International Journal of Sustainable Agricultural Research
2024 Vol. 11, No. 4, pp. 166-178
ISSN(e): 2312-6477
ISSN(p): 2313-0393
DOI: 10.18488/ijsar.v11i4.4010

Analyzing the determinants and challenges for transitioning conventional farmers towards agroecological practices in the centre region of Cameroon

Tiamgne Yanick Alphonse[1+]
Hamamata Hawa Garba[2]
Manu Ibrahim Nformi[3]

[1]*Ministry of Agriculture and Rural Development, Program for Consolidation of the Agricultural Advisory, Centre Region, Cameroon.*
[1]*Email: yanicktiamgne@yahoo.fr*
[2,3]*Department of Agricultural Economy and Rural Sociology, University of Dschang, Dschang, Cameroon.*
[2]*Email: hamamatahawa@gmail.com*
[3]*Email: manu_ibrahim@yahoo.fr*


(+ Corresponding author)

Article History
Received: 14 October 2024
Revised: 21 November 2024
Accepted: 9 December 2024
Published: 19 December 2024

Keywords
Agroecological practices
Agroecological transition
Agroecology
Adoption
Cameroon
Conventional farming.

ABSTRACT

This research examined the socioeconomic and demographic characteristics of the respondents and sheds light on the farmers' perceptions of agroecological practices and their transition. Agroecology is a sustainable development perspective for our rural communities. This study assessed the determinants and challenges for transitioning farmers from conventional agricultural practices to agroecological practices, focusing on farmers in the Centre region of Cameroon. The probability sampling method was employed to establish a representative study sample. By utilizing descriptive statistical analyses, frequencies observed among adopters and non-adopters were compared from the study. Key findings revealed significant socio-economic and demographic disparities between adopters and non-adopters. Gender, education level, farm size, and access to credit were identified as critical determinants of adoption. Men adopted agroecological practices (77%) more than women (23%). Adopters had higher levels of secondary (63%) and tertiary education (26%) compared to non-adopters. In addition, adopters had a large farm size (8.4 ha) compared to non-adopters (5 ha), and a higher percentage of adopters (40%) had access to credit facilities. This study highlighted varied perceptions among respondents, with risk aversion being a significant barrier to adoption. The study identified ignorance, financial constraint, and a lack of technical knowledge as major obstacles to widespread adoption. The study emphasized the substantial knowledge gap between adopters and non-adopters and highlighted the need for targeted interventions to address the challenges facing the widespread adoption of agroecological practices.

Contribution/Originality: Numerous studies on agroecology exist around the world, emphasizing techniques and practices. This study aims to address the determinants and challenges associated with transitioning conventional farmers towards agroecological practices, particularly highlighting the lack of information available for Central Africa, and specifically Cameroon.

1. INTRODUCTION

The global food systems are failing to adequately nourish the world's population (FAO, IFAD, UNICEF, WFP, & WHO, 2020) simultaneously causing severe environmental degradation that poses a threat to life on earth by exceeding local and continental boundaries (Gerten et al., 2020). In low- and middle-income countries, this is coupled with population growth, urbanization, and persistent economic and social inequalities (Jones et al., 2022). Conventional agricultural practices, including intensive tillage, high-dose fertilization, monocropping, and intensive

use of pesticides, have raised significant nutrient losses, greenhouse gas emissions, and biodiversity declines (Mihelič, Pintarič, Eler, & Suhadolc, 2024) resulting in low agricultural yields in most of sub-Saharan Africa and exacerbating climate change (Tankoano & Sawadogo, 2022).

The imperative to transform agricultural and agrifood systems with respect to sustainable development goals can no longer be ignored or postponed (Eyhorn et al., 2019). The current global agricultural landscape is divided between two models, which implicitly suggest a radical shift in thinking and action (SAILD, 2022). The call to transition to sustainable food systems that can provide nutritious, healthy, and affordable food to the growing population while ensuring fair and stable incomes for farmers, restoring the natural environment, and regenerating ecosystem services (Webb et al., 2020).

Agroecology, which involves the application of social and ecological principles for the design and management of sustainable agroecosystems, plays a key role in the global response to achieving sustainable agricultural development (Tittonell et al., 2020). It offers a unique approach to meet the future demand for increased food production while leaving no one behind (Barrios et al., 2020). Agroecology is considered the ecological foundation of agrifood systems and has gained prominence due to its potential to address several negative externalities associated with conventional agriculture (Food and Agricultural Organisation FAO, 2022). However, similar to other sustainable agricultural practices, the implementation of agroecology has been slow (Duru, Therond, & Fares, 2015; Erisman et al., 2016; Pretty & Bharucha, 2014; Runhaar, 2017).

Evidently, Cameroon, like many Sub-Saharan African countries, is currently experiencing declines or stagnation in national food production (Epule & Bryant, 2015). Some studies say this drop is because the soil does not have enough nutrients (Kombiok, Buah, Dzomeku, & Abdulai, 2012) while others say it's because of changes in the global environment, like more people living in cities and more land being used for farming because trees are being cut down, which lowers the amount of organic and nitrogen in the soil that plants need to grow (Epule & Bryant, 2015). With its significant agroecological potential, Cameroon has incorporated agroecological elements into its Development Strategy of the Rural Sector. These elements contribute to the main thematic axes of the strategy and other sector strategies, ensuring comprehensive understanding of the integration of agroecology (Alliance for Food Sovereignty in Africa AFSA, 2020). Despite this, the adoption of agroecology in Cameroon remains limited mostly to individual farms and research scales, with many local farmers yet to fully recognize its merits (SAILD, 2022). Although several works have demonstrated the potential of agroecology as "truly sustainable" (High Level Panel of Experts HLPE, 2019) agroecology has still been to a lesser extent integrated into current agricultural public policy agendas (Migliorini & Wezel, 2017). Farmers need more effective support so that they can improve their knowledge and skills and take advantage of new technologies and markets (Tsafack, Degrande, & Simpson, 2014). Several development methods have been started in response to these limitations, both to help the farms and to integrate them into a context of global and sustainable development (Knox, Hess, Daccache, & Wheeler, 2012).

Given the growing concern about the limited integration and widespread adoption of agroecological approaches within current agricultural system in the Center region of Cameroon, the purpose of this study is to provide a deeper investigation on the determinants and challenges for the successful transition of conventional farmers towards agroecological practices.

2. METHODOLOGY

2.1. Study Area

The present study was conducted in the Centre region of Cameroon. Among the ten divisions of this region, six specific divisions were chosen to form the survey zone. These included "Lékié", "Mefou et Afamba", "Mfoundi", "Nyong et So'o", "Mefou et Akono", and "Mbam et Inoubou". Figure 1 is the map depicting study zones in the Centre region of Cameroon. As illustrated in Figure 1, the Centre region is located between the 10th and 15th

degrees of East latitude and the 3rd and 6th degrees of North longitude. It is located at coordinates 4°45'0" North and 12°0'0" East and covers a continental area of 68,953 km², with a density of 60.3 inhabitants/km².

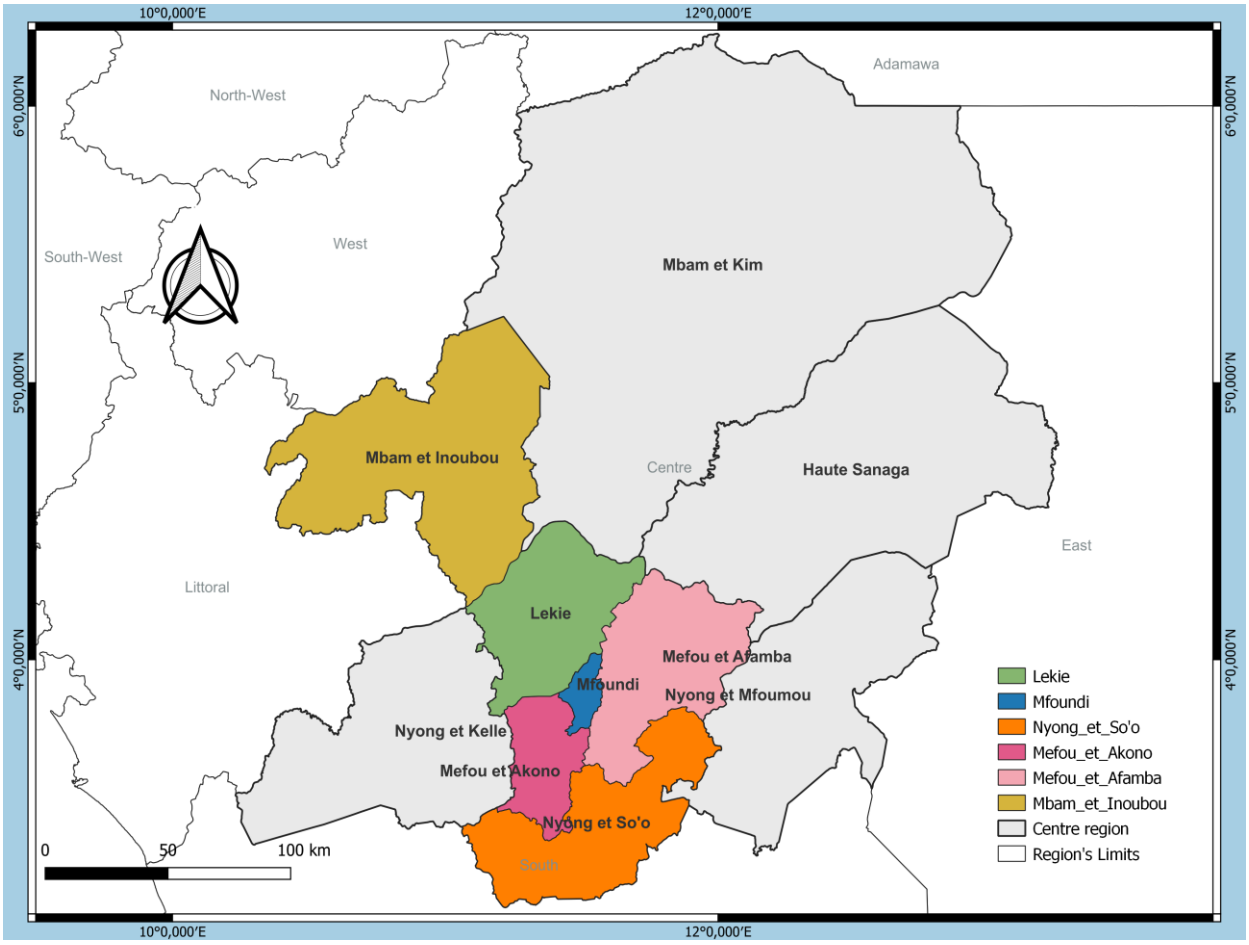

Figure 1. Map showing the 6 divisions involved in the study.

This region is part of the South Cameroonian plateau, a vast crystalline platform with an average altitude of 650 m, belonging to the belt of hilly plateaus that form the western and northern edge of the Congo basin. Precambrian deposits of metamorphic rocks, including gneiss, mica, migmatites, and schists, primarily compose its soil. Granite dominates from about 4° N to the Adamawa border (Institut National De La Statistique INS, 2017).

Regarding vegetation, the climatic conditions of the region reflect the massive large forest that covers a good part of the region; it is rich in forest species and wildlife species, which predispose it to logging, organized hunting, and poaching. Economically, the region's populations derive their income from the following activities: agriculture, livestock, fishing, and pisciculture, logging, trade, crafts, hunting, services, and processing industries (Institut National De La Statistique INS, 2017).

2.2. Sampling Technique

The probability sampling method was employed to establish a representative study sample. The method employed stratified random sampling to select farmer groups, ensuring an accurate representation from each division. The household member carrying out farming activities within the household served as the sampling unit, while the sampling frame comprised farmers involved in any type of agricultural production. According to Harden et al. (2004) the utilization of stratified random sampling offers the advantage of reducing data collection costs for larger population groups by enabling researchers to draw meaningful conclusions from a large sample obtained

from a smaller group. The formation of strata within each division was undertaken to categorize farmers' groups. From these strata, household farmers affiliated with the selected groups were randomly chosen using the simple random sampling method to actively participate in the survey. This approach aimed to ensure that the survey sample adequately represented the diverse range of farmers across the selected divisions in the Centre region.

In accordance with our study design, a minimum of six distinct farmer groups were meticulously chosen for each division. Each group was expected to have at least five (agropastoral family farmer) members. Consequently, our intended sample size aimed to encompass a total of 150 individuals. However, the field survey encountered several challenges that necessitated adjustments to the original plan. The selected farmers' lack of responsiveness posed a significant obstacle. As a result, the final survey sample size was slightly reduced, comprising a total of 126 household farmers as indicated on Table 1. Table 1 presents the sample distribution of the five divisions involved in the study.

Table 1. Sample distribution per division.

Division	Number of survey respondents	Percentage (%)
Mfoundi/Mefou et Afamba	40	31.74
Lekie	27	21.43
Mefou et Akono	23	18.25
Nyong et So'o	18	14.29
Mbam et Inoubou	18	14.29
Total	126	100

2.3. Data Collection, Compilation and Analyses

The Accelerated Participatory Research Method (APRM), which employs techniques like semi-structured interviews, participatory observation, data mining, revealing quotes, and triangulation (Chimi et al., 2022) was used to collect the data. Along with this strategy, observation was important in understanding the farming environment. Semi-structured questionnaires gathered data, capturing both qualitative and quantitative information.

The present study employed descriptive statistical analyses as a method to address objectives. The survey sample was carefully characterized by considering various demographic and economic factors. By using descriptive statistical analyses, frequencies observed among adopters and non-adopters were compared from the study.

Initially, data was collected from survey respondents through manual administration of questionnaires. After collecting data in the field, we assigned a unique identification number to each questionnaire. Subsequently, the raw data was entered into Excel 2013 software to establish a secure database. To facilitate analysis, the data was coded and transferred to Statistical Package for Social Sciences (SPSS) version 23. In these software platforms, the data was categorized based on its nature, distinguishing between qualitative and quantitative data.

Qualitative data underwent processing and analysis through topic coding, involving the creation of categories, themes, and identification of patterns of relationships. On the other hand, quantitative data was entered in its original form as a continuous variable, enabling mathematical analyses.

Additionally, based on our research topic, we categorized the data into two distinct groups: adopters and non-adopters of agroecological practices. For this study, seven agroecological practices were selected, namely composting, crop rotation, organic manuring based on recycling practices, biological fertilization, biological pest and disease control, agroforestry, and crop association.

To classify the sample into these two groups, the absolute threshold method was employed. This approach involved establishing a fixed number of practices that defined an adopter, with the criterion set at utilizing four or more of the selected practices as illustrated in Figure 2. Accordingly, farmers who employed four or more of these practices were categorized as adopters, while those who utilized fewer practices were classified as non-adopters.

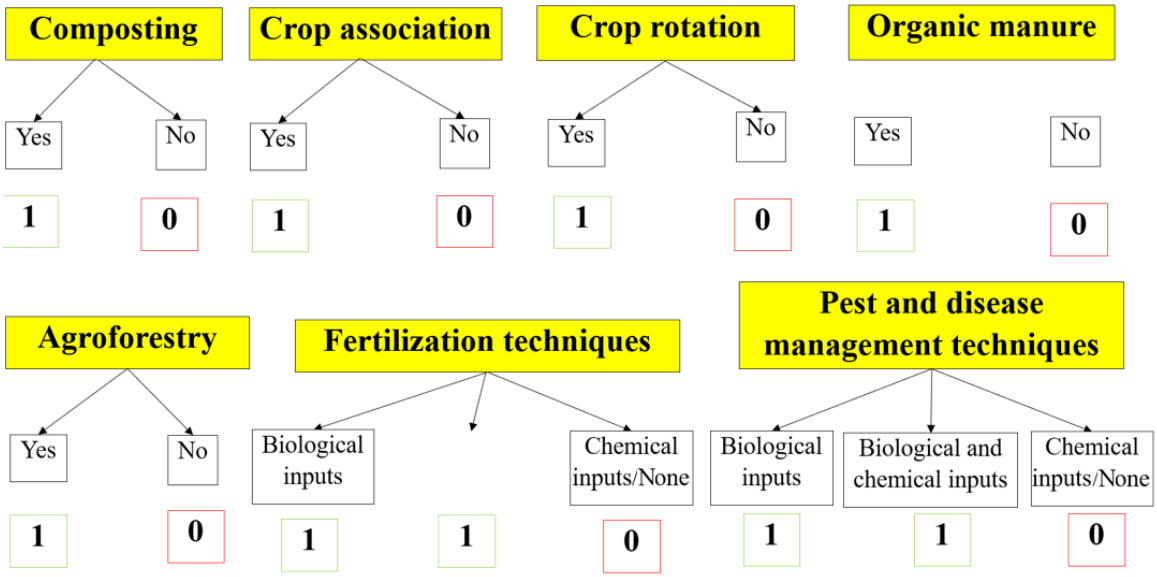

Figure 2. Scoring method for adopter categorization.

3. RESULTS AND DISCUSSION

3.1. Socio-Economic and Demographic Characteristics

The respondents in the two broad categories, adopters and non-adopters, showed significant and non-significant differences in some of the socio-economic and demographic variables. From the overall sample, the scoring method classified 72% as non-adopters of agroecological practices and the other 28% as adopters.

3.1.1. Gender

The survey sample consisted of 33% female respondents and 67% male respondents. As illustrated in Figure 3, male respondents (77%) adopt agroecological practices at a higher rate compared to female respondents (23%).

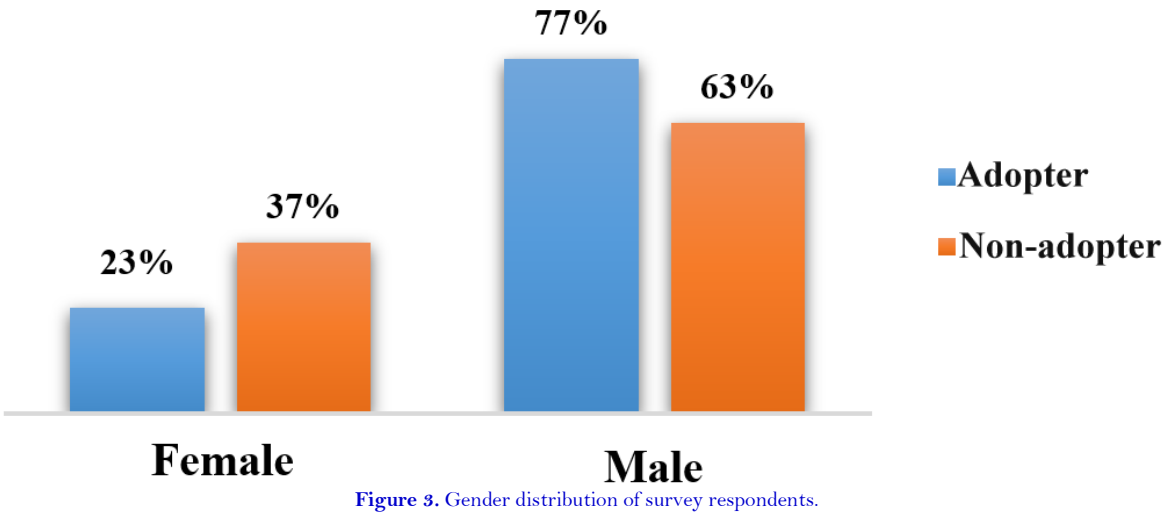

Figure 3. Gender distribution of survey respondents.

This result aligns with previous studies by Epule and Bryant (2016) in the Meme division of Cameroon and Tankoano and Sawadogo (2022) in Burkina Faso, which revealed that men adopted agroecological practices more than women. Other studies suggested that conservation and land management are jobs for a "male" (Gebru, Wang, Kim, & Lee, 2019) for introduced agroforestry practices. The perception that agroecological practices require significant physical labor and energy, attributes more commonly associated with the masculine gender, may account for the gender disparity in adoption rates. Women's lack of interest in this activity could potentially explain this

disparity. This suggests that gender norms may play a role in shaping the differential engagement of men and women in agroecological practices in the study area.

3.1.2. Principal Activity

The present research study focused on agricultural activities. Therefore, the main interest was farmers who practiced any agricultural farming activity. This study observed that some individuals chose agriculture as their primary activity, while other prioritized alternative activities.

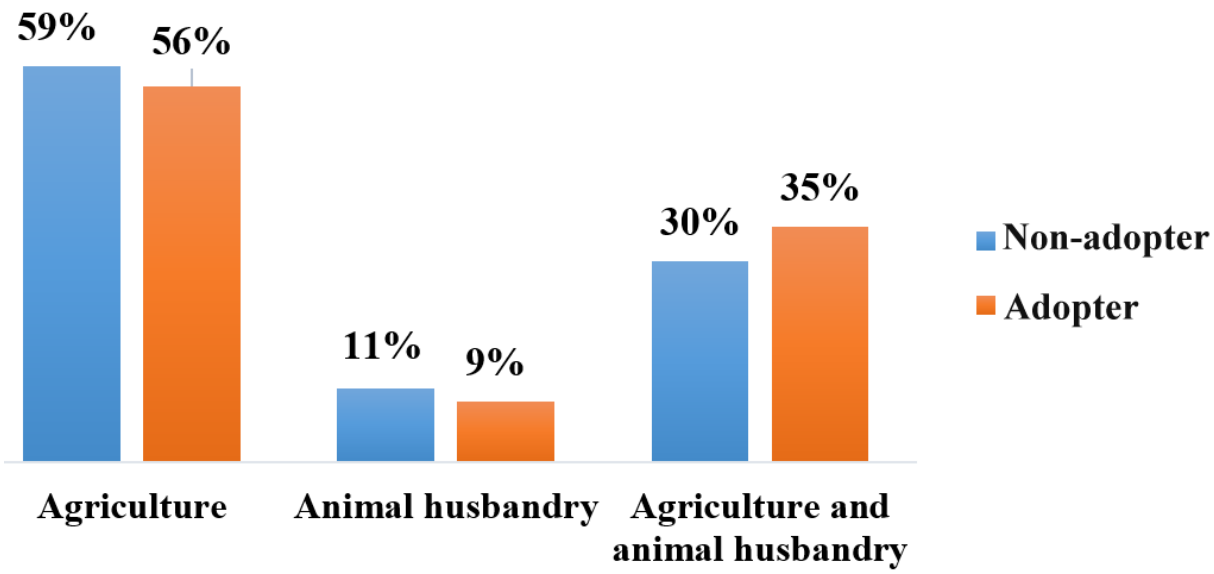

Figure 4. Distribution of respondents according to principal activity.

Results from Figure 4 reveal that a majority of respondents in both the adopter group (56%) and non-adopter group (59%) exclusively practiced agriculture as their farm activity. The prevalence of respondents engaging solely in agriculture highlights the significance of this activity as a primary source of income and livelihood for a considerable proportion of farmers.

Interestingly, a greater proportion of adopters compared to non-adopters (35%) combined agriculture with animal husbandry as their primary activities on their farms. The higher occurrence of adopters combining agriculture with animal husbandry suggests a potential synergy between these activities, possibly leading to improved productivity and income diversification and also facilitating the use of livestock waste as organic manure and compost production in their farms.

This finding is in accordance with a study from Herrero et al. (2010) emphasizing that extensive mixed crop-livestock systems, particularly in developing countries, could significantly contribute to future food security.

3.1.3. Level of Education

Results indicate that educational background is a significant factor in the adoption of agroecological practices with a statistically significant relationship ($p = 0.040$) at 5% level of significance.

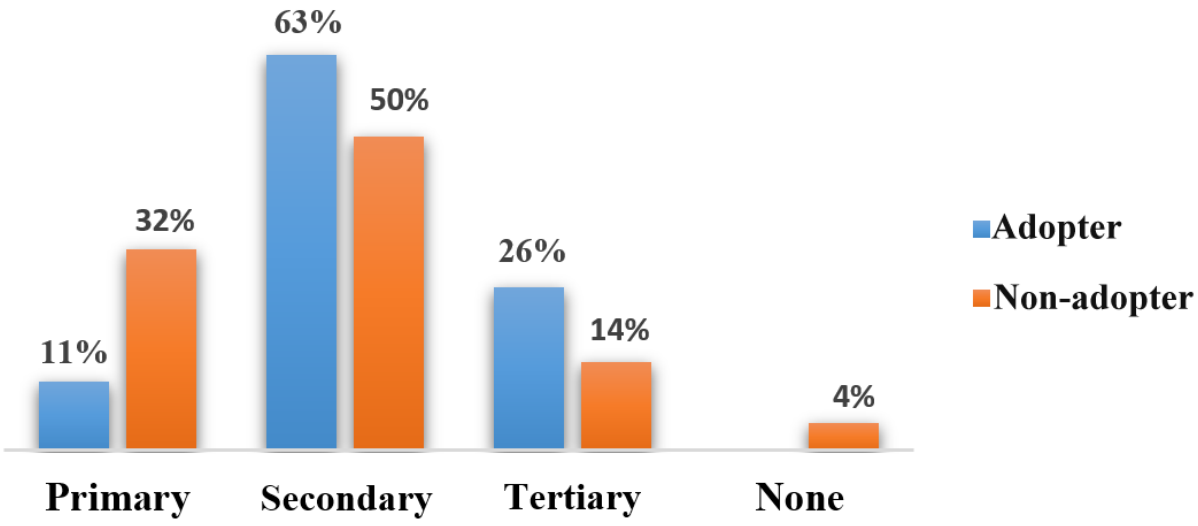

Figure 5. Distribution of respondents according to their level of education.

From Figure 5, among the non-adopter group, a greater proportion only had a secondary (50%) or primary (32%) educational background. Conversely, a larger proportion of adopters (63%) had attained a secondary educational level background, while some (26%) of them had undergone tertiary studies. These results suggest that individuals with higher levels of education are more inclined to adopt agroecological practices. Epule and Bryant (2016) conducted a previous study in the Meme division of Cameroon, where secondary educational level had a higher value for agroecology than the primary educational level.

3.1.4. Marital Status

The marital status of respondents was classified into four categories: single, married, divorced, and widowed. The statistical analysis revealed that the adoption of agroecological practices was independent of marital status ($p = 0.550$, $p>0.01$).

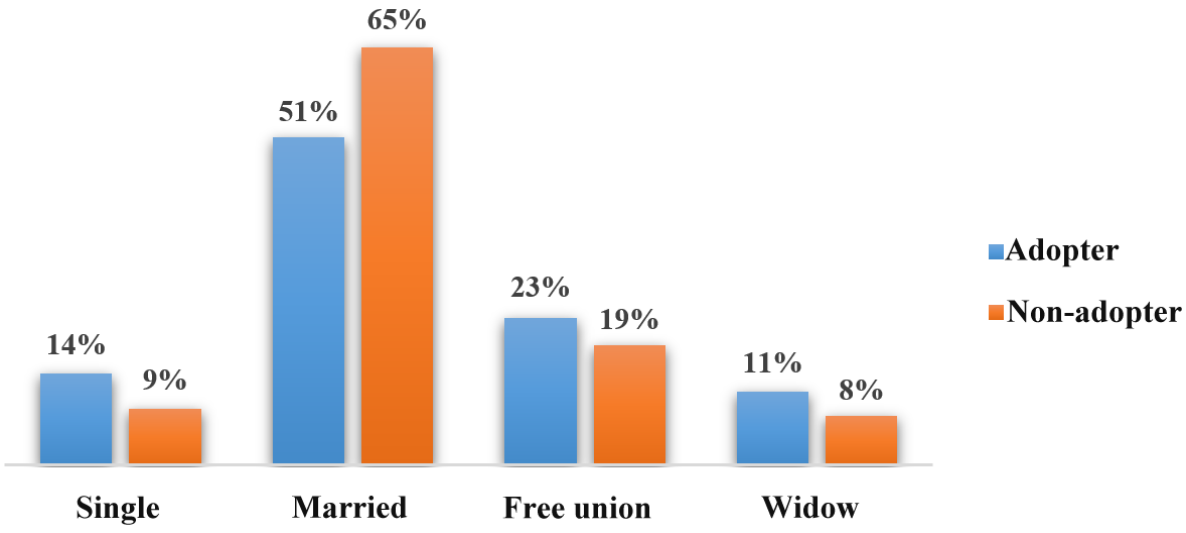

Figure 6. Distribution of respondents according to their marital status.

Results in Figure 6 reveal that majority (64.8%) of non-adopters were married, while some were engaged in informal or legally unrecognized relationships (18.7%). As for the adopters of agroecological practices, majority (51.4%) were married, while some were engaged in informal relationships (22.9%). Interestingly, none of the

respondents reported having a divorce. These results contradict those of Tankoano and Sawadogo (2022) which revealed that marital status significantly influenced the adoption of agroecological practices.

3.1.5 Implication in Non-Farm Activities

The study findings indicate that among the adopter group, 60% were involved in additional non-agricultural activities, while 40% relied solely on agricultural activities for their livelihood. On the other hand, 56% of non-adopters participated in additional activities, while 44% solely engaged in agricultural activities. However, results analyses indicated that there is no statistically significant association between adoption of agroecological practices and involvement in additional non-agricultural activities ($p = 0.688$, $p>0.05$). However, a study by Karanja et al. (2020) pointed out that the existence of income from non-agricultural activities increases the chances of adopting new technologies.

3.1.6. Age

The analysis of age distribution revealed that there was no statistically significant difference in the mean age between adopters and non-adopters ($p = 0.314$, $p>0.05$). However, a noticeable mean age difference was observed between the two groups. Adopters had an average age of 50.74 years, while non-adopters had an average age of 53.29 years, indicating that non-adopters tended to be older than adopters. These results align with previous studies by Brown, Tuan, Nhan, Dung, and Ward (2018) which explain that older farmers are more reluctant to change, less motivated to experiment with new technologies, and less likely to be influenced by the benefits of new technologies. Similarly, Epule and Bryant (2016) suggested that older farmers may prefer to stick to familiar systems due to factors such as reliance on conventional inputs and limited energy for investing in more sustainable farming methods. Läpple and Van Rensburg (2011) showed that early adopters were the youngest to adopt organic farming.

3.1.7. Household Size

The results of the analysis indicated that household size was not a differentiating variable in the adoption of agroecological farming practices. However, the average household size of adopters of agroecological practices was 9.20 members, slightly higher than the average household size of non-adopters (8.53). There is a slight difference between household size of adopter and non-adopter groups but not statistically significant ($p = 0.507$, $p>0.05$). However, previous studies by Mekuria et al. (2022) in Ethiopia suggested that families having more labour force are likely to adopt diverse agroecological practices. In contrast, Bayard, Jolly, and Shannon (2006) argued that the greater the number of family members involved in farming, the lesser the adoption of alley farming in Haiti.

3.1.8. Farm Experience

The research findings unveiled a statistically significant disparity in farming experience between the group of individuals who adopted agroecological practices and those who did not. The participants who embraced agroecological practices demonstrated an average farming experience of 20.12 years, whereas the non-adopters exhibited an average of 25.31 years of experience. The prevalence of older individuals in the sample, who have been involved in agricultural activities since a young age, partially explain this. Epule and Bryant (2016) found their previous study that the more years of farming experience individuals had, the more they utilized both agroecology and conventional techniques.

3.1.9. Farm Size

From Table 2, analysis revealed a remarkable disparity in farm sizes between adopters and non-adopters of agroecological practices. Adopters exhibited a substantially larger average farm size of 8.42 ha, while non-adopters

possessed an average farm size of 5.03 ha. Importantly, this discrepancy in farm size between the two groups exhibited statistical significance at the 10% level (p= 0.077*). This result corroborates with results of a study by Tankoano and Sawadogo (2022) in Burkina Faso where farmers who adopted agroecological practices appeared to exploit a larger surface area on average than non-adopters. These findings imply that adopters, endowed with larger landholdings, enjoy enhanced flexibility and increased prospects for implementing diverse agroecological practices throughout their farms.

Table 2. Average comparison of sociodemographic characteristics of survey respondents.

Variables	Average			P (value)
	Adopter (N=35)	Non-adopter (N=91)	Difference	
Age	50.74	53.29	2.54	0.314
Household size	9.20	8.53	-0.67	0.507
Farm experience	20.12	25.31	5.19	0.085*
Farm size	8.42	5.03	-3.4	0.077*

Note: *= Significant at 10% level of significance

3.1.10. Access to Credit Facilities

Results from Table 3 indicate a significant disparity in access to credit facilities between adopters and non-adopters of diverse Agroecological Practices (AEP).

Table 3. Credit facilities distribution among respondents.

Category	Access to credit facilities	Frequency	Percentage (%)
Non-adopter (N=91)	No	75	82.4
	Yes	16	17.6
Adopter (N=35)	No	21	60.0
	Yes	14	40.0

Among the non-adopter group, a substantial majority (82.4%) lack access to credit facilities, with only a small proportion (17.6%) benefiting from credit facilities through microfinance institutions or village cooperatives.

In contrast, among the adopter group, at least 40% have access to credit facilities while the remaining 60% do not. This finding implies that even within the group of AEP adopters, a considerable proportion still faces challenges in accessing credit facilities. This highlights the importance of addressing the issue of limited credit availability in the study area.

3.2. Evaluating the Farmers' Perception of Agroecological Practices

3.2.1. Awareness of the Term Agroecological Practices

This section seeks to assess the respondents' familiarity and understanding of the concept of agroecological practices. Findings indicate a connection between awareness or knowledge of agroecological practices and the actual adoption of these practices among the studied population. The results show a significant correlation (p=0.002 at 1% level of significance).

Table 4. Respondents' awareness of the term agroecological practices.

Category	Knowledge of the term AEP	Frequency	Percentage (%)
Non-adopter (N=91)	No	64	70.3
	Yes	27	29.7
Adopter (N=35)	No	14	40.0
	Yes	21	60.0

Table 4 reveals that, among the adopters' group, 60% reported having prior knowledge and awareness of the term agroecology and demonstrated an understanding of the practices they were implementing. Conversely, 40% of them were found to be practicing without being familiar with the specific terminology. This implies that a significant proportion is practicing without a formal understanding of the underlying terminology. Glover, Sumberg, Ton, Andersson, and Badstue (2019) described how framing the way that new ideas or practices are presented to farmers also influences their perceptions.

As for non-adopters, 29.7% indicated that they had already heard about agroecological practices, while 70.3% of them had never been exposed to or were unfamiliar with the concept of agroecology. Therefore, a substantial knowledge gap exists among non-adopters, with the majority having no prior exposure to agroecological approaches. This lack of awareness and familiarity with agroecology may be a contributing factor to the non-adoption of these practices.

3.2.2. Perception of Farmers towards AEP Transition

Transition can only be effective if farmers have a positive perception of the use of agroecological practices. Adoption of agroecological practices significantly depended on the farmers' opinion on these practices (p=0.001***) at 1% level of significance. These results corroborate with previous studies from Adesina and Zinnah (1993); Adesina and Baidu-Forson (1995) and Negatua and Parikh (1999).

Table 5. Respondents' perception of agroecological transition.

Category	Perception on AEP transition	Frequency	Percentage (%)
Non-adopter (N=91)	Risk	27	30
	Opportunity	23	25
	Necessity	31	34
	Priority	10	11
Adopter (N=35)	Necessity	19	54
	Opportunity	8	23
	Priority	8	23

According to Table 5, proportionately, all adopters had a positive perception of agroecological practices. 54% of adopters perceived agroecological practices as a necessity. They recognized the inherent value and importance of agroecological approaches for sustaining their agricultural systems, especially improvement of soil fertility and production of high-quality products. 23% perceived it as an opportunity. These farmers viewed the adoption and use of agroecological practice as a means to integrate new competitive markets. The remaining 23% of adopters perceived it as a priority. They prioritized the implementation of agroecological practices as a key strategic objective in their farming activities. In particular, they prioritized they mitigation of climate change through specific practices like agroforestry. A study conducted by Punzano, Rahmani, and Cabello Delgado (2021) showed that farmers had a good level of knowledge about all aspects of agroecological practices.

In contrast, a significant proportion (30%) of non-adopters expressed concerns about the perceived risks associated with the use of agroecological practices. These concerns included potential yield losses, the labor-intensive nature of these practices, financial risks, uncertainties about outcomes, slow harvests, and the absence of a structured market for agroecological products or difficulties in selling them. Mekuria et al. (2022) conducted previous research in Ethiopia, where farmers also identified certain agroecological practices as potential risks to their long-term food and financial security. Additionally, studies by Epule and Bryant (2016) and Lal (2006) have highlighted that, despite the advantages of organic fertilizers, there is evidence suggesting that optimally managed organic or agroecology farms may produce lower yields per unit area compared to conventional or inorganic farms.

Moreover, within the non-adopter group, 34% perceived the use of agroecological practices as a necessity, recognizing the need to integrate these practices in order to overcome production constraints justified by their lack of knowledge and ignorance of the method of implementation and use of agroecological practices. Furthermore, opportunity perception by 25% of non-adopters suggested that the potential benefits of adopting agroecological practices were an opportunity for them to learn and discover new approaches to sustainably manage their farm. Hashemi and Damalas (2018) highlighted the importance of factors such as the perception of pesticide safety and knowledgeable experience of pest integration methods in the decision of farmers to adopt or not adopt alternatives to conventional agricultural practices.

4. CONCLUSION AND RECOMMENDATIONS

The study findings highlight a notable gap between adopters and non-adopters of AEP. This gap was evident in socio-economic and demographic characteristics, in addition to the perception of agroecological practices by farmers. Factors such as gender, education level, farm size, non-farm activities, and farm experience were identified as determinants of AEP adoption. Farmer awareness of agroecology and its practices also played a significant role in adoption, with higher awareness leading to increased practice.

The study highlights the heterogeneity in farmers' perceptions of agroecological practices and their transition, both among adopters and non-adopters. Understanding these differing perspectives is crucial for designing targeted interventions to promote widespread adoption of sustainable agroecological approaches in the study area. Ignorance, risk perceptions, financial constraints, lack of technical know-how, and reliance on chemical inputs are some of the major challenges to the widespread adoption of these diverse AEPs in the study area.

Hence, promoting the adoption of AEP requires a multifaceted approach that considers the varied perspectives of farmers. By designing appropriate incentives that carefully consider the challenges faced by farmers in the study area, widespread adoption of AEP is likely to occur. Farmers advocating for the transition to a more sustainable farm system should consider expanding their farm area, as smaller landholdings pose more constraints in transitioning to and maintaining agroecological production systems. In addition, the knowledge gap on agroecological practices should be addressed by creating awareness among farmers about the existence and benefits of agroecological practices and transitioning towards them.

Funding: This study received no specific financial support.
Institutional Review Board Statement: The Ethical Committee of the Agricultural Advisory Mechanism, Yaoundé, Cameroon has granted approval for this study on 12 February 2024 (Ref. No. 013).
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Adesina, A. A., & Baidu-Forson, J. (1995). Farmers' perceptions and adoption of new agricultural technology: Evidence from analysis in Burkina Faso and Guinea, West Africa. *Agricultural Economics*, *13*(1), 1-9. https://doi.org/10.1111/j.1574-0862.1995.tb00366.x

Adesina, A. A., & Zinnah, M. M. (1993). Technology characteristics, farmers' perceptions and adoption decisions: A Tobit model application in Sierra Leone. *Agricultural Economics*, *9*(4), 297-311. https://doi.org/10.1016/0169-5150(93)900199

Alliance for Food Sovereignty in Africa AFSA. (2020). *A national study on the possible inclusion of agroecology into the climate policy framework of Cameroon.* Retrieved from https://afsafrica.org/wp-content/uploads/2021/10/agroecology-study-cameroon-mboscuda-afsa1.pdf

Barrios, E., Gemmill-Herren, B., Bicksler, A., Siliprandi, E., Brathwaite, R., Moller, S., . . . Tittonell, P. (2020). The 10 Elements of Agroecology: Enabling transitions towards sustainable agriculture and food systems through visual narratives. *Ecosystems and People*, *16*(1), 230-247. https://doi.org/10.1080/26395916.2020.1808705

Bayard, B., Jolly, C. M., & Shannon, D. A. (2006). The adoption and management of soil conservation practices in Haiti: The case of rock walls. *Agricultural Economics Review*, *7*(2), 28-39.

Brown, P. R., Tuan, V. V., Nhan, D. K., Dung, L. C., & Ward, J. (2018). Influence of livelihoods on climate change adaptation for smallholder farmers in the Mekong Delta Vietnam. *International Journal of Agricultural Sustainability*, *16*(3), 255-271. https://doi.org/10.1080/14735903.2018.1472858

Chimi, P. M., Mala, W. A., Essouma, F. M., Ngamsou, A. K., Matick, J. H., Fobane, J. L., & Bell, J. M. (2022). Family farming systems in Northern central Cameroon: Challenges and prospects for food security. *ESI Preprints*, *11*, 678-678.

Duru, M., Therond, O., & Fares, M. (2015). Designing agroecological transitions; a review. *Agronomy for Sustainable Development*, *35*, 1237–1257. https://doi.org/10.1007/s13593-015-0318-x

Epule, E. T., & Bryant, C. R. (2015). Drivers of arable production stagnation and policies to combat stagnation based on a systematic analysis of drivers and agents of arable production in Cameroon. *Land Use Policy*, *42*, 664-672. https://doi.org/10.1016/j.landusepol.2014.09.018

Epule, E. T., & Bryant, C. R. (2016). Assessing the effects of agroecology and conventional farming techniques on small-scale peasant farmers crop yields in the Fako and Meme divisions of Cameroon. *African Journal of Agricultural Research*, *11*(10), 849-866. https://doi.org/10.5897/ajar2015.10498

Erisman, J. W., van Eekeren, N., de Wit, J., Koopmans, C., Cuijpers, W., Oerlemans, N., & Koks, B. J. (2016). Agriculture and biodiversity: A better balance benefits both. *AIMS Agriculture and Food*, *1*(2), 157-174. https://doi.org/10.3934/agrfood.2016.2.157

Eyhorn, F., Muller, A., Reganold, J. P., Frison, E., Herren, H. R., Luttikholt, L., . . . Seufert, V. (2019). Sustainability in global agriculture driven by organic farming. *Nature Sustainability*, *2*(4), 253-255. https://doi.org/10.1038/s41893-019-0266-6

FAO, IFAD, UNICEF, WFP, & WHO. (2020). *The state of food security and nutrition in the world 2020. Transforming food systems for affordable Healthy Diets*. Rome: FAO.

Food and Agricultural Organisation FAO. (2022). *Enabling extension and advisory services to promote agroecology*. Retrieved from http://openknowledge.fao.org/

Gebru, B. M., Wang, S. W., Kim, S. J., & Lee, W.-K. (2019). Socio-ecological niche and factors affecting agroforestry practice adoption in different agroecologies of Southern Tigray, Ethiopia. *Sustainability*, *11*(13), 3729. https://doi.org/10.3390/su11133729

Gerten, D., Heck, V., Jägermeyr, J., Bodirsky, B. L., Fetzer, I., Jalava, M., . . . Schaphoff, S. (2020). Feeding ten billion people is possible within four terrestrial planetary boundaries. *Nature Sustainability*, *3*(3), 200-208. https://doi.org/10.1038/s41893-019-0465-1

Glover, D., Sumberg, J., Ton, G., Andersson, J., & Badstue, L. (2019). Rethinking technological change in smallholder agriculture. *Outlook on Agriculture*, *48*(3), 169-180. https://doi.org/10.1177/0030727019864978

Harden, A., Garcia, J., Oliver, S., Rees, R., Shepherd, J., Brunton, G., & Oakley, A. (2004). Applying systematic review methods to studies of people's views: An example from public health research. *Journal of Epidemiology & Community Health*, *58*(9), 794-800.

Hashemi, S. M., & Damalas, C. A. (2018). Factors influencing farmers' adoption of agroecological practices: A systematic review. *Journal of Sustainable Agriculture*, *42*(7), 712-731.

Herrero, M., Thornton, P. K., Notenbaert, A. M., Wood, S., Msangi, S., Freeman, H., . . . van de Steeg, J. (2010). Smart investments in sustainable food production: Revisiting mixed crop-livestock systems. *Science*, *327*(5967), 822-825. https://doi.org/10.1126/science.1183725

High Level Panel of Experts HLPE. (2019). *Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition*. Retrieved from A Report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

Institut National De La Statistique INS. (2017). *Statistical yearbook of the central region*. Retrieved from https://ins-cameroun.cm/

Jones, S. K., Bergamini, N., Beggi, F., Lesueur, D., Vinceti, B., Bailey, A., . . . Hainzelin, E. M. (2022). Research strategies to catalyze agroecological transitions in low-and middle-income countries. *Sustainability Science*, *17*(6), 2557-2577. https://doi.org/10.1007/s11625-022-01163-6

Karanja, E. N., Fliessbach, A., Adamtey, N., Kambura, A. K., Musyoka, M., Fiaboe, K., & Mwirichia, R. (2020). Diversity and structure of prokaryotic communities within organic and conventional farming systems in central highlands of Kenya. *PloS One*, *15*(8), e0236574. https://doi.org/10.1371/journal.pone.0236574

Knox, J., Hess, T., Daccache, A., & Wheeler, T. (2012). Climate change impacts on crop productivity in Africa and South Asia. *Environmental Research Letters*, *7*(3), 034032. https://doi.org/10.1088/1748-9326/7/3/034032

Kombiok, J., Buah, S., Dzomeku, L., & Abdulai, H. (2012). Sources of pod yield losses in groundnut in Northern Savana zone of Ghana. *West African Journal of Applied Ecology*, *20*(2), 53-63.

Lal, R. (2006). Enhancing crop yields in the developing countries through restoration of the soil organic carbon pool in agricultural lands. *Land Degradation & Development*, *17*(2), 197-209. https://doi.org/10.1002/ldr.696

Läpple, D., & Van Rensburg, T. (2011). Adoption of organic farming: Are there differences between early and late adoption? *Ecological Economics*, *70*(7), 1406-1414. https://doi.org/10.1016/j.ecolecon.2011.03.002

Mekuria, W., Dessalegn, M., Amare, D., Belay, B., Getnet, B., Girma, G., & Tegegne, D. (2022). Factors influencing the implementation of agroecological practices: Lessons drawn from the Aba-Garima watershed, Ethiopia. *Frontiers in Environmental Science*, *10*, 965408. https://doi.org/10.3389/fenvs.2022.965408

Migliorini, P., & Wezel, A. (2017). Converging and diverging principles and practices of organic agriculture regulations and agroecology. A review. *Agronomy for Sustainable Development*, *37*, 1-18. https://doi.org/10.1007/s13593-017-0472-4

Mihelič, R., Pintarič, S., Eler, K., & Suhadolc, M. (2024). Effects of transitioning from conventional to organic farming on soil organic carbon and microbial community: A comparison of long-term non-inversion minimum tillage and conventional tillage. *Biology and Fertility of Soils*, *60*(3), 341-355. https://doi.org/10.1007/s00374-024-01796-y

Negatua, W., & Parikh, A. (1999). The impact of perception and other factors on the adoption of agricultural technology in the Moret and Jiru Woreda (district) of Ethiopia. *Agricultural Economics*, *21*, 205-216. https://doi.org/10.1016/S01695150(99)00020-1

Pretty, J., & Bharucha, Z. P. (2014). Sustainable intensification in agricultural systems. *Annals of Botany*, *114*(8), 1571-1596.

Punzano, P. A., Rahmani, D., & Cabello Delgado, M. D. M. (2021). Adoption and diffusion of agroecological practices in the horticulture of catalonia. *Agronomy*, *11*(10), 1959. https://doi.org/10.3390/agronomy11101959

Runhaar, H. (2017). Governing the transformation towards 'nature-inclusive'agricultur: Insights from the Netherlands. *International Journal of Agricultural Sustainability*, *15*(4), 340-349. https://doi.org/10.1080/14735903.2017.1312096

SAILD. (2022). *Mapping agroecology actors and practices in Cameroon.* Retrieved from https://www.saild.org/wp-content/uploads/2023/01/Mapping-agroecological-practices-and-actors.pdf

Tankoano, M. E., & Sawadogo, M. (2022). Farmers' perceptions and adoption of agroecological practices in the Central-North region of Burkina Faso. *African Scientific Journal*, *3*(15), 407-429.

Tittonell, P., Piñeiro, G., Garibaldi, L. A., Dogliotti, S., Olff, H., & Jobbagy, E. G. (2020). Agroecology in large scale farming—A research agenda. *Frontiers in Sustainable Food Systems*, *4*, 584605. https://doi.org/10.3389/fsufs.2020.584605

Tsafack, S. A., Degrande, S. F., & Simpson, B. (2014). *Farmer-to-farmer extension in Cameroon: A survey of extension organizations.* Retrieved from World Agroforestry Center Working Paper No.182. Nairobi, Kenay: World Agroforestry Center.

Webb, P., Benton, T. G., Beddington, J., Flynn, D., Kelly, N. M., & Thomas, S. M. (2020). The urgency of food system transformation is now irrefutable. *Nature Food*, *1*(10), 584-585. https://doi.org/10.1038/s43016-020-00161-0