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CONSTRAINTS RELATED TO SESAME CULTIVATION IN THE SUDANIAN ZONE OF BURKINA FASO: THE CASE OF THE MANGODARA AREA

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Abstract: In the search for diversification of income sources, producers have adopted sweet potato cultivation in their crop rotation, especially in irrigated plains. Despite the growing interest of producers in this crop, few results exist on the production systems as practiced by the producers with a view to sustaining the activity. Sesame production is an activity mainly carried out by people aged 15 to 45 in the Mangodara area with the aim of improving their living conditions. The crop generally grows better in sandy soils than in clay-sandy soils. The farmers' enthusiasm for this activity may indicate that it provides significant income. However, this crop faces challenges. The aim of this study is to analyze the constraints related to sesame cultivation in the Sudanian zone of Burkina Faso. To conduct this study, a semi-structured survey was carried out over 12 months with 75 producers. Data analysis showed that the lack of financial resources, fertilizers, pesticides, storage, and fluctuations in selling prices are the main constraints related to sesame production. The survey results indicate that 2% of producers apply fertilizers to sesame, compared to 98% who do not apply any fertilizer to their sesame fields. 10% of producers apply herbicide treatments in the fields to combat weeds, compared to 90% of producers who report not applying any treatment. This indicates that many challenges need to be addressed to overcome these various difficulties. This level of adaptation could be improved through technical training, access to quality seeds, and access to credit. The present study made it possible to understand the adaptation strategies developed by sesame producers. Further studies are needed to determine the impact of cultivation on soil properties and to consider options for ensuring its sustainability.

Keywords: Agricultural constraints; producer surveys; sesame cultivation; soil fertility.

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INTRODUCTION

Burkina Faso is a landlocked country in the heart of West Africa, more than 1,000 km from the sea. Agriculture is the main source of income and employment for over 86% of the working population and contributes 46% to the country's Gross Domestic Product (GDP) (MAHRH, 2010). Land, pastoral resources, forest, wildlife, and fishery resources are the main natural resources on which Burkina Faso largely bases its economic and social development (MARHRH, 2010). Indeed, Burkinabe agriculture is subsistence agriculture, practiced mainly on small family farms. It is characterized by insufficient agricultural equipment and low input capacity, which makes it vulnerable to climatic hazards. Primarily rain-fed, agriculture is extensive and marked by low productivity. Physical, technical, and socioeconomic constraints limit the performance of crop production (Vognan, 2012). One of the major constraints of production and marketing is the

low level of input acquisition. Today, sustainable economic and social development relies on the revitalization of the primary sector. The production of agricultural products, recognized as an important link in the promotion of agricultural value chains, can be either manual or mechanized. Long neglected, sesame is cultivated throughout the national territory, from dry areas to humid ones, excluding flood-prone soils. Its production, estimated at 25,060 tons in 2005, rose to over 136,000 tons in 2013 (Rongead, 2013a). In the past, sesame production, which was mainly intended for self-consumption, is now the subject of significant trade at the local, national, and international levels. However, sesame production is a driver of development, the creation of added value, and employment (Campagne et al., 1989). The third agricultural export product in Burkina Faso after cotton and shea respectively in 2022 (INSD, 2023), sesame is now a source of income for producers. It is a sector that could improve the living conditions of producers in particular and would contribute to the fight against poverty in general. In such a context, it is important to ask what difficulties are encountered in sesame cultivation. Therefore, we wonder about the strategy developed by producers to cope with the constraints related to sesame farming, hence the relevance of our study. The objective of this study is to improve sesame productivity in the Mangodara area in the southern Sudanese region of Burkina Faso.

EXPERIMENTAL

The municipality of Mangodara is located in the southern part of Burkina Faso, on the border with the Republic of Côte d'Ivoire. More specifically, it is situated at the extreme south of Comoé Province, in the Cascades region. It is 99 km away from Banfora (Comoé Province). The municipality of Mangodara has a Sudanian type climate, characterized by the alternation of two seasons: a short dry season and a rainy season. The main types of soils are poorly developed lithic erosion soils, lithosols on ferruginous crust, and hydromorphic soils. The most common plant species are: *Vitellaria paradoxa, Detarium microcarpum, Daniellia oliveri, Prosopis africana, Terminalia laxiflora, Combretum crotonoides, Khaya senegalensis, Parkia Biglobosa, Isoberlinia doka, Pterocarpus erinaceus, Daniellia oliveri, Ceiba pantendra, Prosopis africana, Lannea microcarpa, Terminalia macroptera. Tamarindus indica, Diospyros mespiliformis. Andropogon ascinodis, Andropogon pseudapricus, Loudetia togoensis, Andropogon gayanus, Pennisetum pedicellatum.*

Méthods: For this study, a sample of 5 sites (Torokoro, Lingakoro, Logognegue, Gnaminadougou, Mangodara) at 15 producers each, for a total sample of 75 producers. The average age of the producers is between 15 and 45 years. Producers' perceptions of sesame production were gathered through surveys conducted in rural areas between April and October 2024.

Selection of fields and experimental producers: Total 5 sites were chosen for their excellence in sesame production. The producers to be surveyed were selected in collaboration with the regional agricultural office agent. The selection of producers to be surveyed was done in collaboration with producer groups and agricultural agents. This choice took into account two (02) criteria: (i) being sesame producers, and (ii) being available for the survey. The selected producers are distributed across all the sites without any particular preference.

Analyses des données: The collected data were initially processed manually, entered into Excel software, and statistical analyses were performed using SPSS 12 Fr.

RESULTS AND DISCUSSION

Average age of Producer

The results of the survey in Table 1 show that 66% of producers are between 15 and 45 years old. In addition, 34% of producers are over 45 years old. The majority of producer in the older age group are active members of households.

Table 1. Average Age of Producer

Average age (years)	15 à 45	45>0
Frequency of Producer	66%	34%

Education level of Producer

For the education levels (Figure 1), 50% of respondents are uneducated, 28% attended a

Quranic school, 2% are literate, 12% have primary education, and 8% have completed secondary education. These education frequencies indicate an average level of schooling.

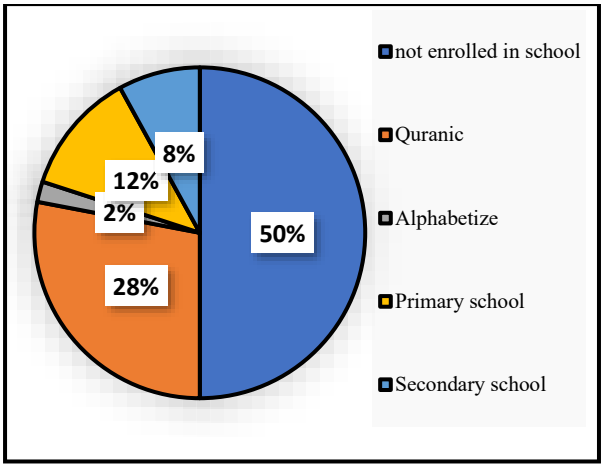


Figure 1. Education level of Producer

Average number of producer per group

Table 2 indicates that the average number of members per producer group is 24, regardless of the sesame production site.

Table 2. Average Number of Members per Group

Producers' association	Average number of members per group
Benkadi	24
Rahama	
Pegwende	
Balimaya	
Basnèré	

Activities carried out by Producer

The statistical analysis of the activities carried out by the producer shows in Table 3 that 100% of respondents engage in rainfed agriculture as their main activity. As for secondary activities, 56% of respondents engage in trade and 46% practice livestock farming to occupy themselves during the rest of the time in the wet and dry seasons.

Table 3. Activities carried out by the Producer

Activities	Main (%)	Secondary (%)
Rainfed agriculture	100	-
Market gardening irrigation	-	-
Commerce	-	56%
Breeding	-	46%
Others	-	2%

Fertilization and Plant Protection Treatment

The survey results indicate that 2% of producers apply fertilizers to sesame, compared to 98% who do not apply any fertilizer to their sesame fields (Figure 2). Highly significant differences are observed between fertilized and non-fertilized fields. The results show that only 4% of producers carry out plant protection treatments in the fields to combat harmful insects, while 96% of producers report not applying any plant protection treatment (Figure 3a). The same observation is made with weeds. 10% of producers apply herbicide treatments in the fields to combat weeds, compared to 90% of producers who report not applying any treatment (Figure 3b). According to the producers, damage caused by weeds in the fields is a real production problem. In general, it appears that sesame does not receive particular attention from producers regarding its cultivation.

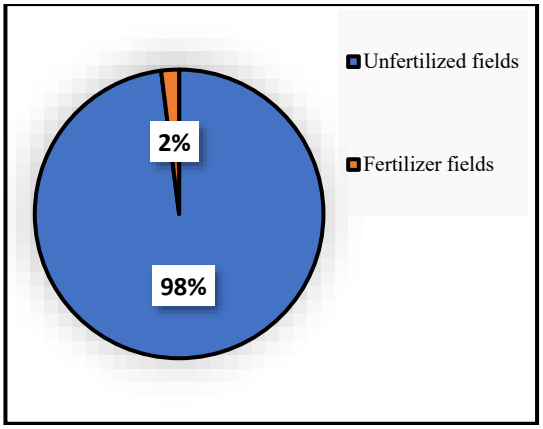
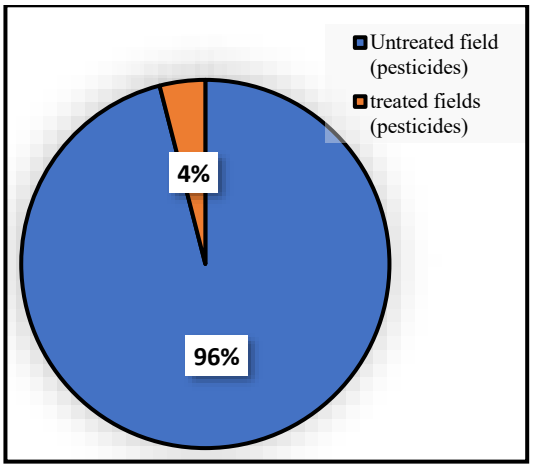
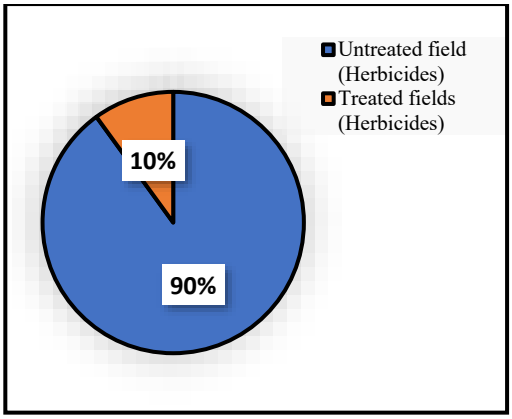


Figure 2. Fertilization of sesame fields



3a) Pesticide treatment



3b) Herbicide treatment

Figures 3: Survey Results on a) pesticide treatment et b) herbicide treatment of sesame fields

Constraints related to the acquisition of inputs and sesame management

The survey results show that 100% of respondents face a lack of financial resources to acquire inputs (Table 4). It should be noted that there is a lack of support for producers regarding the technical practices of sesame cultivation. Labor remains a concern in sesame farming for more than 92% of producers. The majority (94%) of producers face a lack of storage facilities for harvested sesame products. The lack of appropriate bags (triple-layer bags) is also an issue for packaging sesame harvest products. Analysis of the results shows that 100% of the surveyed producers experience price fluctuations for sesame and difficulty selling it in the village market.

Table 4. Activities carried out by the Producer

Activities	Stress Frequency (%)
Acquisition of inputs	100
Harvest/labor	92
Sesame storage	94
Sesame sale	100

Suggestions and Proposed solutions

The survey results indicate in table 5 that 2% of producers offer a farm-gate purchase price of sesame at 500 FCFA per kg, compared to 98% of producers who offer 1000 FCFA per kg. In addition, the producers made suggestions on strengthening the training of producers, particularly on the technical itineraries for sesame cultivation. The creation of a favorable framework for collaboration among stakeholders to establish a supply chain will contribute to good organization. Create a supportive financing framework tailored to producers by gaining the trust of financial institutions. Assist producers by granting credits to ensure the supply of inputs. Strengthen producers' technical capacity through appropriate training and access to modern equipment and suitable infrastructure. Provide producers with improved varieties that have high yields and high nutritional value.

Table 5. Proposed farm-gate purchase price of Sesame

Producters (%)	Quantity (kg)	Selling price (FCFA)
2	1	500
98	1	1000

DISCUSSION

Survey results reveal a large young population in these areas. According to producers, the high number of young people involved with this crop can be explained by the interest in sesame cultivation and the level of education. This situation could also be explained by the fact that sesame cultivation as a cash crop is relatively recent in Burkina Faso and has only developed over the past decade. The involvement of producers mainly comes from promotional activities carried out by supporters of the crop. These results are consistent with those of Sanogo (2008). Indeed, producers have focused their actions on the financial and ecological benefits that the plant could bring. The non-use of chemical fertilizers and plant protection products for sesame fields is explained by their high cost for generally low-income farms. These results are consistent with those of Kafando (2015). Producers explain their non-use of chemical fertilizers not only by their high cost but also by the fact that this plant does not seem to need fertilizers to grow. Failure to adhere to fertilization doses has a negative effect on sesame producers' yields (Zoma, 2024). This situation undoubtedly contributes to the low yields obtained by them, according to interviews with key stakeholders. As explained by Zoungrana et al. (2022). The reduced use of fertilizers affects environmental sustainability with a decrease in soil degradation but potential yield losses that could lead to land expansion and deforestation. The results of Zoma's (2024)

work showed that stone ridges, composting, zaï, grass strips, reforestation, assisted natural regeneration, and the treatment of certain gullies help protect and maintain soil fertility, retain moisture for longer, and others help restore it.The main constraints to sesame production are : the insufficient availability of seeds of the varieties demanded in the village market, which limits the potential production capacity.

The unavailability of quality organic and mineral fertilizers: The use of organic and mineral fertilizers to improve the entire fertilization chain is a common need expressed by all categories of producers. Mineral fertilizers, as well as insecticides and pesticides for conventional sesame, are available from private vendors, but the production of quality organic fertilizer faces challenges. These results are in line with those of Zoma (2024), who showed that conventional agriculture, characterized by heavy use of pesticides and chemical fertilizers, leads to numerous harmful effects on health. Addressing this issue could be the focus of a sub-project within the sector, which would extend to all production systems involving family units, promoting the integration of Agriculture/Livestock.The study indicates an insufficiency or even a lack of technical support for sesame cultivation. Sesame is primarily a secondary crop despite its economic importance (SP/CPSA, 2013). How can farmers be expected to achieve good production without mastering the cultivation system? The absence of support for producers regarding the technical practices of sesame cultivation could be explained by a disengagement of the State from the agricultural sector. This lack of mastery of the technical production practices results in low yields (300 to 450 kg/ha) compared to the potential of the varieties (750 kg/ha) according to INERA (2004). The results of Zoma's work (2024) reveal that in 2021, the average yield of conventional sesame was 970 kg/ha. In addition to the lack of mastery of the cultivation system, it is important to note the frequent use of low-performing post-harvest techniques (e.g., threshing and winnowing directly on the ground, uncontrolled storage, inappropriate packaging and transport methods). Improper handling conditions could be a source of germs and the development of pathogens (e.g., salmonella, aflatoxin…) which could compromise the quality of the sesame that will be marketed. Weed control presents a problem as long as there is not enough labor capacity to manually weed by uprooting, hoeing, or cutting with a machete. However, two factors lead to situations where grass cover is no longer controlled: the increase in cultivated areas and the lengthening of the age of plots with the abandonment of cleaning fallows. Weeding is all the more arduous because it is carried out late on very dense weed populations. The increase in production and the reduction in labor difficulty are linked to the limitation of early grass cover. Controlling grass cover is an element of the technical approach, managed by the farmer according to their production objectives. It is necessary to develop the concept of weed management in the cropping system by diversifying control methods, for example, through the use of mechanical hoeing, the application of herbicides at different stages of the crop cycle, or the introduction of cover crops into the rotation. For pest management, many combinations of integrated protection methods are possible : manually destroying certain pest stages or some alternative hosts, intervening with specific chemical means that are low in toxicity and have minimal side effects when economic thresholds are exceeded. In the simplest cases, this integrated protection combines agricultural practices with a rational use of pesticides, not forgetting varietal resistance when it exists. It is important to always consider the compatibility of the methods you want to combine on the same plot. Despite good storage aptitude, post-harvest losses can be very significant. They are mainly due to external factors (insects, molds). These results corroborate those of the International Trade Centre (ITC, 2011). With the application of a minimum of preventive measures from harvest (quick drying and insect prevention) and during storage (insecticide protection), their storage suitability is adequate as it allows seeds to be kept until the next year's harvest. As for the difficulties related to the marketing of sesame, the insufficient market quality of sesame at the producer level: Currently, extension efforts and the conditions of

the specifications pay particular attention to the drastic reduction of the impurity rate from 20 to 1% (FAO, 2012 and Rongead, 2013b).

CONCLUSION

The study highlighted the constraints related to sesame cultivation in the Mangodara area. Indeed, the study showed that the main characteristic of the difficulties encountered in sesame farming lies in the lack of financial resources and the lack of knowledge of cultivation systems. Thus, there is the problem of acquiring inputs, the insufficiency or even absence of improved seed varieties and synthetic plant protection products. In terms of equipment, the lack of necessary tools for carrying out this activity is also evident (plow, sprayer, cart). Regarding soil fertility, the lack of organic manure and mineral fertilizers can be said to contribute to reduced yields. As for storage and sales, the unavailability of adequate storage facilities and the sale of the product at often unsatisfactory prices. In light of these constraints, the following suggestions are made for producers, groups, the State, and agricultural research.

- Focus on training production actors in the area of technical procedures;
- Ensure compliance with good farming practices ;
- Create a favorable framework for collaboration with stakeholders in other parts of the sector in order to better organize and cooperate;
- Strengthen the technical capacity of producers and support with modern equipment and storage infrastructure.
- Support producers with the granting of credits to ensure the supply of inputs.
- Develop high-yield sesame varieties to ensure its availability to producers.

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