World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Agrotechnical characterization of mango producers and typology of cropping systems in the Poro region (Northern Côte d'Ivoire)

KOFFI Konan Jean-Mathias [1,*], YAO Kouadio Jacques-Edouard [1], FONDIO Lassina [2], N'DA ADOPO Achille [2] and SORO Dogniméton [1]

[1] *University Jean LOROUGNON GUEDE, UFR Agroforestry, Agricultural Production Improvement Laboratory, BP 150 Dalea, Côte d'Ivoire.*
[2] *National Centre for Agricultural Research (CNRA), Regional Directorate of Korhogo, BP 856 Korhogo, Côte d'Ivoire.*

World Journal of Advanced Research and Reviews, 2025, 27(03), 1739-1746

Publication history: Received on 19 August 2025; revised on 25 September 2025; accepted on 27 September 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.27.3.3300

Abstract

This study aims to characterize mango producers and their farming systems in the Poro region, in the north of Côte d'Ivoire, in order to identify levers for sustainable and efficient management of the mango sector. The study was conducted among 300 producers, through semi-structured interviews, field observations and the analysis of agronomic and socio-economic data. The results reveal that the majority of producers are men aged 51 to 60 (48%), with a low presence of young people (4.8%), highlighting a generational renewal issue. The level of education is generally low (55% without school or primary level), limiting access to innovation. The majority (85%) own their land, ensuring some land stability. The farms have an average surface area of 8 ha, with a predominance of semi-intensive orchards (5 to 10 ha). The Kent, Keitt and Amélie varieties dominate the plantations (70%), with Kent being the most cultivated (45.5%). The mango tree occupies 77.6% of the area, reflecting a strong specialization. Cultivation practices remain traditional (68%), with intensive but poorly controlled use of pesticides (90%). In addition, 60% of producers benefit from technical supervision. Yields range from 2.66 to 12.38 t/ha, with an average of 6.75 t/ha. These results underline the need to strengthen training, the inclusion of young people and women, and technical support for a sustainable professionalization of the sector.

Keywords: Farmer; Côte d'Ivoire; Mango Tree; Yield; Farming System

1. Introduction

Agriculture is the essential pillar of the Ivorian economy, contributing to 23% of the gross domestic product (GDP), employing 43.5% of the working population and accounting for two-thirds of national exports [1]. Beyond its economic role, it plays a central social role in ensuring food security, rural job creation and poverty reduction. In this context, the mango sector has gradually established itself as a strategic cash crop, alongside cotton, cashew nuts and other speculations. Côte d'Ivoire is now the leading exporter of fresh mangoes in West Africa, with volumes ranging from 30,000 to 40,000 tonnes exported annually to the European Union [1] and [2]. The Ivorian mango, particularly the Kent variety, enjoys a good reputation on the international market thanks to its organoleptic quality, although its marketing is facing many structural challenges.

The Poro region, located in the north of the country, is one of the main production basins. Its pedoclimatic conditions, characterized by an average annual rainfall of between 1,200 and 1,400 mm and tropical ferruginous soils, favor the cultivation of the mango tree [4]. However, behind this economic and agronomic importance, production systems remain highly heterogeneous. These include producers with large, export-oriented commercial orchards and

* Corresponding author: KOFFI Konan Jean-Mathias

smallholders who integrate mango into diversified agricultural systems dominated by food crops and livestock. These differences in profiles directly influence production performance and marketing strategies [5].

Indeed, mango producers in Poro have varied socio-economic characteristics: the advanced age of many farmers, a low level of education, limited access to credit and inputs, and a still fragile collective organization. These constraints increase the sector's vulnerability to climatic hazards, phytosanitary attacks, particularly those of fruit flies (*Bactrocera dorsalis*) and increased competition on the markets [6] and [7]. In addition, there is a poor mastery of modern technical itineraries, resulting in yields often lower than the agronomic potential observed in the region [5].

The analysis of producer profiles therefore appears essential to understand the structuring of the sector in Poro. It makes it possible to distinguish farmers according to their resources, their objectives and their level of integration into the marketing channels. At the same time, the study of agricultural farming systems, which are often multi-active and combine food crops (maize, rice, yams), cash crops (cotton, cashew nuts) and livestock, offers an essential reading of the strategic choices of households. These systems influence not only the place of mangoes in farmers' incomes, but also cultivation practices, the availability of labour and the sustainability of orchards [8].

In a context of agricultural transition marked by demographic pressures, the degradation of natural resources and the globalization of markets, understanding the local dynamics of mango production in the Poro becomes crucial. This analysis aims not only to highlight the opportunities and constraints specific to the sector, but also to identify levers for action to improve its competitiveness. It thus constitutes a scientific and operational basis to guide public policies, strengthen technical support for producers and promote better integration of Ivorian mango into global value chains.

2. Materials and methods

2.1. Study area

The study was conducted in the Poro region, located in the north of Côte d'Ivoire, which is a strategic agricultural basin of the country. With Korhogo as its capital, this region is distinguished by the cultivation of cotton, cashew nuts and mangoes, the latter having become an increasingly structured and promising sector for local producers [8]. The dry tropical climate, ferruginous soils and land availability provide particularly favourable conditions for the establishment of orchards, especially mango trees. The population, which is mostly rural, practices diversified family farming, often integrated into mixed farming and livestock systems, which reflects a strong resilience in the face of climatic and economic hazards.

2.2. Data collection

The data used in this study were collected during the mango campaign, through field surveys conducted with producers in the Poro region, located in the department of Korhogo, in the north of Côte d'Ivoire. A total of 300 producers were interviewed, providing a representative sample of the diversity of profiles and farming systems in the area. The survey method adopted is based on semi-structured interviews, combining open-ended and closed-ended questions in order to promote both the accuracy of the answers and the richness of qualitative information. The questionnaire was structured in two main parts.

The first part aimed to characterize the socio-demographic profile of producers. It covered variables such as age, gender, level of education, as well as the mode of acquisition of plots (customary allocation, inheritance, purchase, rental, etc.). These elements provide a better understanding of individual trajectories and the social factors influencing access to land and engagement in the mango sector.

The second part focused on the technical and economic characteristics of agricultural holdings. It collected data on the area under cultivation, the varieties of mangoes planted, the crops associated with the mango tree (food or cash crops), the quantities produced, as well as the cultural practices adopted (orchard maintenance, fertilization, pest control, etc.).

3. Results

3.1. Socio-economic profile of producers

The results reveal that the majority of mango growers are between 51 and 60 years old, accounting for nearly 48% of the sample (Figure 1A). This age group corresponds to farmers in full activity, accumulating experience and stability in their agricultural practice. Producers over 60 years of age constitute 28.6% of the total, reflecting a significant presence

of elderly farmers, often bearers of traditional know-how. The under-50s, on the other hand, represent only 23.8%, with a very low proportion of young people under 40 (4.8%), which underlines the challenge of generational renewal in the sector.

The vast majority of producers are men (more than 90%), which confirms a strong male dominance in the mango sector (Figure 1B). The presence of women remains marginal, with only 10% of women producers listed. This low representation underscores the need to promote the inclusion of women in agricultural activities, including through training programs, access to land and support for rural entrepreneurship.

Analysis of the graph reveals that the majority of mango farmers have a low level of education, with 55% of them having a primary level or no school level (Figure 2C). This situation severely limits their access to technical information, agricultural training and innovations. Only 30% of producers have reached secondary level, while 15% have a higher level, giving them a better ability to adopt modern practices. This distribution highlights an urgent need to strengthen extension and technical support mechanisms, adapted to the educational realities of producers.

The majority of producers (85%) own their land directly, which gives them land tenure stability that is conducive to agricultural investment (Figure 2D). Producers with customary inheritance represent 15% of the sample. This method of access to land, although traditional, can sometimes limit the possibilities of securing land tenure or accessing credit. This distribution underlines the importance of strengthening land formalization mechanisms to sustainably support producers in the management of their farms.

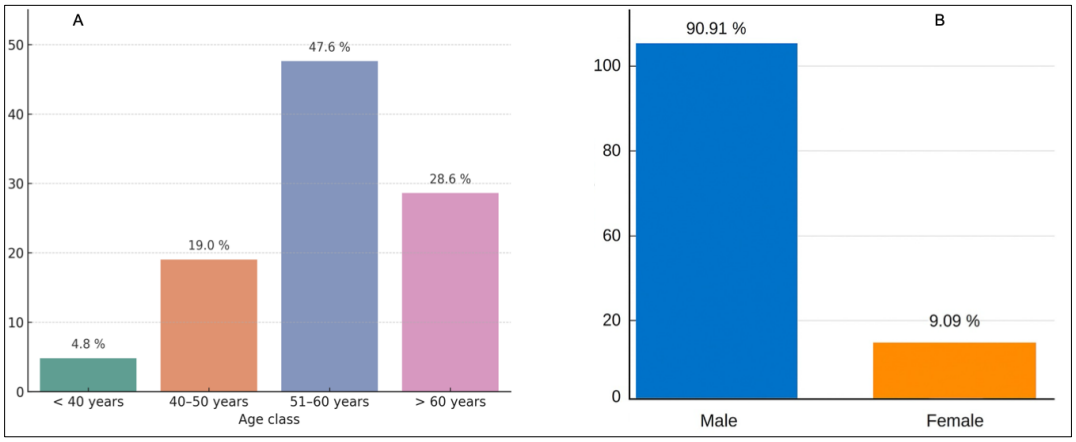

Figure 1 A Age class and B) Gender of mango producers

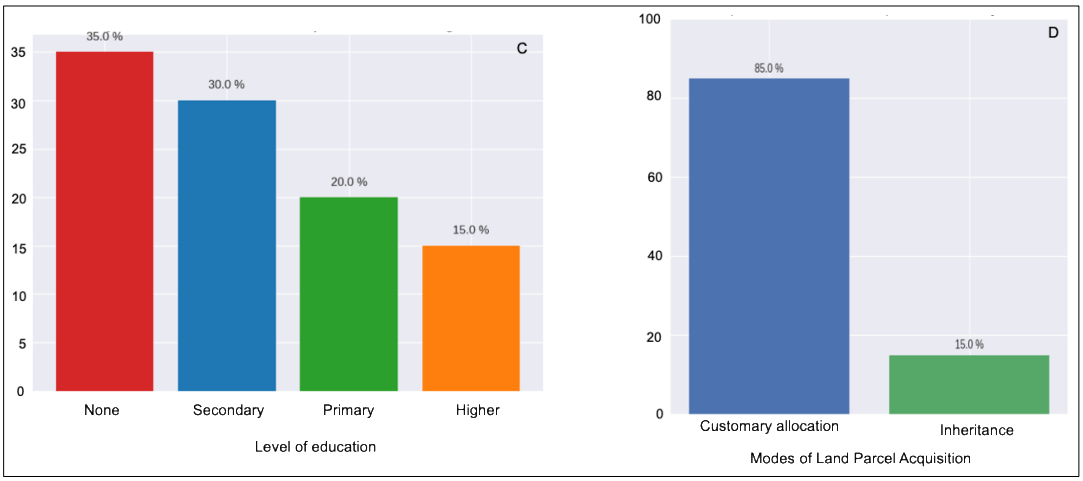

Figure 2 C Level of education and D) Modes of land parcel acquisition

3.2. Characteristics of agricultural holdings

Farms dedicated to mango cultivation in Côte d'Ivoire have a great diversity in terms of surface area, ranging from small plots of 1 to 5 hectares to orchards of more than 10 hectares. The average area observed is 8 hectares, reflecting a trend towards medium-sized farming systems. Analysis of the graph shows that the majority of orchards (46%) have an area of between 5 and 10 hectares, reflecting a predominance of semi-intensive, often family-owned, farms with the potential for commercial structuring (Figure 3). Small farms, less than 5 hectares, represent 34% of the sample. This significant proportion reflects the strong presence of producers with limited capacity, who often face constraints in accessing inputs, technical training and markets. In contrast, large farms, larger than 10 hectares, although less numerous (20%), account for a large share of the total cultivated area. These structures generally have greater resources and play a strategic role in the professionalization of the sector.

The most commonly grown varieties are Kent, Keitt and Amélie, which alone account for more than 70% of the citations recorded. Kent, in particular, clearly dominates with 45.5%, confirming its central role in the majority of orchards observed (Figure 4). It is generally favored for its high productivity, its recognized taste quality, as well as its good adaptation to local agroclimatic conditions. In addition to these main varieties, there is also the more occasional presence of mango trees of the Brooks, Zill, Palmer, Lippens and Valencia varieties. Although less frequent, these secondary varieties enrich the genetic diversity of the plantations. They can offer complementary agronomic advantages, such as a staggered harvest period, increased resistance to certain diseases, or specific organoleptic characteristics that respond to market niches.

The cultivation of the mango tree is usually associated with other crops such as cashew trees, maize and seasonal vegetables. However, agricultural production remains strongly dominated by mango (77.6%), which reflects a marked specialization of the production system (Figure 5). The cashew tree (17.6%) occupies a secondary place but represents a significant commercial alternative. The other crops (maize, groundnuts and various crops) account for only 4.8% of the area, thus revealing a limited diversification of the crop rotation.

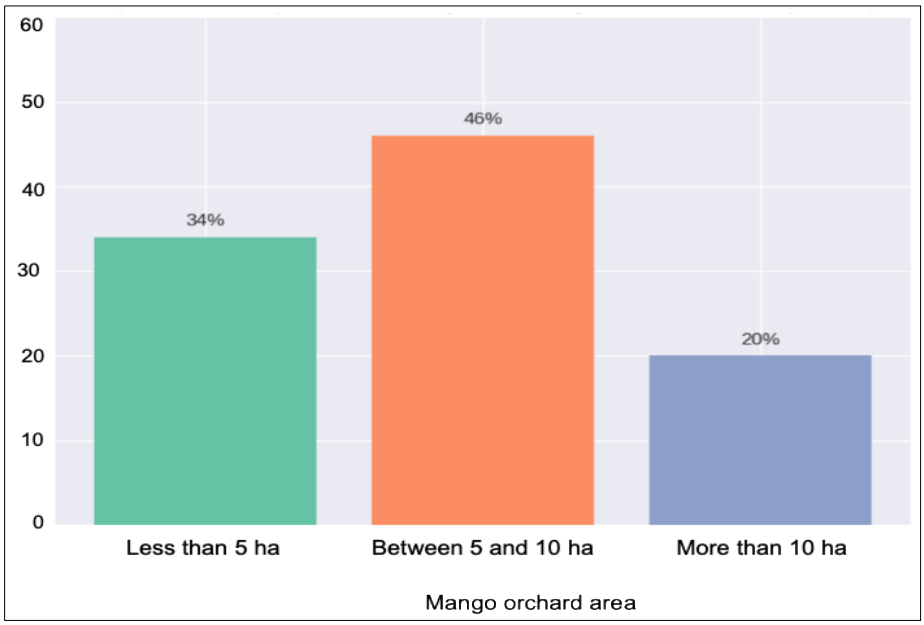

Figure 3 Distribution of mango orchard areas

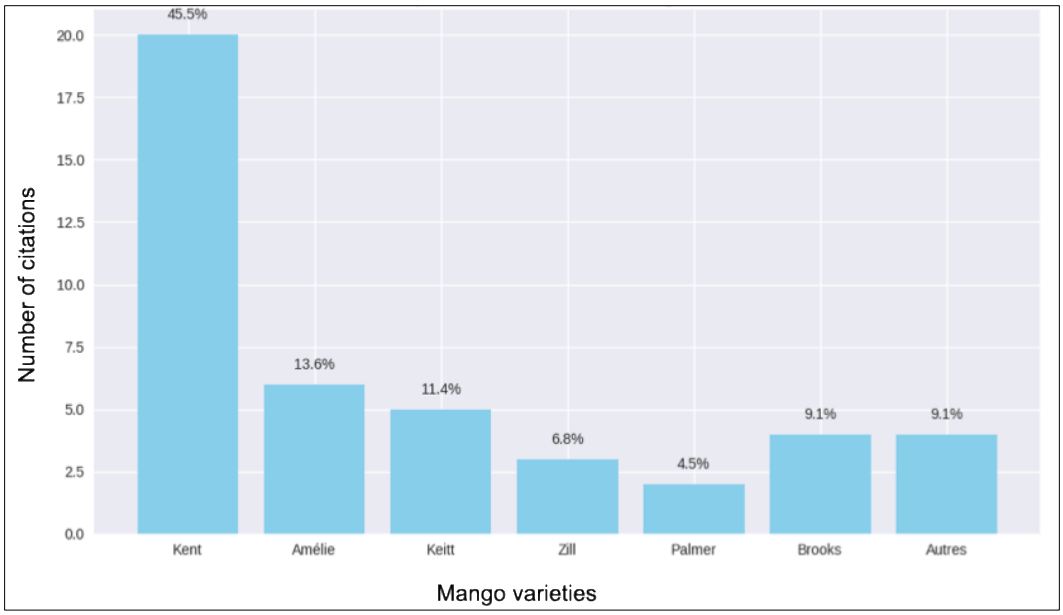

Figure 4 Cultivated mango varieties

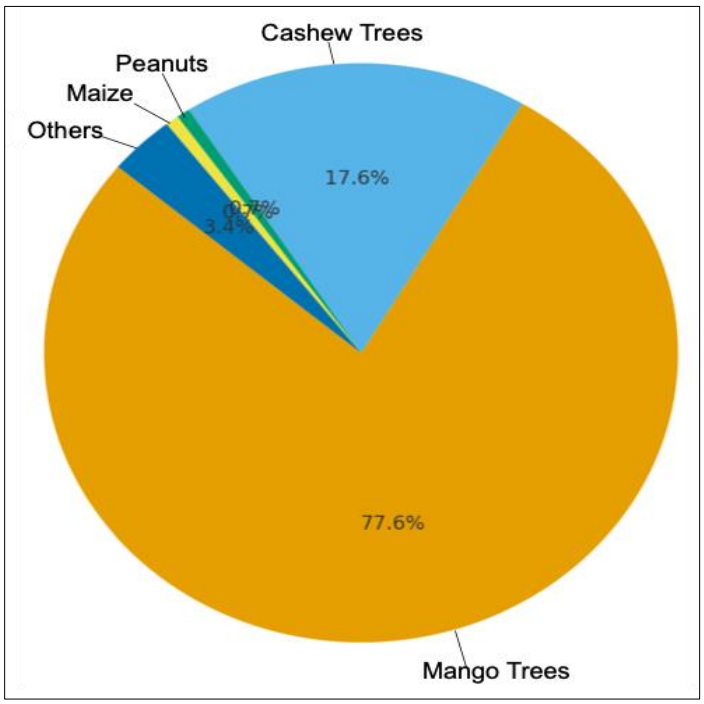

Figure 5 Distribution of areas by crop

3.3. Cultivation practices

The majority of producers (68%) use traditional practices, without the use of organic or mineral fertilizers. The use of pesticides is widespread (90%), mainly to control fruit flies, bacteriocins and anthracnose. However, this use is often poorly controlled: 54% of producers admit that they do not respect the recommended doses and 70% do not have any personal protective equipment, thus putting their health at risk. In addition, 60% of producers have access to formal technical support, contributing to the improvement of agricultural practices and the agroecological transition.

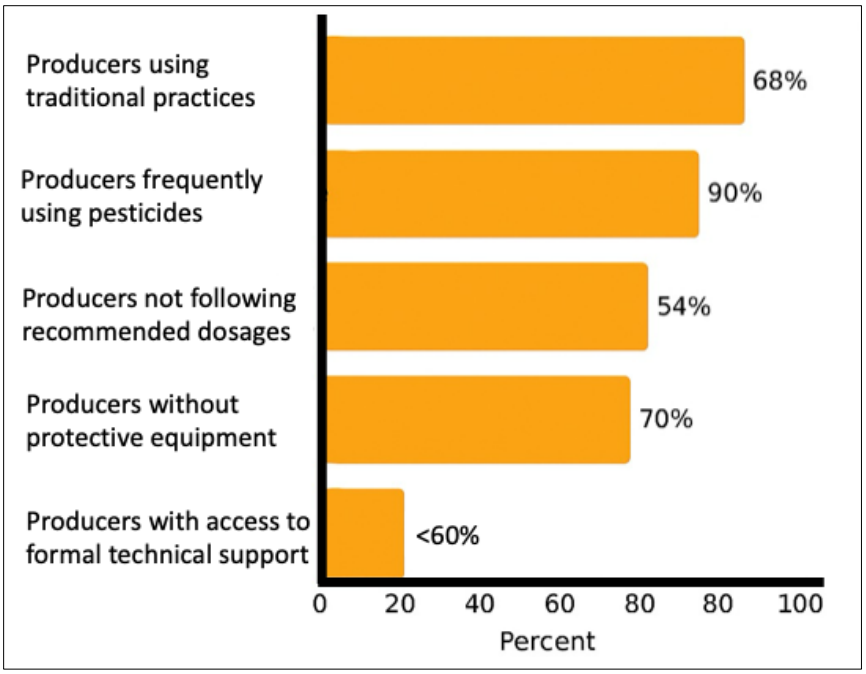

Figure 6 Growers' Farming Practices

3.4. Orchard Yield

The data collected in 31 orchards show yields ranging from 2.66 to 12.38 t/ha, with an average of 6.75 t/ha and a median of 6.80 t/ha, reflecting an overall satisfactory performance. The standard deviation of 2.25 t/ha reveals a moderate dispersion around the mean, suggesting significant differences between farms. More than 70% of the orchards exceed 5 t/ha, which testifies to a generally good technical level. However, some orchards such as V2, V12 and V13, with yields below 3.5 t/ha, could face specific constraints such as low soil fertility, limited access to inputs or poorly optimised cultural practices.

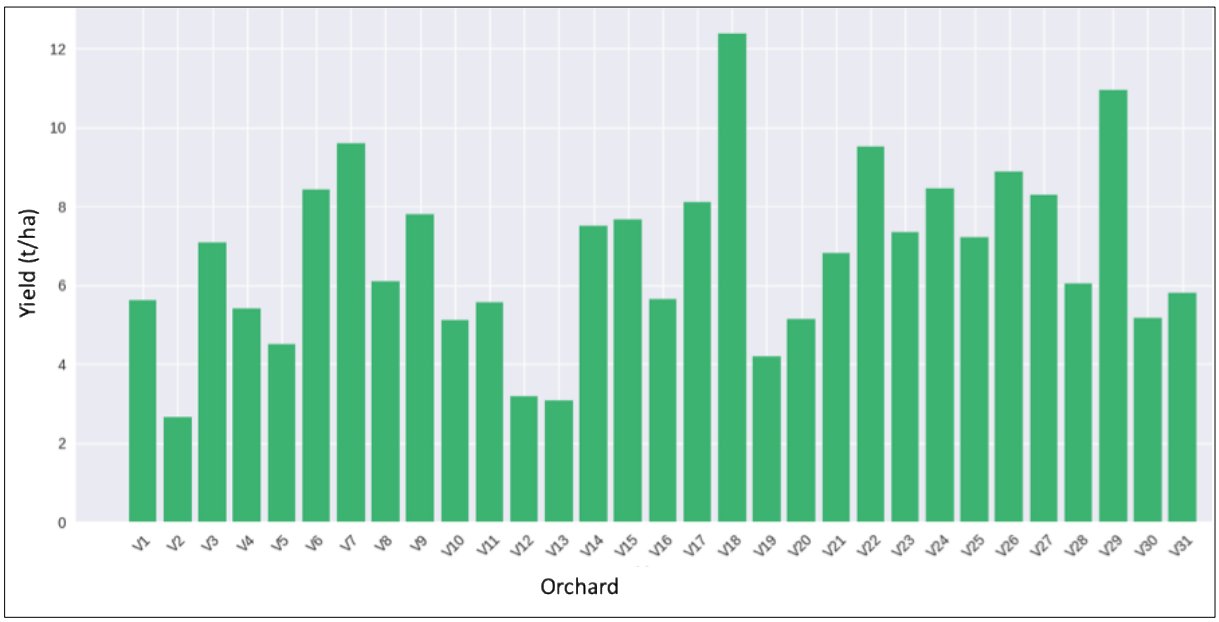

Figure 7 Mango orchard yield

4. Discussion

The socio-economic profiles observed in the Poro region, characterized by a predominance of older, male, poorly educated and mostly landowners, corroborate the data of the Cashew and Mango Sector Development Support Project (PADFA), which highlight a strong masculinization of the sector. Of the 3,988 mango producers identified in northern Côte d'Ivoire, only 26 are women, revealing a marked structural imbalance in access to orchards, productive resources and support mechanisms [9]. This marginalization is also highlighted by Diabaté [10], a specialist in gender and rural development, who calls for an inclusive transformation of agricultural policies. It insists on the urgency of integrating women and young people into the mechanisms of training, local governance and structuring of sectors, in order to guarantee territorial equity and social sustainability in agricultural dynamics.

The average area of 8 hectares observed in this study is consistent with the 17,732 hectares spread over 4,708 plots identified by PADFA, which confirms the predominance of semi-intensive systems in the Poro region. The dominance of Kent, Keitt and Amélie varieties (70%) is consistent with data from Rey [11], which identifies these cultivars as the most adapted to the requirements of the European market and local agroclimatic conditions. This configuration, characterised by varietal specialisation and a progressive organisation of the orchards, is a strategic asset for exports. Djedji [12] points out that the Kent and Keitt varieties, mostly grown in these systems, meet the requirements of the European market in terms of size, quality and traceability, thus strengthening the commercial potential of the Ivorian mango sector internationally.

The traditional practices observed by 68% of Poro producers reflect the predominance of extensive systems in the region. These orchards, often exploited with few inputs and limited mechanization, have low productivity but retain a certain agroecological resilience [11]. However, this resilience is weakened by the intensive but poorly controlled use of pesticides: 90% of producers use them, 54% of them without respecting the recommended doses. This observation is in line with the warnings of the West African Council for Agricultural Research, which identifies the fight against fruit flies as a major obstacle to exports to Europe [13]. Beyond the commercial issues, the health risks are worrying. N'Guessan [14] highlights the frequent absence of personal protective equipment and the non-compliance with protocols, exposing producers, consumers and ecosystems to multiple dangers. However, solutions exist: the technical manual of the Europe-Africa-Caribbean-Pacific Liaison Committee (COLEACP) recommends integrated strategies for fruit fly control, including trapping, product rotation and residue monitoring [15]. Despite their relevance, these protocols remain poorly applied in the field, due to a lack of training, limited access to equipment and insufficient supervision of small producers.

The average yields of 6.75 t/ha observed in the Poro exceed those of the traditional systems of Mali and Burkina Faso, where performance is between 4 and 5 t/ha [11]. This differential testifies to a real technical potential, provided that fertilization, crop diversification and post-harvest practices are strengthened. Domestically, Côte d'Ivoire produced around 180,000 tonnes of mangoes in 2024 [12], of which 32,000 tonnes were exported to Europe. Local processing of mangoes remains marginal, revealing a low post-harvest value that slows down the economic benefits for producers, especially rural women engaged in artisanal processing. This structural deficit limits the creation of added value and the territorial anchoring of the sector. In response, the government is working to strengthen processing infrastructure, in line with the recommendations of the PADFA [9]. This initiative opens up promising prospects for an inclusive move upmarket, promoting the integration of women, the diversification of opportunities and the development of a more resilient rural economy.

5. Conclusion

The study conducted in the Poro region reveals a dynamic mango sector but facing major structural challenges. The majority of producers are between the ages of 51 and 60, representing 48% of the sample, while young people under 40 make up only 4.8%, posing a real challenge for generational succession. The sector remains strongly male-dominated, with only 10% of women producers. The level of education is low for 55% of producers, limiting access to technical innovations. In terms of land, 85% are owners, which encourages agricultural investment. The farms have an average surface area of 8 hectares, with a marked specialization: the mango tree occupies 77.6% of the cultivated land. Yields, ranging from 2.66 to 12.38 tons per hectare, average 6.75 tones, but with significant variability. Cultivation practices remain traditional for 68% of producers, and 90% use pesticides, more than half of them without respecting the doses. In addition, 70% do not have any protective equipment, and less than 60% benefit from technical supervision. These results underline the urgency of setting up appropriate training systems, promoting the inclusion of women and young people, and strengthening territorial structuring to ensure a transition to a more sustainable, equitable and efficient mango sector.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] MENINADERPV: Ministry of State, Ministry of Agriculture, Rural Development and Food Production. A word from the Minister. Government of Côte d'Ivoire. 2023, https://web.agriculture.gouv.ci/mot-du-ministre

[2] Mieu B. Côte d'Ivoire: the government wants to restructure the mango sector. 2017, www.Jeuneafrique.com. 12 p

[3] Fruitrop. The European mango market: trends and prospects. 2021, https://www.fruitrop.com

[4] Djaha AJB, N'da HA, Koffi KE, Adopo AA, Ake S. Morphological diversity of cashew tree accessions (*Anacardium occidentale* L.) introduced in Côte d'Ivoire. Revist Ivoire Sciences Technological, 2014; 23: 244-258

[5] Koffi JMK, Sarron J, Soro D, Normand F, Kouakou CK, Fondio L, Djidji H, Faye E. Variability of mango tree production ('Kent') in northern Côte d'Ivoire. Acta Horticulturae, 2023; 1366, 71-78. https://doi.org/10.17660/ActaHortic.2023.1366.10

[6] Minhibo YM, Akpesse AAM, Diby YKS, Koua KH. Effectiveness of prophylactic methods in fruit fly management in northern Côte d'Ivoire. European Journal of Biotechnology and Bioscience, (2019); 7 (3): 84-87

[7] Coulibaly A. Integrated pest management methods include the use of *Oecophylla longinoda* (Hymenoptera: Formicidae), neem oil (Azadirachtin) and Success bait (Spinosad) in the control of mango fruit flies in northern Côte d'Ivoire. Doctoral Thesis, UFR Agroforestry, Jean Lorougnon Guédé University (Daloa, Côte d'Ivoire), 2021; 193 p

[8] Sanoko FK, Adiko YYO, Coulibaly FL, Koffi KJ-M, Fondio L, Djaha AJB, Malezieux E. Characterization of cashew producers and farms in Lataha (Poro region) in Côte d'Ivoire. African Agronomy, 2024; 36 (2): 181-195.

[9] Messou E. Georeferenced inventory of mango orchards in Côte d'Ivoire. Cashew and Mango Sector Development Support Project (PADFA). 2024; 52 p. https://padfaci.org/wp-content/uploads/2024/10/Document-PADFA_IVGM-4.pdf

[10] Diabaté A. Gender and agricultural governance in Côte d'Ivoire: challenges and perspectives. 2024; https://www.vivafrik.com

[11] Rey J-Y, Diallo TM, Vannière H, Didier C, Keita S, Sangaré M. Mango in French-speaking West Africa: varieties and varietal composition of orchards. Fruits, 2004; 59 (3): 191-208

[12] Djedji S. Analysis of the commercial potential of the Ivorian mango. Akwaba International Trading. 2024; https://www.akwabanegoce.ci

[13] Sidibe A. Phytosanitary framework and the challenges of exporting West African mangoes. West and Central African Council for Agricultural Research and Development (CORAF). 2023; https://www.coraf.org

[14] N'Guessan K. Phytosanitary risks and agricultural practices in the mango sector. National Center for Agronomic Research (CNRA). 2023; https://www.cnra.ci

[15] Hory J-F. Manual of sanitary and phytosanitary requirements for the mango sector in West Africa. COLEACP. 2021; https://www.allianceforproductquality.de/wp-content/uploads/Manuel-MANGUE-CIV_25_10_21.pdf