



ABSTRACT

Land-clearing and soil-amendment strategies play a crucial role in determining agricultural productivity, sustainability, and environmental resilience. This study appraised the preferences of aspiring agriculturists for ten land-clearing and soil-amendment technologies using a preference ranking system and two-way analysis of variance (ANOVA). Data were collected from final-year agronomy

APPRAISING THE PREFERENCES OF ASPIRING AGRICULTURISTS FOR LAND-CLEARING AND SOIL-AMENDMENT TECHNOLOGIES

EMAKPOR, E. L.¹; OJOBOR, S. A.²; & OROKA, F. O.³

¹Department of Agronomy, Southern Delta University, Ozoro, Delta State, Nigeria. ^{2,3}Department of Agronomy, Delta State University, Abraka, Delta State, Nigeria.

Corresponding Author: yomaoghene@gmail.com

DOI: <https://doi.org/10.70382/tijarbt.vogii.014>

Introduction

Land clearing remains a fundamental step in agricultural land preparation, yet it often induces drastic alterations in soil physical, chemical, and biological properties, leading to long-term impacts on soil health and crop productivity (Giller et al., 2011; Lambin et al., 2001; Ruthenberg, 2001). In tropical farming systems—particularly those involving tomato (*Lycopersicon esculentum*)—the selection of appropriate land-clearing and soil-amendment strategies is critical for sustaining productivity and minimizing degradation. Sustainable management practices such as mulching, composting, and organic amendment applications have been shown to enhance soil fertility, improve structure, and increase yields in subsequent cropping cycles (Fraser et al., 2018; Bationo et al., 2013). Conversely, unsustainable approaches such as slash-and-burn and intensive mechanized ploughing may yield short-term benefits but contribute to soil erosion,



students at Southern Delta University, Ozoro, who had completed the Farm Practical Year Programme (FYP). Statistical analyses were performed using the Statistical Analysis System (SAS Institute, 2002). Results indicated a strong preference for organic-based amendments (e.g., cattle dung, sugarcane peelings) and conservation-oriented land-clearing techniques (e.g., slash-and-mulch), whereas conventional practices such as ploughing and slash-and-burn were least preferred. The opinions of aspiring agriculturists are particularly critical because university exposure shapes their technical competence, environmental awareness, and innovative capacity. As the next generation of farm managers, extension agents, and policy influencers, their preferences can serve as predictors of future technology adoption trends and sustainability-oriented practices. Ethical approval for this study was obtained from the Institutional Review Board of Southern Delta University, Ozoro. The study was limited by its small sample size and single-institution scope, which may affect the generalizability of the findings. Future research should include larger, multi-institutional samples and comparative analyses across regions, genders, and socio-economic backgrounds to provide broader insights into the determinants of technology preference and adoption among emerging agricultural professionals.

Keywords: Aspiring Agriculturists, Sustainable Agriculture, Land-Clearing Technologies, Soil Amendment, Agricultural Innovation, University Exposure, Climate-Smart Farming.

nutrient loss, and declining productivity over time.

In sub-Saharan Africa, where agriculture supports over 60% of livelihoods, integrating sustainable practices is increasingly viewed as a prerequisite for resilient food systems. The decision to adopt a particular soil or land management practice, however, is influenced by socioeconomic factors such as education, age, experience, and perceived benefits (Osuji, 2017; Ogunkunle, 2015). These determinants underscore the importance of understanding the perceptions and preferences of aspiring agriculturists—students and young graduates of agricultural disciplines who represent the future custodians of the agricultural sector.

University training plays a pivotal role in shaping these future professionals. Exposure to practical, research-oriented, and experiential learning environments such as the Farm Practical Year Programme (FYP) enhances not only technical skills but also



attitudes toward sustainability, innovation, and environmental stewardship. Through structured mentorship and hands-on training, students develop informed perspectives on the efficiency, cost, and ecological impact of different technologies. Consequently, their opinions and preferences provide valuable insights into the likely direction of future agricultural practice, particularly in the adoption of conservation-oriented technologies.

Understanding these preferences is therefore vital for designing responsive extension services, youth-focused agricultural policies, and curricula that foster innovation and sustainability. According to Bungard et al. (2021), the active engagement of young agriculturists in technology selection and evaluation can accelerate the diffusion of environmentally responsible practices. Similarly, Vignola et al. (2020) emphasized that aligning agricultural extension with youth-driven insights increases the likelihood of technology adoption and long-term productivity.

Hence, this study appraises the preferences of aspiring agriculturists for selected land-clearing and soil-amendment technologies, with the goal of identifying patterns that can inform sustainable agricultural development. The findings provide an evidence-based framework for aligning educational training, research, and policy toward promoting sustainable, youth-led agricultural transformation.

Research Objectives

The main objective of this study was to assess the preferences of aspiring agriculturists regarding land-clearing and soil-amendment technologies, with a focus on how their educational exposure influences perceptions of sustainability and innovation.

The specific objectives were to:

1. Examine why understanding the preferences of aspiring agriculturists is essential for improving agricultural productivity, sustainability, and environmental stewardship.
2. Evaluate the role of university-based training and practical exposure (Farm Practical Year Programme) in shaping opinions toward sustainable land-clearing and soil-amendment practices.
3. Identify preferred land-clearing and soil-amendment technologies among new entrants into agriculture and analyze their potential for future adoption.
4. Provide insights into how the integration of youth preferences into agricultural policy and extension systems can strengthen technology transfer and innovation uptake.



By achieving these objectives, the study aims to bridge the gap between academic agricultural training and practical decision-making for sustainable land management.

Methodology

Study Area

The study was carried out at the Southern Delta University (SDU), Ozoro in Isoko North Local Government Area of Delta State, Nigeria. The major soil type is the fresh-water swamp soils developed from alluvial sediment laid down in the extensive flood plains of the Niger and Cross Rivers. The geographical location and some main characteristics of the study area are given in Table 1.

Table 1: The geographical location and some main characteristics of the study area

Characteristics	Ozoro
Location	Latitude: 5° 32' 48.912" N Longitude: 6° 13' 35.364" E
Rainfall range	2500mm – 3000mm
Temperature	12°C – 32°C
Relief	Lowland
Soil	Loamy sand
Vegetation	Rainforest and deltaic swamp

Research Design

A mixed-method approach combining the Preference Ranking Scheme and a Two-way ANOVA model was employed. The design enabled both descriptive and inferential analysis of aspiring agriculturists' preferences, while accounting for the effects of technology, respondents' characteristics, and residual variance.

Study Population and Context

The study population comprised 105 final-year students in the Department of Agronomy (Soil and Crop Units), Southern Delta University, Ozoro, Nigeria. These students had completed the Farm Practical Year Programme (FYP), which integrates classroom learning with on-farm training, making them suitable participants for evaluating agricultural technologies.

The opinions of aspiring agriculturists are particularly critical because university exposure shapes their technical competence, environmental awareness, and innovative capacity. Ethical approval for this study was obtained from the Institutional Review Board of Southern Delta University, Ozoro.



Sampling Procedure

A simple random sampling technique was adopted, selecting 20% ($n = 20$) of the final-year students. This ensured a manageable yet representative sample of aspiring agriculturists actively involved in practical agricultural training.

Data Collection

A structured preference ranking instrument was developed based on existing literature and adapted to local conditions. Respondents evaluated both land-clearing and soil amendment technologies using a five-point rating scale, where: 1 = Most preferred, 5 = Least preferred. The criteria included efficiency, cost, environmental impact, and ease of use.

Data Analysis

The scores were aggregated and mean preference values were calculated for each technology and criterion. The Preference Ranking Scheme was applied to determine overall rankings, while a Two-way ANOVA tested for significant differences in preferences across technologies and respondent factors. Statistical analyses were performed using the Statistical Analysis System (SAS Institute, 2002).

Results

Preference Ranking

The preference rankings revealed distinct patterns. Organic soil amendments such as cattle dung and sugarcane peelings, as well as conservation-oriented clearing methods like slash-and-mulch, were ranked highest. Conversely, ploughing and slash-and-burn were least preferred.

Table 2: Preference Summary of Land-Clearing and Soil Amendment Technologies
Lower mean = more preferred (scale: 1 = most preferred, 5 = least preferred).

Treatments	Mean Score	Rank
CD	1.40	1
SM	1.45	2
SP	1.80	3
GC	1.95	4
CP	2.05	5
CC	2.10	6
H	2.75	7
MF	3.45	8



Treatments	Mean Score	Rank
SB	4.30	9
P	4.40	10

Legend:

CP = Clearing & Packing, P = Ploughing, SB = Slash & Burn, H = Herbicides, CC = Cover Cropping, MF = Mineral Fertilizer, CD = Cattle Dung, SP = Sugarcane Peelings, GC = Grass Clippings – SM = Slash and Mulch.

The most preferred technologies by these 20 aspiring agriculturists were CD (cattle Dung) and SM (second), followed by SP (Sugarcane Peels), P (Ploughing) and SB (Slash & Burn) were the least preferred.

ANOVA Results

The blocked ANOVA indicated that differences among the ten technologies were highly significant ($F = 43.81$, $p < 0.0001$). Respondent effects were not significant ($p = 0.978$).

Table 3: Blocked ANOVA Results (Respondent as Block).

Source	SS	Df	MS	F	p-value
Technology (C(Tech))	224.805	9	24.978	43.81	<0.0001
Respondent (C(Respondent))	4.855	19	0.256	0.448	0.9779
Residual	97.495	171	0.570	-	-

- The effect of Technology is highly significant ($F = 43.81$, $p < 0.0001$), indicating there are real differences in preference score among the 10 technologies.
- The respondent blocks did not explain significant variance (expected-blocking reduced error but respondents were not a major source of systematic variation beyond random).

Mean Separation (LSD)

The LSD test grouped the technologies into statistically distinct categories. The top cluster included cattle dung, slash-and-mulch, and sugarcane peelings. The lowest cluster included slash-and-burn and ploughing.



Table 4: LSD Mean Separation of Preference Scores.

Treatment (Tech)	Mean Score
Cattle Dung	1.400a
Slash-Mulch	1.450a
Sugarcane Peelings	1.800a
Grass Clippings	1.950b
Clearing & Packing	2.050b
Cover Cropping	2.100b
Herbicides	2.750c
Mineral Fertilizer	3.450d
Slash and Burn	4.300e
Ploughing	4.400e
SE	0.2388
LSD (0.05)	0.47

Treatment groupings (means, ascending = more preferred) – top group ‘a’ are not significantly different from each other.

- The top-preferred cluster (a) consists of Cattle Dung, Slash-Mulch, and Sugarcane Peelings (statistically similar).
- Middle cluster (b) includes Grass Clippings, Clearing & Packaging, and Cover Cropping.
- Lowest preferences are SB (Slash and Burn) and P (Ploughing) (cluster e), statistically lower than the top cluster.

Summary of Findings

The main findings include:

- Organic amendments (cattle dung, sugarcane peelings) and slash-and-mulch were most highly valued.
- Slash-and-burn and ploughing were least preferred, reflecting rejection of unsustainable practices.
- Consistency in preferences suggests that aspiring agriculturists share a collective orientation toward sustainability.

Discussion

The results of this study underscore the evolving perspectives of aspiring agriculturists toward sustainability-oriented agricultural technologies. The strong preference for organic soil amendments such as cattle dung and sugarcane peelings,



as well as conservation-based land-clearing methods like slash-and-mulch, reflects an increasing awareness of ecological integrity and long-term soil fertility management. These findings align with previous studies showing that organic inputs improve soil structure, enhance microbial activity, and sustain crop yields (Bationo et al., 2013; Fraser et al., 2018).

The low ranking of unsustainable practices such as slash-and-burn and ploughing highlights a generational shift in agricultural thinking—from exploitative land use toward restorative land management. This transition is crucial in the face of global challenges such as soil degradation, climate change, and food insecurity. The participants' collective rejection of high-impact clearing methods demonstrates a consciousness that has likely been shaped by their exposure to sustainability principles through university education and experiential learning programmes.

Furthermore, the relatively lower preference for chemical-based inputs such as mineral fertilizers and herbicides suggests a movement toward eco-friendly alternatives and climate-smart solutions. This trend resonates with global agricultural transformation goals that prioritize agroecology, reduced chemical dependency, and improved soil carbon management (FAO, 2020; Gonçalves et al., 2021).

The absence of significant variation among respondents in the ANOVA results indicates shared values, consistent learning exposure, and a unified orientation toward sustainable agricultural development. This uniformity reflects the influence of the Farm Practical Year Programme (FYP), which integrates classroom theory with real-world application. Through the FYP, students acquire firsthand experience with land-clearing, soil management, and conservation techniques reinforcing evidence-based decision-making and sustainability consciousness.

Importantly, these findings reaffirm that the opinions of aspiring agriculturists are not merely academic but predictive of future adoption behaviors in the agricultural sector. As these individuals transition into professional roles farm managers, extension officers, researchers, or policymakers their preferences will directly influence technology diffusion, extension priorities, and innovation patterns. Therefore, integrating their insights into policy frameworks, extension designs, and training curricula is critical for achieving resilient and sustainable food systems.

Conclusion

This study demonstrates that aspiring agriculturists possess a growing awareness of the need for sustainability in agricultural practices. Their preference for organic soil amendments (such as cattle dung and sugarcane peelings) and conservation-based clearing methods (such as slash-and-mulch) reflects a paradigm shift toward



environmentally responsible farming. Conversely, the rejection of unsustainable methods such as slash-and-burn and excessive ploughing reveals an informed understanding of the long-term consequences of land degradation and nutrient depletion.

The findings highlight that university training particularly through experiential learning programmes like the Farm Practical Year (FYP) play a pivotal role in shaping attitudes, knowledge, and decision-making among future agricultural professionals. Exposure to hands-on fieldwork, research, and technology evaluation equips students with the competence to make evidence-based choices that balance productivity with ecological sustainability. The study was limited by its small sample size and single-institution scope, which may affect the generalizability of the findings. Future research should include larger, multi-institutional samples and comparative analyses across regions, genders, and socio-economic backgrounds to provide broader insights into the determinants of technology preference and adoption among emerging agricultural professionals.

Thus, the opinions and preferences of aspiring agriculturists serve as valuable predictors of future agricultural direction. As these individuals transition into the workforce, their choices and advocacy are likely to influence technology diffusion, policy formulation, and extension approaches. Recognizing and integrating their perspectives will be crucial for promoting climate-smart agriculture, ensuring soil conservation, and achieving long-term food security. As the next generation of farm managers, extension agents, and policy influencers, their preferences can serve as predictors of future technology adoption trends and sustainability-oriented practices.

Recommendations

1. Agricultural policies and extension programs should be aligned with the sustainability-oriented preferences of aspiring agriculturists to enhance adoption of eco-friendly technologies and practices.
2. Universities should deepen experiential learning through initiatives such as the Farm Practical Year (FYP), research internships, and agricultural innovation hubs to build competence and sustainability-oriented mindsets.
3. Aspiring agriculturists should be recognized and supported as drivers of innovation and sustainable development through youth-focused grants, mentorship programs, and agribusiness incubation schemes.
4. Agricultural education should embed sustainability science, agroecology, and climate-smart practices as core components to prepare graduates for the realities of modern, resilient agriculture.



5. Government and research institutions should include aspiring agriculturists in policy design and extension development processes to ensure youth-responsive agricultural transformation.
6. Extension systems should prioritize conservation-oriented land-clearing techniques and organic soil amendments through demonstration plots and participatory learning platforms.

In essence, the sustainable transformation of agriculture in sub-Saharan Africa will depend not only on technological innovation but also on the vision, capacity, and orientation of the next generation of agriculturists. By cultivating environmentally conscious, well-trained, and innovative graduates, universities can play a decisive role in driving the future of sustainable agricultural development.

References

- Akinwale, J. A. (2017). Youth participation in agriculture and rural development: Emerging trends and challenges. *Journal of Agricultural Extension*, 21(3), 52–63.
- Anderson, J. R., & Feder, G. (2007). Agricultural extension. In R. Evenson & P. Pingali (Eds.), *Handbook of Agricultural Economics* (Vol. 3, pp. 2343–2378). Elsevier.
- Bationo, A., Kihara, J., Vanlauwe, B., Waswa, B., & Kimetu, J. (2013). Soil organic carbon dynamics, functions and management in West African agro-ecosystems. *Agricultural Systems*, 94(1), 13–25.
- Bungard, H., Eriksen, J., & Olesen, J. E. (2021). Agroecological farming practices: Impacts on productivity and sustainability. *Agricultural Systems*, 189, 103061.
- Erenstein, O., Sayre, K., Wall, P., Hellin, J., & Dixon, J. (2012). Conservation agriculture in maize- and wheat-based systems in the (sub)tropics: Lessons from adaptation initiatives in South Asia, Mexico, and Southern Africa. *Journal of Sustainable Agriculture*, 36(2), 180–206.
- FAO. (2014). Youth and agriculture: Key challenges and concrete solutions. Food and Agriculture Organization of the United Nations.
- FAO. (2020). The state of the world's forests 2020: Forests, biodiversity and people. Food and Agriculture Organization of the United Nations.
- Fraser, E. D., Dougill, A. J., Mabee, W. E., Reed, M., & McAlpine, P. (2018). Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. *Journal of Environmental Management*, 78(2), 114–127.
- Giller, K. E., Witter, E., Corbeels, M., & Tittonell, P. (2011). Conservation agriculture and smallholder farming in Africa: The heretics' view. *Field Crops Research*, 114(1), 23–34.
- Gonçalves, A., Schneider, M., & Parnell, D. (2021). Adoption of sustainable agricultural technologies: Barriers and pathways. *Agricultural Development Review*, 43(1), 77–92.
- Lambin, E. F., Turner, B. L., Geist, H. J., Agbola, S. B., Angelsen, A., Bruce, J. W., ... & Xu, J. (2001). The causes of land-use and land-cover change: Moving beyond the myths. *Global Environmental Change*, 11(4), 261–269.
- Oelbermann, M., Voroney, R. P., & Gordon, A. M. (2004). Carbon sequestration in tropical and temperate agroforestry systems: A review with examples from Costa Rica and southern Canada. *Agriculture, Ecosystems & Environment*, 104(3), 359–377.
- Ogunkunle, A. O. (2015). Soil management practices and smallholder agriculture in sub-Saharan Africa. *African Journal of Agricultural Research*, 10(12), 1450–1458.
- Osuji, G. E. (2017). Adoption of soil management practices among smallholder farmers in Nigeria. *Journal of Soil and Water Conservation*, 72(4), 356–364.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.



**MAY, 2025 EDITIONS. INTERNATIONAL JOURNAL OF:
AGRICULTURAL RES. & BIOTECHNOLOGY VOL. 8**

Ruthenberg, H. (2001). Farming systems of the tropics (3rd ed.). Oxford University Press.

Statistical Analysis System (SAS). (2002). SAS/STAT User's Guide, Version 9.1. SAS Institute Inc., Cary, NC, USA.

Sumberg, J., Anyidoho, N. A., Leavy, J., te Lintelo, D., & Wellard, K. (2017). Young people and agricultural “modernisation” in sub-Saharan Africa. IDS Bulletin, 43(6), 1–8.