Social Science and Humanities Journal
Everant Journal
ISSN: 2456-2653
https://sshjournal.com/
Impact Factor: 2024: 6.576
2023: 5.731
Volume 09 Issue 09 September 2025
DOI: https://doi.org/10.18535/sshj.v9i09.2045

Market Gardening Operations in the Solomougou Irrigated Area (Côte d'Ivoire): Adoption of Agroecological Practices and Perception of Innovations

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Received 20-08-2025
Revised 11-09-2025
Accepted 23-09-2025
Published 25-09-2025

Abstract:

Context: The adoption of innovative agricultural practices is promoted as a way to improve the living conditions of rural communities.

Objective: This study assesses the contribution and understanding of agroecological practices on market garden farms in the Solomougou irrigated area in the Korhogo department.

Methods: A quantitative approach was implemented on a sample of 203 female producers surveyed in 10 villages, and a qualitative approach through three focus groups was used to understand the perceptions of users of the area. A binary logistic regression was used to identify the determinants of the adoption of agroecological practices.

Results: The female producers, mostly aged 31 to 50, have a low level of education (75.37%), and 79.31% have more than 10 years of experience. Yields are higher for farms undergoing ecological transition (4.41 T/ha) than those using conventional practices (3.8 T/ha) for the combined production of eggplant, pepper and okra. The adoption of agroecological practices is significantly influenced by the size of the workforce, the level of education, and the farming system used. While some recognize its environmental benefits and its propensity for resilience, concerns remain regarding the often unpredictable yields and increased workload.

Conclusion: Ultimately, the irrigated area brings greater productivity to female producers undergoing agroecological transition. While the exploitation of this new production environment has strengthened women's empowerment, it has also increased their social responsibilities through increased workload, thus hindering their overall emancipation.

Keywords: Agroecology, Market gardening, Irrigation, Adoption, Perception, Korhogo, Ivory Coast

Introduction:

Global agriculture is facing unprecedented challenges in ensuring food security, preserving natural resources, and building resilience to climate change (Trabelski, 2017), a reality that is particularly acute in West Africa and Côte d'Ivoire, where agricultural systems are vulnerable (Sultan & *al.*, 2021).

In this context of the quest for sustainability, agroecological practices are emerging as a promising approach, offering sustainable solutions for resilient and environmentally friendly

agricultural production (Altieri and Nicholls, 2005). These practices encompass a wide range of approaches, including, for example, the use of organic manures, the implementation of crop rotations and associations, the use of biopesticides, and the optimization of local resources to reduce dependence on synthetic chemical inputs (Akchaya & *al.*, 2025).

Thus, numerous studies have highlighted the environmental benefits of adopting agroecological practices, such as improving soil quality, conserving water, reducing greenhouse gas emissions, and preserving biodiversity (Pretty & Bharucha, 2015). Furthermore, on a socioeconomic level, research has shown that agroecology can contribute to farmer autonomy, income diversification, and improved food security, particularly in developing countries (Rosset & Martinez, 2012). For example, studies conducted in West Africa have highlighted the crucial role of agroecological practices in adapting production systems to climate change and improving the resilience of rural communities (Ouédraogo & *al.*, 2018).

However, despite these documented benefits, the large-scale adoption of agroecological practices remains a challenge, often hampered by socio-economic, institutional, and cultural factors (Francis & al., 2019). It is therefore essential to note that producers' perception of innovations and their ability to integrate new techniques are also crucial aspects that influence the adoption rate (Rogers, 2003).

As market gardening in Côte d'Ivoire faces growing challenges related to climate variability and farm insecurity, the development of the Solomougou irrigated area represents a technological response to water management and production regulation. Promoting agroecological practices is part of a dynamic of sustainability and agro-environmental resilience. However, the adoption of these innovations may depend on producers' perceptions of them, which are often influenced by their experience, economic rationality, social norms, and local constraints. It is therefore imperative to focus not only on the level of adoption of agroecological practices, but also on market gardeners' perceptions of these innovations and to understand their determinants.

Thus, this study conducted in the north of Côte d'Ivoire on the Solomougou irrigated perimeter has the general objective of evaluating the contribution of agro-ecological practices in market gardening farms in the Solomougou irrigated perimeter. Specifically, it involves (i) characterizing the market gardening farms established on the Solomougou irrigated perimeter, (ii) highlighting the determinants of the adoption of agro-ecological practices in market gardening crops on the irrigated perimeter and (iii) describing the perception of beneficiary producers regarding the innovations introduced in the production environment.

1. Methodology :

1.1. Material

The biological material consists of various market garden crops, including tomatoes, eggplant, okra, and chili peppers, grown by women producers from the 10 villages that operate the Solomougou irrigated area. These are Karakpo, Bapolkaha, Talere, Zienkolo, Nambekaha, Golokaha, Guiembe, Kaforo, Kafine, and Fegboho (Table 1).

As technical material, a questionnaire and two interview guides were used for farmers and technical organizations. The questionnaire, divided into three (3) parts, collected sociodemographic data on the producers, the characteristics of the market gardening farms, and the production techniques used. The interview guides were used to conduct interviews to identify perceptions of agroecological practices, understand the production environment, and provide guidance to producers on the innovations introduced in the irrigated area.

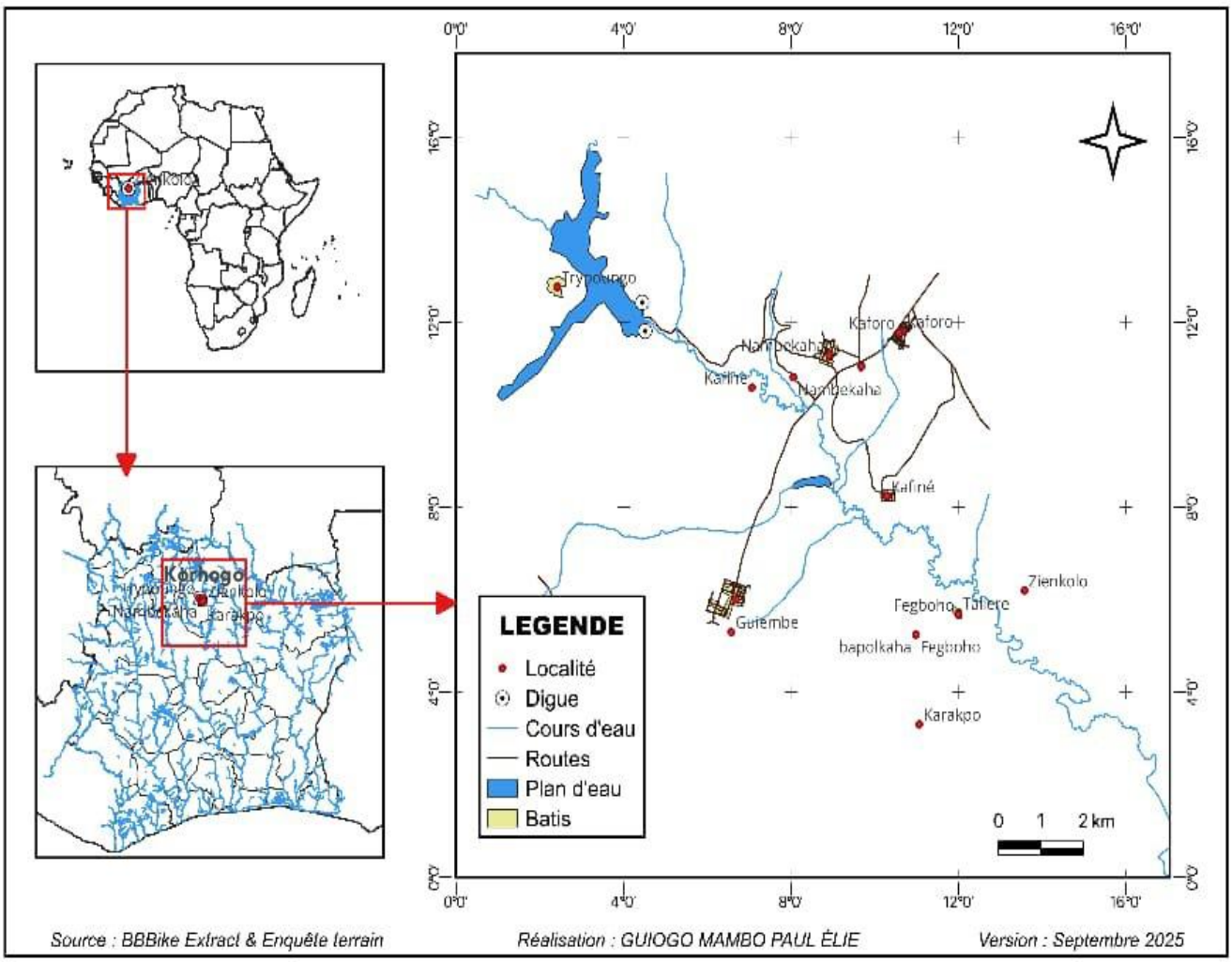
1.2. Methods

1.2.1. Criteria for choosing the study area

The choice of the Solomougou irrigated area as a study area stems from its historical significance, its recent modernization, and its proximity to the

city of Korhogo. Its attractiveness for such a study has increased with its modernized rehabilitation, its water retention capacity increased to 19 million m3, and its irrigable area extended to 800 ha. Also, its geographical proximity to Korhogo, combined with the presence of a fully paved road, considerably facilitates travel to farms, which is a comparative advantage for local populations. Data collection is easier there. Finally, the commitment of Solomougou farmers to the agroecological transition makes this site particularly relevant. These characteristics made it an ideal site for such a study (Figure 1).

Figure 1: Presentation of the Solomougou irrigated area in the Korhogo department



1.2.2. Data collection

The advantage of having a directory of farmers available from the supervisory structure motivated the choice of the stratified random sampling method. This method ensures adequate representation of the different subpopulations or strata within the total population. According to Chalico & Riegelhaupt (2002), stratified sampling improves the accuracy of estimates by reducing sampling work, characterizing each stratum separately and facilitating the coordination of fieldwork. The Cochran formula was used to determine the minimum sample size.

$$n = \frac{\frac{z^2 * p(1-p)}{e^2}}{1 + \left(\frac{z^2 * p(1-p)}{e^2 N}\right)}$$

- N=Population size (Here N= 897)
- Z = z-score or confidence level (for $\alpha = 5\%$ and $z = 1.96$)
- E = Margin of error (5%)
- P = Standard deviation (0.5)

Applying this formula, the minimum sample size is 201 producers out of a population of 885. In

practice, 203 people were surveyed, corresponding to a sampling rate of 23%. Based on this rate, the number of female producers to be interviewed was distributed proportionally to the sample size by village and by crop (Table 1).

To select the farmers to be interviewed, simple random sampling was applied. This sampling technique involves randomly selecting elements from a database. Each element thus has an equal chance of being included in the sample (Nikiema, 2022). The survey was conducted from April 1 to June 5, 2025.

Interviews to analyze perceptions of innovations took place through three focus groups of 5 to 8 women producers each in the localities of Guiembé, Karakpo, and Kafine.

Table 1: Distribution of market gardening producers in the Solomougou area by locality

Localities	Population	Échantillon
Nambekaha	205	47
Golokaha	33	8
Tallere	37	9
Guiembe	228	52
Bapolkaha	31	7
Kafine	145	33
Kaforo	45	8
Zinkolo	66	15
Karakpo	49	11
Fegboho	58	13
Total	897	203

1.2.3. Data analysis

a. Analysis tools

To assess the variables selected for this study, the mean and standard deviation were determined. These statistics were used to describe and highlight the limits of variation of the analyzed parameters. The illustrations were made through graphs and tables designed from the quantitative data. The statistical processing of the quantitative data was carried out using SPSS 23.0 software. Finally, the qualitative data collected during the interviews were organized in an analysis grid to support the interpretation of the results obtained (Ballé, 2018; Ballé, 2019).

To analyze the influence of various factors on the adoption of agroecological practices, a binary logistic regression model was used based on the approach of Hosmer& *al.* (2013). The sample size was limited to a subset of female producers who combined the cultivation of pepper, eggplant and okra on the same area (0.1 ha). A total of 164 female producers were involved in this type of crop association. The variables used to run the model are coded in Table 2. The explanatory variable (Y) is "adoption of agroecological practices". It is coded:

- Y = 0 if the producer has opted for the conventional production system and coded

- Y = 1 if the respondent has adopted agroecological practices or is in an agroecological transition phase.

Thirteen potentially explanatory variables were selected to discriminate the adoption of agroecological practices

b. Theoretical framework for justifying explanatory variables

The underlying hypothesis is that the characteristics of women producers impact their production behavior and their ability to accept innovation.

- Age: Age reflects both experience and physical capacity to carry out agricultural activities. Ghali & *al.* (2022) show that age

influences productivity. Younger farmers may be more open to innovations and the risks associated with agroecological practices.

- Education: A high level of education can facilitate understanding of complex agroecological principles, access to technical information, and farm management (Kassie & *al.*, 2015).
- Household size: Household size indicates the availability of family labor, a key resource in production systems (N'Gome & *al.*, 2007).
- Yield: Yield can encourage farmers to adopt certain practices or technologies to improve it (D'Souza & Ikerd, 2015).
- The production system: The production system influences constraints and opportunities, and therefore farmers' choices (Pretty & *al.*, 2006).
- Experience: Long-standing experience in agriculture can be both a hindrance (habits) and an advantage (knowledge of the land) (Prosperi & *al.*, 2020).
- Marital status: Marital status can influence access to social capital and family labor (Marenya & Barrett, 2007), highlighting that married women often benefit from greater support for agricultural activities. It can also influence the distribution of responsibilities and decision-making support.
- How one entered farming: Initial motivation for farming can reflect one's commitment and motivation (Darnhofer & *al.*, 2010).
- Cooperative membership: Membership in a cooperative can facilitate access to training and information, suitable seeds, and markets (Verhofstadt & Maertens, 2014). - Subsidies: Various forms of subsidies can influence agricultural activity and economic incentives, and reduce the perceived risks associated with adopting new practices (Wibowo & *al.*, 2017).
- Labor: The nature of the labor force can determine the flexibility and cost of agricultural operations (Lemeilleur S. & Sermage J., 2020).
- Cropping system: The cropping system determines ecological and economic interactions, influencing the adoption of other practices (Altieri & Nicholls, 2005).

Table 2: Coding variables

Variables	**Codification**
Production system	Conventional=0; Agroecological=1
Localité	Kaforo=1; Golokaha=2; Karapko=3; Fegboho=4; Bapolkaha=5; Guiembe=6; Kafine=7; Nambekaha=8; Talletre=9; Zinkolo=10
Yield	Yield < 4.07 T/ha = 0 ; Yield ≥ 4.07 T/ha = 1 ; 4.07 is the average yield for the 164 producers
Workforce size	numerical value
Age	18 to 30 = 0; 31 to 50 = 1; 50 and more = 2
Household size	numerical value
Experience	Less than 10 years = 0 ; 10 years and more = 1
Educational level	Not in school = 0 ; Primary level = 1
Marital status	Married = 0; Widow = 1; Bachelor = 2
Motivation for the job	Profitable activity = 0; Legacy = 1
Cooperative membership	Yes = 0 ; No = 1
Type of Grant	Inputs = 0; Agricultural equipment and inputs = 1
Labor type	Family and support group = 0; family, support group and day worker = 1
Cropping system	Crops association = 0 et Monocropping =1

c. Theoretical framework for analyzing interviews

The analysis of perception was based on the five principles of the theory of diffusion of innovation according to Rogers (1995) and Moore Benbasat (1991). These principles are (i) the relative advantage of the innovation, (ii) its compatibility with existing values, past experiences and social practices and norms of the living environment, (iii) the complexity of its understanding and use, (iv) the testability of the innovation and (v) its observability which is assimilated to the clarity of the results of the innovation. The responses given during the interactive meetings are transcribed and organized according to major trends noted by the interviewees. The analysis grid whose five axes are indicated above makes it possible to assess the response and actions of the producers in relation to the underlying aspects of the said axis. Taking trends into account makes it possible to retain collective thinking within the group regarding a specific point, while putting this position into perspective with the divergent reactions within the same group.

2. Result:

2.1. Sociodemographic characteristics of market gardening producers

Table 3 shows that the majority of female producers are in the age group 31 to 50 years (61.58%). In terms of educational level, the majority of female producers (75.37%) have no schooling, and only 24% have a primary education level. The majority (79.31%) have more than 10 years of experience in market gardening. On the other hand, 20.69% have less than 10 years of experience. The majority (78.82%) inherited the agricultural activity from their parents while others succeeded in meeting family needs. The households of female producers are made up of an average of 7 ±3 people. The size of households varies between 1 and 14 people. As for marital status, 91.63% are married, 2.96% single and 5.42% widowed.

Table 3: Sociodemographic profile of the producers

Variables	Modalities	Number	Percentage (%)
Household size	1 to 5	47	23.15
	6 to 10	129	63.55
	More than 10	27	13.30
Marital status	Widow	11	5.42
	Bachelor	6	2.96
	married	186	91.63
Experience	10 Y. and more	161	79.31
	Less than 10 Y.	42	20.69
Age	18 to 30 Y.	66	32.51
	31 to 49 Y.	125	61.58
	50 Y. and more	12	5.91
Educational level	Not to school	153	75.37
	Primary level	50	24.63

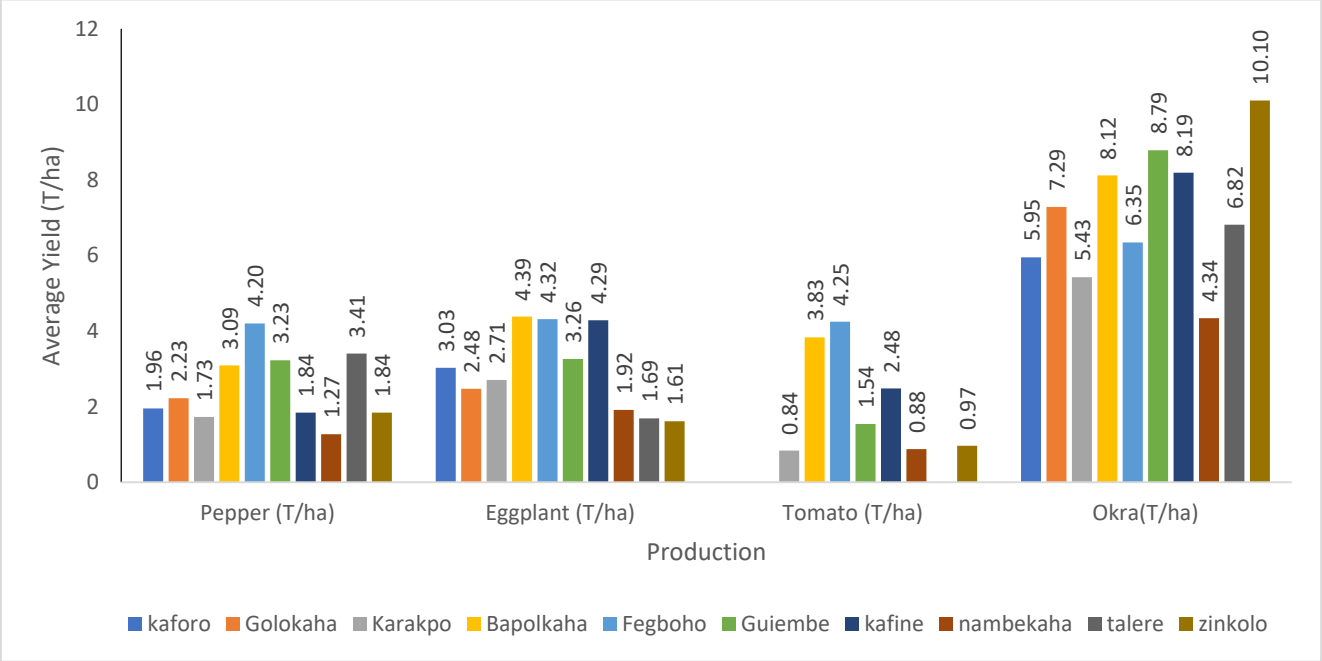
2.2. Characterization of the farms

2.2.1. Average yield of market gardening farms

Figure 2 shows the average yields recorded by crop and by locality. Okra is the best-performing crop, with the best yields in Zinkolo (10.1 ± 0.9 T/ha), Guiembe (8.79 ±1.9 T/ha) and Kafiné (8.19 ±2.5 T/ha). For pepper cultivation, the localities of Fégboho (4.2 ±1.5 T/ha) and Talléré (3.4 ±0.75 T/ha) have the highest yields, while Karakpo (1.73 ±0.52 T/ha) and Nambekaha (1.27 ±0.62 T/ha) have the lowest. Eggplant reached its highest

yields in the villages of Kafiné (4.2 ± 1.9 T/ha), Fegboho (4.3 ± 1.2 T/ha) and Bapolkaha (4.3 ± 2.2 T/ha), with lower yields in Talere (1.6 ± 0.7 T/ha) and Zinkolo (1.6 ± 0.5 T/ha). Finally, tomato showed its best yields in Fégboho (4.2 ±0.85 T/ha) and Bapolkaha (3.8 ±1.2 T/ha), and the lowest in Karakpo (0.8 ± 0.19 T/ha) and Nambekaha (0.8 ± 0.26 T/ha).

Figure 2: Distribution of average yields of crops by locality



2.2.2. Characteristic elements of agroecological practices on the irrigated perimeter

Table 4 displays the characteristic elements of the agroecological techniques observed on the irrigated perimeter. Field data reveal that the practices observed are mulching, application of organic manure, crop rotation, use of Apichi which is a biopesticide, neem juice, neem powder, liquid fertilizer and organic solid fertilizer. These observations were made on a total of 83 producers. It appears that certain practices are adopted by all producers. This is the case of mulching, Apichi (biopesticide), neem juice, liquid fertilizer and solid fertilizer, which were observed on all farms. The application of organic manure is also very widespread, with a rate of 88%. The use of neem powder as a pesticide is a practice observed in 61.5% of cases.

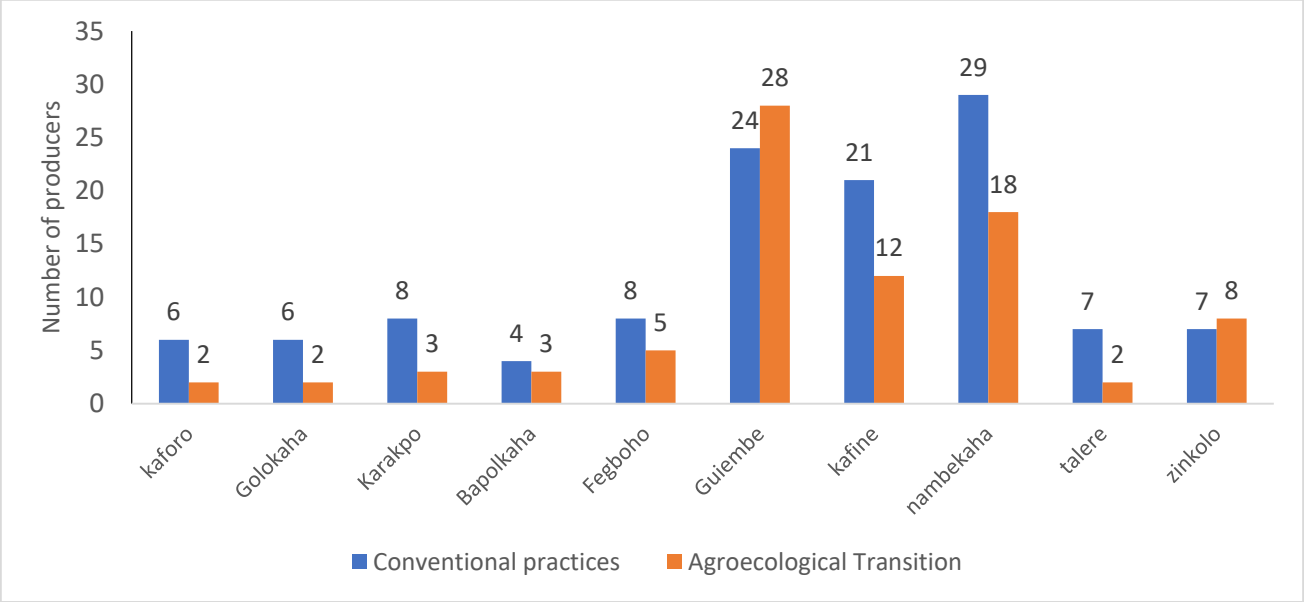
Table 4: Characterization of agroecological practices in the irrigated area

	Practising		Not practising	
	Number	Rate (%)	Number	Rate (%)
Mulching	83	100	0	0
Application of organic manure	73	88	10	12
Apichi (biopesticide)	83	100	0	0
Neem juice	83	100	0	0
Organic liquid fertilizer	83	100	0	0
Organic solid fertilizer	83	100	0	0
Neem powder	32	38,5	51	61,5

2.2.3. Production systems practiced on the irrigated perimeter

Figure 3 shows the dominance of the conventional production system in all the localities visited. Overall, female producers in agroecological transition represent 40.89% of the farms. In the majority of villages, female producers associated with the conventional production system (59.11%) are more numerous than those who have adopted agroecological practices. The exceptions where farms in agroecological transition manage to surpass plots where conventional techniques are applied are the villages of Guiembé and Zinkolo, i.e. 20% of the localities. Agroecology is not yet established as the dominant technique in market gardening farms in the Solomougou irrigated area.

Figure 3: Distribution of producers by locality according to the production system



2.2.4. Comparison of yields according to the production system used

Tables 5 presents the results of the statistical analyses applied. The statistical analysis revealed a significant difference between yields according to the type of production system used by women in the irrigated area. The average production for actors using agroecological practices was 4.41 T/ha, while that of producers adopting conventional practices was 3.81 T/ha. According to the Student t-test, this difference is not the result of chance with a t-statistic of -3.619. The p-value is 0.000, which is well below the 5% threshold. This attests to a highly significant difference between the two groups. The average difference is estimated at approximately 0.61 T/ha.

Table 5: Statistics of conventional versus agroecological groups

	Production System	N	Average	Standard deviation	Mean standard error
Yield (T/ha)	**Conventional**	120	3.80	1.08	0.10
	Agroecological	83	4.41	1.29	0.14

2.3. Determinants of the adoption of agroecological practices in market gardening in the irrigated area

2.3.1. Logistic regression statistics for the adoption of agroecological practices

The Chi-square test ($\chi 2$) of the model presents a value of 42.42 for a significance level $p<0.05$ (Sig. = 0.000), indicating that the model is globally significant. This result confirms that all the explanatory variables included significantly

improve the prediction of the adoption of agro-ecological practices compared to a model without predictors. Regarding the proportion of variability of the dependent variable explained, the Cox and Snell coefficient of determination (R^2) is estimated at 0.23. The Nagelkerke R^2 presents a value of 0.31. These values suggest that the model explains a moderate proportion of the variance in the adoption of agro-ecological practices (Table 6).

Table 6: Overview of model coefficients

Model statistics	**Khi-square**	**ddl**	**Significance**
	42.42	13	0.00
	Log likelihood -2	**R^2 of Cox and Snell**	**R^2 of Nagelkerke**
	181.41	0.23	0.31

2.3.2. Determinants of the adoption of agroecological practices

The logistic regression statistics are reported in Table 7. The results reveal that four variables have a statistically significant impact (Sig.<0.05) on the probability of adopting agroecological practices. First, Yield (B = 1.26; Exp(B) = 3.54, p = 0.01) is positively and significantly associated with adoption. High yield is associated with 3.54 times more chances of adopting agroecological practices. Second, labor force size (B = -0.15; Exp(B) = 0.86, p = 0.04) is positively and significantly related to adoption. Each one-unit increase in labor force size decreases the probability of adopting agroecological practices by 0.85 times. Third, education (B = 1.066; Exp(B) = 2.90, p = 0.01) has a positive and significant impact on the adoption of agroecological practices. Producers with a higher level of education are 2.90 times more likely to adopt agroecological practices. Finally, the cropping system (B = -1.217; Exp(B) = 0.296, p = 0.004) is also a significant determinant, but with a negative effect. Recurrent modification of associated crops is likely to reduce the probability of adopting agroecology by 70.4%. The other variables included in the model (Locality, Age, Household Size, Experience, Marital Status, Reason for Engagement, Cooperative Membership, Type of Subsidy, Type of Labor) did not demonstrate a statistically significant effect on the probability of adopting agroecological practices.

Table 7: Table of variables in the model

	B	**ddl**	**Sig.**	**Exp(B)**
Constant	2.53	1	0.22	12.60
Locality	0.06	1	0.58	1.06
Yield	1.26	1	0.01 **(S)**	3.54
Workforce size	0.15	1	0.04 **(S)**	0,85
Age	0.60	1	0.10	1,.83
Household size	-0.01	1	0,74	0.98
Experience	0.73	1	0.06	2.08
Educational level	1.06	1	0.00 **(HS)**	2.90
Marital status	-0.31	1	0.48	0.72
Motivation for commitment	-0.57	1	0.14	0.56
Cooperative membership	-0.38	1	0.32	0.68
Type of grant	-0.46	1	0.31	0.62
Type of labor	-1.10	1	0.12	0.33
Cropping system	-1.21	1	0.00 **(HS)**	0.29

S : Significant; HS : Highly Significant

2.4. Perceptions of producers regarding innovation in the production environment

2.4.1. From rain-fed agriculture to irrigated agriculture

On the one hand, the women producers interviewed have a positive view of irrigated agriculture, highlighting several advantages. They highlight an increase in agricultural income due to the ability to carry out two crop cycles per year, unlike seasonal production. They see continuous production as ensuring better food availability for their families, thus reducing their vulnerability during lean periods. This also allows them to organize their activities with a well-defined crop calendar and irrigation plan.

In addition, controlling irrigation gives them a choice of crops to cultivate within the perimeter. They welcome the ability to open the intakes to irrigate according to crop needs. Thus, they are no longer constrained by rainfall fluctuations and can turn to more water-intensive and more profitable crops. On the other hand, the interviews reveal disadvantages associated with irrigated agriculture, mainly related to the gradient of the irrigation operation. Indeed, the collective irrigation operation is carried out from upstream to downstream. This organization requires producers located downstream to wait until those upstream have finished irrigating, which increases working time and establishes a form of arduousness of the work since the producers must remain on the lookout.

2.4.2. A controversial return to the agroecological tradition

The interviews revealed that the majority of women producers acknowledged that their grandparents' farming practices were just as environmentally friendly, even though these methods were not explicitly designated as agroecology. Several of them stated that these techniques ensured a certain yield stability and preserved soil fertility over the long term. However, their parents switched to conventional farming due to the promoted agricultural intensification, the need for rapid profitability, and the pressures of increasing food needs.

Regarding the possibility of a return to agroecological practices, opinions are divided. Some of the women producers are favorable, provided it does not lead to a significant drop in yields or an excessive workload. Others, more wary, emphasize the need for technical support, access to effective natural inputs, and stable commercial outlets for agroecological products.

2.4.3. An overly controlled production environment

Following the interviews, it was noted that the production environment, although structured, limits the production potential of women producers. Due to the uniform size of the areas for market gardeners (0.1 ha), the yields observed are similar from one producer to another. The limited area prevents the adoption of intensification techniques. Also, this small size of the area does not allow for investment in more efficient equipment, forcing them to be content with subsistence production rather than a real income-generating activity. The project framework and the production environment do not allow women producers to diversify crops beyond the speculations imposed by the program.

2.4.4. Women at the heart of the development of the localities benefiting from the project

The interview results reveal that thanks to the production activity on the perimeter, the women producers keep their granaries full. After the production, they go to markets to sell their harvest. Beyond individual production, they also report their active participation in the maintenance of irrigation infrastructure. They are responsible for removing weeds growing in the canals to ensure the sustainability and proper functioning of the facilities. It is their responsibility to hull, dry, and preserve the rice and corn produced by the men. Also, the women producers prepare organic inputs for their own agricultural production and for the men's rice production. This task involves going to different markets and searching the environment for ingredients for these preparations.

Despite the intensification of their involvement in agricultural production, the women producers assume all of their domestic responsibilities once they return from the fields. The interviews conducted made it possible to identify the full determination of the women in the beneficiary localities in supporting their families and increasing seasonal income. Clearly, the project has increased their involvement in local development by giving them, on occasion, more opportunities and more responsibility.

3. Discussion:

The study results reveal that female market gardeners in the Solomougou area are adults aged 31 to 50. This finding is largely supported by Traoré (2022), who analyzed the market gardening value chain in the Korhogo region, confirming the predominant involvement of this age group in market gardening production. However, it appears that few young people (aged 18 to 30, only 32.51%) work in market gardening. These results contradict those of Soro (2024), in which she states that the majority of the rural population is young and agriculturally oriented, based on the 2021 general population and housing census.

The results show that female producers have a low level of education (75.37%) and the majority have more than 10 years of experience (79.31%). This could be explained by limited access to education in the past. Also, since they were very young, they went to the fields to help with field work. These observations are in line with those of Kouadio & *al*. (2017) who states in his study in Côte d'Ivoire that the agricultural populations are mostly illiterate. The majority of female producers (95.07%) using the three (3) types of labor due to the diversification of labor in market gardening could be explained firstly by the labor requirements of agricultural production given the arduousness of the work. The results of this study are in line with those of Traoré (2022). On the other hand, Oula & *al.* (2021) highlighted the existence of four (4) main types of labor from which market gardeners benefit, namely family labor, permanent labor, daily labor and mutual aid.

Conventional agriculture, with the purchase of chemical inputs (NPK, urea, herbicide, insecticide), generates more expenses than the supply of agroecological inputs. This could be explained by the fact that agroecology promotes the valorization of endogenous resources and the recycling of nutrients. This approach transforms what would be considered "waste" or by-products (crop residues, animal manure) into valuable and reusable resources, thus reducing the cost of supply. Similarly, Akchaya & *al.* (2025) emphasize that agroecological practices, by reducing dependence on external and expensive inputs, can decrease production costs while improving the resilience of agricultural systems. However, although the costs of monetary biological inputs are reduced, some studies highlight other economic challenges or potential trade-offs associated with the agroecological transition. Yield is a variable influencing the decision to adopt agroecological practices. Vodounou (2025) argues that satisfactory agronomic performance is a condition for adoption in his study on agroecology in sub-Saharan Africa, he highlights that ecological intensification can lead to competitive yields, by improving soil fertility and resilience to climate shocks.

The size of the workforce has a statistically significant impact on the likelihood of adopting agroecological practices. This is likely justified by the fact that agricultural labor is a valuable resource needed by women market gardeners for agricultural production because agroecological practices are very labor-intensive. ARAA (2025) agroecology advocates highlight the fact that many agroecological practices, such as compost production, manual weeding, or the management of complex systems such as agroforestry, are more labor-intensive than conventional agriculture, which is heavily dependent on chemical inputs. However, work such as Tlili's (2015) dissertation on the employment of female wage labor highlights that these high labor requirements can become a barrier if family labor is limited or if the cost of wage labor is high.

The education of female producers is a determining factor in the adoption of agroecological practices. This result supports the findings of Kpadenou & *al.* (2019) in the Niger Valley, as well as those of Coulibaly & *al.* (2019) in Benin. These researchers highlight, through their studies, the impact of education level on farmers' choices to adopt agroecological practices. They emphasize that formal education has a positive effect on decisions to adopt organic practices. However, Maré & *al.* (2023) in their study in Burkina Faso on farmer education and the adoption of sustainable agriculture without chemical pesticides temper this optimism by suggesting that formal education alone does not always guarantee practical adoption, especially if it is not accompanied by relevant extension services, practical demonstrations, and ongoing support.

The cropping system is a determining factor in agroecological practices, as confirmed by the work of Dhehibi (2017). Farmers who already practice some form of diversification may find it easier to adopt other agroecological principles. However, for farmers engaged in intensive monoculture systems, the transition may present higher barriers (Tapsoba, 2020) for agroecological transitions in Benin and Burkina Faso. These systems are often optimized for the use of external inputs and may require more profound changes in practices, equipment, and mindsets, which can make adoption more difficult and costly initially.

In many terms, ecological agriculture is an old way of producing in the rural area. The idea of returning to agroecological practices is divisive. On the one hand, some women producers perceive agroecology as a sustainable path, provided it does not compromise yields or increase their workload. On the other hand, fears persist regarding the lack of technical support, limited access to natural inputs, and the absence of secure markets for agroecological products (Tittonell, 2020; Sinyangwe & *al.*, 2022). These reluctances reveal the need for a transition supervised and supported by public policies, local institutions, and appropriate incentive schemes (Wezel & *al.*, 2020). Despite these limitations, women emerge as strategic actors in local development. Their role goes beyond simple agricultural production: they participate in the maintenance of hydraulic infrastructure, processing, conservation, and the production of organic inputs, while also taking on all domestic tasks (Carr & Thompson, 2014; Doss & *al*., 2018). This accumulation of responsibilities reflects both their resilience and an under-recognized workload, which hinders their economic emancipation (UN Women, 2023).

Conclusion:

This study was conducted with the aim of evaluating the contribution of agro-ecological practices on the agricultural production activity of market gardening farms in the Solomougou irrigated area. Market gardening in the irrigated area is dominated by women, mostly experienced with more than 10 years of experience for 79.31% of them. Most of them inherited their activity and a large majority (75.37%) have not been educated. Households are medium-sized, around 7 people. While the conventional system remains dominant (59.11%), a proportion of 40.89% of female producers are in agro-ecological transition, even surpassing the conventional in some localities such as Guiembe and Zinkolo. The farms are characterized by small individual areas (0.1 ha for 88.67% of female producers), with varied yields depending on the crops, okra showing the best performance. The analyses highlighted a statistically significant difference in favor of agroecological production systems, which show higher average yields of 4.41 T/ha compared to 3.81 T/ha for conventional systems. Furthermore, input costs are substantially reduced thanks to the use of organic components. Regarding the adoption of agroecological practices, mulching, the use of biopesticides (Apichi, neem juice and powder) and biofertilizers are widespread, as is organic manure. The logistic regression model identified key determinants of the adoption of agroecological practices, including yield, workforce size, cropping system and education

level. Producers' perceptions of agroecological innovations are nuanced. While the preparation of organic inputs is considered difficult by a majority (83.74%), the overall satisfaction rate of adopters is high (89.15%). The agroecological transition represents not only a promising way to strengthen the environmental and socio-economic sustainability of market gardening, but also a lever of competitiveness for the sector in Côte d'Ivoire and on international markets.

Acknowledgments:

Sincere thanks to the officials of the Poro Regional Office of the Ministry of State, Ministry of Agriculture, Rural Development and Food Production, and to the NGO'S Rural Animation of Korhogo, for making this study possible.

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