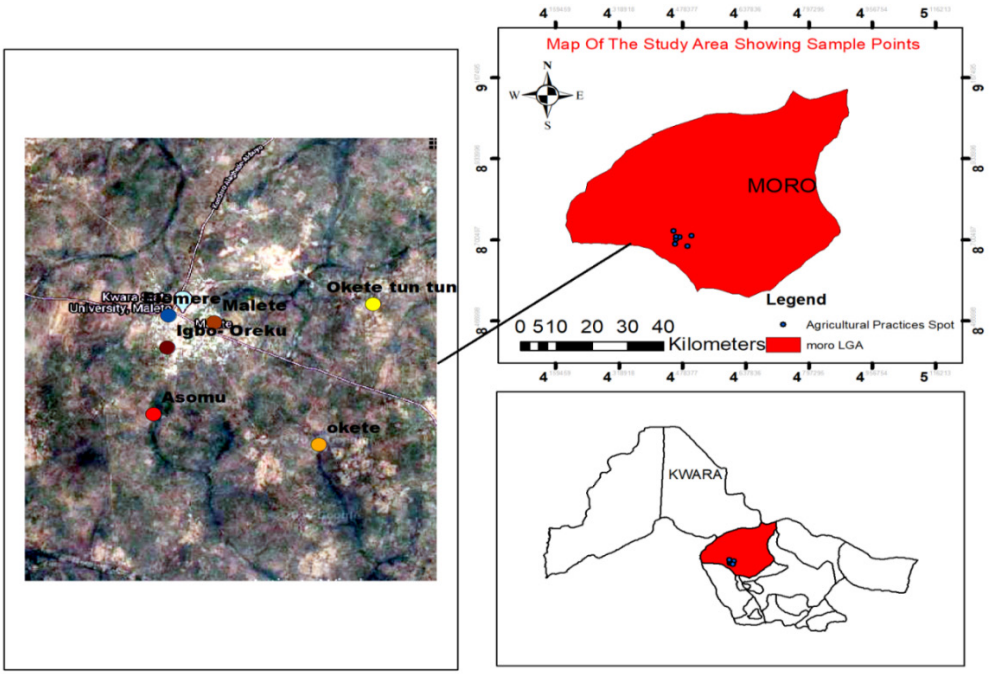

Fig. 1: Study area map (prepared by the authors using Google Earth imagery, 2022).

Results and discussion

Demographics characteristics of the farmers

The demographic characteristics of the farmers in Moro Local Government Area show a predominance of males, accounting for 65% of the respondents, with females making up 35% (Table 1). Most of the farmers (75%) are aged 39 and above, while the younger age groups, particularly those between 18-24 and 25-31 years, represent smaller proportions at 15% and 10%, respectively. The level of education among the farmers is predominantly low, with 65% having less than primary education and 35% having completed primary school, but none had attained higher educational qualifications such as OND, HND, or BSc. In terms of farming experience, 60% of the farmers have been engaged in farming for over 20 years, and 20% have between 10-20 years of experience. Most of the farms are relatively small, with 70% of farmers cultivating less than 1 hectare, and 85% of the respondents are involved in full-time farming. This may be attributed to the fact that the study area is predominantly rural, with vast expanses of land available for farming. The abundance of arable land likely encourages agricultural activity, even with limited access to advanced farming techniques or formal education.

The demographic profile of the farmers in this study is similar to that of Sennuga *et al*., (2020) and highlight some challenges. The limited educational attainment among most farmers may impede their ability to comprehend and implement more advanced, environmentally sustainable farming techniques. This aligns with the findings

of Borkhani & Mohammadi (2019), who observed that 82% of citrus farmers who largely adopted good agricultural practices were literate, suggesting that education may plays a critical role in the adoption of eco-friendly methods. Additionally, the small farm sizes and high percentage of full-time farmers reflect the subsistence nature of farming in the area, where farmers may prioritize immediate productivity over long-term sustainability (Touch *et al*., 2024).

TABLE 1

Demographics characteristics of the farmers

Demographic characteristics	Response	Frequency	Percentage
Gender	Male	78	65
	Female	42	35
Age (years)	18-24	18	15
	25-31	12	10
	32-38	0	0
	Above39	90	75
Education Level	Less primary School	78	65
	Primary Less WAEC	42	35
	OND, HND, NCE, BSc	0	0
Farming experience (years)	1-2	6	5
	2-5	0	0
	5-10	18	15
	10-20	24	20
	Over20	72	60
Largeness of farm (Hectares)	≤ 1	84	70
	1 – 5	18	13
	7	6	5
	10	6	5
	200	6	5
Involvement in Agriculture	Full time	102	85
	Part time	18	15

Adopted farming practices by farmers

The farming practices adopted by the farmers were identified and each of these practices were presented in Table 2. A significant 95% of the farmers use manual labour, with only 5% employing mechanized methods. Mulching and crop rotation are practiced by 35% and 75% of the farmers, respectively. Mixed cropping and shifting cultivation are widely adopted, with 75% and 85% of the respondents engaging in these practices, while 5% still practice bush burning. Chemical methods dominate both weed and pest control, with 95% of farmers using chemical control methods and only 5% adopting biological or organic controls.

TABLE 2

Adopted practices by farmers

Farm Practices	Responses	Frequency	%
Type of labour used on the farm	Manual	114	95
	Mechanised	6	5
Some form of machines used	Yes	18	15
	No	102	85
Agricultural practices engaged in	Mulching	42	35
	Crop rotation	90	75
	Bush Burning	6	5
	Mixed Cropping	90	75
	Mixed Farming	18	15
	Shifting Cultivation	102	85
	Bush Fallowing	36	30
Methods of weed control	Preventive control	0	0
	Cultural method	6	5
	Mechanical method	0	0
	Biological method	0	0
	Chemical method	114	95
Methods of Pest/Disease control	Biological/Organic control	6	5
	Integrated Pest Management Method	0	0
	Chemical control method	114	95

Adesida *et al*., (2021) reported that older and experienced farmers were more likely to practice traditional methods of farming such as using manual labour, mixed cropping and shifting cultivation due to their level of education, poor awareness and reluctance to embrace technology. This assertion agrees with our finding since most of the farmers are of the opinion that soil rejuvenates itself especially after lying fallow for some time. They equally noted that large land mass in relation to population density in the areas encourages this practice.

Knowledge and practice of soil fertility management and organic farming

The order of preference for soil conservation methods among farmers is presented in Table 3. Crop rotation is viewed as the best practice for preserving soil, with 50% of respondents endorsing it, followed by mulching at 35%. However, the use of chemical fertilizers is prevalent, with 80% of the farmers relying on them, while only 20% use organic fertilizers like livestock manure. Notably, 95% of respondents had heard of organic farming, and 80% believed it could prevent soil degradation. Again, despite their awareness of organic farming, all the respondent (100%) perceived it as requiring more time than using chemical alternatives. However, the practice of some environmentally friendly agriculture, though recognized by some farmers, is still limited, with only 30% of respondents actively engaging in such practices, while 70% do not (Figure 2).

The results of this study indicate that farming is largely characterized by traditional practices,

with limited adoption of environmentally friendly methods. Similar results were reported in other studies (Odefadehan, 2017; Sennuga *et al*., 2020; & Fasina *et al*., 2024). Cost of production, increased labour and lack of adequate knowledge and training ranked highest in the report of Fasina *et al*., (2024) on why farmers do not embrace good agricultural practices. Although most farmers in the study (95%) are aware of organic farming and are equally aware that the practice is cheaper since it involves materials from natural origin and recognize its benefits for soil conservation, the perception that it is time-consuming poses a significant barrier to its widespread adoption. This suggests that interventions promoting environmentally friendly practices especially by extension agents must also address issues of labour efficiency and provide practical, time-saving solutions and not just productivity and profitability (Adesida *et al*., 2021, Olatinwo *et al*., 2024). Odefadehan (2017) reported that farmers expressed willingness to adopt alternative farming practices beyond traditional methods, provided that agricultural extension agents offered regular training.

TABLE 3

Preference of soil conservation practice

Questions	Responses	Frequency	Percentage
Best practice good for soil	Crop rotation	60	50
	Mulching	36	35
	Mixed Farming	24	20
	Bush Fallowing	18	15
	Mixed Cropping	12	10
	Bush Burning	6	5
Methods of Preserving Soil Fertility	Fertilization	60	50
	Crop rotation	24	20
	Tillage	18	15
	Intercropping	6	5
	Shifting cultivation	6	5
	Bush fallowing	6	5
Ever heard of Organic Farming	Yes	114	95
	No	6	5
Types of Fertilizers Applied	Organic fertilizers	24	20
	Chemical fertilizers	96	80
Type of Organic fertilizers applied	Livestock manure	18	15
	Poultry manure	6	5
	Green manure	0	0
Do you think organic farming prevent soil degradation?	Yes	96	80
	No	24	20
Is organic farming time saving or time consuming?	Time saving	0	0
	Time consuming	120	100

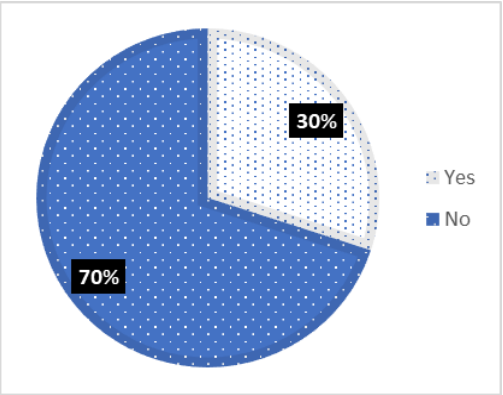

Fig. 2: Adoption and implementation of environmentally friendly agricultural practices

The farmers cultivate a variety of crops, such as cassava, maize, sweet potatoes, yams, guinea corn, tomatoes, beans, soybeans, groundnut and various vegetables (Figure 3). The diversity of crops cultivated in Kwara State reflects the agroecological suitability of the region and the adaptive strategies employed by smallholder farmers in response to market demands (Adeniyi & Abubakar, 2020). Cassava and yam dominate as staple crops under the prevailing semi-arid conditions, while the integration of legumes and vegetables indicates the use of crop rotation practices aimed at maintaining soil fertility, an essential strategy for managing nutrient-depleted soils characteristic of this part of West Africa (Oku *et al*., 2021). Nevertheless, dependence on rain-fed agriculture exposes farmers to climate-related risks, including the increasingly erratic rainfall patterns reported in recent years (Aderinoye-Abdulwahab & Abdulbaki, 2020).

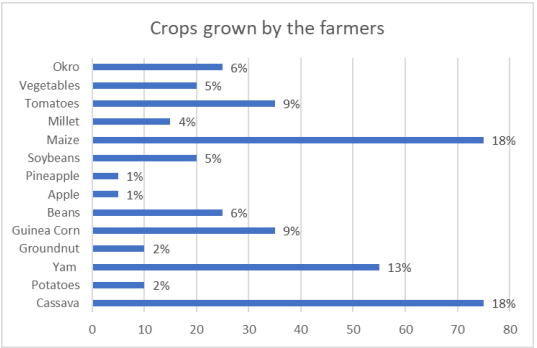

Fig. 3: Crops grown by the farmers

Influence of farmers' characteristics on awareness and adoption

From Table 4, it was found that education level shows the strongest positive correlation with awareness of organic farming and adoption of organic fertilizers at 5% of significance indicating a better understanding of sustainable farming techniques among the moderately educated farmers. Farm size also has a moderate positive correlation with awareness of good soil health practices and awareness of organic farming at 5% level of significance. Relatively larger farms are more likely to use crop rotation ($r = 0.37$), likely due to increased resources and scale that allow for experimentation. Years of farming experience is moderately correlated with awareness of good soil health practices, awareness of organic farming, adoption of organic fertilizers and use of crop rotation. Age has a small but positive correlation with awareness of organic farming and good soil health practices, indicating that older farmers may be more familiar with these concepts, though it does not significantly affect the adoption of organic methods.

Gender shows weak correlations across all variables, with the strongest being with use of bush burning (r = 0.15). These results indicate that education and farm size are the most influential factors in promoting the awareness and adoption of environmentally friendly agricultural practices, while gender and age play less significant roles. The relatively low correlations between some characteristics and the adoption of chemical fertilizers and pest control methods indicate that despite awareness, easier methods like chemical use remain prevalent. This supports the need for targeted education and training to encourage the shift toward sustainable farming (Mim & Islam, 2023).

TABLE 4

Relationship between selected characteristics of the respondents and awareness/adoption of environmentally friendly practices.

Characteristics	Coefficient of correlation							
	Awareness of Organic Farming	Awareness of Good Practices for Soil Health	Adoption of Traditional Farm Practices	Adoption of Organic Fertilizers	Adoption of Chemical Fertilizers	Adoption of Chemical Weed/Pest Control	Use of Crop Rotation	Use of Bush Burning
Gender	0.12	0.08	-0.05	0.06	0.04	0.10	-0.08	0.15*
Age	0.18*	0.22*	0.16	0.20	-0.05	-0.07	0.14	-0.02
Education Level	0.60**	0.39	-0.12	0.56*	0.15	-0.09	0.52	-0.05
Years of Farming Experience	0.28*	0.30*	0.10	0.26*	-0.08	-0.04	0.20*	0.07
Farm Size (Hectares)	0.44*	0.47*	0.22	0.26	-0.10	-0.05	0.37*	0.03

Conclusion

The results of this study showed that farmers in the study area actively engage in various soil conservation practices, likely due to the numerous benefits these methods offer. However, many farmers still utilize practices that are not environmentally friendly, such as the application of chemical fertilizers, the use of pesticides for weed and pest control, and bush burning. These practices pose significant risks to the environment. To mitigate these impacts, it is essential to provide farmers with training and education on environmentally sustainable practices. Many farmers were unaware of the negative effects their methods have on the environment. Educating them on safer alternatives can help reduce environmental harm and increase food security. Improving access to quality information, educational programs, and training on eco-friendly agricultural practices will be crucial for fostering more sustainable farming in the region and in the nation.

References

ADEGBEYE, M. J., REDDY, P. R. K., OBAISI, A. I., ELGHANDOUR, M. M. M. Y., OYEBAMIJI, K. J., SALEM, A. Z. M. & CAMACHO-DÍAZ, L. M. (2020). Sustainable agriculture options for production, greenhouse gasses and pollution alleviation, and nutrient recycling in emerging and transitional nations-An overview. *Journal of Cleaner Production*, ***242***, 118319.

ADENIYI, A. & ABUBAKAR, I. M. (2020). Impact of Climate Variability on Food Availability in Kwara State, Nigeria. *Osun Geographical Review*, ***3***(1): 22-27.

ADERINOYE-ABDULWAHAB, S. A. & ABDULBAKI, T. A. (2021). Climate change adaptation strategies among cereal farmers in Kwara State, Nigeria. In W. Leal Filho *et al*. (eds.), *African Handbook of Climate Change Adaptation* (pp. 1-14). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-42091-8_228-1

ADESIDA, I. E., NKOMOKI, W., BAVOROVA, M., & MADAKI, M. Y. (2021). Effects of agricultural programmes and land ownership on the adoption of sustainable agricultural practices in Nigeria. *Sustainability*, ***13***(13), 7249.

ALABI, K. O., AFE, A. I., & ADEWUMI, A. O. (2024). Effects of Maize–Cowpea Intercropping Patterns on Yield and Properties of Typic Plinthustalfs Soil In South Guinea Savanna Zone, Nigeria. *Ghana Journal of Science*, ***65***(2), 1-15.

ANABARAONYE, B., OKAFOR, J. C., & HOPE, J. (2018). Educating farmers in rural areas on climate change adaptation for sustainability in Nigeria. *Int. J. Eng. Res*, ***10***, 1391-1398.

ANWAR, A., SARWAR, S., AMIN, W., & ARSHED, N. (2019). Agricultural practices and quality of environment: evidence for global perspective. *Environmental Science and Pollution Research*, ***26***, 15617-15630.

BORKHANI, R. F., & MOHAMMADI, Y. (2019). Perceived outcomes of Good Agricultural Practices (GAPs) technologies adoption in citrus farms of Iran (reflection of environment-friendly technologies). *Environmental Science and Pollution Research*, ***26***, 6829-6838.

FASINA, O. O., TEHINLOJU, O. A., & ADESIDA, I. E. (2024). Use of Good Agricultural Practices among Cassava Farmers in Southwest, Nigeria. *Journal of Agricultural Extension*, ***29***(1), 89-94.

HUSSAIN, A., ELKARMOUT, A. F., MANSOUR, E. Z., AWAIS, M., USMAN, M., AHMAD, H. & AHMAD, T. (2024). An Environment Friendly Practice, the Climate Smart Agriculture Crop Production and Soil Management Systems: A review. *Journal of Sustainable Agricultural and Environmental Sciences*, ***3***(3), 101-124.

JAMES, P. H., & NGALA, A. L. (2015). Farmers' preferences and adoption of soil conservation practices in Zing Local Government Area of Taraba State, Nigeria. *Journal of Biology, Agriculture and Healthcare,* ***5***(11), 55-58.

MIM, M. K., & ISLAM, M. M. (2023). Identification of the Discrepancy between Farmers' Practices and Good Agricultural Practices in Crop Husbandry. New Countryside, **2**(1), 1-15.

ODEFADEHAN, O. O. (2017). Implications of Manual Farming on the Health of Rural Farmers in Ifedore Local Government Area, Ondo State Nigeria. *International Journal of Agriculture and Development Studies*, ***2***(2), 103-112.

OKU, E., DOS PASSOS, A. M. A., QUINTINO, S. S., ODOH, N. C., & OLOWOOKERE, T. B. (2021). Soil fertility status of soils of Sudano-Sahelian and humid forest zones of west Africa and some soil management strategies for smallholder farms. *EQA-International Journal of Environmental Quality*, ***46***, 25-36. DOI: 10.6092/issn.2281-4485/12745

OLATINWO, L. K., YUSUF, O. J., & KOMOLAFE, S. E. (2024). Climate change adaptation practices of smallholder arable crop farmers in Kwara State, Nigeria. *International Journal of Agricultural Technology*, ***20***(1), 231-240.

OSABOHIEN, R., MATTHEW, O., GERSHON, O., OGUNBIYI, T., & NWOSU, E. (2019). Agriculture development, employment generation and poverty reduction in West Africa. *The Open Agriculture Journal*, ***13***(1).

PARVEN, A., MEFTAUL, I. M., VENKATESWARLU, K., & MEGHARAJ, M. (2025). Herbicides in modern sustainable agriculture: environmental fate, ecological implications, and human health concerns. *International Journal of Environmental Science and Technology*, ***22***(2), 1181-1202.

REHMAN, A., FAROOQ, M., LEE, D. J., & SIDDIQUE, K. H. (2022). Sustainable agricultural practices for food security and ecosystem services. *Environmental Science and Pollution Research*, ***29***(56), 84076-84095.

SENNUGA, S. O., BAINES, R. N., CONWAY, J. S., & ANGBA, C. W. (2020). Awareness and adoption of good agricultural practices among smallholder farmers in relation to the adopted villages programme: The case study of Northern Nigeria. *Journal of Biology, Agriculture and Healthcare*, *10*(6), 34-49.

SHANKA, D. (2020). Roles of eco-friendly low input technologies in crop production in sub-Saharan Africa. *Cogent Food & Agriculture*, ***6***(1), 1843882.

TOUCH, V., TAN, D. K., COOK, B. R., LI LIU, D., CROSS, R., TRAN, T. A., ... & COWIE, A. (2024). Smallholder farmers' challenges and opportunities: Implications for agricultural production, environment and food security. *Journal of Environmental Management*, ***370***, 122536.

Received 05 May. 25; revised 21 Aug. 25.