



Adoption of Regenerative Agricultural Practices among Maize-Based Farmers in Kwara State, Nigeria

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Abstract

This study examined the adoption of regenerative agricultural practices (RAPs) among maize based farmers in Kwara State, Nigeria. A multistage sampling procedure was used in collecting data from 158 maize-based farmers using interview schedule. Data were analysed using percentage, mean and multiple regression. The findings revealed that the respondents were aware of RAPs, yet adoption was moderate. Access to loans ($\beta = 3.314$) and higher RAPs knowledge scores ($\beta = 3.055$) significantly increased adoption, while greater years of farming experience ($\beta = -0.093$) reduced it at $p < 0.05$ level. The study conclude that farmers moderately adopt RAPs but insufficient enabling conditions, such as insecurity and limited extension services hindered the uptake in Kwara State. Strengthening credit access, improving extension delivery, and security barriers are essential to accelerate widespread adoption of regenerative practices and enhance sustainable maize production in Kwara State.

Introduction

Regenerative agricultural practices are prospective response to the climate-related problems, aiming to create farming methods that improve soil fertility, maximize biodiversity, and promote ecological balance (Otara et al., 2023). Regenerative agriculture is a comprehensive farming system aimed to restore and enhance soil health and fertility through increased soil biodiversity and water retention. It helps farmers to reduce dependence on agrochemicals for soils fertility and control of pest (Sher et al., 2024). Key practices include cover cropping, no tillage, composting, and agroforestry. These practices aim to create a more sustainable and resilient agricultural system that can support long term food production and environmental health (Sher et al., 2024)

Adequate adoption of regenerative agriculture can lead to numerous benefits for maize based farming. Regenerative agriculture has been proven to improve food security, improve farmer livelihoods, and support sustainable agricultural development (Babaniyi et al., 2024). For instance, regenerative agriculture like crop rotation and cover cropping enables farmers to diversify crops, promote soil organisms essential for soil health, and are important for preventing soil erosion. On the other hand, no tillage and holistic grazing management facilitate soil structure by improving water retention and nutrient cycling (Sher et al., 2024).

Kwara State, known for its maize production, faces several challenges, including soil degradation, declining fertility, erratic rainfall, and increasing vulnerability to change in the climate (Ajibowu et al., 2022). The challenges threaten the sustainability of maize farming and the overall agricultural productivity in the state. While regenerative agricultural practices offer viable solutions to these challenges, the record of adoption rate and roles of socioeconomic factors among maize-based farmers in the state remains limited in literature. This study seeks to examine the level of adoption of regenerative practices, identify the barriers to adoption, and the socio-economic variables influencing farmers' adoption of regenerative practices for maize production.

Methodology

Kwara state where the study was conducted lies between latitudes 7° 45'N and 9° 30'N and longitudes 2° 30'E and 6° 25'E. The population for this study consists of maize-based farmers in Kwara State. Sampling of respondents was done through multistage procedure. Ajelanwa, Ogbondoroko, Ganmo, Sobi, Shao and Malete communities were purposively selected in the first stage. In the second stage, 26 farmers in each community and 27 in two communities where one additional farmer each showed readiness to provide data were randomly selected. A total of 158 sampled farmers were recruited as respondents.

Data were collected using interview schedule. The instrument consist question to assess the adoption of regenerative agriculture and identify the barriers to adoption of regenerative agriculture among selected maize-based farmers. The instrument was subjected to close examination by 8 experts in relevant fields in the Kwara State University to ensure content validity. Respondents rated use of RAPs on a 4-point scale, with scores of 3, 2, 1, and 0 corresponding to "Always Used," "Sometimes Used," "Rarely Used," and "Never Used," respectively. A mean score of 1.5 and above determined the

high usage while scores below 1.5 indicating low usage. Rating of factors hindering adoption of RAPs followed a 4-point scale, with scores of 4, 3, 2, and 1 corresponding to "Very Severe," "Severe," "Slightly Severe," and "Not Severe," respectively. A mean score of 2.5 and above determined the high severity, while scores below 2.5 indicating less severe factors. Test test-retest reliability method was carried out among 10 maize farmers who were not included in the sampling. A Pearson Product Moment Correlation coefficient of 0.82 was obtained to affirm the reliability of the instrument. Data collected were analyzed using regression analysis to assess factors influencing farmers' adoption of regenerative practices for maize production while percentages and mean were employed to present specific objectives.

Results and Discussion

Farmers' Knowledge of Regenerative Agriculture

As presented in Table 1, results show that farmers were highly aware of several regenerative practices including crop rotation (98.1%), organic farming (86.1%), zero/reduced tillage (83.5%), cover cropping (79.7%), agroforestry (70.9%), composting (62.0%), water-conservation techniques (57.6%) and climate-smart agriculture (51.3%). High reported awareness of core practices (crop rotation, organic farming, zero/reduced tillage) suggests that information about many regenerative practices has reached maize farmers in Kwara State. This high knowledge level is expected to create a necessary precondition for adoption, but knowledge alone is not sufficient for adoption. Resources, incentives, training quality and enabling services also play significant roles (Otara et al., 2023).

Table 1: Farmers by knowledge of regenerative agriculture

Regenerative agricultural practices	Yes, I know Percentage
Crop rotation	98.1
Agroforestry	70.9
Zero/reduced tillage	83.5
Organic farming	86.1
Cover cropping	79.7
Composting	62.0
Water conservation technique	57.6
Climate smart agriculture	51.3

Source: Field survey, 2025

Farmers' Usage of Regenerative Agricultural Practices

Result presented in Table 2 reported the usage mean. Finding show that climate-smart agriculture ($\bar{x}=1.76$, 1st), and composting ($\bar{x}=1.61$, 2nd) were widely used regenerative agricultural practices. Farmers' wide implementation of climate-smart agriculture and composting may be attributed to their immediate productivity benefits and compatibility with existing farming systems (Oparaojiaku et al., 2025; Usman, 2024). In contrast, majority of others poorly implemented water conservation ($\bar{x}=1.28$, 3rd), agroforestry ($\bar{x}=1.27$, 4th), zero/reduced tillage ($\bar{x}=0.87$, 5th), cover cropping ($\bar{x}=0.85$, 6th), organic farming ($\bar{x}=0.74$, 7th), and crop rotation ($\bar{x}=0.17$, 8th). This is to show that farmers in the study area are facing some challenges to implement regenerative agricultural practices

despite the high knowledge earlier reported in this study. Study conducted by Gabriel et al., (2023) reported similar finding in North-central Nigeria.

Table 2: Farmers by use of regenerative agricultural practices

Regenerative agricultural practices	Mean	Std. deviation
Climate smart agriculture	1.76	1.186
Composting	1.61	1.188
Water conservation technique	1.28	1.167
Agroforestry	1.27	1.186
Zero/reduced tillage	0.87	0.943
Cover cropping	0.85	0.979
Organic farming	0.74	0.939
Crop rotation	0.17	0.454

Source: Field survey, 2025.

Adoption of Regenerative Agricultural Practices

As shown in Table 3, most of farmers (50.6%) moderately adopted RAPs, an appreciable percentage (44.9%) were low adopters while very few (4.4%) were grouped as high adopters of RAPs. This pattern of adoption from appreciable low adopters to middling adopters and then fewer high adopters of generative agricultural practices, suggest that RAPs adoption tends to be incremental as farmers experiment and scale up practices that prove economically viable. Interestingly, moderate adoption still signals good potential for generative agricultural practices scaling among the farmers because these farmers already use some RAPs and may be receptive to capacity building, credit, or input packages that allow bundling of practices to reach high adoption thresholds. This finding contradicts a similar study that reported very high adoption of RAPs (Amanze et al., 2024).

Table 3: Level of adoption of regenerative agricultural practices

Obtained Usage score	Percentage	Remark
0 – 8	44.9	Low adopters
9 – 16	50.6	Moderate adopters
17 – 24	4.4	High adopters
Total	100	

Possible score range 0 – 24 (8x3)

Factor Hindering the Adoption of Regenerative Agricultural Practices

Results of analysis in Table 4 showed that limited extension services ($\bar{x}=2.59$) was considered a factor. Extension services are important to diffuse knowledge, technical skills, and timely advice on RAPs practices. Thus, more adoption of sustainable practices is likely to be more among farmers with better access to extension supports, because they receive tailored information, demonstrations, and problem-solving support. Conversely, when extension outreach is inadequate as shown in this study, farmers will lack access to up-to-date agronomic knowledge on RAPs. This finding is similar to report by Olabanji and Chitakira (2025).

Insecurity threat and insurgency ($\bar{x}$ =2.56) was considered as a factor. This shows that farmers are risk aversion of consequences of conflict and insecurity who may prioritize short-term survival over investing in new farm practices like RAPs. Studies have previous report that security threats can disrupt agricultural activities by limiting mobility, access to fields, markets, and extension agents' services on farm practices (Olatinwo et al., 2025; Amare et al., 2024).

Another factor is climate variability ($\bar{x}$ =2.50). Climate variability include erratic rainfall, droughts, and temperature extremes. These phenomena are known to directly affect farming decisions (Matthew et al., 2025; Olatinwo et al., 2024). Farmers facing unpredictable weather may be reluctant to adopt RAPs practices whose benefits depend on stable conditions or on RAPs technical knowledge they do not have. Climate risk can also heighten the need for adaptive practices, but without adequate support systems, farmers remain vulnerable (Madaki et al., 2024).

However, lack of technical knowledge ($\bar{x}$ =1.83), poor infrastructure (irrigation system, rural road) ($\bar{x}$ =1.81), limited access to financial support or loans ($\bar{x}$ =1.82), Resistance to change from other farmers ($\bar{x}$ =1.75), contradiction to social norm ($\bar{x}$ =1.68), and inadequate access to education and training ($\bar{x}$ =1.68), and were grouped as not a factor hindering the adoption of regenerative agriculture.

Table 4: Factors hindering the adoption of regenerative agricultural practices

Factors	Mean	Std. deviation
Lack of technical knowledge	1.83	1.179
Poor infrastructure (e.g irrigation system, rural road)	1.81	0.908
Limited access to financial support or loans	1.82	0.89
Limited extension services	2.59	0.99
Climate variability	2.50	0.88
Resistance to change from other farmers	1.75	0.81
Inadequate access to training and education	1.68	0.85
Insecurity threat and insurgency	2.56	0.75
Contradiction to social norm	1.63	0.84

Source: Field survey, 2025. Mean cut-off point = 2.5

Factors Influencing the Adoption of Regenerative Agricultural Practices

Table 5 reveals that access to a loan (β = 3.314) is significantly positive. This strong positive coefficient supports the factor analysis component 1 named as inadequate resources and services and many studies reports that credit access substantially increases the probability and intensity of adopting improved or resource-requiring practices among farmers (Fadeyi et al., 2022). This is because credit relaxes liquidity constraints and allows investments in inputs (Balana & Oyeyemi, 2022), indicating similar tools required for many regenerative agricultural practices among farmers in the study area.

Knowledge score (β = 3.055) of the respondents reveal a strong positive significant. This implies that a higher knowledge score strongly predicts the adoption of RAPs among the farmers. This implies that awareness and knowledge of how to implement RAPs are crucial for uptake. This agrees with several adoption studies indicating knowledge gained

through extension contact drives adoption intensity (Miine et al., 2023; Hörner et al., 2022).

Years of farming experience ($\beta = -0.093$) indicate a significant negative influence. The negative and statistically significant coefficient for farming experience is interesting, though not expected. While some studies report that experience can increase adoption (because experienced farmers have more production knowledge) (Olurinde et al., 2024), other studies find that farmers having more years of experience may be more conservative because of traditional knowledge and less willingness to try new practices (Yeleliere et al., 2023). The negative sign here suggests that greater experience correlates with lower adoption of RAPs, perhaps indicating unchanging habits or risk aversion among highly experienced farmers.

Table 5: Factors influencing adoption of regenerative agricultural practices

Variables	Coefficients(β)	Std. Error
Sex	-0.831	0.834
Age	-0.016	0.039
Marital Status (married)	-0.998	1.146
Years of education	-0.065	0.35
Number of household members	0.155	0.113
Farm Size	-0.006	0.113
Experience in farming (years)	-0.093*	0.03
Access to loan (yes)	3.314*	0.887
Membership of association (yes)	0.344	0.855
Knowledge score	3.055*	0.771
(Constant)	23.731	2.58

Dependent variable: Cumulative adoption score

R-Square = 52.1

* $P \leq 0.05$

Conclusion and Recommendations

The study shows that although maize farmers in Kwara State are aware of agricultural regenerative practices, adoption remains largely moderate. Only farmers with access to credit and strong technical knowledge significantly achieve high adoption. Weak extension services, climate variability and insecurity hinder uptake of RAPs among farmers in Kwara State. Experienced farmers also appear less willing to change established practices.

Scaling regenerative agriculture in Kwara State requires improving credit access, strengthening extension services on RAPs and other climate-smart agricultural practices among farmers with a minimal number of years of farming experience, and addressing security barriers. To do these, there is a need to formulate an agricultural extension policy that combines (i) improved access to tailored finance, (ii) stronger, practical extension and knowledge transfer, and (iii) community-level approaches to address insecurity where it is affecting farmers.

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